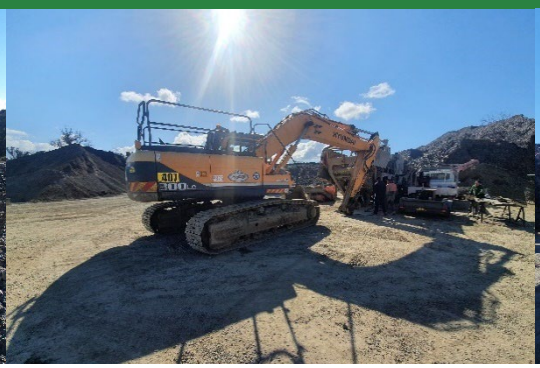
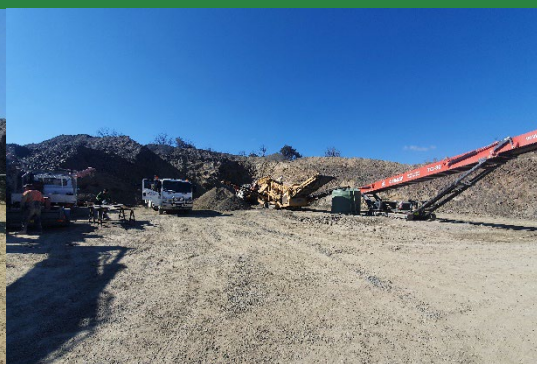
Environmental Impact Statement

Williams Quarry, Arding

Quality solutions. Sustainable future.

GeoLINK
environment | engineering | planning | design

GeoLINK Consulting Pty Ltd

PO Box 119
Lennox Head NSW 2478
T 02 6687 7666

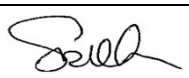
PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

PO Box 1267
Armidale NSW 2350
T 02 6772 0454

info@geolink.net.au

Prepared for: Ducats Earthmoving Pty Ltd

Certification

	Name	Signature	Date
Prepared by	Michelle Campione-van Zetten Environmental Planner		10/03/2025
Reviewed by	Simon Williams Principal Environmental Planner		10/03/2025

UPR	Description	Issued By	Date Issued
4079-1007	First issue - draft	Simon Williams	05/07/2023
4079-1029	Final issue	Simon Williams	12/03/2025

Table of Contents

Illustrations

Tables

Plates

Figures

Appendices

Statement of Validity

Submission of Environmental Assessment (Environmental Impact Statement)

Prepared under Part 4 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*

Environmental Impact Statement Prepared by:		**Reviewed by:**
Name	Michelle Campione-van Zetten	Simon Williams
Qualifications	MURP	BEnvP, MEnvLaw, CEnvP,
Title	Environmental Planner	Principal Environmental Planner
Address	GeoLINK PO Box 1267 ARMIDALE NSW 2350	

In respect of

Applicant and Land Details

Proponent	Ducats Earthmoving Pty Ltd
Subject Site	107 Rose Hill Road, Arding NSW 2358.

Land to be Developed

Lot and DP	Lot 1 DP 1302364
Project Summary	Expansion and increased extraction of up to 150,000m^3 of material per annum at the existing gravel quarry site (Williams Quarry).

Environmental Assessment

Environmental Impact Statement (EIS) pursuant to Part 4 of the EP&A Act

Declaration

I certify that I have prepared the contents of the EIS in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* and Regulation and that, to the best of my knowledge, the information contained in this report is not false or misleading.

Signature 

Name SIMON WILLIAMS

Date 10 March 2025

Executive Summary

The Project

The project involves the expansion of the existing gravel quarry (Williams Quarry) at 107 Rose Hill Road, Arding NSW.

The project will comprise:

- A maximum extraction of up to 150,000 m^3 of material per annum.
- Operating period until use of the quarry is no longer required or material had been exhausted.
- Removal of existing (deceased) trees to accommodate expansion of quarry to the east and south.
- Haulage to be undertaken by truck and dog with average 32 tonne payload.
- Haulage times to be between 7 am and 5 pm Monday to Friday and 7 am to 1 pm Saturday.
- Maximum of 302 haulage days available per annum.

This EIS has been prepared for Ducats Earthmoving Pty Ltd and describes the project in detail, assesses all potential impacts of the project and how the works relate to the local, State and Commonwealth statutory environmental assessment framework.

The Site

Williams Quarry is located on the Northern Tablelands of NSW, approximately 10 km north of Uralla and 15 km south-west of Armidale. The land is legally described as Lot 1 DP1302364. The project is located within the land parcel of 107 Rose Hill Road, Arding NSW. This site is accessible from (and sits adjacent to the southern side of) Rose Hill Road.

Planning Approval Pathway

The project is for expansion of an existing gravel quarry ('extractive industry') and seeks use of the land to extract up to 150,000 m^3 of material per year. Extractive industries are permitted with development consent in the RU2 Rural Landscape zone under the *Uralla Local Environment Plan 2012*.

As the project is an extractive industry and would extract more than 30,000 m3 of material per year, the project is identified as Designated Development (under Section 26 of Schedule 3 of the Environmental Planning and Assessment Regulation 2021) and Regionally Significant Development (under Section 7, Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021*) to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979.* As such, the project will be assessed by Council and determined by the Northern Regional Planning Panel.

Conclusion

If approved, the project would deliver positive socio-economic benefits for the local economy and community. The potential environmental impacts posed by the project have been thoroughly examined through this EIS. Some minor impacts would occur locally. However, it is unlikely that any significant or long-term adverse impacts would eventuate. To help ensure that the extent of impacts is limited and that unavoidable impacts likely to occur are managed and minimised, mitigation measures have been developed and would be implemented and monitored.

The project is considered justifiable taking into account the potential environmental impacts and subsequent mitigation measures. The project supports local and regional development, is generally in accordance with ecologically sustainable development principles and is generally consistent with the objectives of the *Environmental Planning and Assessment Act 1979.* The project deserves favourable consideration by the Northern Regional Planning Panel.

1. Introduction

1.1 Project Overview

GeoLINK has been engaged by Ducats Earthmoving Pty Ltd to prepare an Environmental Impact Statement (EIS) to accompany a Development Application (DA) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for expansion of the existing gravel quarry (Williams Quarry). It is proposed to increase extraction up to 150,000m^3 of material per annum (the project).

Williams Quarry is located on the Northern Tablelands of NSW, approximately 10 km north of Uralla and 15 km south-west of Armidale. The land is legally described as Lot 1 DP1302364. The project is located within the land parcel of 107 Rose Hill Road, Arding NSW. This site is accessible from (and sits adjacent to the southern side of) Rose Hill Road.

The site locality is shown in **Illustration 1.1**.

The primary objective of the project is to extract and process more gravel material to supply to local markets. The project generally involves:

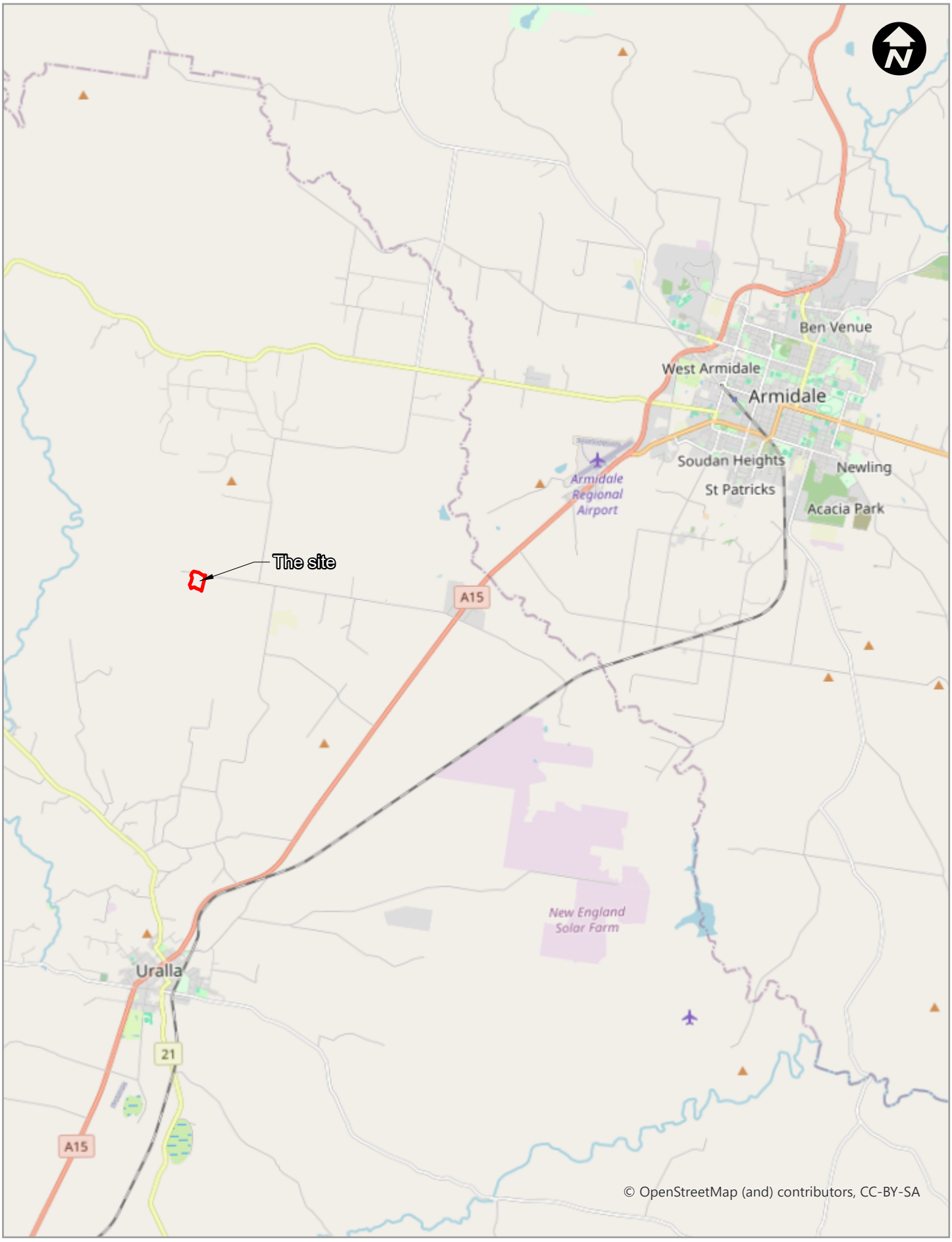
- A maximum extraction of up to 150,000 m^3 of material per annum.
- Operating period until use of the quarry is no longer required or material had been exhausted.
- Removal of existing (deceased) trees to accommodate expansion of quarry to the east and south.
- Haulage to be undertaken by truck and dog with average 32 tonne payload.
- Haulage times to be between 7am and 5pm Monday to Friday and 7am to 1pm Saturday.
- Maximum of 302 haulage days available per annum.

The project is deemed Designated Development under Part 4 of the EP&A Act as the project is identified as an extractive industry seeking extraction of more than 30,000 cubic metres of extractive material per year. As such, the preparation of an EIS is required.

1.2 Project Objectives

The project has been developed around the following objectives:

- Economically extract gravel and rock.
- Effectively collect and manage rainfall runoff from disturbed areas.
- Minimise the generation of dust.
- Minimise biodiversity impacts of the development.
- Ensure sound environmental management.



0 2.5 km

Site Locality - Illustration 1.1

GeoLINK environment | engineering | planning | design

Environmental Impact Statement - Williams Quarry, Arding
4079-1033

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: OpenStreet Map
Date: 14/02/2025
Revision: A

1.3 Project Need and Analysis of Alternatives

A substantial quantity of rock is required for a range of regional infrastructure projects and is anticipated to be sourced from local quarries. Williams Quarry provides a high quality and proximal option for the sourcing of gravel and rock for the region. Williams Quarry has an estimated capability to supply up to 1,135,000 tonnes of gravel and rock suitable for providing aggregates for concretes, asphalt and drainage blankets. The proximity of the quarry to the Ducats processing facility in Armidale ensures an efficient use of resources, reducing the need for materials to undergo significant transportation and subsequently limiting its carbon footprint.

The use of Williams Quarry significantly contributes to regional infrastructure projects' viability and supports triple bottom line outcomes. The use of Williams Quarry helps to improve the environmental and socio-economic outcomes of regional infrastructure projects through improved sustainability, local employment opportunities and a reduced economic cost of the project compared to sourcing rock material outside of the local government area (LGA).

The primary need for the use of Williams Quarry is to ensure the cost-effective and efficient delivery of various regional infrastructure projects and therefore, its approval and use are integral to the upgrade and associated benefits to the community and region.

1.4 Purpose of this EIS

This EIS assesses the potential environmental impacts of the project and has been prepared pursuant to the EP&A Act and Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) including the Secretary's Environmental Assessment Requirements (SEARs).

1.5 Secretary's Environmental Assessment Requirements

In accordance with Section 4.12(8) of the EP&A Act, the Secretary of the Department of Planning and Environment (DPE) issued the requirements for the preparation of the EIS on 21 June 2022. A copy of the SEARs is attached as **Appendix A**. However, due to an extended period of preparation of the EIS, the timeframe for the original SEARs lapsed and a new SEARs was applied for and issued on 25 November 2024. A copy of the new SEARs is attached as **Appendix B**. This EIS was updated to reflect the November 2024 SEARs; however, it should be noted that requirements addressed in this EIS as per the June 2022 SEARs were not removed. Unless specified, references to the SEARs are referring to the November 2024 SEARs.

The SEARs require that the EIS must be prepared in accordance with, and meet the minimum requirements of, Clauses 190, 192 and 193 of Part 8 Division 5 of the EP&A Regulation. The SEARs also include specific requirements that must be included in the EIS. **Table 1.1** provides a summary of the individual matters listed in the SEARs and identifies where these requirements are addressed in this EIS and the accompanying specialist studies (where relevant).

Table 1.1 Summary of and Location of SEARs in the EIS

SEARs	Location	
General Requirements	***Report***	***Appendix***
The EIS must meet the minimum requirements of Clauses 190, 192 and 193 of Part 8 Division 5 of the EP&A Regulation	This EIS	N/A
Executive summary	Executive Summary	N/A
A comprehensive description of the development	Section 3	N/A
A conclusion justifying why the development should be approved	Section 8	N/A
A signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading	Statement of validity	N/A
Key Issues	**Report**	**Appendix**
Noise	Section 6.1	Appendix D
Blasting & Vibration	Section 6.1	Appendix D
Air	Section 6.2	Appendix E
Water	Section 6.3	N/A
Biodiversity	Section 6.4	Appendix F
Heritage	Section 6.5	Appendix G
Traffic & Transport	Section 2.4.1, 6.6 and 4.1	Appendix H
Land Resources	Section 6.7	N/A
Waste	Section 6.8	N/A
Hazards	Section 6.9	N/A
Visual	Section 6.10	N/A
Social & Economic	Section 6.11	N/A
Rehabilitation	Section 6.12	N/A
Consultation	**Report**	**Appendix**
Details of the consultation carried out	Section 4	N/A

1.6 The Proponent and Project team

This EIS has been prepared for Ducats Earthmoving Pty Ltd (the Proponent) with the assistance of a comprehensive project team. The project team and their responsibilities are outlined in **Table 1.2**.

Table 1.2 Project Team and Responsibility

Name	Responsibility
Ducats Earthmoving Pty Ltd	Company owner and operator
GeoLINK Pty Ltd	Environmental Planners Environmental Scientists Soil Scientists Ecologists
Heritage Management & Planning Pty Ltd	Heritage specialists
Rodney Stevens Acoustics Pty Ltd	Noise, vibration and blasting specialists
Todoroski Air Sciences Pty Ltd	Air Quality specialists

The project is located on land owned by a local landholder. The landholder has provided consent for use of the land and the proponent has engaged in a lease arrangement for the life of the project.

2. The Site and Locality

2.1 Cadastral Description

The project site is described as Lot 1 DP1302364 and the project is located at the existing Williams Quarry. An aerial image of the lot is shown on **Illustration 2.1**.

2.2 Site Context

Williams Quarry is located on the Northern Tablelands of NSW, approximately 10 km north of Uralla and 15 km south-west of Armidale.

The site generally consists of cleared rural land with some sparse vegetation and is zoned as RU2 Rural Landscape under the *Uralla Local Environmental Plan 2012* (Uralla LEP). The existing quarry is located in the north-west part of the site, adjoining the southern side of Rose Hill Road. A stand of trees is located to the east of the existing quarry site, however these trees have died as a result of past droughts. Additional small pockets of trees stand south to the existing quarry internal road and centrally west to the project footprint.

Although Spring Creek flows to the south and west of the project site, there are no watercourses within the project footprint. The site is surrounded by privately owned land, with the closest sensitive receivers to the east of the site along Rose Hill Road. The site is also identified as bushfire prone land.

The development footprint and nearby receivers are shown on **Illustration 2.1**.

2.3 Site History

The site is the location of the existing Williams Quarry (refer to **Illustration 2.1**) and has been operating under an existing approval to extract less than 30,000 m3 of material per annum. The site was previously managed and operated by Uralla Shire Council (Council) until the proponent took over the operation.

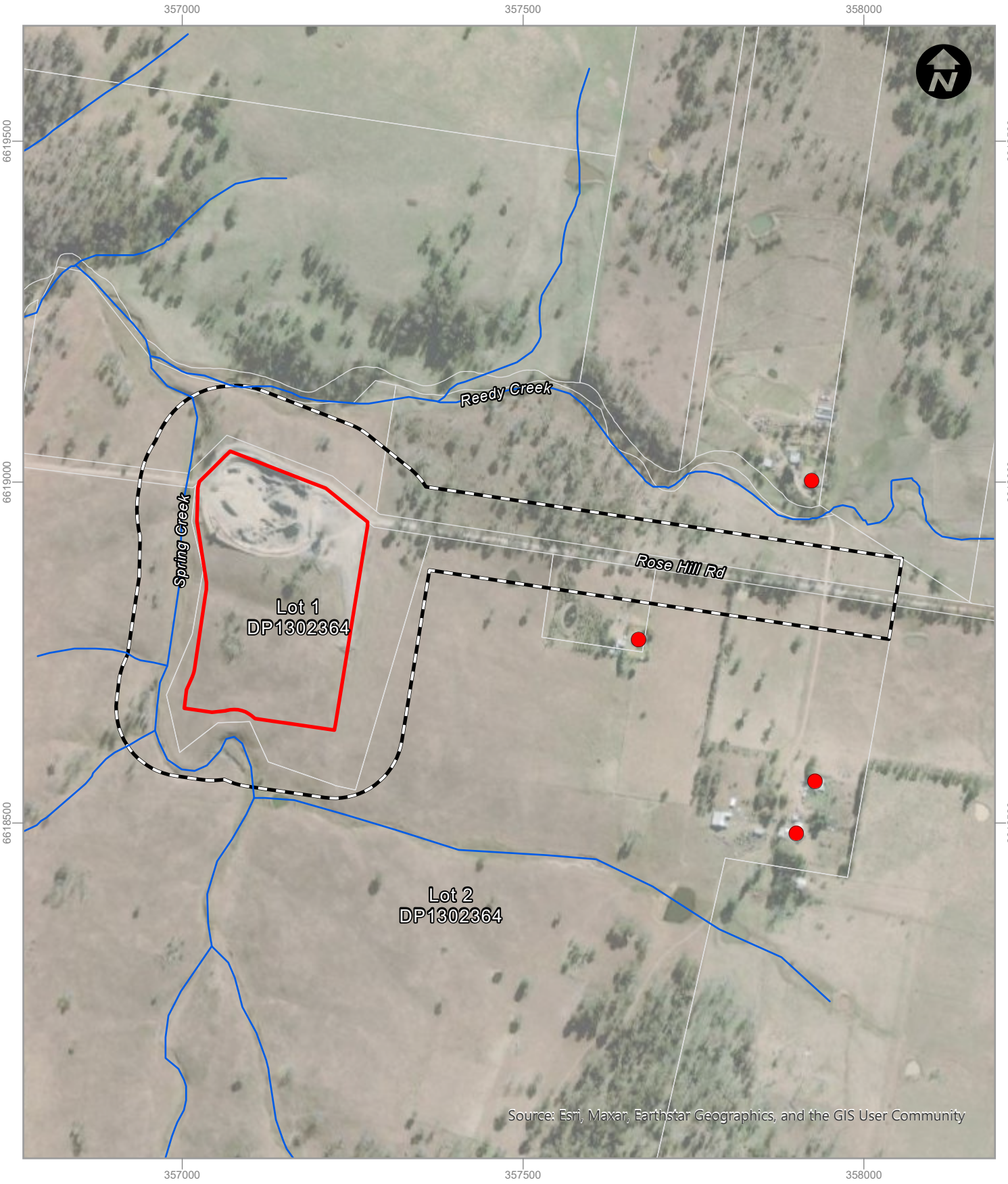
Lot 1 DP1302364 was formally a portion of Lot 4 DP1096564, which also included what is now Lot 2 DP1302364, but was recently subdivided in March 2024. This has resulted in the area identified for the William's Quarry expansion to be subdivided from the remaining land that would not have been included in the proposed footprint. Therefore, a notice of determination would only be applicable to the appropriate land and the remaining land of the original lot would not be subject to approvals or conditions. The adjacent lot has been used for grazing and can continue to do so.

2.4 Site Analysis

The existing quarry site is approximately 20,000 m^2. The project is seeking an expansion of the existing quarry area to include the area to the south and east of the existing site, with a total approximate area of 81,000 m^2.

The topography of the site is predominantly moderate and undulating land, comprising hills/ ridgelines and valleys/ gullies. The site has an elevation of approximately 1,000 m Australian Height Datum (AHD). The topography would allow for relatively straight forward extraction design and sequencing of extraction.

A view of the site is shown in **Plate 2.1** with a site analysis plan is shown as **Illustration 2.2**. This plan also shows the proposed quarry staging during operation which is further discussed in **Section 3.2**.



LEGEND

- Development footprint
- Investigation area
- Watercourse
- Sensitive receiver

0 150 Metres

The Site - Illustration 2.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
Date: 14/02/2025
Revision: A

Plate 2.1 View east of the existing Williams Quarry operations showing Rose Hill Road around the perimeter (to the right)

2.4.1 Road Network, Access and Parking

Rose Hill Road

Rose Hill Road is an unsealed rural road, typically 5 m wide with informal roadside grassed table drains (see **Plate 2.2**). There is no sign posted speed limit for this road in the vicinity of the site. This road currently only services a handful of residential properties.

The site access is essentially incorporated into the road formation of Rose Hill Road, which deviates around the northern edge of the existing quarry. A 'Trucks Entering' sign is located at the approach to the site approximately 100 m east on Rose Hill Road. Rose Hill Road provides access to just four rural properties apart from the existing quarry site. This indicates that existing traffic volumes are likely to be generally very low.

Arding Road

Arding road is a sealed rural road with a typical 7 m sealed width with 1 m unsealed shoulders (see **Plate 2.3**). Arding Road has no signposted speed limit in the vicinity of the site and it is expected that the default rural speed limit of 100 km/h would apply. Arding Road acts as a rural collector road, providing direct connection to a number of rural properties, while also connecting a number of smaller rural roads to the wider road network. There is a potential conflict of existing traffic movement and right-of-way at the intersection of Arding Road, Mount Butler Road and Rose Hill Road. No 'give way' signage or linemarking has been installed.

Arding Road connects with the New England Highway in a 'Give Way' controlled crossroads arrangement, with Saumarez War Service Road forming the opposite leg of the intersection and the New England Highway being the major through road. Sight distance both north and south along the New England Highway from Arding Road is good with no obstructions and good intersection geometry.

New England Highway

The New England Highway is a Transport for NSW (TfNSW) controlled state road (HW9) which provides connection across the broader New England Region, including between larger population centres in the surrounding region such as Tamworth, Uralla, Armidale and Glen Innes.

It has a typical through lane width of 3.6 m, with 2.5 m wide sealed shoulders and approximately 1 m unsealed shoulders, however, there are many areas where the carriageway is widened to provide for overtaking lanes, auxiliary and channelised turning lanes and enhanced dividing barrier lines (see **Plate 2.4**).

Plate 2.2 Rose Hill Road

Plate 2.3 Arding Road, at the intersection with Mt Butler Rd

Plate 2.4 New England Highway, view from Arding Road to the south

Parking

There are no current parking arrangements at the existing quarry. The existing access arrangements would remain unchanged.

2.4.2 Existing Infrastructure

There is no existing infrastructure on site.

2.4.3 Soil Landscape

The soil within the area proposed for expansion is classified as Invergowrie (9236in) soil landscape, while the existing quarry is classified as ‘disturbed terrain’ (9236xx) (DPIE 2020).

The landscape is ‘level to hummocky terrain extensively disturbed by human activity including complete disturbance, removal or burial of soil’. The surrounding area is characterised by narrow crests and rolling side slopes.

Soil qualities of the Invergowrie soil landscape include: hardsetting, acidic, sodic and dispersible, low general fertility, and highly erodible, and are at risk of both sheet and gully erosion. Limitations present at the site, in combination of the soil qualities and observations during site inspections, limit the ability for high impact land management uses such as cropping and restricts suitability to light grazing or pasture establishment in its current state.

Further detail is provided in **Section 3.3** and **Section 6.7**.

2.4.4 Vegetation

Vegetation at the site is highly disturbed and comprises mostly cleared grassland with small patches of dry sclerophyll forest within the site footprint. A Biodiversity Development Assessment Report (BDAR) has been prepared by an accredited ecologist to accompany this EIS (**Appendix F**).

The BDAR, which has been summarised in **Section 6.4** of this EIS, describes the current vegetation composition.

2.4.5 Surface Water

Spring Creek travels along the southern border of the site and then turns northward to run along the site's western border. Spring Creek feeds into Reedy Creek approximately 185 m to the north of Rose Hill Road, which then feeds into Rocky River approximately 3 km to the west.

The site is also characterised by two surface water catchments. Catchment A is about 4.28 ha in size draining to the north-west with Catchment B about 1.23 ha in size draining to the west.

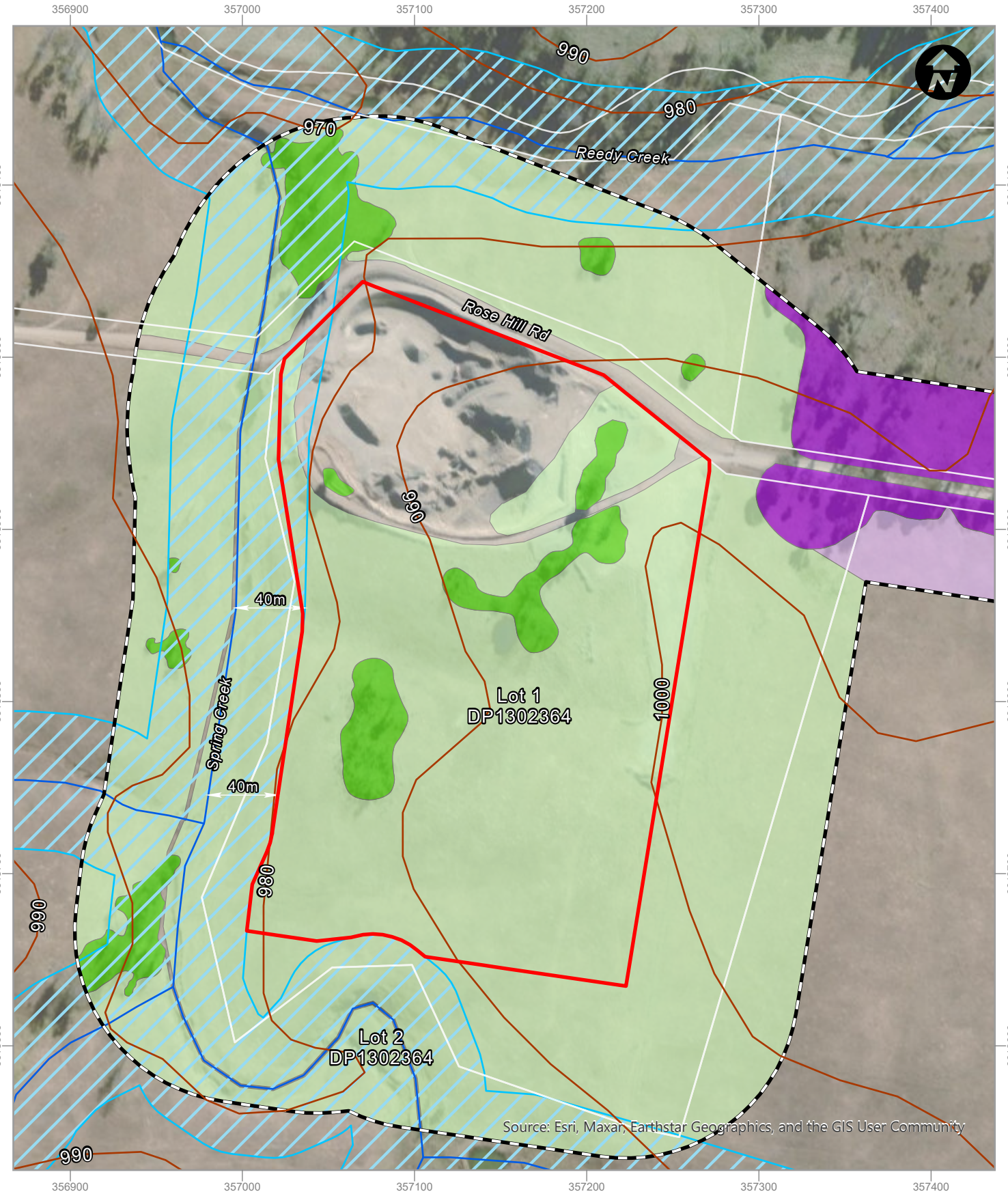
Further detail is provided in **Section 3.10** and **Section 6.3**.

2.4.6 Sensitive Receivers

The nearest neighbouring rural residence is located approximately 400 m to the east of the project site and there are five sensitive receivers within 1.5 km of the site. Nearby sensitive receivers are listed in **Table 2.1** below and shown in **Illustration 2.1**. This is discussed in more detail in **Section 6.1**.

Table 2.1 Sensitive Receivers Within 1.5 km of the Proposed Site

Sensitive Receiver	Address	Lot/DP	Approximate Distance
Residence	107 Rose Hill Road	Lot 1 DP585872	400 m east
Residence	76 Rose Hill Road	Lot 95 DP755807	650 m north-east
Residence	75 Rose Hill Road	Lot 2 DP1302364	700 m south-east
Residence	1 Rose Hill Road	Lot 80 DP755807	1.4 km south-east
Residence	Mount Butler Road	Lot 214 DP755807 / Lot 236 DP755807	1.5 km north-east



LEGEND

- Development footprint
- Cadastre
- Investigation area
- 40m watercourse buffer
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Low condition
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Moderate condition
- PCT 3359 - New England Hills Stringybark-Box Woodland - Low condition
- PCT 3359 - New England Hills Stringybark-Box Woodland - Moderate condition
- Watercourse

0 60 Metres

Site Analysis - Illustration 2.3

GeoLINK environment | engineering | planning | design

Environmental Impact Statement - Williams Quarry, Arding
4079-1033

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
Date: 14/02/2025
Revision: A

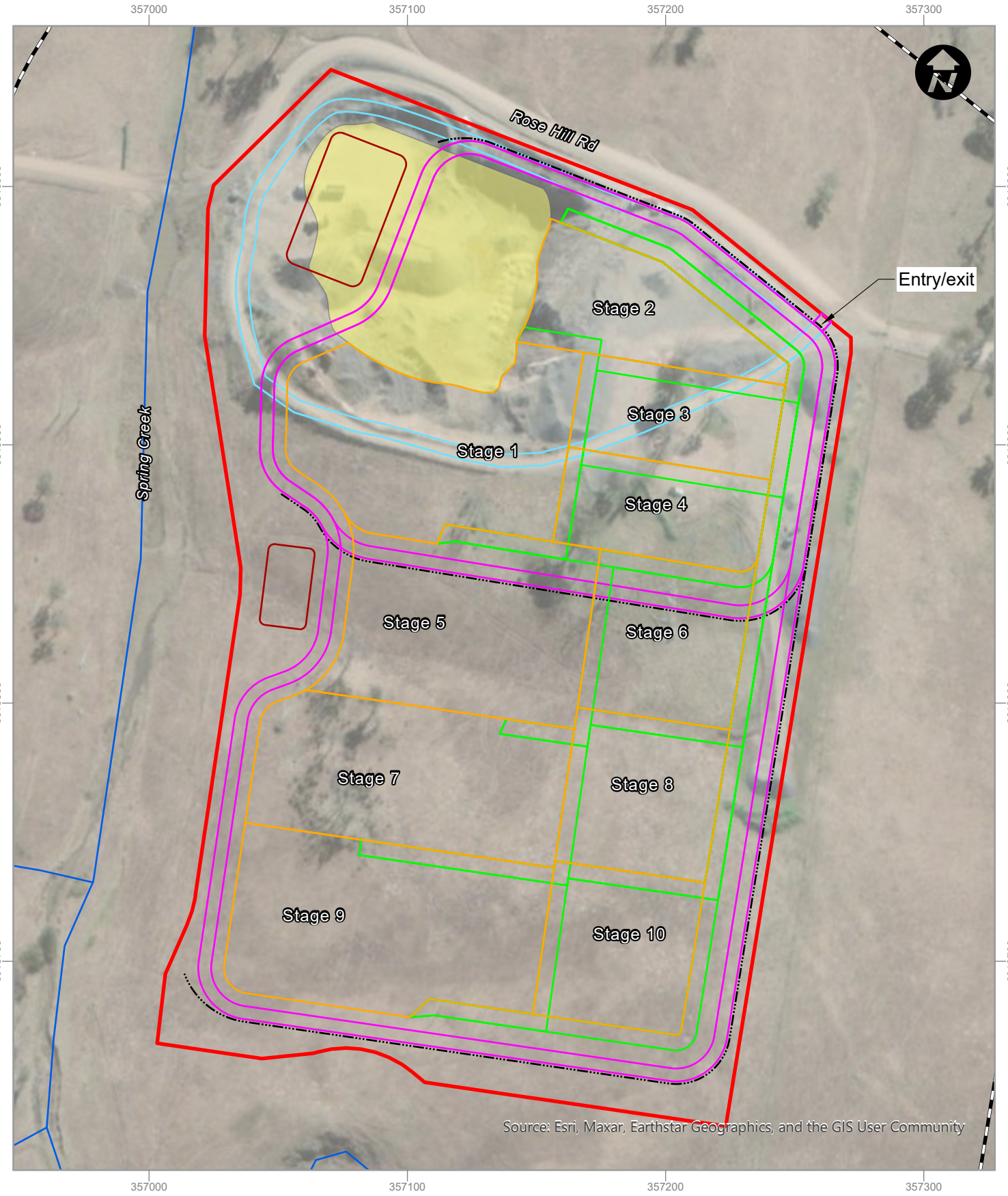
3. Description of the Project

3.1 Overview

A summary of key elements of the project is listed in **Table 3.1** below. These are further discussed in subsequent sections. An extract of the concept plans presented in **Appendix C** is also shown in **Illustration 3.1**.

Table 3.1 Summary Table Listing Key Elements of the Project

Project Element	Summary of the Project		
Extraction method	■ Blasting the quarry face. ■ Ripping and removal of the material to the stockpile area. ■ Crushing and sorting of raw material. ■ Establish stockpiles of gravel material ready for transport.		
Resource	Gravel and rock		
Disturbance Area	Approximately 81,000 m^2		
Annual Production	Up to 150,000m^3 per annum		
Quarry life	Until use of the quarry is no longer required, or material has been exhausted.		
Anticipated Total Resource	Approximately 676,000 m3 over 10 stages		
Equipment	Crushing Equipment: ■ Jaw crusher. ■ Cone crusher. ■ Impact crusher. ■ Scalper. ■ Triple Deck Screen.	Mobile Equipment: ■ Excavator(s). ■ Loader(s). ■ Dozer. ■ Truck and Dog (32t load). ■ Dump truck.	Ancillary Equipment: ■ Generators. ■ Staff vehicles. ■ Site Facilities.
Product Transport	Typical transportation would be using a truck and dog with a 32 tonne pay load.		
Operational workforce	Crushing machinery operation: 4 full time staff Transportation contractors: 3		
Hours of Operation	Overburden stripping and site establishment Truck loading hours Truck Haulage: Processing Blasting	6.00 am to 5.00 pm 6.00 am to 5.00 pm 7.00 am to 5.00 pm 7.00 am to 1.00 pm 7.00 am to 5.00 pm 10.00 am and 4.00 pm	Monday to Saturday. Monday to Saturday. Monday to Friday. Saturday. Monday to Saturday. Monday to Friday.
Water catchment	Catchment A – 4.28 ha draining to north-west sediment basin. Catchment B – 1.23 ha draining to west sediment basin.		



LEGEND

- Development footprint
- Investigation area
- Existing quarry footprint
- Quarry staging
- Proposed haul road
- Basin
- Topsoil stockpile bund
- Existing 5m one-way haul road loop
- Watercourse

0 40 Metres

Proposed Site Plan - Illustration 3.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 25/08/2023

3.2 Staging

The proponent proposes to expand the operation and activities associated with the existing Williams Quarry and extract a higher rate of material per annum. The extraction methods would involve blasting and mechanical excavation and materials would be crushed on site to be sold within the local market.

The expansion would be undertaken in 10 stages as shown in **Illustration 3.1** and the concept plans in **Appendix C**. Prior to commencement of extraction, environmental controls would be established, haul roads would be developed, and minor topsoil stripping and stockpiling would be completed. Once the required environmental controls are implemented, Stage 1 of extraction would commence with dozer and excavator work which would involve bench re-establishment. Subsequent construction staging is shown in the concept plans provided in **Appendix C**.

The estimated volume of extracted material from each stage is shown in **Table 3.2**. Overall, it is proposed to extract up to 676,399 m^3 over the life of the quarry.

Table 3.2 Indicative Volumes of Extracted Material

Stage	Volume (m^3)
1	74,053
2	72,666
3	67,841
4	64,182
5	61,215
6	68,065
7	66,501
8	66,421
9	72,556
10	62,899
Total	**676,399**

3.3 Resource Definition

A petrographic analysis was undertaken by Geochempet Services in 2018. In summary, the findings indicate the material present in the existing Williams Quarry is suitable for use as a concrete aggregate. It is hornfelsed volcaniclastic sandstone which is non-porous, unweathered, hard, strong and finely crystalline. The material is predicted to be durable with the potential for mild or slow deleterious alkali-silica reactivity in concrete.

This is consistent with the existing long-term use of the quarry site.

3.4 Quarrying Process

3.4.1 Resource Accessibility

The existing nature of the quarry and the modest topography at the site allows for relatively straight forward extraction design and sequencing of extraction. **Section 3.2** outlines the proposed staging of the quarry and this is also shown in **Appendix C**.

In general, it is considered that continuation of the currently existing workings and methods would continue for new workings. To extract the rock and gravel, the following techniques would be implemented at the quarry:

- Blasting the quarry face.
- Ripping and removal of the material to the stockpile area.
- Crushing and sorting of raw material.
- Establish stockpiles of gravel material ready for transport.

3.4.2 Blasting

Blasting would be used to extract rock and gravel material from the source. All drill and blast work would be completed by a suitably qualified and professional explosives contractor, using an industry standard rock on ground contract. This would eliminate the requirement for any 'on site' storage of explosives. Typical explosives may include ANFO or emulsions (particularly for wet holes) initiated by primers and using non-electric delay detonation techniques.

No blast design has been undertaken at this stage, but this would be managed by the contractor undertaken in accordance with the site blast management plan (to be prepared prior to commencement of operations). Detonation of blasts would generally be scheduled between 10:00 am and 4:00 pm Monday to Friday. The surrounding residents would be notified of forthcoming blasts.

3.4.3 Processing and Operations

The existing quarry has established areas to access material, facilitate crushing, and stockpiling and support transport movements through the site. Topsoil would be removed and stored at designated stockpile sites. The stored topsoil would be stockpiled in low, domed mounds with sediment and erosion measures installed to prevent sediment runoff.

The quarried material would then be crushed, screened and stored on site prior to transport to the Ducats processing facility in Armidale. It is envisaged that a mobile crushing and screening plant would be used to produce crushed rock and aggregate products. These units are likely to comprise a primary (jaw) crusher, and secondary (cone) together with a mobile screen and stockpiler and will require operating and stockpiling area within the benched quarry. This plant would be established on the quarry floor alongside the raw and crushed material stockpiles.

Raw material stockpiles would be located near the crushing plant for easy loading into the crusher. Dozers would push raw material from the quarry face to the raw material stockpiles near the crushing plant. All blasted rock would be fed through the primary crusher with some also being processed through the secondary crusher. Oversize rock would be broken down using an excavator with hammer.

The quarry would require minor clearing of vegetation (including recent regrowth) in order to access the material. Native vegetation cleared from the footprint would be taken off site to be mulched and stockpiled at designated stockpile sites and non-native vegetation would be managed in accordance with the *Biosecurity Act 2015*. Refer to **Section 6.4** for further information.

Following the construction of each stage, an approximate 6 m wide bench would be constructed around the perimeter with appropriate erosion and sediment control measures. Bench development would involve conventional multi-level benching, with active bench thicknesses commonly in the order of 15 to 25 metres width with bench heights of 10 m chosen for a safe and stable profile. Working bench elevations would be between 980 m AHD and 1,000 m AHD. This material would be removed

primarily by conventional drill and blast methods, as described above. A 5 m wide one-way haul road loop will also be constructed around the active stages.

Overburden materials extracted from within the quarry site would be used to extend and shape the existing floor of the quarry, and to construct the sediment basins and environmental controls. The floor area of the quarry would be initially increased by extracting hard rock material from the lowest existing bench and reducing its width.

The quarry is anticipated to process around 384 tonnes per day of raw material.

3.5 Transport and Haulage

Typical transportation would be using a truck and dog with a 32 tonne pay load. This equates to approximately ten loads per day or 20 truck movements. Therefore, in summary:

- Typical haulage per day: Ten loads or 20 movements.
- Haulage times: 7am to 5pm Monday to Friday and 7am to 1pm Saturday.

These haulage schedules are based on the maximum yearly haulage movements required for transporting the annual volume of material.

Quarry material would be hauled from Williams Quarry to Ducats processing facility in Armidale.

Loaded trucks would approach the New England Highway via Rose Hill Road and Arding Road for approximately 6.5 km, requiring a left-hand turn onto New England Highway, travelling for 6 km, exiting the roundabout onto Uralla Road, travelling for 2.3 km, taking a left hand turn onto Miller Street and travelling for 0.7 km before making a left hand turn into the Ducats processing facility. This is shown in **Figure 3.1**.

There is an existing access from the Williams Quarry floor to Rose Hill Road via an internal road running parallel to Rose Hill Road which is constructed with a crushed rock road base. An access road is proposed at the site which will connect directly to Rose Hill Road as an unsealed driveway connection similar to the existing arrangement. This access connection and segment of Rose Hill Road is proposed to be upgraded and stabilised to enable safe passage of trucks and trailers and ensure long-term stability of the road pavement.

Trucks would enter and leave the site via the single access road from New England Highway via Rose Hill Road/ Arding Road and onto the quarry floor. Loaded trucks leaving the quarry would be able to queue in the truck parking area and unloaded trucks returning to the quarry would be able to queue on the internal haul road. Traffic management controls would be installed for this section.

There are no timber bridges on the route. There is one concrete causeway on Arding Road, and one concrete bridge at Saumarez Creek on the New England Highway between Arding Road and Uralla Road. A detailed traffic assessment is provided at **Appendix H** and summarised in **Section 6.6**.

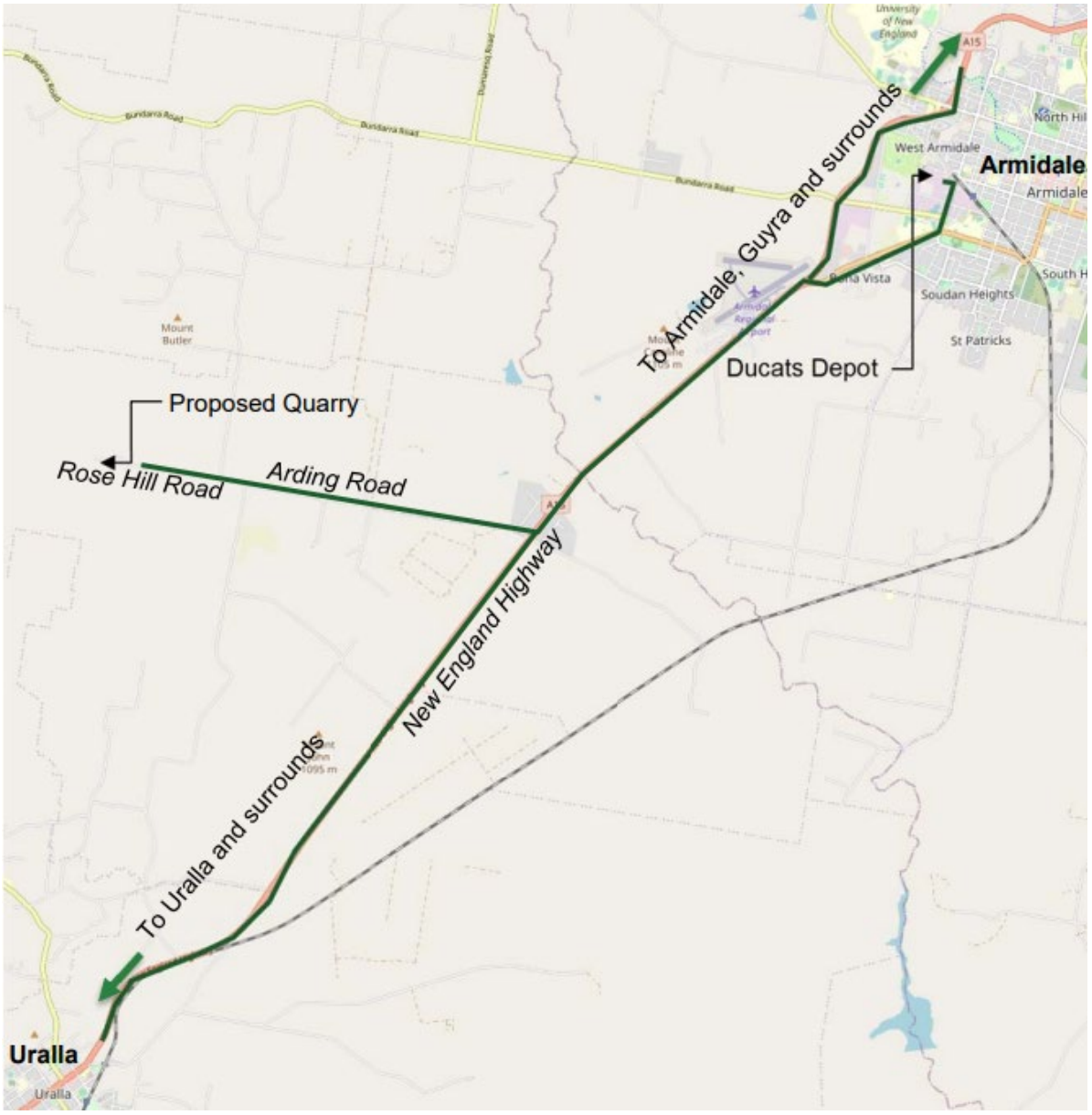


Figure 3.1 Proposed haulage route

3.6 Hours of Operation

The proponent proposes the following hours of operation:

■ Overburden stripping and site establishment	6.00 am to 5.00 pm	Monday to Saturday.
■ Truck loading hours	6.00 am to 5.00 pm	Monday to Saturday.
■ Truck Haulage	7.00 am to 5.00 pm	Monday to Friday.
■ Truck Haulage (Saturday)	7.00 am to 1.00 pm	Saturday.
■ Processing	7.00 am to 5.00 pm	Monday to Saturday.
■ Blasting	10.00 am and 4.00 pm	Monday to Friday.

Plant and machinery servicing, general site maintenance and office work may be undertaken during Sundays or public holidays between normal business hours. Any work undertaken during these times must be of an inaudible nature.

3.7 Equipment

Plant and infrastructure on site may include the following, or equivalent:

Crushing Equipment:
- Jaw crusher
- Cone crusher
- Impact crusher
- Scalper
- Triple Deck Screen.

Mobile Equipment:
- Excavator(s)
- Loader(s)
- Dozer
- Truck and Dog (32t load)
- Dump truck.

Ancillary Equipment:
- Generators
- Staff vehicles
- Site Facilities.

3.8 On Site Facilities

The project is anticipated to require approximately four full-time staff to operate crushing machinery and up to three contractors for transportation activities.

Portable facilities, such as a crib room/ change room, office and ablutions facility, would be required for employees. A small closed system of water would be introduced to the site to cater for the amenities and ablution facilities. Potable water would be delivered by water tanks and stored in portable on site tanks near the office buildings to allow for the staged operation. This water would be used for basins, toilets, sinks etc. The effluent produced by these applications would be collected in an on site sewage collection sump, and transported off site for treatment.

A generator would be used on site to allow for electricity use. The project also proposes to store a limited amount of fuel on site (near the portable facilities, at the western end of the project site) to allow for the efficient operation of machinery and generator. All fuel storage will be within a separate bunded area where no other flammable materials will be stored.

No parking is proposed as part of the project as it is anticipated existing parking arrangements on site would be sufficient.

3.9 Water Usage

Other than the detail provided in **Section 3.8** above, water demands on site would be predominantly for dust suppression of any unsealed haul roads (internal access road and Rose Hill Road), quarry floor and the material stockpiles. Water would also be used to irrigate the areas that are revegetated after quarrying.

Water for these purposes would be primarily sourced from the two sediment basins on site. Where required, non-potable water would be sourced from off site and delivered by water tanks.

3.10 Erosion and Sediment Control

The project would involve vegetation/ topsoil removal from areas within the proposed quarry footprint, thereby increasing the risk of erosion. Soil erosion is less likely within active quarry areas because once the topsoil and overburden have been removed, bare rock will be exposed. However, erosion is a particular risk on the haul roads and other areas of exposed soil.

During construction, two sediment basins will be constructed to capture run-off from the site. As shown in **Appendix C**, the surface water catchment is divided into two catchments. A clean water diversion drain would be established around the active quarry and re-aligned as the project progresses through the stages. Catchment A is about 4.28 ha in size and drains to the north-west with Catchment B about 1.23 ha in size, draining to the west.

A sediment basin is proposed to the north-west with a volume capacity of 1,500 m^3. Stages 1 to 4 would drain to this basin during construction. Once Stage 5 commences, the west basin will be brought online. This basin would have a volume capacity of 350 m^3 and would complement the existing north-west basin. Erosion and sediment controls would be established on site to manage the surface water flows during construction.

3.11 Closure and Rehabilitation

Prior to the current management operations by the proponent, Williams Quarry had been operated by Council. During this period, little rehabilitation or assisted revegetation occurred due to the need for floor space for occasional product extraction and ongoing quarrying from time to time.

A site closure and rehabilitation plan has been prepared for the project as provided in **Section 6.12**. The plan includes erosion control, quarrying and revegetation, supplied details of the final landform, the planting regime including species and maintenance requirements. In summary, the closure and rehabilitation include the following initiatives:

- Manage the closure and rehabilitation during the operation of the quarry.
- Selection of similar plant species with that of surrounding vegetation communities.
- Creation of quarry benches to facilitate visual blending and stimulate vegetation growth.
- Management of weeds and vertebrate pests.
- Integrated final form water management.
- Common maintenance program.

The final form of the quarry would blend with the current landform and consist of a series of benches and batters that would extend in an east west direction and would eventually form an amphitheatre shape. The floor would appear flat to the eye but would have slight fall to allow for water management.

At this time, the final landform of the project can only be considered conceptual, as local variation in rock strength and quality may vary the final benching and batters grades.

3.12 Project Value

The project has an estimated capital investment value of $1,200,000 and will result in up to five full time equivalent jobs.

4. Consultation

The existing quarry is currently in operation. The intensification of the use and increased activity on the site would be designed and managed to effectively minimise potential environmental impacts and any potential impacts to residential properties within the vicinity as far as practical.

The closest sensitive receivers to the proposed development are identified in **Section 6.1.2**.

The DA would be notified/ advertised by the Council in accordance with necessary requirements and this would provide the community adequate opportunity to review and comment on the proposal if necessary.

As detailed in the Scoping Report and confirmed by the environmental assessment, no further community engagement beyond this is required or warranted given no significant environmental impacts are anticipated.

4.1 Agency Consultation

This EIS has been prepared in accordance with Part 4 of the EP&A Act and the EP&A Regulation. The requirements of the Planning Secretary of the NSW Department of Planning, Housing and Infrastructure (DPHI) were sought. Each of the matters raised by the Planning Secretary in the November 2024 EARs for consideration in the EIS is outlined in **Section 1.5** and **Appendix B**, together with the relevant section of the EIS which addresses that matter.

A number of government agencies were consulted as part of the EARs process. The requirements are summarised in **Table 4.1**. The following government agencies responded to the consultation and did not have any additional requirements to add:

- Department of Primary Industries and Regional Development – NSW Resources
- Uralla Shire Council.

The agency requirements previously requested within the June 2022 SEARs have been included below in **Table 4.2**. Please note that agency names that were in place at the time of the consultation have been left as they appear in the SEARs.

Table 4.1 Summary of Government Agency Requirements – November 2024

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
NSW Crown Lands	-	No Crown waterways are within the development footprint, however it is noted that Crown waterway known as Reedy Creek is within the vicinity and the development drains into Spring Creek which in turn flows into the Crown waterway of Reedy Creek. Crown Lands would require protection of Crown waterways from sedimentation, pollution and alteration to local hydrology to be considered in the preparation of the Environmental Impact Statement.	6.3	-
Department of Primary Industries and Regional Development – Resources Regulator	-	The Resources Regulator may undertake assessments of the mine operators' proposed mining activities under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and Regulation as well as other WHS regulatory obligations.	Noted	-
NSW Department of Primary Industries - Agriculture	-	<u>Land Resources</u> • In addition to the following as set out in the draft EARs: *'potential impacts on soils and land capability (including potential erosion, land contamination and biosecurity risks) and the proposed mitigation, management and remedial measures (as appropriate)'*; Include: *'paying particular attention to the agricultural land use in the region'*	6.7	-
		<u>Cumulative impacts</u> Cumulative impacts on agricultural resources and developments can result from the combined effects of developments over time and multiple developments in a locality. Assessment should identify potential impacts on rural enterprises and landholders, assess the relative risks and consider possible cumulative effects. Aspects to consider include: • Areas removed from agricultural use due to quarrying operations, infrastructure, plant or access requirements as well as the storage or processing of materials. • Any areas to be excluded (temporarily or permanently) from agricultural use to ensure a safe working environment and prevent injusry to livestock and wildlife.	6.7	-
		<u>Biosecurity issues</u> • Include biosecurity (pests, wees, and disease) risk assessment outlining the likely plant, animal, and community risks. The relevant weed or pest animals for a region are addressed in the regional plans or strategies issued by NSW Local Land Services. • Include details of how the proposal will deal with identified biosecurity risks as well as contingency plans for any failures. Include monitoring and mitigation measures for week and pest management prior to operations commencing, during operation and rehabilitation.	6.4	F

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		Land Use Conflict Risk Assessment (LUCRA) • A Land Use Conflict Risk Assessment (LUCRA) should be undertaken by a suitably qualified person to identify potential impacts the proposal may impose on or in the reverse experience from, lawful agricultural land uses and activities in the vicinity and detail effective mitigation measures.	6.7	-
		Land Stewardship • Provide details of any proposed earthworks including, an assessment of the overall footprint where the natural contours of the land will be modified, the total amount of material involved, how many stockpiled material will be managed and an outline of how this material will or will not be used for rehabilitation purposes. • Provide a complete soil survey, undertaken prior to works commencing, as a benchmark for rehabilitation.	3, 6.7, 6.12	-
Transport for NSW	-	A Traffic Impact Assessment (TIA) is to be prepared by a suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and TfNSW Guide to Traffic Impact Assessment, 2024.	5.4.1	-
		The TIA should be tailored to the scope of the proposed development and include, but not necessarily limited to, consideration of the following: • A map of the surrounding road network identifying the site access, nearby accesses, intersections and transport related facilities. • A map of the proposed transport route/s identifying all public roads proposed to obtain access from the classified (State) road/s to the development site. • The total impact of existing and proposed development on the road network with consideration for a 10 year horizon. This should include; o Identify Annual Average Daily Traffic (AADT) volumes with percentage heavy vehicles along the transport route/s and diagrammatically demonstrate AM and PM peak hour movements at key intersections. o Background traffic data from published sources and/or recent survey data. The source of data and any assumptions are to be clearly explained and justified, including the growth rate applied to the future horizon. o The volume and distribution of existing and proposed trips to be generated by the construction, operational and decommission phases of the development. This should identify the maximum daily and hourly demands generated by the development, particularly where they coincide with the network peak hour. o The type and frequency of design vehicles accessing the development site. • Details of the road geometry and alignment along the identified transport route/s, including existing formations, crossings, intersection treatments and any identified hazards. This should include; o Available sight distances at intersections along the proposed transport routes and any constraint to achieving the required sight distance for the posted speed limit.	6.6	H

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		○ An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for intersections along the identified transport route/s, identifying the existence of the minimum basic turn treatments and addressing the need for any warranted higher order treatments. ○ Swept path analysis demonstrating the largest design vehicle entering and leaving the development, and moving in each direction through intersections along the proposed transport route/s. • Capacity analysis using SIDRA or other relevant application, to identify an acceptable Level of Service (LOS) at intersections with the classified (State) road/s, and where relevant, analysis of any other intersections along the proposed transport route/s. • A review of crash data along the identified transport route/s for the most recent 5 year reporting period and an assessment of road safety along the proposed transport route/s considering the safe systems principles adopted under Future Transport 2056. • Strategic (2D) design drawings of all proposed road works and the site access demonstrating scope, estimated cost and constructability of works required to mitigate the impacts of the development on road safety, traffic efficiency and the integrity of transport infrastructure. Works must be appropriately designed for the existing posted speed limit. • Site plan demonstrating site access, internal manoeuvring, servicing and parking areas consistent with the relevant parts of AS2890 and Council requirements. • Details of measures to address impacts and/or provide connections for public transport services and active transport modes, such as, public and school bus services, walking and cycling. • Details of measures to ameliorate the impacts of road traffic noise, dust, and/or glare generated along the proposed transport route/s. • Details of any Traffic Management Plan (TMP) proposed to address the construction and operation phases of the proposed development. The TMP should be prepared and implemented in accordance with *Australian Standard 1742.3 and the Work Health and Safety Regulation 2017*. It is recommended that any TMP include, but not necessarily limited to, the following; ○ A map of the primary transport route/s highlighting critical locations. ○ An induction process for vehicle operators and regular toolbox meetings. ○ Procedures for travel through residential areas, school zones and/or bus route/s. ○ Any proposed temporary measures such a Traffic Guidance Scheme (TGS) ○ A Driver Code of Conduct for heavy vehicle operators. ○ A complaint resolution and disciplinary procedure. ○ Community consultation measures proposed for peak periods.		
NSW Environment	1	Environmental impacts of the project	6	-
	1.1	The description should include the following for both the construction and operation of the project:	2 and 3	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
Protection Agency		a. Details of the premises covered by the project including any relationship with any existing Environment Protection Licences b. the layout of all the physical elements of the project within the project area, including all buildings, structures, works, haulage activities, pollution controls, stockpile and material handling areas, sealed and unsealed areas, landscaping and open space. c. all mitigation measures that will be built into the physical layout and design of the project (such as noise walls) d. any ancillary infrastructure for which approval is being sought (such as upgrades to utilities or surrounding roads) e. identify those components of the physical layout and design that may change during the detailed design of the project, and set clear limits within which this change may occur without requiring amendments to the DA or modifications to the development consent if the project is approved f. plans showing the layout and design in plan-view and cross section.		
	1.2	Identify any likely interactions between the development and any existing/approved developments and land uses in the area.	6.7	-
	1.3	Identify all sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways.	Illustration 2.2 and Section 6.1	D
	1.4	Identify all potential environmental emissions, assess the likely environmental impacts, and describe the proposed mitigation measures to minimise environmental pollution to achieve compliance with relevant environmental legislation, policies, and guidelines.	6	-
	1.5	The EIS must accurately summarise the key findings of the detailed technical studies in the appendices of the EIS and use suitable cross-referencing to reduce repetition between the two parts of the EIS.	noted	-
	1.6	The EIS must address the requirements of Section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) by determining the extent of each impact and providing sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL).	6	-
	2	EPA Licensing and Approval Requirements		
	2.1	Identify all approvals and licences required under environment protection legislation including details of all scheduled activities under schedule 1 of the *Protection of the Environment Operations Act 1997*.	5.4.1	-
	2.2	Should project approval be granted, the proponent will need to make an application to the EPA for its EPL for the proposed facility prior to undertaking any on site works. Additional information is available through the EPA Guide to Licensing document (www.epa.nsw.gov.au/licensing/licenceguide.htm).	noted	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
	2.3	Outline how the proposal and its environmental protection measures would be implemented and managed 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).	7	-
	3	Construction Works		
	3.1	The EIS must include detail of the construction works including: a. any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site). b. Identify, characterise and classify the following in accordance with the EPA's Waste Classification Guidelines (2014): i. all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste; ii. all waste that is to be removed to an offsite location, including proposed quantities. Include the commitment to ensure this waste is taken to a facility that can lawfully receive it. Note: The EPA's Waste Classification Guidelines (2014) are available at: https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste c. construction timetable and staging; hours of construction; proposed construction methods. d. environment protection measures, including noise mitigation measures - in accordance with the Interim Construction Noise Guideline (DECC, 2009), dust control measures and erosion, and sediment control measures- in accordance with Managing urban stormwater: Soils and construction, vol. 1 (Landcom 2004).	3 and 7	-
	3.2	Include a site diagram showing the site layout and location of environmental controls.	Illustration 3.1	C
	3.3	Construction noise associated with the proposed development should be assessed using the Interim Construction Noise Guideline (DECC, 2009). These are available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/construction-noise	6.1	D
	4	Air issues		
	4.1	The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the POEO Act and the *Protection of the Environment Operations (Clean Air) Regulation 2022*. This consideration should include section 129 of the POEO Act concerning control of "offensive odour".	6.2	E
	4.2	The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022). These are available at: https://www.epa.nsw.gov.au/yourenvironment/air/industrial-emissions/approved-methods-for-the-modelling-and-assessmentof-air-pollutants	6.2	E
	4.3	The EIS must detail emission control techniques/practices that will be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, *POEO (Clean Air) Regulation* (2022) and criteria within *Approved Methods for*	6.2	E

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		the Modelling and Assessment of Air Pollutants in NSW (2022).		
	5	Noise and Vibration		
	5.1	Operational and construction activities on the premises that maybe considered vibration intensive should be assessed using the guidelines contained in the *Assessing Vibration: a technical guideline* (DEC, 2006). These are available at: https://www.epa.nsw.gov.au/yourenvironment/noise/industrial-noise/assessing-vibration	6.1	D
	5.2	If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in *Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC, 1990). These are available at: https://www.epa.nsw.gov.au/yourenvironment/noise/industrial-noise/construction-noise	6.1	D
	5.3	Operational noise from noise intensive activities to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Noise Policy for Industry* (EPA, 2017). Available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noisepolicy-for-industry-(2017)	6.1	D
	5.4	If applicable, noise on public roads from increased road traffic generated by land use developments other than road projects should be assessed using the guidelines contained in the *NSW Road Noise Policy* (EPA, 2011) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.	6.1	D
	5.5	If applicable, noise on rail lines from increased rail traffic generated by land-use developments other than rail projects should be assessed using the guidelines contained in the Rail Infrastructure Noise Guideline (EPA, 2013) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.	N/A	-
	6	Waste, chemicals and hazardous materials and radiation		
	6.1	Assess and describe all aspects of waste generation, management and disposal associated with the proposed development.	6.8	-
	6.2	The EIS must identify, characterise and classify the following in accordance with the *EPA's Waste Classification Guidelines* (2014) and associated addendums: i. all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste; ii. all waste that is proposed to be disposed of to an offsite location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.	3.3 and 6.8	-
	6.3	Demonstrate compliance with all regulatory requirements outlined in the POEO Act and associated waste regulations.	6.8	-
	6.4	Outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on-site.	6.3	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
	6.5	Demonstrate that appropriate spill containment will be provided for storage, filling and loading of all fuels and other chemicals to be used on site, in accordance with all relevant Australian Standards, and/or NSW EPA's *Storing and Handling of Liquids: Environment Protection-Participants Manual* (DECC, 2007).	6.3	-
	6.6	Demonstrate compliance with Part 9.3E of the POEO Act for the use of any industrial chemicals, including details of activities involving Schedule 6 or Schedule 7 chemicals listed on the IChEMS register. Additionally, demonstrate a system for periodic review to ensure that any new IChEMS Register requirements are incorporated.	6.8	-
	6.7	Identify the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-21. Available at: https://www.epa.nsw.gov.au/yourenvironment/recycling-and-reuse/warr-strategy.	6.8	-
	7	Water		
	7.1	Demonstrate that all practical measures to prevent, control, abate or mitigate water pollution have been implemented, including a description of options that were explored (such as reuse to avoid a discharge or treatment).	6.3	-
	7.2	Provide details of the proposal that are essential for predicting and assessing potential impacts to receiving waters. This could include (but is not limited to): a. Site layout, including details of the existing and proposed water management system. b. Drainage map for the entire site identifying sub-catchments, flow paths, drainage infrastructure, design sizing of structures, water storages, discharge points, and any potential flow paths to receiving waters. c. How stormwater will be managed in all phases of the project. Information should include, where appropriate, measures to avoid or minimise erosion, leachate generation, and sediment mobilisation at the site. d. Any in-water activities (such as piling or dredging).	6.3	-
	7.3	Include water balance(s) for ground and surface water, including any intake and discharge locations, volumes, frequency and duration.	6.3	-
	7.4	Identify and estimate the quality and 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. This should be undertaken for construction and operational phases.	6.3	-
	7.5	Include a water pollution impact assessment undertaken consistent with the guidance available at https://www.epa.nsw.gov.au/your-environment/water/managing-water-pollutionin-nsw/environment-protection-licensing/water-pollution-discharge-assessments. The level of assessment should be commensurate with the risk to the environment and human health.	6.3	-
	7.6	Describe any surface water quality monitoring programs, including proposed monitoring locations, frequency and indicators of surface water quality. Analytical limits of reporting should have regard to any identified	6.3	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		guideline values. Water quality monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (2004) available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/22p3488-approved-methods-for-water-innsw.pdf.		
	7.7	The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines *Managing urban stormwater: soils and construction*, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).	6.3	-
	8	Groundwater		
	8.1	Provide details of the project that are essential for predicting and assessing impacts to groundwater with a description of the existing environment, including: a. Geological, topographical, and hydrogeological resource descriptions, maps, and cross sections. b. Assessment of groundwater quality, users of groundwater, existing bores including depths and construction, assessment of local land use. c. A hydrogeological interpretation of water-bearing geological units, depth to water table, groundwater gradient, Conceptual hydrogeological model, assessment of groundwater dependent ecosystems. d. Site map and cross-sections showing and characterising any proposed excavations and spoil emplacement (relative to water table) with topography. e. Proposed groundwater monitoring program.	6.3	-
	9	Soils		
	9.1	The EIS should include an assessment of the potential impacts on soil and land resources should be undertaken, being guided by the *Soil and Landscape Issues in Environmental Impact Assessment* (DLWC 2000). The nature and extent of any significant impacts should be identified. Particular attention should be given to: a. Soil erosion and sediment transport- in accordance with *Managing urban stormwater: Soils and construction*, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C Unsealed Roads; D Main Roles) (DECC2008). b. Mass movement (landslides) – in accordance with *Landslide risk management guidelines presented in the Australian Geomechanics Society* (2007). c. Urban and regional salinity – guidance given in the *Local Government Salinity Initiative* booklets which includes *Site Investigation for Urban Salinity* (DLWC, 2002).	6.7	-
	9.2	A description of the mitigation and management options that will be used to prevent, control, abate or minimise identified soil and land resource impacts associated with the project. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented. Where required, add any specific assessment requirements relevant to the project.	6.7	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
	10	Contamination		
	10.1	Identify the likelihood of contamination at the site and surrounding land (on different media such as soils, groundwater, ground gas, surface water and sediments, where applicable) by considering the context of past, current, and proposed land uses. The EIS must document how the assessment of contaminated land has been undertaken with regard to the relevant guidelines for contaminated land made or approved by the NSW EPA.	6.7	-
	10.2	All reports on contamination must be prepared by a suitably qualified contaminated land consultant(1) who is also certified(2). (1) A suitably qualified and experienced contaminated land consultant is a contaminated land consultant who meets the competencies outlined in the Guideline on the Competencies and Acceptance of Environmental Auditors and Related Professionals (Schedule B9) as provided in the ASC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013)." (2) A certified consultant is a consultant certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme;	noted	-
	10.3	Where contamination is considered likely based on past or current land uses or other factors (such as offsite contamination migrating onto the site), undertake detailed site investigation/s to determine the nature and extent of the contamination.	noted	-
	10.4	Where contamination exists, assess if remediation of the land is required, having regard to current and future land uses; and the ecological and human health risks posed by the contamination to both onsite and offsite receptors.	N/A	-
	10.5	Where a detailed site investigation is prepared and/or remediation is considered necessary, a NSW EPA accredited Site Auditor must be engaged to undertake an audit. The EIS must include copies of any Interim Audit Advice provided by the auditor and a Site Audit Statement and Site Audit Reports issued by the auditor which certifies the site can be made suitable for the proposed use	N/A	-
	10.6	The following references should be included as relevant guidelines that must be followed when assessing contaminated land: a. *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA, 1998) - https://www.epa.nsw.gov.au/-/media/epa/corporatesite/resources/clm/managing-contaminated-land-guidelinesremediation.pdf?la=en&hash=6AAE054645C2A0264515ABF7121AEF7F47E5FC85* b. *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015)* c. *Contaminated land sampling design guidelines - Part 1 and 2 (EPA, 2022)* d. *Consultants reporting on contaminated land: contaminated land guidelines (EPA, 2020)* e. *Guidelines for the NSW Site Auditor scheme 3rd edition (EPA, 2017)*		

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		f. Any other relevant guidelines made or approved by the EPA under s105 of the *Contaminated Land Management Act 1997 - https://www.epa.nsw.gov.au/yourenvironment/contaminated-land/statutory-guidelines*		
	11	Climate Change		
	11.1	The proponent must prepare a Greenhouse Gas Assessment in accordance with the EPA's *Greenhouse Gas Assessment Guide for Large Emitters* (or its most recent version that is available on the EPA website). Input data and assumptions must also be robustly justified by providing supporting evidence to assist the EPA's assessment.	N/A due to not being a large emitter	-
	11.2	For projects estimated to emit 25,000 tonnes or more of scope 1 and 2 emissions (CO2-e) in any financial year during the operational life of the project (based on planned operational throughput and as designed), a GHG Mitigation Plan must be provided in accordance with the EPA's *Greenhouse Gas Assessment Guide for Large Emitters* (or its most recent version that is available on the EPA website).	N/A	-
	11.3	For projects estimated to emit 25,000 tonnes or more of scope 1 and 2 emissions (CO2-e) in any financial year during the operational life of the project (based on planned operational throughput and as designed), the proponent must prepare a Climate Change Adaptation Plan that incorporates the following components: a. A climate change risk assessment that addresses predicted climatic changes and the potential impacts of climate hazards on the environmental performance of the project. b. An assessment of measures to reduce climate risk, including: i. a description of measures that would be implemented to reduce likely climate change risks and potential impacts on the environmental performance of the project. ii. an assessment of: • the likely effectiveness of these measures • whether these measures will remain effective over time as climate change risks increase • whether contingency plans will be necessary to manage any residual risks. iii. if contingency measures are deemed necessary under (ii) above, a description of how the project is designed so that these contingency measures can be readily implemented if and when necessary. c. A description of how the effectiveness of measures to reduce climate risk will be monitored over time, including: i. a description of metrics that will be used to periodically evaluate the effectiveness of the adaptation management measures. ii. a description of the measures that would be implemented to monitor and periodically report on against these metrics. d. A timetable for review of the project's Climate Change Adaptation Plan that reflects the project's lifespan and incorporates at each review the latest knowledge about predicted climate risks in the short and long term.	N/A	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
Heritage NSW	-	The Environmental Impact Statement must be informed by an Aboriginal Cultural Heritage Assessment Report (ACHAR), and that the ACHAR must: • be prepared in accordance with the relevant policy and guidelines • including results of thorough archaeological survey and test excavations (where required) • include evidence of adequate and continuous consultation with Aboriginal stakeholders.	6.5	G
Biodiversity, Conservation and Science Group (BCS) of the NSW Department of Climate Change, Energy, the Environment and Water	-	BCS anticipates the EIS will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts on biodiversity, particular on state and/or commonwealth listed threatened endangered ecological communities and species known to occur in the locality.	6.4	F
		Adjacent areas, such as Spring Creek, may be subject to changes in ground and surface hydrology and thus will require ecological surveys and assessment.	6.4	F
		In addition to the proposed Mine Closure Plan, any revegetation works associated with bank stability or visual screening are to be guided by an approved management plan.	noted	-
		BCS expects the EIS will map the extent of any woodland EECs or CEECs in accordance with the BCS North East Branch Principles set out in Appendix 1 of our EARs.	6.4	F
		The applicant will need to confirm the location and extent of Category 1 Exempt Land within the subject land by undertaking site-based floristic assessment to verify the presence or absence of CEECs, critically endangered plants and grasslands that are not low conservation grasslands. BCS expects the applicant will apply the BCS guidance on land categorisation and the Native Vegetation Regulatory Map provided in Appendix 2 of our EARs.	6.4	F

Table 4.2 Summary of Government Agency Requirements - June 2022

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
NSW Crown Lands	-	Spring Creek to the west of the proposed quarry flows north into Reedy Creek. Reedy Creek is a Crown waterway, and while outside the proposed quarry planning area, Crown Lands notes that Reedy Creek may be impacted by the proposal if suitable protection of flows and water quality in Spring Creek is not adequately addressed.	6.3	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
NSW Department of Primary Industries - Agriculture	-	Important issues for extractive industries are the potential impact on nearby agricultural resources and the ability to rehabilitate the land to enable continued agricultural investment.	6.7	-
NSW Environment Protection Agency	-	The proponent will require an Environment Protection Licence ("EPL") for extractive activities, clause 19 of Schedule 1 of the *Protection of the Environment Operations Act 1997* ("the POEO Act"), to operate the proposed quarry.	5.4.1	-
	-	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 POEO Act.	Noted	-
	3.1	The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the Protection of the Environment Operations (POEO) Act 1997 and the POEO (Clean Air) Regulation 2021. Particular consideration should be given to section 129 of the POEO Act concerning control of "offensive odour".	5 and 6.2	D
	3.2	The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2022).	6.2	D
	3.3	The EIS must detail emission control techniques/ practices that will be employed at the site and identify how the proposed control techniques/ practices will meet the requirements of the POEO Act, POEO (Clean Air) Regulation and associated air quality limits or guideline criteria.	6.2	D
	4.1	Construction noise associated with the proposed development should be assessed using the Interim Construction Noise Guideline (DECC, 2009).	6.1	C
	4.2	Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the Assessing Vibration: a technical guideline (DEC, 2006).	6.1	C
	4.3	If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990).	6.1	C
	4.4	Operational noise from all industrial activities (including private haul roads and private railway lines) to be undertaken on the premises should be assessed using the guidelines contained in the NSW Noise Policy for Industry (EPA, 2017).	6.1	C

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
	4.5	Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the NSW Road Noise Policy and associated application notes (EPA, 2011).	6.1	C
	5.1	The EIS must assess all aspects of waste generation, management and disposal associated with the proposed development.	6.8	-
	5.2	The EIS must demonstrate compliance with all regulatory requirements outlined in the POEO Act and associated waste regulations.	6.8	-
	5.3	The EIS must identify, characterise and classify the following in accordance with the EPA's Waste Classification Guidelines (2014) and associated addendums: i. all waste that will be generated on site through excavation, demolition or construction activities, including proposed quantities of the waste; ii. all waste that is proposed to be disposed of to an off site location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.	6.8	-
	5.4	The EIS must outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on site.	6.3	-
	5.5	The EIS must demonstrate that appropriate spill containment will be provided for storage, filling and loading of all fuels and other chemicals to be used on site, in accordance with the relevant Australian Standard.	6.3	-
	6.1	The EIS must demonstrate how the proposed development will meet the requirements of section 120 of the POEO Act.	6.3	-
	6.2	The EIS must include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	6.3	-
	6.3	If the proposed development intends to discharge waters to the environment, the EIS must demonstrate how the discharge(s) will be managed in terms of water quantity, quality and frequency of discharge and include an impact assessment of the discharge on the receiving environment. This should include: ■ Description of the proposal including position of any intakes and discharges, volumes, water quality and frequency of all water discharges. ■ Description of the receiving waters including upstream and downstream water quality as well as any other water users. ■ Demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.	6.3	-

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
	6.4	The EIS must refer to Water Quality Objectives for the receiving waters and indicators and associated trigger values or criteria for the identified environmental values of the receiving environment. This information should be sourced from the ANZECC (2018) Guidelines for Fresh and Marine Water Quality.	6.3	-
	6.5	The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).	6.3	-
	6.6	The EIS must describe any water quality monitoring programs to be carried out at the project site. Water quality monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2022).	6.3	-
Department of Regional NSW - Mining, Exploration and Geoscience	-	All environmental reports (EIS, EA, SoEE 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. If deemed commercial-in-confidence, the resource assessment summary included in the EIS should commit to providing MEG with full resource assessment documentation separately.	3	-
	-	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.	Noted	-
NSW Rural Fire Service	-	The EIS is to include a bush fire report. The bush fire report shall identify the risks to life and property and recommend bush fire prevention measures to reduce those risks.	6.9	-
Transport for NSW	-	A Traffic Impact Assessment (TIA) is to be prepared by a suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and Roads and Maritime Guide to Traffic Generating Developments.	6.6	G
	-	The TIA should be tailored to the scope of the proposed development and include, but not be limited to, the following: ■ A map of the surrounding road network identifying the site access, relevant traffic route/s and connections to the classified (State) road network. ■ Assessment of all relevant vehicular traffic routes and intersections for access to/ from the subject properties.	6.6	G

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		■ Current traffic counts for all relevant traffic routes and relevant intersections, including connections to the classified (State) road network. ■ The anticipated additional vehicular traffic generated from both the construction and operational stages of the project. ■ The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation. ■ An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for relevant intersections along the identified transport route/s, including connections to the classified (State) road network. ■ Consideration of the traffic impacts on existing and proposed intersections, in particular, the intersection New England HWY and Arding Rd. ■ Consideration shall also include access to the site, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area. ■ Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council. ■ Traffic analysis of any major/ relevant intersections impacted, using SIDRA or similar traffic model, including: – Current traffic counts and 10-year traffic growth projections. – With and without development scenarios. – 95th percentile back of queue lengths. – Delays and level of service on all legs for the relevant intersections. – Electronic data for TfNSW review. ■ Relevant swept path analysis for the largest design vehicle accessing the site. ■ Any other impacts to the road network including consideration of active transport and public transport facilities. ■ Identification of necessary road upgrades that are required to mitigate the impact of the development. Preliminary concept drawings for any road upgrades shall be designed in accordance with Austroads Guidelines, Australian Standards and TfNSW Supplements and be submitted with the EIS. Road upgrades shall be to the satisfaction of TfNSW and/or Council in accordance with relevant Roads Act functions.		

Government Agency	Ref.	Requirement	Location in EIS	
			Section	Appendix
		■ Details of any Traffic Management Plan (TMP) proposed to address the construction phase of the proposed development. The TMP and associated Traffic Control Plans (TCPs) should be prepared by suitably qualified persons in accordance with the TfNSW Traffic Control at Work Sites Manual.		
NSW Biodiversity Conservation Division	-	The proposed development (detailed requirements provided in their response)	This EIS	-
	-	Environmental impacts of the proposed development (as above)	6	-
	-	Biodiversity (as above)	6.4	E
	-	National Parks and Wildlife Estate (as above)	N/A	-
	-	Flooding (as above)	6.3	-
	-	Cumulative impacts (as above)	6.13	

5. Statutory Planning Framework

5.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the primary legislation for environmental planning in NSW. It establishes the legislative framework that governs land use, development assessment and decision making. The EP&A Regulation creates the required administration and allocates roles and responsibilities for land use and assessments.

This chapter summarises the project's permissibility, and the relevant policies and plans that are called up and required to be addressed under Section 4.15 of the EP&A Act.

5.2 Permissibility

5.2.1 Zoning

The site is zoned RU2 Rural Landscape under the *Uralla Local Environment Plan 2012* (Uralla LEP). The objectives of this zone are:

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

Further discussion of Uralla LEP provisions is provided in **Section 5.2.6**.

5.2.2 Definition of Use and Permissibility

The project is for expansion of an existing gravel quarry ('extractive industry') and seeks use of the land to extract up to 150,000 m^3 of material per year. The Uralla LEP definition of an 'extractive industry' is:

> ***Extractive industry*** *means the winning or removal of extractive materials (otherwise 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.*

Extractive industries are permitted with development consent in the RU2 Rural Landscape zone.

The project is consistent with the zone objectives and is permissible.

5.2.3 Designated Development

Section 26 of Schedule 3 of the EP&A Regulation states that *development for the purposes of an extractive industry facility is designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year*.

The project proposes to extract more than 30,000 cubic metres of material per year. Therefore, the project is considered Designated Development in accordance with the EP&A Regulation. As the project is Designated Development it requires the preparation of an EIS (this EIS).

5.2.4 Regionally Significant Development

Pursuant to Section 2.19 of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) *development specified in Schedule 6 is declared to be regionally significant development for the purposes of the Act*.

As the project is considered a Designated Development for extractive industries, the project is considered Regionally significant development in accordance with Section 7, Schedule 6 of the Planning Systems SEPP, which identifies Regionally Significant Development as a particular designated development which is *development for the purposes of— extractive industry facilities that meet the requirements for designated development under the Environmental Planning and Assessment Regulation 2021, Schedule 3, section 26*.

5.2.5 Integrated Development

Pursuant to Section 4.46(1) of the EP&A Act, integrated development is development (not being State significant development or complying development) that, in order for it to be carried out, requires development consent and other agency approvals.

The project is defined as Integrated Development as it requires an environment protection licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) to authorise carrying out of scheduled activities at any premises. This is discussed further in **Section 5.4.1**.

In addition to an EPL, the project also requires the following additional approvals:

- Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act)
- Controlled Activity Approval under Section 91(2) of the *Water Management Act 2000* (WM Act)
- Aquifer Interference Approval under the Section 91(3) of the WM Act.

These are discussed further in **Sections 5.4.2** and **5.4.6**.

5.2.6 Uralla Local Environmental Plan 2012

Williams Quarry is located within the Uralla LGA and is subject to the planning provisions within the Uralla LEP. There are a number of relevant clauses in the Uralla LEP and these are identified in **Table 5.1.**

Table 5.1 Uralla Local Environmental Plan 2012

Uralla LEP Clause	Requirement
Clause 5.11 Bushfire Hazard Reduction	Bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.
Clause 6.1 Earthworks	Before granting development consent for earthworks, the consent authority must consider the matters listed in Clause 6.1(3)(a) –(h). The project has been identified for expansion due to the existing quarry operations on the site. The required earthworks are not anticipated to result in adverse impacts. Standard construction management practices, including erosion and sedimentation control measures in accordance with the 'Blue Book', will be applied to ensure this (refer to **Section 6**).
Clause 6.4 Essential Services	Development consent must not be granted to development unless the consent authority is satisfied that any services that are essential for the proposed development are available or that adequate arrangements have been made to make them available when required. Any required services are discussed in **Section 3.8**.

5.2.7 Uralla Development Control Plan

The Uralla Development Control Plan 2021 (Uralla DCP) supports the provisions of the Uralla LEP and provides a set of development objectives and provisions for development within the Uralla LGA. There are a number of relevant clauses in the Uralla DCP and these are identified in **Table 5.2**. A reference to the relevant EIS section where the aspect is assessed is also shown in **Table 5.2**.

Table 5.2 Uralla DCP Matters Relevant to the Project

DCP Reference	Aspect	EIS Reference
4.3	Biodiversity	Section 6.4
4.4	Bushfire Management	Section 6.9
4.5	Access to Rural Properties – General	Section 6.6
6.4	Access and Traffic Generation	Section 6.6
14	Contaminated Land	Section 6.7

5.2.8 Uralla Development Contributions Plans 2021

The Uralla Shire Council Section 7.11 Development Contributions Plan 2021 - Heavy Haulage (Section 7.11 Plan) and Section 7.12 Development Contributions Plan 2021 - Fixed Levy (Section 7.12 Plan) apply to the project.

The Section 7.11 Plan authorises Council to impose a condition on certain development consents, including extractive industries, requiring the payment of a contribution pursuant to Section 7.11 of the EP&A Act. Section 7.11 of the EP&A Act requires that levies raised be used for amenities, facilities and services that are required as a result of demand created by the new development. Development contributions may be conditioned on development consents that are anticipated to result in increased heavy vehicle movements, and may either be based on the equivalent standard axles or tonnage of material generated and transported by Council's road network. Two principal contribution rates have been identified in the plan for both regional or local sealed roads ($0.111 per tonne per km) and unsealed roads ($0.058 per tonne per km).

The Section 7.12 Plan authorises Council to impose a condition on certain development consents requiring the payment of a contribution pursuant to Section 7.12 of the EP&A Act. Levies payable will assist Council to provide the appropriate public facilities to maintain and enhance amenity and service delivery within the Uralla LGA. As the project is proposed to cost more than $200,000, a levy of 1% of the proposed cost of carrying out the development will apply.

5.3 State Environmental Planning Policies

5.3.1 State Environmental Planning Policy (Planning Systems) 2021

The aims of the Planning Systems SEPP are:

(a) to identify development that is State significant development,

(b) to identify development that is State significant infrastructure and critical State significant infrastructure,

(c) *to identify development that is regionally significant development.*

Pursuant to Section 2.6 of the Planning Systems SEPP and as listed in Schedule 1, an Extractive Industry is classified as State Significant Development if the development:

(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.*

The project would not involve the extraction of more than 500,000 tonnes of material per year or a total resource of more than 5 million tonnes, and is not from an environmentally sensitive area of State significance. As such, the project is not classified as State Significant Development.

Section 2.19 of the Planning Systems SEPP specifies that development in Schedule 6 is to be declared Regionally Significant Development. Section 7 of Schedule 6 includes *extractive industry facilities that meet the requirements for designated development under the Environmental Planning and Assessment Regulation 2021, Schedule 3, section 26*.

Section 26 of Schedule 3 of the EP&A Regulation states *development for the purposes of an extractive industry facility is designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year.*

As the project is an extractive industry and would extract more than 30,000 m^3 of material per year, it is identified as Designated Development and Regionally Significant Development to be assessed under Part 4 of the EP&A Act. As such, the project will be assessed by Council and determined by the Northern Regional Planning Panel.

5.3.2 State Environmental Planning Policy (Resources and Energy) 2021

The project is permissible, with consent, on the subject site under *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP). Consistent with extractive industries being permissible under the Uralla LEP, the Resources and Energy SEPP directs LEP zoning of agricultural or industrial land to permit such development.

Extractive industries are permissible with consent on any land which agriculture or industry is permissible, in accordance with Section 2.9(3)(a) of the Resources and Energy SEPP. Additionally, Section 2.9(4) identifies the co-location of industry related to the extractive industry as follows:

(4) Co-location of industry If extractive industry is being carried out with development consent on any land, development for any of the following purposes may also be carried out with development consent on that land—

(a) the processing of extractive material,

(b) the processing of construction and demolition waste or of other material that is to be used as a substitute for extractive material,

(c) facilities for the processing or transport of extractive material,

(d) *concrete works that produce only pre-mixed concrete or bitumen pre-mix or hot-mix.*

Therefore, the project and associated works are permissible with consent on the subject site under the Resources and Energy SEPP.

Part 2.3 (particularly Section 2.17) of the SEPP also identifies matters for consideration by the consent authority when determining the application. These matters are as follows:

- Compatibility with other land uses.
- Compatibility with mining, petroleum production or extractive industry.
- Natural resource management and environmental management.
- Resource recovery.
- Transport.
- Rehabilitation.

These matters have been addressed in **Section 6** of this EIS.

5.3.3 State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) provides a coordinated approach to assessing development in NSW. The Resilience and Hazards SEPP provides land use planning provisions for development within the coastal management zone, hazardous and offensive development and remediation of land.

Chapter 3 Hazardous and Offensive Development

Although the project proposes to store a limited volume of fuel for the efficient operation of the site, this activity does not meet the definition of a 'hazardous industry' or 'hazardous storage establishment' as defined in Section 3.2 and 3.3 of the Resilience and Hazards SEPP. As such, the requirements of this chapter do not apply to the project. This is discussed further in **Section 6.9.2**.

Chapter 4 Remediation of Land

Chapter 4 of the Resilience and Hazards SEPP aims to promote the remediation of contaminated land for the purpose of reducing risk of harm to human health or any other aspect of the environment, by consideration of contaminated land as part of the planning process. Under the Resilience and Hazards SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.

The site has no known history of potentially contaminating land uses. A preliminary site investigation is not warranted, and it is reasonable to assume that the site is not contaminated and is suitable. This is discussed further in **Section 6.7**.

5.3.4 State Environmental Planning Policy (Biodiversity & Conservation) 2021 Chapter 4 – Koala Habitat Protection 2021

State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala Habitat Protection SEPP) commenced 17 March 2021 and reinstates the policy framework of the 2019 to 83 LGAs in NSW, including Uralla. Koala Habitat Protection SEPP does not apply to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry. As the project is located within an RU2 Rural Landscape zoning, Koala Habitat Protection SEPP does not apply.

A discussion of potential biodiversity impacts is provided in **Section 6.4**.

5.4 Other Relevant NSW Legislation

5.4.1 Protection of the Environment Operations Act 1997

The POEO Act is administered by the NSW Environment Protection Authority (EPA), and provides licences relating to air, water and noise pollution, and waste management. One of the objectives of the Act is to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development. There are serious offences under this Act for causing pollution of air, noise, water or land.

The landholder and/or proponent is obliged to notify NSW EPA when a 'pollution incident' occurs that causes or threatens 'material harm' to the environment.

The POEO Act outlines scheduled activities that require an EPL. As discussed in **Section 5.2.5**, an EPL will be required as the project will involve the extraction and processing of more than 30,000

tonnes of extractive material per year. The project proposes to extract up to 150,000 m^3 of material annually (equating to around 250,000 tonnes). As this is more than 30,000 tonnes of material, the project is considered a scheduled activity in accordance with Clause 19, Schedule 1 of the POEO Act.

5.4.2 National Parks and Wildlife Act 1974

The NPW Act provides the basis for the legal protection and management of Aboriginal cultural heritage within NSW. The key principles of the Act in relation to Aboriginal heritage are the prevention of unnecessary or unwarranted destruction of Aboriginal objects, and the active protection and conservation of objects which are of high cultural significance.

The NPW Act provide statutory protection for any physical/ material evidence of Aboriginal occupation of NSW and places of cultural significance to the Aboriginal community.

An Aboriginal Cultural Heritage Assessment Report has been prepared and is provided in **Appendix G**. As Aboriginal objects were identified, an Aboriginal Heritage Impact Permit (AHIP) will be required in accordance with Section 90 of the NPW Act. Further discussion is provided in **Section 6.5**.

5.4.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) sets out the assessment framework for threatened species and threatened ecological communities (TECs).

Part 7 of the BC Act (Biodiversity Assessment and Approvals under EP&A Act) inserts provisions to the planning approvals process via Clause 1.7 of the EP&A Act. Part 7 of the BC Act outlines the biodiversity assessment process and relates to assessing the impact on threatened species or ecological communities, or their habitats.

The project involves clearing up to 6.28 ha of native vegetation. As per the BC Act, entry into the Biodiversity Offset Scheme (BOS) is triggered due to the proposed development impacting native vegetation over the clearing threshold (1 ha native vegetation) for a minimum lot of 400 ha. Therefore, a Biodiversity Development Assessment Report (BDAR) is required to accompany the DA.

A BDAR has been prepared in accordance with the Biodiversity Assessment Method (BAM) 2020 (refer to **Appendix F**) and is summarised at **Section 6.4**.

5.4.4 Rural Fires Act 1997

The *Rural Fires Act 1997* outlines development types for which a Bush Fire Safety Authority (BFSA) is required. The site is located within bush fire prone land. However, the project is not classified as a special fire protection purpose, therefore a BFSA from the NSW Rural Fire Service (RFS) is not required.

Planning for Bushfire Protection 2019 (PBP) applies to all development on bush fire prone land. The project will retain appropriate access and egress for emergency service personnel and is considered consistent with the aims and objectives of PBP. This is discussed further in **Section 6.9**.

5.4.5 Biosecurity Act 2015

In NSW, the administration of noxious weed control is the responsibility of the Minister for Primary Industries under the *Biosecurity Act 2015*. The Act is implemented and enforced by the Local Control Authority for the area, usually local government, or NSW Agencies.

Biosecurity risk weeds would be managed in accordance with the Act. This is further discussed in **Section 6.4** and **Appendix F**.

5.4.6 Water Management Act 2000

The *Water Act 1912* and *Water Management Act 2000* (WM Act) contain provisions for the licensing of water capture and use, as well as the issuing and trade of water licences within areas governed by a Water Sharing Plan. Spring Creek and the surface water resources of the project form part of the Rocky River Water Source managed under the *Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012*. Water contained within outcropped and buried rocks and outcropped alluvial sediments within the vicinity of the project forms part of the New England Fold Belt Murray Darling Basin Groundwater Source managed under the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources*.

The project would involve the removal and deposition of material from and on land within 40 m of the bed of Spring Creek (see **Illustration 2.2**). It is therefore a controlled activity and would require a controlled activity approval, pursuant to Section 91(2) of the *Water Management Act 2000*.

The *NSW Aquifer Interference Policy* identifies mining activities and other extractive industries, among others, as potential aquifer interference activities. The project would therefore require an aquifer interference approval, pursuant to Section 91(3) of the *Water Management Act 2000*.

Water Management (General) Regulation 2018

In accordance with the *NSW Aquifer Interference Policy*, the taking of water includes water taken for consumptive use as well as water taken incidentally by an aquifer interference activity.

Clause 3, Schedule 1 of the *Water Management (General) Regulation 2018* (Water Regulation) specifies excluded works as including:

> *Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.*

While the proposed sediment basins do not currently fall under the definition of a minor stream, it is anticipated that the altered hydrological regime associated with the project's construction would constitute the beginning of a first order stream and may therefore be treated as a minor stream for the purposes of the Water Regulation (see Section 3 of the Water Regulation for the definition of a minor stream). The Proponent is therefore exempt from the requirement for:

- a water access licence for the capture and recirculation of drainage water from the quarry footprint pursuant to Section 21 of the Water Regulation.
- water use approval for the use of water from the sediment basins for the purposes of dust suppression and rehabilitation pursuant to Section 34 of the Water Regulation.
- water supply works approval for the construction and use of the sediment basins pursuant to Section 39 of the Water Regulation.

5.4.7 Water Act 1912

The *Water Act 1912* controls the issuing and trade of water licences within areas not governed by a Water Sharing Plan, as well as within areas in which existing approvals have not been converted. As the project does not hold a water access licence issued under the *Water Act 1912*, and the immediate area is governed by a Water Sharing Plan, the *Water Act 1912* is not applicable to the water licensing requirements of the project.

5.5 Commonwealth Legislation

5.5.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), any action that has, or is likely to have, a significant impact on matters of national environmental significance or other aspects of the environment, such as on commonwealth land, may progress only with approval of the Commonwealth Minister for the Department of Climate Change, Energy, the Environment and Water under Part 9 of the EPBC Act.

There are no matters of national environmental significance or Commonwealth land that would be significantly impacted by the project. All biodiversity related matters are discussed in the BDAR in **Appendix F**. There are also no World Heritage Properties, National Heritage Place, or Commonwealth Land within 1 km of the project site. The project also does not involve a nuclear action nor is it related to coal seam gas development. Therefore, a Commonwealth referral or approval is not necessary in this instance.

5.5.2 Native Title Act 1993

A search of the National Native Title Register confirmed there are no active registrations for Native Title Claim in the area.

6. Environmental Assessment

6.1 Noise, Blasting and Vibration

Issue	Environmental Assessment Requirements	Section
Noise	A quantitative assessment of potential: ■ Construction and operational noise and off-site transport noise impacts of the development in accordance with the I*nterim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy* respectively. ■ Reasonable and feasible mitigation measures to minimise noise emissions. ■ Monitoring and management measures.	6.1.3 6.1.4 6.1.4
Blasting and Vibration	■ Proposed hours, frequency, methods and impacts. ■ An assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZECC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features.	6.1.3 6.1.3

6.1.1 Methodology

A Noise Impact Assessment was undertaken for the project by Rodney Stevens Acoustics Pty Ltd. This section presents the key findings of the assessment with the full report provided in **Appendix D**.

The assessment was undertaken and prepared in accordance with the following guidelines and criteria:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Interim Construction Noise Guideline (DECCW, 2009).
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration 1990 (ANZEC, 1990).

The assessment includes:

- A description of the site characteristics and of the surrounding locality, including identification of the nearest sensitive receivers.
- Identification of the proposed activities associated with the quarry (establishment and operational).
- An assessment of the likely noise and vibration impacts generated by the quarry activities, including operational noise and blasting impact assessment.

6.1.2 Existing Environment

The project is located approximately 10 km north of Uralla and 15 km south-west of Armidale, in the locality of Arding. The site is located within in a rural landscape setting, with predominantly cleared agricultural land.

There are a number of residential dwellings with the location of the nearest sensitive receivers listed below and shown in **Illustration 2.1:**

- Receiver 1: 107 Rose Hill Road (Lot 1 DP 585872), approximately 500m south-east of the quarry.
- Receiver 2: 76 Rose Hill Road (Lot 95 DP 755807), approximately 750m north-east of the quarry.
- Receiver 3: 75 Rose Hill Road (Lot 3 DP 1096564) approximately 900m south-east of the quarry.

The NPfI characterises the area surrounding the project as a 'Rural' noise environment. This is identified as an area with an acoustical environment dominated by natural sounds, with little to no road traffic noise, generally characterised by low background noise levels and sparse settlement patterns.

Existing noise

Unattended noise monitoring was undertaken from 15 November 2022 to 22 November 2022. The noise logger was placed at Receiver 2 (76 Rose Hill Road) and was selected with consideration to other noise sources, security issues and access permission.

The aim of the noise monitoring was to establish the ambient (background) noise levels expected to be in the residential vicinity of the site, recorded as L_{A1}, L_{A10}, L_{A90} and L_{Aeq} (i.e. the levels exceeded for 1%, 10% and 90% of the sample time). Data obtained from the monitoring was then processed in accordance with NPfI to establish the representative noise levels that could be expected as a result of noise emissions from the project.

The background noise levels established from the noise monitoring are shown in **Table 6.1**.

Table 6.1 Measured Background Noise Levels

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 7am – 6pm	Evening 6pm – 10pm	Night-time 10pm – 7am
Receiver 2: 76 Rose Hill Road	L_{Aeq}	52	43	42
	Rating Background Level (RBL)	30	27	22

Note: All values expressed as dB(A) and rounded to nearest 1 dB(A)

The NPfI project noise levels for industrial noise sources control the intrusive noise impacts for residents and other sensitive receivers in the short term, and they maintain noise level amenity for particular land uses for residents and sensitive receivers in other land uses. The intrusiveness noise level essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15-minute period.

As the ambient noise environment is not controlled by industrial noise sources, the project amenity noise levels are assigned in accordance with the recommended amenity noise levels outlined in the NPfI. These are outlined in **Table 6.2**. The lower/ more stringent of the project trigger noise levels were adopted (in bold).

Table 6.2 Operational Project Trigger Noise Levels

Receiver	Time of Day	ANL[1] L_{Aeq}	Measured		Project Trigger Noise Levels	
			RBL $L_{A90\ (15\ min)}$	Existing $L_{Aeq\ (Period)}$	Intrusive $L_{Aeq\ (15\ min)}$	Amenity $L_{Aeq\ (15\ min)}$
Residential	Day	50	35*	52	**40**	53
	Evening	45	30*	43	**35**	48
	Night	40	30*	42	**35**	43

Note 1: ANL = 'Amenity Noise Level' for residences in rural areas
* The RBLs have been adjusted in accordance with section 2.3 of the NPfI

The proposed hours for truck loading and site establishment will be from 6 am to 7 am. It may be unreasonable to expect operations at this time to be assessed against the night-time project noise trigger levels since the existing RBLs are steadily rising in the early morning hours. For this situation, the shoulder period assessment will be used to derive the relevant criteria in accordance with NPfI. As such, the shoulder period noise criteria was calculated to be LAeq, 15min 40 dB(A).

The NPfI provides guidance for sleep disturbance or sleep arousal assessment. Based on the minimum ambient noise level of 30 dB(A) (see **Table 6.2**), the sleep disturbance criteria is LAeq, 15min 40 dB(A) and LAFmax 52 dB(A).

Blasting and Vibration

The project is required to be assessed in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration 1990* (ANZEC, 1990).

The ANZEC criteria for the control of blasting impact at residences include:

- The recommended maximum level for airblast is 115 dBLinear.
- The level of 115 dBLinear may be exceeded up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dBLinear at any time.
- The recommended maximum level for ground vibration is 5mm/s (peak particle velocity (ppv)).
- The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.
- Blasting should generally only be permitted during the hours of 9.00 am to 5.00 pm Monday to Saturday. Blasting should not take place on Sundays and Public Holidays.

It is noted the recommended standard hours for blasting in the Interim Construction Noise Guideline (DECCW, 2009) are 9.00 am to 1.00 pm on Saturdays.

6.1.3 Potential Impacts

Predicted Noise Levels

As discussed in **Section 3.2**, the project would be constructed in 10 stages over the life of the quarry. The types of activities and hours of operation are outlined in **Section 3.6** with a list of possible plant and equipment outlined in **Section 3.7**.

Sound power levels were determined for the type of plant and equipment proposed. The predicted noise levels were calculated for the worst-case scenario, which has assumed a crusher, scalper, excavator and dump truck will be in use simultaneously in each stage. The predicted noise levels assumed the following:

- Heights of receivers were assumed to be 1.5 metres above respective level.
- A crusher, scalper, excavator and truck (truck dump) will be in use simultaneously in each stage.
- Two truck movements (entering or leaving) per 15 minutes (worst-case), based on 90 vehicle movements per day.
- Shoulder period activities to consist of one truck coming entering the site and being loaded.
- Resulting noise levels were calculated to the most affected point on the boundary of the affected receivers.

Based on the assessment, the predicted noise levels for daytime, shoulder periods and sleep disturbance criteria were below the relevant calculated noise levels across all 10 stages, at all three sensitive receivers. Detailed findings are presented in **Appendix D**.

Traffic Noise

A Traffic Impact Assessment was undertaken for the project and is summarised in **Section 6.6** with the full report in **Appendix H**. It was identified that the project will increase the volume of heavy vehicle traffic on Rose Hill Road, Arding Road and the New England Highway.

The small increase in traffic will result in a minimal increase in traffic noise. Given the distance of the proposed operation from the nearest residential dwelling, the rural nature of the locality and the existing operations, any impact from traffic noise is anticipated to be minimal. The environmental expectations of nearby residents will not be significantly altered by the additional traffic movements of seven vehicles during the peak hour with an average of two vehicles per hour.

Blasting and Vibration

The proposed method of material extraction for the project is by drill and blast techniques incorporating free-face blasting. The indicative blast design details for the project are presented in **Appendix D**. Based on this indicative blast design, the level of blast emissions (ground vibration and airblast) can be predicted using the formula given in the Orica Explosives Blasting Guide and AS 2187.2-1993, applicable to blasting to a free face in average rock.

The predicted levels are shown in **Table 6.3**.

Table 6.3 Predicted Levels of Blast Emissions for 25kg to 80kg Maximum Instantaneous Charge (MIC)

Residence	Nearest Distance From Blasting (m)	PVS Ground Vibration (mm/s)	Peak Airblast (dB Linear)
Receiver 1	360	1.2 – 3.1	114 - 118
Receiver 2	600	0.5 – 1.4	109 - 113
Receiver 3	570	0.6 – 1.5	109 - 113

In summary:

- The predicted levels of ground vibration at all nearby residences comply with the ANZEC's general human comfort criterion (of 5 mm/s).
- The maximum predicted ground vibration level of 3.1 mm/s occurs at Receiver 1 using an MIC of 80 kg at an offset distance of 360 m.
- The predicted levels of peak airblast at all residences comply with the ANZEC's general human comfort criterion of 115 dB Linear except at Receiver 1.

Receiver 1 exceeds the peak airblast general human comfort criterion of 115 dB Linear by 3 dB Linear. This prediction is based on a worst-case scenario with an MIC of 80 kg at the closest point of blasting throughout the life of the project. However, with an MIC of 34 kg, airblast and ground vibration levels at the nearest receivers are predicted to comply with the ANZEC Guideline. This would still provide sufficient energy, with an appropriate blast design, to achieve a bench height of up to 10 m.

6.1.4 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to noise, vibration and blasting:

1. A Noise and Vibration Management Plan will be prepared prior to works commencing and in accordance with relevant guidelines and criteria. This will include requirements for ongoing monitoring to ensure actual noise levels are equivalent to or less than the predicted noise levels. The Noise and Vibration Management Plan will also include a Blast Management Plan to ensure all blasts are monitored at the most affected residence.
2. Blasting will be carried out in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration 1990* (ANZEC, 1990).
3. Unless otherwise approved, activities will be undertaken in accordance with the following proposed construction hours:

- Overburden stripping, site establishment and truck loading - 6:00 am to 5:00 pm Monday to Saturday).
- Truck haulage - 7.00 am to 5.00 pm Monday to Friday, 7.00 am to 1.00 pm Saturday
- Processing - 7.00 am to 5.00 pm Monday to Saturday.
- Blasting - 10.00 am and 4.00 pm Monday to Friday only, with notification provided to nearby residences.

4. Any noise complaints will be recorded and include suitable identification/ description of the noise source and general location of the complaint. Any noise complaints will be investigated and actioned as required.
5. All vehicles and equipment will be turned off and not left idling when not required for work uses.
6. All plant will be fitted with appropriate exhaust systems to ensure compliance with pollution and noise emission standards.

6.2 Air Quality

Issue	Environmental Assessment Requirements	Section
Air	■ 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 facility.	6.2.3 6.2.3

6.2.1 Methodology

An Air Quality Impact Assessment was undertaken for the project by Todoroski Air Sciences Pty Ltd. This section presents the key findings of the assessment with the full report provided in **Appendix E**.

The assessment was undertaken and prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022).

The assessment includes:

- A review of the existing meteorological and air quality environment surrounding the site.
- A description of the dispersion modelling approach and emission estimation used to assess potential air quality impacts.
- Predicted modelling results and discussion of air quality impacts and associated mitigation and management measures.

An overview of the dispersion modelling approach is provided in **Appendix E**.

Criteria

Particulate matter consists of dust particles of varying size and composition. Air quality goals refer to measures of the total mass of all particles suspended in air defined as the Total Suspended Particulate (TSP) matter. The upper size range for TSP is nominally taken to be 30 micrometres (μm) as in practice particles larger than 30 to 50μm will settle out of the atmosphere too quickly to be regarded as air pollutants.

Two sub-classes of TSP are also included in the air quality goals, namely PM_{10}, particulate matter with equivalent aerodynamic diameters of 10μm or less, and $PM_{2.5}$, particulate matter with equivalent aerodynamic diameters of 2.5μm or less.

Particulate matter, typically in the upper size range, that settles from the atmosphere and deposits on surfaces is characterised as deposited dust. The deposition of dust on surfaces may be considered a nuisance and can adversely affect the amenity of an area by soiling property in the vicinity.

The air quality goals relevant to the assessment are outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022). The air quality goals for total impact relate to the total pollutant burden in the air and not just the contribution from the project. The air quality impact assessment criteria is outlined in **Table 6.4**.

Table 6.4 NSW EPA Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90 µg/m^3
PM_{10}	Annual	Total	25 µg/m^3
	24 hour	Total	50 µg/m^3
$PM_{2.5}$	Annual	Total	8µg/m^3
	24 hour	Total	25 µg/m^3
Deposited dust	Annual	Incremental	2 g/m^2/month
		Total	4 g/m^2/month

6.2.2 Existing Environment

Climatic Data

Long-term climatic data was analysed to characterise the local climate in proximity to the project site. It was identified that January is the hottest month with a mean maximum temperature of 26.2 degrees (Celsius) and July is the coldest month with a mean minimum temperature of 1.4 degrees. Rainfall decreases during the cooler months with April being the driest month. December is the wettest month of the year. Relative humidity levels exhibit variability over the day and seasonal fluctuations.

Wind speeds also exhibit variability over the day with lower wind speed records for 9am and higher observations for 3pm. An analysis of the wind roses shows that the wind directions follow an east to west axis. The summer wind rose shows the greatest proportion of winds from the east. In autumn and spring, winds follow a similar distribution to the annual wind rose with winds following along an east to west axis. During winter, winds from the west to the northwest are most frequent.

Existing Air Quality

The main sources of air pollutants in the area include agricultural emissions and other anthropogenic activities such as domestic wood heaters and motor vehicle exhaust. The Armidale monitoring station was used to characterise the background levels for the site given no ambient air quality monitoring data is available from the site. The monitoring station is located about 15 km north-east of the project and is located in a more urban setting which is subject to higher levels of particulate matter. As such, this is considered to be conservative as the levels would be an overestimate for the site.

An analysis of the available date from 2017 to 2021 was undertaken with a detailed discussion provided in **Appendix E**. This is summarised in the calculated background levels shown in **Table 6.5**.

Table 6.5 Summary of Background Air Quality Levels

Pollutant	Background Level	Units
Annual average TSP	37.6	µg/m³
24-hour average PM_{10}	Daily varying	µg/m³
Annual average PM_{10}	10.4	µg/m³
24-hour average $PM_{2.5}$	Daily varying	µg/m³

Pollutant	Background Level	Units
Annual average $PM_{2.5}$	7.2	µg/m³
Annual average deposited dust	1.7	g/m²/month

6.2.3 Potential Impacts

The main dust generating activities associated with the operation of the project are identified as:

- Loading/ unloading of material.
- Vehicles travelling on site and off site.
- Crushing and screening processes
- Windblown dust from stockpiles.

The on site plant and equipment also have the potential to generate particulate emissions from the diesel exhaust.

Operational Emissions

The impact assessment identified Stage 10 of the project (see **Illustration 3.1**) to represent the potential worst-case impact scenario during operation. This considers extraction and processing activities occurring in the most southern part of the site with the greatest haulage distance. The scenario also considers the largest extent of total exposed area that could occur at the project and the potential for greatest wind erosion due to areas in the other stages already being disturbed or exposed. Additionally, the proposed activities during this stage occur closest to the assessed receptors (Receivers 1, 2 and 3 identified in **Table 2.1**) and would result in potential worst-case air quality impacts at these locations.

The dust emissions for the project were estimated for each potential activity, with some combinations. The modelling predicted the incremental (operation of the project in isolation) and cumulative (modelling impact associated with the operation of the project with the estimated ambient background levels) particulate impact at each of the assessed residential receptor locations.

The predicted incremental results show that minimal incremental effects would arise at the receptor locations as a result of the operation of the project. The predicted cumulative results indicate that all of the assessed receptors are predicted to experience levels below the relevant criteria for each of the assessed dust metrics.

Overall, it is clear from the assessment that the project has a minimal influence at the assessed receptor locations and in most case, would be difficult to discern beyond the existing background level. Notwithstanding, the project does have the potential to generate dust emissions. As such, mitigation measures have been recommended to minimise any potential air quality impacts (see **Section 6.2.4**).

Construction Emissions

The progression of the project would involve the construction of the associated infrastructure of each stage. This has the potential to generate dust emissions from activities such as haul road construction, erosion and sediment control installation, bench construction etc. The potential dust impacts are difficult to quantify due to the short sporadic period of dust generating activity which will overlap the operational activities. The total amount of dust generated from the construction process is unlikely to be significant given the nature of the activities. It is expected the potential dust emissions generated by the construction activities would be less than the emissions produced during the operational stages of the project.

Odour Emissions

Odour emissions have some potential to arise from the diesel exhaust emissions of on site plant equipment. These odorous emissions are generally considered to be too low to generate any significant off site pollutant concentrations and have not been assessed. In addition, the material handled on site is not considered odorous and will not result in any off site odour impacts.

6.2.4 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to air quality:

7. All works are to be undertaken in accordance with the requirements of the *Protection of the Environment Operations Act 1997* and associated regulations.
8. Works will not be carried out during strong winds (particularly easterly or north-easterly winds) or in weather conditions where high levels of dust or air borne particulates are likely.
9. Weather forecast to be checked daily and prior to any material handling/ processing.
10. Machinery and vehicles are to be turned off when not in use.
11. Adequately maintain the internal access road.
12. Cover all loads before leaving the site.
13. Maintain appropriate moisture level on the internal access road, sections of Rose Hill Road and any stockpiles.
14. Vehicles, machinery and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.
15. Haulage of material is to use the most efficient route option, in accordance with the approved Traffic Management Plan.
16. The site is to be rehabilitated as soon as possible to minimise exposed soils.

6.3 Water

Issue	Environmental Assessment Requirements	Section
Water	■ A detailed site water balance and an assessment of any water licensing requirements or other approvals required under the *Water Act 1912* and/ or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; ■ An assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and ■ A detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts.	6.3.1 & 6.3.4 6.3.3, 6.3.4 & 6.3.5 6.3.5 & 6.3.6

6.3.1 Legislative Context

A review of relevant legislation is provided in **Section 5.4** of this EIS, including:

- POEO Act.
- WM Act.
- *Water Act 1912.*

Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order 2020

It is not anticipated that greater than 3 ML of groundwater will be taken as part of aquifer interference activities. Within the New England Fold Belt Murray Darling Basin Groundwater Source there are currently approximately 156 groundwater access licences with a total licensed extraction volume of approximately 11,496 ML/year, assuming 1 ML/unit share in any Annual Water Determination. The long term average annual extraction limit for the New England Fold Belt Murray Darling Basin Groundwater Source is 39,253 ML/year, which is approximately five percent of the estimated annual recharge of the area (DPI Water 2012). This demonstrates that large volumes of unallocated groundwater exist and while the project does not require a water access licence, any groundwater extraction is unlikely to significantly impact aquifer sustainability.

Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012

It is not anticipated that the Proponent would need to access any water from the Rocky River Water Source. The rehabilitation of the quarry would involve the retention of the sediment basins for the control and prevention of soil and erosion and would therefore be exempt from the requirement for any access licence and approvals for water supply work construction, water supply work use, and water use (refer to **5.4.6**).

6.3.2 Existing Environment

Williams Quarry is located directly east of Spring Creek, in the upper reaches of the Gwydir River catchment. The site is in an elevated position within an undulating landscape. The adjacent Spring Creek is a second order stream with a small catchment area (approximately 7 km^2).

Runoff from within the project area naturally flows in a generally western direction toward Spring Creek on a moderate to steep (7-17%) slope. The area immediately surrounding the project is dominated by grazing lands predominantly containing pasture species, with sparse pockets of isolated vegetation. Spring Creek converges with Reedy Creek approximately 225 m downstream of the immediate vicinity of the project. A summary of the hydrological characteristics and constraints of the site is presented in **Table 6.6**.

Table 6.6 Hydrological Characteristics and Constraints of the Site

Characteristic/ Constraint	Value
Rainfall	791.1 mm mean annual rainfall (from nearest BOM station)
Rainfall erosivity (*R-factor*)	1370
Rainfall distribution zone	Zone 2
Upslope gradients	17%
Potential erosion hazard	High erosion hazard
Soil erodibility (*K-factor*)	0.066
Soil texture group	D/F
Disturbed site area	5.51 ha
Soil loss class	2
Soil hydrologic group	Group D
Volumetric runoff coefficient	0.9
Slope Length	80 m
Slope Gradient	1-2%
Length/gradient (*LS-factor*)	0.41
Erosion control practice (*P-factor*)	1.3 (compacted and smooth)
Ground cover (C-factor)	1.0 (0% grass cover, stripped)

No groundwater bores have been constructed to establish the depth, pressure or quality of water bearing zones within the vicinity of the project. The groundwater quality within the New England Fold Belt Murray Darling Basin Groundwater Source is understood to be variable due to the broad range of geological formations present. The surface geology of the project forms part of the Sandon Association, comprised predominantly of sedimentary and metamorphic rock.

Groundwater salinity is typically low in the shallow aquifer systems and more variable in the deeper aquifers subject to longer residence times. Yields within the region are understood to be variable. The nearest groundwater bore is located at Lot 80 DP755807, approximately 1.5 km east of the project at an elevation of 1,043 m Australian Height Datum (AHD), with several bores located further to the east. Water bearing zones within this area located on the Sandon Association are typically found at an elevation of 1,030 mAHD.

The project site is not susceptible to flooding and is not mapped within the flood planning area under the Uralla LEP 2012.

6.3.3 Potential Impacts

Surface Water

Potential impacts on surface water as a result of the project include:

- Sediment-laden runoff from overburden emplacements, waste-rock dumps, stockpiles and other disturbed areas entering Spring Creek.
- Stormwater contamination from processing areas and vehicle wash-down areas entering Spring Creek.
- Oils and fuel associated with the operation of mechanical equipment running off into Spring Creek.

Groundwater

The *NSW Aquifer Interference Policy* outlines Minimum Impact Considerations for different aquifer sources, with the New England Fold Belt Murray Darling Basin Groundwater Source classified as a less productive porous and fractured rock water source (DPE 2021). The Minimum Impact Considerations are summarised in **Table 6.7**.

Table 6.7 Minimum Impact Considerations for Less Productive Porous and Fractured Rock Water Sources

Water Table	75. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: a. high priority groundwater dependent ecosystem; or b. high priority culturally significant site; listed in the schedule of the relevant water sharing plan. A maximum of a 2m decline cumulatively at any water supply work. 76. If more than 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any: a. high priority groundwater dependent ecosystem; or b. high priority culturally significant site; listed in the schedule of the relevant water sharing plan then appropriate studies will need to demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site.

	If more than 2m decline cumulatively at any water supply work then make good provisions should apply.
Water Pressure	77. A cumulative pressure head decline of not more than a 2m decline, at any water supply work. 78. If the predicted pressure head decline is greater than requirement 1.(a) above, then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply.
Water Quality	79. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity. 80. If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works.

The project is not located within proximity of any high priority groundwater dependent ecosystem or culturally significant site listed within the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order 2020*. Noting this, the potential impacts on groundwater as a result of the proposal include:

- Cumulative decline of water table at water supply works within nearby properties.
- Cumulative decline of pressure head at water supply works within nearby properties.
- Decline in groundwater quality within nearby properties.

Flood Risk

The project has a 5.51 ha catchment area that would likely undergo some degree of compaction as a result of the project, which will locally reduce infiltration and increase runoff. All surface runoff within the quarry footprint associated with the five-day 90th percentile rainfall event (37.4 mm) will be collected by way of water diversion structures and sediment basins. The project is therefore not likely to significantly affect flood behaviour within the catchment.

The construction and ongoing management of sediment basins will, in the vast majority of cases, prevent the discharge of dirty water from the site and provide protection from any avoidable erosion and siltation issues. The project is therefore not likely to cause avoidable erosion or siltation issues within Spring Creek and is not likely to significantly damage riparian areas and creekbanks.

A regional flood frequency estimation model was undertaken for the adjacent meander of Spring Creek (refer to **Table 6.8**). Under current climate conditions, discharge associated with the 1% AEP (1 in 100) rainfall event is expected to peak at 27.7 m^3/s. AdaptNSW modelling indicates that rainfall within the region is projected to increase by 1.51 % by 2039. Discharge peak flows, with respect to projected increases in the region as well as increases in rainfall intensities of 10%, 20% and 30%, are presented in **Table 6.9**. There is minimal frictional resistance within the riparian zone and immediate slopes of the meander of Spring Creek within the immediate vicinity of the project, with the vegetation comprising various grass species. Given the slope, relative elevation of the project and minimal frictional resistance adjacent to Spring Creek, it is unlikely that flooding will impact the project during a 1% AEP event with a 1.51 % increase.

Table 6.8 Regional Flood Frequency Estimation Model for Spring Creek

AEP %	Expected Quantiles (m^3/s)	5% Confidence Limit (m^3/s)	95% Confidence Limit (m^3/s)
50	2.12	0.920	4.88
20	5.22	2.37	11.5
10	8.48	3.78	19.2
5	12.7	5.47	29.9
2	20.3	8.20	50.5
1	27.7	10.7	71.8

Source: Australian Rainfall & Runoff 2019

Notes:

1. Catchment area: 7 km^2
2. Catchment centroid location: -30.573, 151.51
3. Catchment outlet location: -30.554, 151.51
4. Shape factor: 0.8

Table 6.9 Adjusted Regional Flood Frequency Estimation Model for Spring Creek

AEP %	Expected Quantiles (m^3/s)	AdaptNSW 2039 Model (m^3/s)	10% Rainfall Increase (m^3/s)	20% Rainfall Increase (m^3/s)	30% Rainfall Increase (m^3/s)
50	2.12	2.15	2.33	2.54	2.76
20	5.22	5.30	5.74	6.26	6.79
10	8.48	8.61	9.33	10.18	11.02
5	12.7	12.89	13.97	15.24	16.51
2	20.3	20.61	22.33	24.36	26.39
1	27.7	28.12	30.47	33.24	36.01

Source: Adapted from Australian Rainfall & Runoff 2019

Notes:

1. Catchment area: 7 km^2
2. Catchment centroid location: -30.573, 151.51
3. Catchment outlet location: -30.554, 151.51
4. Shape factor: 0.8

6.3.4 Site Water Balance

A site water balance has been undertaken for the project. The water balance does not include potable water and effluent. A mobile crib room, change room, office and ablutions facility would be required for employees. All water and wastewater will be sourced and treated off site. There will be no permanent structures containing potable water or wastewater facilities (refer to **Section 3.8**).

For the purposes of the site water balance, rainfall is the only input. Of the rain falling on the site, a proportion would infiltrate, another proportion would evaporate, and the remainder would become runoff. Monthly rainfall and evaporation data sourced from the Bureau of Meteorology is summarised in **Table 6.10**.

Table 6.10 Mean Monthly Rainfall and Evaporation Depths

Month	Mean Monthly* Rainfall (mm)	Mean Monthly Evaporation** (mm)
January	102.7	155.0
February	83.9	121.5
March	60.5	105.4
April	39.4	75.0
May	44.2	52.7
June	52.9	36
July	55.9	43.4
August	54.3	65.1
September	53.3	93
October	72.7	124
November	84.6	132
December	88.1	158.1
Annual	**791.1**	**1168.8**

Source: Bureau of Meteorology

* Rainfall data sourced from Uralla weather station approximately 10.4km south of Williams Quarry

** Evaporation data sourced from Armidale (Tree Group Nursery) weather station approximately 15.8km ENE of Williams Quarry

In accordance with *Managing Urban Stormwater: Soils and construction - Volume 2E*, the sediment basins would capture all rainfall runoff associated with the five-day 90th percentile rainfall event (37.4 mm). During an extreme rainfall event in which the design capacity of the sediment basins was exceeded, water would passively discharge into Spring Creek. Instances of this occurring would be recorded. The sediment basin would facilitate settlement of suspended sediment prior to reuse or discharge of the collected water. There would be some evaporation of water from the sediment basin. Water collected in the basin may be reused for any or all of the following on an as-needed basis:

- Suppression of dust within quarry and along access roads; and
- Irrigation of rehabilitated areas and stockpiles.

Based on the mean monthly rainfall and evaporation data, it is estimated that the project would require approximately 84 KL of water per day for dust suppression. In the event that this water was not able to be sourced directly from the sediment basins, non-potable water would be brought in from off site.

6.3.5 Water Management Plan

Water samples would be collected within Spring Creek immediately upstream and downstream of the project site and analysed to establish a baseline condition for the following water quality parameters:

- Electrical Conductivity.
- pH.
- Oil and grease.
- Total suspended solids.
- Dissolved Oxygen.
- BTEX.

In accordance with the *NSW Aquifer Interference Policy*, a baseline condition for groundwater conditions would be established. This would include sampling of all existing bores in the area potentially affected by the project, and any existing monitoring bores, to establish groundwater depth, quality, and flow.

During the operational phase of the project, clean water from offsite would be diverted around the quarry footprint via the use of clean water diversion drains. Stormwater runoff from within the quarry footprint would be diverted to two sediment basins via the use of dirty water diversion drains. Water captured within the sediment basins would be used for dust suppression and irrigation of rehabilitated areas when available as a first priority. Any water in excess of an amount needed for these purposes would be actively discharged into Spring Creek in order to return the sediment basin to its design capacity within five days. This would be undertaken within the parameters of the required EPL. Two active discharge points would be needed for the site, with one associated with each sediment basin. Due to the net evaporative loss of water within the immediate area and the need for its use during the quarry's operation, it is anticipated that the volumes of water discharged to Spring Creek from the sediment basins would be minimal. However, in the unlikely event that the entirety of the water within the sediment basins were to be discharged into Spring Creek, the volumes would not exceed 1,850 m^3.

Prior to active discharge, the water quality within the receiving waters and sediment basins would be assessed. Due to the dispersive nature of the subsoils, treatment of sediment basin waters with a flocculant such as gypsum may be required. Active discharge of waters would only occur when it is determined that the water quality of the receiving stream would not be adversely impacted.

Measurement of the baseline condition of Spring Creek upstream and downstream of the project has not been undertaken, however, would be undertaken prior to construction. Following analysis of the baseline condition, appropriate trigger values would be developed with consideration of potential impacts to the water quality of receiving waters. Until a baseline condition is established and appropriate trigger values have been determined, active discharge would only occur when the water quality within the sediment basin is within the thresholds specified within **Table 6.11** or other thresholds determined by no less than three years of baseline monitoring data.

Records of the volumes, parameter measurements and dates of all actively discharged waters will be recorded.

Table 6.11 Interim Trigger Values for the Active Discharge of Waters from Sediment Basins

Parameter	Lower Limit	Upper Limit	Reference
Electrical Conductivity (μScm^{-1})	30	350	ANZECC/ARMCANZ (2000)
pH	6.5	8.0	ANZECC/ARMCANZ (2000)
Dissolved Oxygen ($\%_{sat}$)	90	110	ANZECC/ARMCANZ (2000)
Turbidity (NTU)	2	25	ANZECC/ARMCANZ (2000)
Visible oils/ grease	None visible		

6.3.6 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to water management:

17. A Soil and Water Management Plan will be developed outlining the soil and water management requirements for the project. This plan will include an erosion and sediment control plan (ESCP) for the various stages of construction and measures to manage erosion and sediment issues onsite. As part of this plan, a Water Quality Monitoring Program will also be developed outlining the requirements for surface water and groundwater monitoring.
18. Erosion and sediment controls, including sediment basins, will be implemented in accordance with guidelines contained within *Managing Urban Stormwater, Soils and Construction (*the Blue Book) (Landcom, 2004) and maintained to:

    - Reduce water velocity and capture sediment onsite.
    - Divert clean water around the site.

- Prevent sediment moving off-site.

19. Erosion and sedimentation controls outlined in the ESCP are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.
20. Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised.
21. Work areas are to be stabilised progressively during the works.
22. Stockpiles will not be placed within 40 m of Spring Creek or within 5 m of hazard areas such as hardstand areas or roads. Stockpiles will be stabilised if in place for more than 10 days.
23. A spill containment kit is to be available at all times. Staff are to be trained in the effective deployment of the spill containment kit.
24. No waste and/or wastewater will be discharged directly or indirectly in drains or waterways.
25. During construction, visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) within and adjacent to the site is to be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls during construction.
26. Council and the EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on 131 555).
27. The EPL will be complied with and implemented onsite for the life of the project.

6.4 Biodiversity

Issue	Environmental Assessment Requirements	Section
Biodiversity	■ 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* ■ 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.	6.4.4 6.4.4 6.4.5 and 6.4.6

6.4.1 Methodology

A BDAR has been prepared for the project (refer to **Appendix F**). The findings of the biodiversity assessment including potential impacts, mitigation measures and offset requirements of the project are summarised in this Section.

The BDAR has been prepared to address the requirements of the BC Act and was undertaken in accordance with the BAM (2020). Methodologies used included a combination of desk-based searches of relevant databases and historical records, as well as a field inspection of the site to identify and assess biodiversity values in accordance with Stage 1 and Stage 2 of the BAM (2020).

The BOS was triggered due to the proposed development impacting native vegetation over the clearing threshold (1 ha native vegetation) for a minimum lot of 400 ha. Additionally, areas being impacted are mapped as 'Biodiversity Value land' (associated with Spring Creek), as such a BDAR was required.

6.4.2 Existing Environment

The site occurs within a rural landscape on hilly terrain with small patches of dry sclerophyll forest within and surrounding the development site. The western and southern edges of the subject site are bordered by Spring Creek which is mapped as 'Biodiversity Value land'. The northern border of the

subject site consists of the existing quarry and Rose Hill Road. The eastern border of the site consists of cleared grassland utilised for primary production purposes. Within the greater locality, the landscape generally consists of rural properties utilised for primary production purposes.

A total of two native plant community type (PCT) were recorded within the site:

- PCT 3352 - Armidale Quartz Hills Stringybark Forest.
- PCT 3359 - New England Hills Stringybark-Box Woodland.

The above PCTs were recorded in two different vegetation condition states being 'derived' and 'moderate' condition.

One TEC was recorded within the investigation area, being *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* This TEC is listed as Critically Endangered (BC Act and EPBC Act) and associated with PCT 3359 - New England Hills Stringybark-Box Woodland.

Additional information regarding the existing environment, including figures, can be located in **Appendix F**.

6.4.3 Threatened Species

In accordance with the BAM, threatened species have been assessed as predicted ecosystem credit species and/ or candidate species credit species.

- Predicted species (ecosystem credit species):
  - A total of 24 threatened fauna species have been identified as predicted ecosystem credit species associated with the project footprint.
- Candidate species (species credit species):
  - A total of three threatened flora species were identified as candidate flora species credit species associated with the project footprint and were subject to targeted surveys. No candidate flora species were identified within the site and as such no candidate flora species would be impacted.
  - A total of five threatened fauna species were identified as candidate fauna species credit species associated with the project footprint and were subject to targeted surveys. No candidate fauna species were identified during targeted surveys and as such no candidate fauna species would be impacted.

6.4.4 Potential Impacts

Impacts unable to be avoided by the project have been assessed in accordance with Stage 2 of the BAM (2020).

In total, there would be a direct impact on 6.28 ha of native vegetation comprising:

- 5.72 ha of PCT 3352 'derived' condition.
- 0.56 ha of PCT 3352 'moderate' condition.

No direct impacts to PCT 3359 - New England Hills Stringybark-Box Woodland are expected to occur as these areas occurred outside the project footprint. As such no impacts to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC are expected.

The project has not been located in an area where subsurface works would impact habitat features. As such, the project is unlikely to directly or indirectly interfere with subsurface or groundwater flows associated with any habitat features or vegetation communities.

Based on ecosystem credits and species credit species, and in accordance with the BAM, there would be the loss of habitat for 24 threatened fauna species identified as predicted ecosystem credit species.

Chapter 3 Koala Habitat Protection 2020 of the Biodiversity and Conservation SEPP defines 'potential koala habitat' as "*areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component*".

Within the site the following Eucalyptus species dominated the canopy of remnant vegetation:

- *Eucalyptus caliginosa* (New England Stringybark);
- *Eucalyptus melliodora* (Yellow Box); and
- *Eucalyptus blakelyi* (Blakely's Red Gum)

None of the above Eucalyptus species are listed in Schedule 1 tree species under Chapter 3 Koala Habitat Protection 2020. On this basis, potential Koala habitat does not occur within the site as defined by the Biodiversity and Conservation SEPP. Overall, it is not considered that the project site provides important koala habitat for the species in the locality. It is likely the project would have a low impact on koalas and koala habitat in the locality.

6.4.5 Mitigation Measures

Mitigation measures have been prepared in accordance with Section 8.1 of the BAM (2020). The following mitigation measures will be implemented to address potential impacts relating to biodiversity:

28. Ensure detailed design is consistent with the impact areas assessed under the BDAR.
29. Internal speed limits and speeds along Rose Hill Rd will be ≤50 km/hr which would reduce the risk of fauna mortality from vehicle strike.
30. An Erosion and Sediment Control Plan (ESCP) will be prepared for the site and incorporate erosion and sediment control measures in accordance with the Landcom/ Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book) with specific controls installed around watercourses.(Department of Environment and Climate Change 2008, Landcom 2004).
31. Erosion and sedimentation controls outlined in the ESCP are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.
32. Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised.
33. Work areas are to be stabilised progressively during the works.
34. Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (e.g. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines) (Department of the Environment 2015).
35. Biosecurity risk weeds are to be managed according to requirements under the *Biosecurity Act 2015* and/or Council management measures.
36. The extent of the development footprint must be clearly (i.e. hi-visibility fencing or similar) pegged/ marked on site by a registered surveyor, consistent with final approved plans/ designs.
37. Vegetation clearing must be undertaken via a staged approach so any resident fauna have opportunities for dispersal into retained vegetation outside the construction zone.
38. Pre-clearing surveys must be undertaken by an ecologist or spotter-catcher to ensure nesting or roosting fauna are not present within vegetation to be removed. Surveys would ensure no Koalas are present within any vegetation to be removed. Surveys would ensure no Koalas are present within any vegetation to be removed. In the event that a Koala is identified on the site, clearing

would be delayed until the animal moves off the site of its own volition, as determined by an ecologist.

39. Any hollow-bearing trees (identified during pre-clearing surveys not previously identified as part of the BDAR) are to be removed in accordance with a two-stage clearing process with surrounding trees to be cleared initially, with the habitat tree to be cleared at least 48 hrs after this. The felling of hollowbearing trees would be supervised by an ecologist. A hollow-bearing tree inventory will be undertaken during the clearing process – data will be used to identify nest box replacement requirements (if required).
40. Any hollow-bearing trees identified to be removed during pre-clearing surveys will be replaced and offset within retained vegetation at a 2 (nest box) :1 (hollow tree) ratio. If required, nest boxes will be provided, installed and monitored as prescribed in the Vegetation Management Plan (outlined below). Nest boxes will be installed in accordance with advice from a suitably experienced and qualified ecologist.
41. Vegetation to be cleared will not be pushed into adjacent vegetation.
42. Relocation of habitat features (fallen timber, hollow logs) from the development footprint are to be retained and placed into areas identified for revegetation or within adjacent vegetation without causing significant damage (i.e. placing on the edge of retained vegetation).
43. Vegetation removed will not be burnt. Vegetation removed will be chipped and mulch retained for reuse on site.
44. A Vegetation Management Plan (VMP) will be prepared and focus management actions surrounding the proposed development (including other facilities on the lot) and along Spring Creek riparian zones and other areas previously cleared and not associated with development. The plan will include (but not limited to):

    - Re-establishment/ restoration of native vegetation along Spring Creek and offset planting areas (including previously cleared areas unused).
    - Weed control surrounding the development area and along Rose Hill Rd.
    - Nest box replacement and monitoring (if required).

45. Implementation of a Vegetation Management Plan in accordance with the measures outlined above.
46. Signage must be installed along access routes displaying road speed limits (<50km/hr) to reduce potential of vehicle strike to fauna and dust impacts.
47. Stormwater swale and outlet works must be completed to minimise disturbance to native vegetation and appropriate erosion and sediment controls are installed and maintained these will be in accordance with an Erosion and Sediment Control Plan (ESCP).

6.4.6 Offset Requirements

Biodiversity offset obligations have been determined using the BAM calculator (BAM-C). The project will require a total of 14 ecosystem credits.

The offset requirement identified in the BDAR will be satisfied either via retirement of suitable biodiversity credits available on the biodiversity credit register or payment into the Biodiversity Conservation Fund.

6.5 Heritage

Issue	Environmental Assessment Requirements	Section
Heritage	An Aboriginal Cultural Heritage Assessment Report (ACHAR), prepared in accordance with relevant policy and guidelines, identifying, describing and assessing any impacts to Aboriginal cultural heritage sites or values associated with the project.	6.5.1, 6.5.2 and Appendix G

	■ The ACHAR must be prepared in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of thorough archaeological survey and test excavations (where required). ■ Include evidence of adequate and continue consultation with Aboriginal stakeholders in determining and assess impacts, developing and selecting options for avoidance of Aboriginal cultural heritage; and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010).	6.5.1 and Appendix G 6.5.3, 6.5.4 and Appendix G

6.5.1 Methodology

An Aboriginal Cultural Heritage Assessment Report (ACHAR) was undertaken for the project by Heritage Management & Planning Pty Ltd. This section presents the key findings of the assessment with the full report provided in **Appendix G**.

The assessment was undertaken and prepared in accordance with the following guidelines and criteria:

- *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DEECW 2010) (CoPAI)
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011)
- *Aboriginal Cultural Heritage Consultation Requirement for Proponents* (DECCW 2010).

The assessment includes:

- A review of relevant information including database registers and other heritage assessments.
- Development of an archaeological predictive model to inform the assessment methodology and impact assessment.
- Consultation with the Aboriginal community including documentation of the consultation process and how the consultation informed the assessment.
- Assessment of the cultural values.
- Recommendations to mitigate the impacts of the project.

Database searches were undertaken to inform the historic heritage impact assessment.

6.5.2 Existing Environment

Aboriginal Heritage

The site is located in an area near the confluence of two smaller creeks (Spring Creek and Reedy Creek) but upstream from the confluence with the Rocky River. The area around Rocky River would have an increased potential for large archaeological sites associated with semi-permanent campsites. The site is approximately 980-1,000 metres above sea level and is located on a low-moderate side slope to the north-west of a relatively large hill/ crest which runs south-east. The site is located nearby to the interface of the older sedimentary Sandon Beds and has the potential to contain metamorphosed stone material (silcrete) which is commonly used for stone tool production.

A review of historic aerials was undertaken to understand the potential impact of historic land use on the potential for the project to harm Aboriginal objects, with specific consideration of impacts to topsoils with the potential to contain Aboriginal archaeological sites. Aerial photos from 1978, 1990 and 2020 demonstrate that the existing quarry has been in use since at least the mid-1970's.

The first records of Aboriginal people on the New England Tablelands estimate that the population was in the order of 600 individuals. A detailed ethnohistory and summary of previous archaeological studies is provided in the ACHAR in **Appendix G**. Following a review of information and interpretation of the landscape features, it is considered there is a moderate potential the study area will contain Aboriginal Archaeological sites.

Aboriginal Heritage Information Management System (AHIMS)

An AHIMS search identified no recorded Aboriginal heritage sites in close proximity to the project site, however the search identified 72 previously recorded Aboriginal sites in the wider area, of which a majority were artefacts. Although there are qualifications around the recording of ceremonial and sacred sites, there are no recorded stone arrangements or bora rings within the search area. Additionally, there are no previously recorded burials.

Historic Heritage

There are no listed items of local or State heritage on or immediately near the project site. No further assessment is required.

6.5.3 Potential Impacts

Site Survey

An archaeological site survey was undertaken with representatives from Iwata Aboriginal Corporation as part of the ACHAR. The survey focused on the elevated saddle and crest to the east of the quarry site where the ground had not been disturbed. Overall, the survey was constrained by grass cover and gravel from access tracks and laydown areas.

During the site survey, an artefact scatter (Williams Quarry Arding Artefact Scatter 01) was identified at the site. The residual area of the ridge crest was identified as a potential archaeological deposit. The site also forms part of a broader cultural landscape that connects the major ceremonial sites of Mt Yarrowyck and Oorala and was likely used by Aboriginal groups who occupied permanent or semi-permanent campsites around Thomas Lagoon and Saumarez to the north.

Aboriginal Community Consultation

In accordance with the *Aboriginal Cultural Heritage Consultation Requirement for Proponents* (DECCW 2010), Aboriginal community consultation was undertaken to inform the impact assessment. The representatives included:

- Armidale Local Aboriginal Land Council (LALC).
- Iwata Aboriginal Corporation.
- Aleira French Trading.
- AT Gomilaroi Cultural Consultancy.
- Edgerton Kwiembal Aboriginal Corporation.
- Gomeroi People (c/- NTSCORP Ltd).
- NTSCORP Ltd.
- Gomery Cultural Consultants.
- Indigenous Outcomes.
- Nunawanna Aboriginal Corporation.
- Vicky Hannah Gomeroi Duncan.
- Anaiwan Traditional Owners Aboriginal Corporation.
- RAW Cultural Healing.
- NSW Aboriginal Land Council.
- Northern Tablelands Local Land Services.
- Heritage NSW.

- Uralla Shire Council.
- Registered individuals.

Based on the outcomes of the consultation, archaeological test excavations were determined to be an appropriate management response for the site given the findings of the Williams Quarry Arding Stone Artefact Scatter 01. No objections were received during the Aboriginal community consultation.

Archaeological Investigations

Archaeological excavations were undertaken (in the form of test pits) to determine the likelihood that Aboriginal archaeological sites occur through the soil profile. The locations of the five test-pits were focused on an area along the eastern fence that represented an area on the ridge crest which had not been subject to significant historical ground disturbance that would have impacted topsoil.

The Williams Quarry Arding Artefact Scatter is a low-moderate density (up to 20 artefacts per square metre) flake scatter typical of travelling or hunting sites on the New England Tablelands. The site is located across the ridge crest east of Williams Quarry pit. The scatter overlooks Spring Hill Creek and looks north-west to Mt. Yarrowyck. The density of artefacts is greatest where soils have eroded and artefacts have been retained on the ground surface.

The overall high density of artefacts identified by the test excavations is from the high proportion of knapping waste, being small flake pieces and debitage, that was identified as a result of using a wet sieve to process the soil. However, the proportion of formed and primary flakes is consistent with other archaeological sites in the region that utilised dry sieve methods for soil processing. Further detail is provided in **Appendix G**.

Following the analysis, the artefacts were reburied within a test pit with each artefact individually bagged and labelled including a metal object to assist with the relocation of the artefact using a metal detector.

As outlined in **Table 6.12**, harm is expected to occur as a result of the project. The project site has been assessed as being of moderate scientific significance.

Table 6.12 Impact Assessment

Site	Type of Harm	Degree of Harm	Consequence of Harm
Williams Quarry Arding Artefact Scatter 01	Direct	Partial	Partial loss of value

It was concluded that the site likely extends into the adjacent paddocks, which has not been subject to significant ground disturbance that has either removed or covered topsoils around the existing operation. The distribution of artefacts across the ridge crest demonstrates that while Aboriginal people may not have been utilising the elevated ridges and spur ridges to the same extent as the lagoons and wetlands, there was a pattern of use which includes hunting and travelling between campsites or ceremonial sites on the interconnected ridges. As such, measures to protect the topsoils on the ridge crest are included in **Section 6.5.4**.

The ACHAR concluded that an AHIP will be required for any future activities that involve disturbance of topsoils within the project site. Mitigation measures have been recommended to avoid or mitigate the consequences of harm. Additionally, a repatriation site has been proposed to ensure topsoil is protected.

6.5.4 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to heritage:

48. All workers will undertake cultural awareness training, either delivered by Aboriginal LALC or Iwata Aboriginal Corporation, and will include operational and reporting conditions of the AHIP, a guide to identify stone artefacts and a summary of mitigation measures around the topsoils relocation and repatriation areas.
49. A topsoil relocation procedure will be developed to ensure intact topsoils on the ridge crest are relocated prior to any further works commencing.
50. An AHIP will be sought for impact to the Williams Quarry Arding Artefact Scatter 01 under Section 90 of the NPW Act.
51. A topsoil repatriation area for the permanent relocation of the topsoils will be located along the eastern boundary fence, outside the project footprint and will be recorded as a new repatriation site on AHIMS.
52. The topsoil repatriation site will be constructed so downslope erosion and loss of artefacts is not increased. Appropriate erosion and sediment controls will be installed, together with revegetation and installation of exclusion fencing and signage.
53. Existing topsoil stockpiles will be quarantined and clearly identified with permanent exclusion fencing and signage.
54. Additional archaeological salvage excavation of the existing topsoil stockpiles will be required (undertaken in accordance with the ACHAR) to understand the archaeological values and to inform the long-term management of stockpiles on the ridge crest.
55. Any artefacts collected during the test excavations or archaeological salvage works on existing topsoils will be repatriated into the permanent topsoil site so they are retained on country.
56. If any suspected heritage items (either Aboriginal or historic) are uncovered during the project, all works will cease in the vicinity of the material/ find. Armidale Regional Council and NSW DPE – Environment and Heritage Group will be contacted immediately.
57. Should skeletal material/human remains be exposed during ground disturbance, work will cease immediately, and contact made with NSW Police.

6.6 Traffic and Transport

Issue	Environmental Assessment Requirements	Section
Traffic and Transport	■ 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.	6.6.3
	■ An assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads.	6.6.3
	■ 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.	6.6.4
	■ Evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance.	4.1
	■ A description of access roads, specifically in relation to nearby Crown roads and fire trails.	6.6.3

6.6.1 Methodology

A Traffic Impact Assessment was undertaken for the project by GeoLINK. This section presents the key findings of the assessment with the full report provided in **Appendix H**.

The assessment was undertaken and prepared in accordance with the following:

- Austroads Guide to Traffic Management Part 12 – Integrated Transport Assessments for Developments (2020).
- Guide to Traffic Generating Developments (RTA, 2002).

The assessment includes:

- A review of the existing road network, traffic flows, traffic safety and any existing public transport routes.
- An assessment of proposed traffic generation and distribution of the project, considering existing roadway capacity and intersection capacity.
- An assessment of proposed impacts relating to traffic efficiency, amenity and safety as a result of the project.
- Consideration of impacts to public transport and pedestrians and cyclists.
- Recommendations to minimise traffic and transport impacts.

6.6.2 Existing Environment

Existing Road Network

The existing road network is discussed in **Section 2.4.1**.

Existing Traffic Volumes

Rose Hill Road

Estimated daily traffic volumes for Rose Hill Road at the connection to Arding Road are around 40 vehicles per day (vpd), with up to 40% heavy vehicles depending on quarry operations.

Arding Road

Traffic data supplied by Council, and verified by an on site traffic count, for Arding Road indicates Annual Average Daily Traffic (AADT) of between 150 vpd (western end) and 250 vpd (eastern end) with 23-55% heavy vehicles. Typical directional split for outbound movements was 70/30, meaning 70% of the vehicles turned left to head north toward Armidale with 30% of the vehicles turning right to head south toward Uralla.

According to Council data, peak hour traffic was between 10 and 18 vehicles per hour (vph). The on site traffic count (undertaken on 19 October 2022) indicated peak hour traffic (PHT) was 35 vehicles, including two school buses, with 75% of outbound traffic to the New England Highway and 25% inbound traffic from the New England Highway.

New England Highway

TfNSW traffic data for New England Highway shows typical AADT of 6,128 vpd for the year 2011, up from 5,842 in 2007. As such, traffic growth in this period is approximately 1.2% per annum. This would indicate likely traffic volumes of around 7,000 vpd for the year 2022. Heavy vehicle volumes were generally around 10% of the total volumes.

The on site traffic count indicated PHT of 451 vph for northbound traffic and 249 vph for southbound traffic during the am peak between 9 an 9am. The proportion of heavy vehicles was around 7% of northbound traffic and 14% of southbound traffic.

Traffic Safety

The TfNSW Centre for Road Safety Interactive Crash Statistics identified a number of crash sites along the proposed haulage route. For many of the crash types that are recorded along the haulage route, the likelihood of the risk increasing for these crash types as a result of the development generated traffic is low. However, there is one crash location at the intersection of Arding Road and the New England Highway that that could be exacerbated by development generated traffic.

A crash at this location resulted in serious injury, but it is unclear from which leg of the crossroad intersection the vehicle was turning. Right turn movements at the intersection is reviewed as part of this assessment with a summary provided in **Section 6.6.3**.

Public Transport, Pedestrians and Cyclists

No public transport routes pass the site access location. However, school buses were observed using Arding Road, with two school buses being observed using the intersection with the New England Highway during the on site traffic count. Public transport routes do use the New England Highway between Uralla and Armidale, with Edwards Coaches route 480 departing Uralla and Armidale three times daily on weekdays and twice daily on Saturdays.

There are many pedestrian/ cyclist generators along the proposed haulage route, with the primary point of potential conflict between vehicles and pedestrians likely to be near the intersection of Miller Street, Uralla Road and Kentucky Street in Armidale. Two schools are located here adjacent to the industrial estate. These potential conflicts already exist due to existing industrial estate traffic and the existing school traffic.

Closer to the project, there are minimal pedestrian or cyclist generators or infrastructure. Conflicts between development generated traffic and pedestrians or cyclists is highly unlikely.

6.6.3 Potential Impacts

The project would involve quarry material to be transported by heavy vehicles from Williams Quarry to Ducats processing facility in Armidale. A discussion of the proposed haulage route is provided in **Section 3.5**.

In general, the operation will require both an inbound and an outbound trip for all trucks carrying out material. It is likely that these trips will, on average, be equally distributed throughout normal business hours, typically between 7 am and 5 pm, with a slightly higher number of vehicle movements in the morning peak period. In addition to truck movements, there will typically be a need for a single vehicle inbound trip each morning and a single vehicle outbound trip each afternoon for the quarry operator.

Peak traffic is likely to occur in the morning period, when the first trucks arrive for material collection for the days works. The afternoon peak period is likely to have fewer truck movements as material deliveries are usually carried out on the day that the material is to be used. As a result, it has been assumed that the morning peak hour will involve the largest number of vehicle movements.

The traffic modelling and assessment has assumed/ estimated a number of inputs to assist with the identification of potential impacts. These are described in detail in **Appendix H**. The modelling identifies a conservative estimate of peak traffic generation of 62 vpd AADT, and a 10-year design

traffic estimate of 75 vpd AADT. The peak hour trip has been assumed to be 7 vehicles per hour, comprising 85% heavy vehicles.

The *Austroads Guide to Road Design Part 3: Geometric Design (*2021) provides recommended minimum geometric characteristics for various types of roads. Rose Hill Road and Arding Road are consistent with the roads identified in this guide where they have traffic volumes less than 150 vpd and some are arterial roads passing through sparsely settled flat country where the terrain leads to a high operating speed. It is noted that Rose Hill Road is likely to have lower operating speeds due to the existing geometry.

Based on the above, it is not considered necessary to upgrade Rose Hill Road as a result of the project. Additionally, Arding Road already provides a 7 m sealed width in good condition. As such, no upgrade to Arding Road is required or proposed. The existing condition of the New England Highway is suitable for the small increase in additional traffic and has the capacity to accept much higher volumes of vehicles.

No other known access roads are likely to be impacted by the project, including crown roads and fire trails.

Overall, the project will have a minimal negative impact. Mitigation measures are provided in **Section 6.6.4** to minimise any potential impacts.

Existing Intersections

There are three existing intersections that would be impacted by the project, including:

- Site access connection to Rose Hill Road.
- Rose Hill Road/ Arding Road.
- Arding Road/ New England Highway.

Site Access and Rose Hill Road

This intersection has assumed to be suitable for all vehicle types and the combined existing and future traffic for a 10-year design horizon, particularly given that it is already used by haulage trucks from the existing operation. Existing geometry and sight distance are considered acceptable.

Rose Hill Road and Arding Road

This intersection is a sort of geometric continuation from Rose Hill Road onto Arding Road, however Rose Hill Road is unsealed while Arding Road is sealed. Additionally, at the intersection, Mt Butler Road also connects from the north in a T-intersection arrangement. There is no existing linemarking or signage at the intersection that indicates right of way.

Due to the increase in traffic expected as a result of the project, a ‘Give Way’ sign and hold line is recommended at the intersection on Mt Butler Rd to avoid unnecessary vehicle conflicts.

Arding Road and New England Highway

This intersection is adequate for all movements, with only vehicles exiting Saumarez War Service Road experiencing less than Level of Service (LOS) A during the peak hour. A model was prepared based on existing geometry and the worst-case traffic data, applying a 1.2% annual growth rate to achieve a 10-year design-horizon and adding the expected traffic generated by the development. The results indicate the existing intersection is expected to operate at LOS A for the year 2032 with no decrease in LOS as a result of the development. Further, the additional traffic does not exceed the maximum volumes recommended for the given road types. As such, the project is not expected to have any noticeable impact on traffic efficiency.

The safe intersection sight distance (SISD) is the minimum standard to be provided on a major road at any intersection as defined by the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2021). The SISD depends on the operating speed at the intersection, and for traffic approaching the Arding Road and New England Intersection, this is 100 km/h. The assessment found the available sight distance at the intersection in both directions is more than sufficient for design speeds greater than those anticipated.

Site Access and Parking

As discussed in **Section 3.5**, the access connection and segment of Rose Hill Road will require upgrading. This will enable safe passage of truck and trailer but will also ensure long-term stability of the road pavement.

Parking demand is considered very low and all parking will be on site, similar to the existing arrangement. There is expected to be one employee on site and unlikely to be multiple haulage trucks arriving simultaneously.

Public Transport, Pedestrians and Cyclists

The project would not generate any demand for the public transport network and would not impact on the existing public transport system operating in the area. Furthermore, due to existing use of these roads for haulage trucks from various other industries, no new potential conflict points between haulage trucks and public transport vehicles are likely to occur.

Conflicts between development generated traffic and pedestrians or cyclists is highly unlikely. The existing and future pedestrian network will not be negatively impacted by the proposal.

However, as discussed in **Section 6.6.2**, the pedestrian infrastructure is very poor at the Miller Street/ Uralla Road/ Kentucky Street intersection in Armidale and could be improved. This is an existing issue that is not likely to be exacerbated by the project but should be considered by Armidale Regional Council.

6.6.4 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to traffic and transport:

58. A Traffic Management Plan will be prepared in accordance with key guidelines and criteria. This plan will manage the traffic impacts resulting from the construction staging of the project and detail the proposed haulage route. Any mitigation measures relevant to traffic, transport and access will also be included in this plan.
59. All drivers will be inducted in road and traffic safety measures including speed limits, haulage routes, school zones, school bus routes, residential driveway interface and internal access road requirements.
60. Monthly compliance audits will be undertaken to ensure road and traffic safety measures are being implemented.
61. Regard to public safety will be maintained at all times.
62. The site access road will be constructed in accordance with the staging drawings provided as part of the concept design plans. Internal roads, circulation and parking areas will be designed in accordance with the relevant standards for the largest likely design vehicle. All vehicles will be able to enter and exit the site in a forward movement. The pavement and surface will be designed for all-weather access.
63. Consultation with Uralla Shire Council will be undertaken to install a ‘Give Way’ sign and linemarking at the Rose Hill Road/ Arding Road/ Mount Butler Road intersection.

64. Consultation with Armidale Regional Council will be undertaken to improve the pedestrian infrastructure at the Miller Street/ Uralla Road/ Kentucky Street intersection in Armidale.

6.7 Soil/ Land Resources

Issue	Environmental Assessment Requirements	Section
Land Resources	■ Potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate) paying particular attention to the agricultural land use in the region.	6.7.2 & 6.7.3
	■ An assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts.	6.7.2 & 6.7.3

6.7.1 Existing Environment

Soil Characteristics

As discussed in **Section 2.4.3**, the existing quarry site is situated on a soil landscape classified as 'disturbed terrain' (9236xx), with the project extending south into the Invergowrie (9236in) soil landscape (DPIE 2020).

Disturbed terrain is described as 'level to hummocky terrain extensively disturbed by human activity including complete disturbance, removal or burial of soil'. This is consistent with the existing quarry operations. The surrounding Invergowrie soil landscape is characterised by narrow crests and rolling side slopes on the Sandon beds, with local relief between 30-60 metres and slopes of between 5-20% (2020). This is consistent with site observations, although the project is located on a hillside with a slope of approximately 10-18%.

The qualities of disturbed terrain landscapes are dependent on the nature of the disturbed material. The underlying geology of both the existing quarry and proposed expansion is understood to be composed of constituent units of the Sandon Association, most likely the low-grade metasediments of the Sandon beds (Colquhoun et al. 2020). Due to the underlying geology of the existing quarry site, as well as the soil landscape classification of the adjacent areas, it can be assumed that the nature of the existing disturbed material is similar in composition to that of the regolith and parent material of the Invergowrie soil landscape.

Invergowrie soil landscapes, such as those within the proposed area of works, are characterised by well drained, shallow to moderately deep (30-80cm) Mottled and Bleached Eutrophic Red Kurosols and Dermosols on crests in the upper slopes, with well drained moderately deep (60-80cm) Bleached Eutrophic Red Chromosols being encountered in midslope areas. Within drainage areas moderately deep to deep (>70 cm), moderately well-drained Haplic Eutrophic Brown Chromosols and Subnatric Eutrophic Brown Sodosols may also be encountered (DPIE 2020).

Land Capability

Invergowrie soil landscapes possess several soil qualities that represent severe limitations for land capability. They are predominantly hardsetting, acidic, and highly erodible, and are at risk of both sheet and gully erosion. There is some local variability within the soils, with sodicity/dispersibility, rocky outcrops, low general fertility, shallow soils, high shrink-swell potential, high plasticity, dieback, and slow permeability often being present (DPIE 2020). Observations during site inspections have confirmed the presence of dispersive subsoils on the lower slopes, and shallow, rocky topsoils present throughout much of the site. The slope present at the site, in combination with the aforementioned soil qualities, represents a severe limitation for high impact land management uses such as cropping. In its current state, the project site is most suited toward light grazing or pasture establishment.

Due to the severe limitations for land capability, the site is classified as Land and Soil Capability (LSC) Class 4, as per the DPIE (2012) land and soil capability assessment guidelines. Pursuant to the DPIE (2013) interim protocol for site verification and mapping of biophysical strategic agricultural land (BSAL), land with a LSC Class above Class 3 is not deemed to be BSAL. As such, the project is not classified as strategic agricultural land.

Existing and Approved Land Uses

The project site is located within the RU2 Rural Landscape zone under Uralla LEP. This is discussed in **Section 5.2.6**. Adjacent properties are currently used for agriculture (light grazing and pasture establishment) and home occupation. Located approximately 2 km east of the project, within RU1 Primary Production zoning, are small scale horticultural (stone fruit and apple orchards) operations. The subject lot is currently used for agriculture (light grazing with low stocking densities) and home occupation, in addition to the existing quarry operations.

The project site sits directly south of land mapped as Biophysical Strategic Agricultural Land under the Strategic Regional Land Use Policy. In the broader scale, the site sits on the western edge of a larger pocket of Biophysical Strategic Agricultural Land (refer to **Figure 6.1**).

Figure 6.1 Biophysical Strategic Agricultural Land mapping

Land Contamination

Online contamination searches didn't identify any cattle dip sites or other registered contamination items within or adjacent to the project site.

6.7.2 Potential Impacts

Erosion and Sedimentation

Erosion has the potential to transport soil, along with any associated nutrients, chemicals and contaminants, into receiving waterways or onto adjoining land. The main causes of soil erosion include wind, rainfall and overland flow from areas generally lacking in vegetation cover.

The project would involve vegetation removal from areas within the project footprint, thereby increasing the risk of erosion. Soil erosion is less likely within active quarry areas because once the topsoil and overburden have been removed, bare rock will be exposed. However, erosion is a particular risk on the haul roads and other areas of exposed soil, with the following potential impacts:

- Altered surface drainage paths due to accumulated sediment.
- Reduced soil productivity, resulting in difficulties in rehabilitation of the site.
- Diminished water quality due to a rise in sediment, suspended solids and various pollutants entering the waterways downstream.
- Altered ecological habitats due to potential introduced species transported in the soils.

Stockpiles are at particularly high risk of erosion resulting from wind and water if they are left exposed to the elements. Not only is this problematic for the above reasons, but it would also decrease the volume of topsoil and overburden material available for rehabilitation of the site.

Mitigation measures will be implemented to manage any potential erosion and sediment impacts (see **Section 6.3.6**.

Land Use, Capability and Potential Conflicts

As described in **Section 5.3.2**, the Resources and Energy SEPP identifies matters for consideration by the consent authority when determining a development application. This particularly relevant when determining the compatibility of the project with other land uses.

The project will result in some long term changes to land use and formation within the project footprint. However, given the high limitations of the land on agricultural activities the project has limited potential to impact agricultural land on and adjoining the site through loss and fragmentation of agricultural land and use conflict as a result of non-compatible adjoining land uses and management practices.

The existing quarry's most northern point is located approximately 90 m south of Reedy Creek, which is mapped as Biophysical Strategic Agricultural Land. The proposed development would be staged and progressively move south through the lot, resulting in the quarry progressively moving away from Reedy Creek and the mapped Biophysical Strategic Agricultural Land. As discussed throughout **Section 6**, there are potential impacts resulting from the proposed development; however, they are anticipated to result in limited impacts. Considering the progressive movement away from the mapped land and the inclusion of mitigation measures to address the potential impacts identified in the relevant sections of this EIS, it is anticipated the impacts on the Biophysical Strategic Agricultural Land would be minimal and considered acceptable.

Although home occupation in the vicinity of the project will continue, the project has the potential to cause conflict with adjoining land uses through impacts to amenity, particularly around air quality, noise and traffic along Rose Hill Road and Arding Road. Given the distance from residential receivers, the isolated rural nature, the existing operations of the quarry, and the nature of the adjoining agricultural land, the risk of conflict with adjoining land uses is considered acceptable. Mitigation measures to address these potential impacts are located in the relevant sections of this EIS. Additionally, the proposed approach to rehabilitation of the site is provided in **Section 6.12** with the need for a rehabilitation plan provided in **Section 6.7.3** below.

Land Contamination

There is no apparent risk associated with contaminated land. Regardless, measures would be in place should unexpected contamination be encountered during the works.

6.7.3 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to soils and land resources:

65. An unexpected contaminated land finds procedure will be developed for the works. In the event contaminated materials are encountered, the EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on Ph: 131 555).
66. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site.
67. Only clean fill will be used on site (if required).
68. Implement topsoil handling measures from *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
69. Prepare a rehabilitation plan that addresses the site stabilisation requirements, revegetation requirements and overall management and monitoring of the site.

6.8 Waste Management

Issue	Environmental Assessment Requirements	Section
Waste	■ Estimates of the quantity and nature of the waste streams that would be generated or received by the development. ■ Any measures that would be implemented to minimise, manage or dispose of these waste streams.	6.8.1 6.8.2

6.8.1 Potential Impacts

The project would be undertaken to ensure minimal impacts are generated from waste produced on site by ensuring that all waste is collected and disposed of or recycled in accordance with Council waste disposal protocols and EPA guidelines. No materials would be used in a manner that poses a risk to public safety.

Waste generated from the project may include, but is not limited to:

- General site and office rubbish.
- Vegetative waste.
- Septic waste (i.e. from portable ablutions).
- Used containers, drums, bags and packaging materials.
- Chemicals, oils and grease from machinery.
- Consumables such as batteries, tyres, oil filters and grease cartridges.
- Unsuitable spoil material.

The quantity of the above waste streams is unquantifiable at this stage given the limited waste proposed from the project. During operations, only one operator is anticipated to be required on site. The volume of waste produced by this operator is considered minimal. Any waste produced by the operations (ie, vegetative waste and unsuitable spoil material) would be reused where possible to minimise the volume of waste produced by the project.

Any excess spoil not utilised on site will be transported to a licensed waste facility.

Native vegetative waste from site clearing would be mulched and stored appropriately on site, for use in erosion and sediment controls where appropriate. All non-native vegetative waste will be managed and disposed of in accordance with the *Biosecurity Act 2015*.

Operation and management of the project would ensure the responsible environmental management of wastes cannot be avoided and would promote opportunities for the re-use of waste products.

6.8.2 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to waste management:

70. Resource management hierarchy principles are to be followed:

    - Avoid unnecessary resource consumption as a priority.
    - Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery).
    - Disposal is undertaken as a last resort.

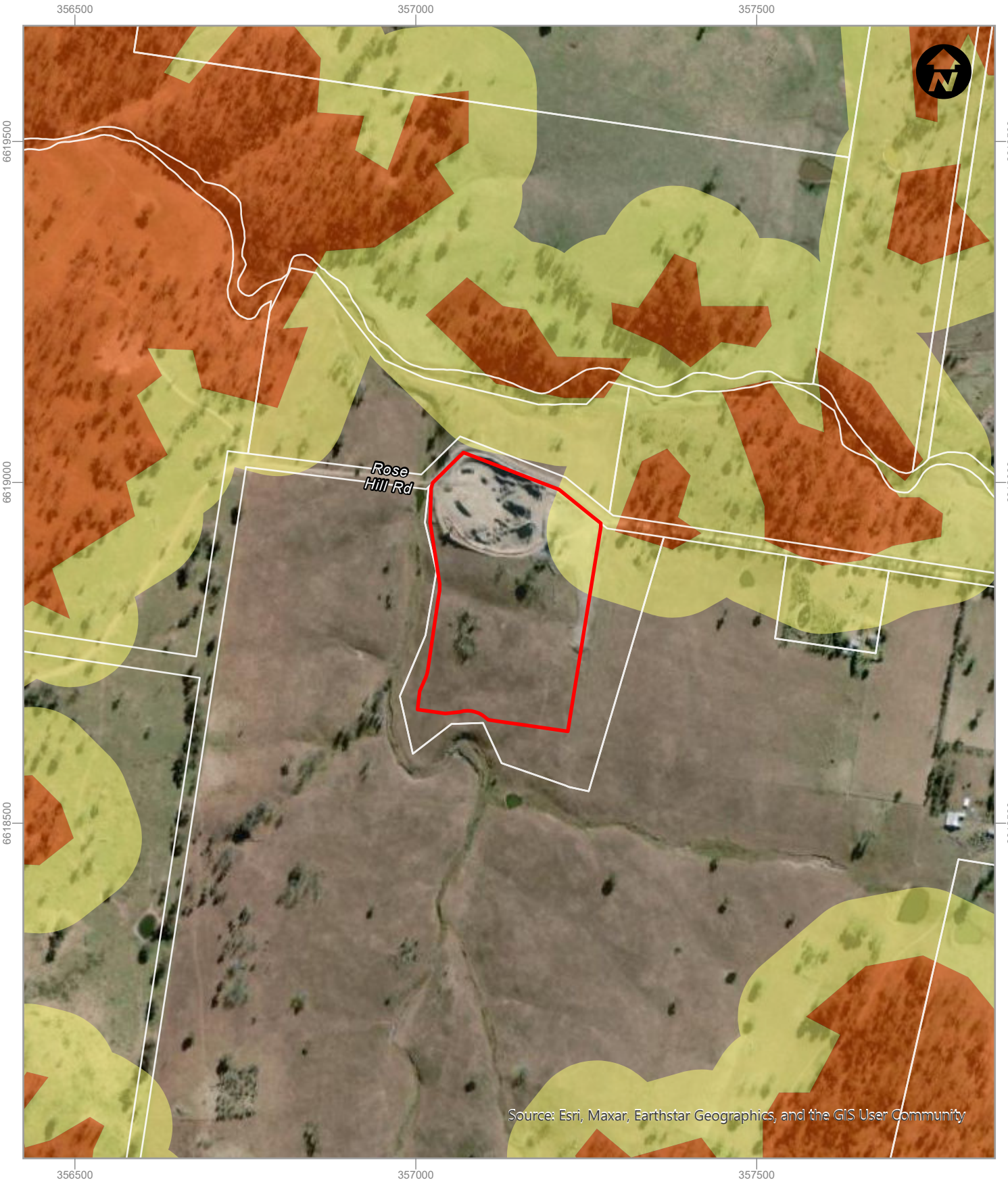
71. Waste material awaiting disposal will not within 40m of Spring Creek.
72. Vegetation or other waste will not be burnt on site.
73. Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
74. Wastes will be collected and disposed of, or recycled, in accordance with Council waste disposal protocols and EPA guidelines.

6.9 Hazards

Issue	Environmental Assessment Requirements	Section
Hazards	■ 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.	6.9.2

6.9.1 Existing Environment

The project site is identified as bushfire prone land (BPL) under Council's mapping (refer to **Illustration 6.1**). The subject lot is mapped as containing Category 1 vegetation and bushfire vegetation buffer in accordance with NSW Rural Fire Services Guideline to Bushfire Prone Land Mapping. Uralla LGA is located within the 'New England' fire weather district, with a Fire Danger Index (FDI) of 80.



LEGEND

- Development footprint
- Vegetation category 1
- Vegetation buffer

0 150 Metres

Bushfire Prone Land - Illustration 6.1

GeoLINK environment | engineering | planning | design

Environmental Impact Statement - Williams Quarry, Arding
4079-1033

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
Date: 14/02/2025
Revision: A

6.9.2 Potential Impacts

Hazardous Goods and Public Safety

A limited volume of fuel is proposed to be stored on site to allow for the efficient operation of machinery and the generator. Any other materials, such as oils, would be stored off site and used when maintaining the machinery.

As discussed in **Section 5.3.3**, the requirements of the Resilience and Hazards SEPP do not apply to the project as the project does not meet the definition of a 'hazardous industry' or 'hazardous storage establishment' as defined in Section 3.2 and 3.3 of the Resilience and Hazards SEPP.

Notwithstanding, a review of the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011) was undertaken. Fuel is deemed a Class 1 combustible liquid and is excluded from the risk screening as they are defined as having no significant hazard in storage. This is only an issue if stored with other flammable liquids as they may contribute fuel to a fire. As the fuel will not be stored with other liquids, no further assessment is required relating to transport or storage.

It is noted fuel storage at the site will only be required on an as-needs basis depending on the construction staging. Measures will also be employed to minimise risk to the environment by placing the limited volume of fuel within a separate bunded area, near the portable site facilities at the western extent of the site away from Spring Creek.

Planning for Bushfire Protection Assessment

The project is for commercial and industrial development on BPL. As such, chapter 8.3.6 and 8.3.10 of Planning for Bushfire Protection 2019 (NSW RFS, 2019) (PBP) applies. No residential component is proposed for the project, thus only the aim and objectives of PBP apply (Chapter 1 of PBP).

Several objectives outlined in Section 1.1 of the PBP are required to be met in relation to access, and emergency planning. These are discussed further below.

Vegetation

The site comprises modified, cleared land which is surrounded by a mosaic of cleared land with remnant patches of native woodland and forest. **Plate 2.1** shows the existing quarry in foreground and cleared landscape (grassland in mid-ground) and forest in background.

Vegetation surrounding the site has been assessed in terms of potential fire hazard over a distance of 140 m, using the formation classes provided within Section A1.2 of the PBP. Dominant vegetation formations in each relevant direction are provided in **Table 6.13**.

Table 6.13 Predominant Vegetation Formation for Project

Direction	Predominant Vegetation Formation
North	Grassland
North-east	Forest
East	Grassland
South	Grassland
West	Grassland

Slope

The effective slope is the slope within the hazard which most significantly affects fire behaviour having regard to the vegetation formation. The effective slope for the project has been assessed over 100 m. The broader property comprises undulating hill slopes from of approximate RL 1030 m AHD down to

980 m AHD. The project site generally slopes to the west towards Spring Creek. The effective slope is shown in **Table 6.14**.

Table 6.14 Effective Slope

Direction	Effective Slope Category
North	0-5°
North-east	0-5°
East	Up slopes and flat
South	Up slopes and flat
West	5-10°

Bushfire Protection Measures

In accordance with Section 1.1 of the PBP, the bushfire protection measures and requirements for 'other development' are considered in **Table 6.15**.

Table 6.15 Section 1.1 of PBP Considerations

PBP Aims and Objectives	Consideration
AIM: Provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.	The combination of bushfire protection measures proposed provide for protection of human life and minimises impacts on property.
Objective (i): to afford buildings and their occupants protection from exposure to a bush fire;	N/A
Objective (ii): to provide for a defendable space to be located around buildings;	N/A
Objective (iii):to provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings	N/A
Objective (iv): ensure that appropriate operational access and egress for emergency service personnel and occupants is available;	The site is accessed from Rose Hill Road, which is a 4 m wide, single lane, unsealed public road extending from the New England Highway to various private properties (see **Plate 6.1**). The existing quarry access provides a single lane, all weather loop road which runs around the perimeter of the existing quarry and joins Rose Hill Road.
Objective (v): provide for ongoing management and maintenance of BPMs; and	Access and egress would be maintained, including 4 m vertical clearance of existing access road.
Objective (vi): ensure that utility services are adequate to meet the needs of firefighters	N/A

Consideration of Section 8.3.6 and 8.3.5 of the PBP have also been made and given there are no buildings associated with the project, no Asset Protection Zone (APZ) requirements exist.

Fire-suppression equipment will be made available in all plant and machinery for quick response for any ignition on site. While there are no static water supply provisions, the access requirements are considered sufficient for all personnel to evacuate the site in the event of a fire.

Plate 6.1 View west of entry to Williams quarry (left) and continuation of Rose Hill Road (right)

6.9.3 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to hazards:

75. A Bush Fire Emergency Management and Operations Plan will be prepared for the site and all staff will be made aware of the requirements.
76. All hazardous materials will be bunded and stored at the western end of the project site near the entrance.
77. Ensure fire suppression equipment is installed in all plant and machinery for quick response for any ignition on site.
78. An unobstructed clearance of 4 m will be maintained above access ways, including vegetation overhanging roads.

6.10 Visual Amenity

Issue	Environmental Assessment Requirements	Section
Visual	■ 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.	6.10.2

6.10.1 Existing Environment

The existing quarry site is located approximately 10 km north of the Uralla township in a predominantly rural landscape setting, with pockets of forests to the south and west. The land is gently undulating immediately around the site and towards the east, while the land becomes increasingly hilly to the west. Rose Hill Road travels along the northern boundary of the existing quarry, following the quarry outline, making the existing quarry highly visible from Rose Hill Road. Spring Creek runs immediately adjacent to the existing quarry site to the west.

The project is located directly south of the existing quarry (the expansion). This land is a rural area that would support grazing, with a cluster of trees that died in the drought in past years. The project

would be positioned within the existing quarry with Rose Hill Road to the north, with Spring Creek to the west and south. The eastern border follows an existing fenceline in the subject lot.

The visual quality associated with the immediate area is considered to be good; however, it is not considered to be a visually significant landscape, with value being at a local scale.

The nearest receivers are located to the east of the project site (as shown in **Illustration 2.1**). The existing quarry is not highly visible to residents and road users approaching the quarry from the west, until the entrance. This is due to the natural topography. However, due to the sloped land down to Spring Creek, the existing quarry is highly visible for any residents travelling east, past the quarry and returning west along Rose Hill Road.

6.10.2 Potential Impacts

The project involves the expansion of the existing quarry towards the east and south, which would alter the adjacent grazing land. Typically, a rural landscape would be sensitive to visual modification for local residents, particularly that imposed by a quarry. However, the existing quarry is already a prominent feature in the local landscape and is visible from Rose Hill Road, particularly on the eastern side. Although the expansion will increase the visual impacts for road users, Rose Hill Road only services a small number of properties, with even less to the east of the existing quarry. The eastern residents are familiar with the existing operation and are unlikely to be impacted by the staged construction of the project.

Additionally, the project would be constructed in a way that the existing quarry would provide a visual buffer from the road. The undulating nature of the surrounding lands and the direction of the excavation into the hillside aids in reducing sightlines to the quarry from greater distances. Sensitive viewpoints, from dwellings within a close proximity, are from the west. These viewpoints are located at a higher elevation than the excavations. Therefore, the resulting ridge created by the excavation would restrict view into the quarry and the sensitive viewpoints would experience a low visual impact.

The project is not anticipated to result in any significant visual impacts or changes in visual amenity. There may be some changes to the visual amenity as a result of increased truck movements along Rose Hill Road. This is discussed in **Section 6.11** with consideration of traffic movements, noise and air quality impacts.

Overall, considering the rural environment, existing quarry operations, location of viewpoints and low road use, the level of visual modification is considered low. The viewpoint sensitivity of local receivers is also considered low. Mitigation measures have been developed to ensure any potential impacts are minimised.

6.10.3 Mitigation Measures

The following mitigation measures will be implemented to address potential impacts relating to visual amenity:

79. Vegetation outside of the project footprint will be retained to provide a screening.
80. Vegetation removal and soil disturbance within the project footprint will be kept to the minimum required for the current stage of construction.
81. At the end of the project, the site will be rehabilitated according to the closure and rehabilitation plan detailed in this EIS.

6.11 Socio-Economic

Issue	Environmental Assessment Requirements	Section
Social & Economic	■ An assessment of the likely social and economic impacts of the development.	6.11.2

6.11.1 Existing Environment

The existing Williams Quarry is located within Uralla LGA within the locality of Arding. The closest settlement to the project is Invergowrie to the north which is a small settlement located west of Armidale. Based on the 2021 census data produced by the Australian Bureau of Statistics, the locality of Arding is populated by around 180 people with a relatively even split of males and females. The median age is 53 with the majority of employed persons of a professional nature. Around 19% of the population are employed in beef cattle farming. The overall estimated population of the Uralla LGA is approximately 6,000 people.

The project is to be located within an existing operating quarry within a rural area, about 10 km north of Uralla. The closest dwelling is located about 400 m east, with only three dwellings located within 1 km of the project site. Typically, residents of rural areas place high value on the scenic amenity and intrinsic lifestyle offered by such settings.

The existing quarry has been in operation for over 50 years. The site was previously managed and operated by Council until the proponent took over the operation. The existing quarry has been providing rock for a range of projects, allowing for a direct economic benefit, by providing resources to the local construction industry.

6.11.2 Potential Impacts

Social Impacts

The project has the potential to impact upon the intrinsic and desirable rural characteristics of the local area, predominately within the vicinity of the project and to a lesser extent, along the proposed haulage routes. However, as the existing quarry has been in operation for some time and due to the isolated location of the project, minimal negative social impacts on dwellings in the locality are anticipated. Additionally, the dwellings are located to the east of the project, over a ridge with limited views of the project site.

Blasting and processing noise is likely to be generated. As detailed in **Section 6.1**, based on the assessment, the predicted noise levels were below the relevant calculated noise levels across all 10 stages, at all three sensitive receivers. With an MIC of 34 kg, airblast and ground vibration levels at the nearest receivers are also predicted to comply with the relevant guideline. Given the distance of the proposed operation from the nearest residential dwelling, the rural nature of the locality and the existing operations, any impact from traffic noise is anticipated to be minimal.

The project is likely to generate dust. However, as discussed in **Section 6.2**, it is clear from the assessment that the project has a minimal influence at the assessed receiver locations and in most cases, would be difficult to discern beyond the existing background level. The project's heavy vehicle traffic generation also has potential to impact the immediate locality around the site and along the proposed haulage route. The local and main roads constituting the proposed haulage routes would be subjected to 20 daily heavy vehicle movements, with peak haulage periods of 62 daily movements (**Section 6.6**).

Any impacts will have the ability to be largely mitigated through utilising the mitigation measures outlined in this EIS.

The expansion of the existing quarry is also likely to produce some positive impacts for the local and regional community. Williams Quarry provides a high quality and proximal option for the sourcing of gravel and rock for the region, injecting economic benefits to the local economy, aiding local businesses and employment.

Economic Impacts

The project would generally have a positive economic impact on the local community and region. The project would stimulate indirect employment as a result of the project as many sub-contractors would gain employment through associated operations. The haulage of material to and from site and the engagement of professionals for the site's rehabilitation and environmental assessment would also stimulate further employment and economic benefits as well as general indirect multiplier effects which would further stimulate the local economy through local expenditure and the use of goods and services.

The proximity of the project to the Ducats processing facility in Armidale ensures an efficient use of resources, reducing the need for materials to undergo significant transportation and subsequently limiting its carbon footprint. The use of Williams Quarry helps to improve the environmental and socio-economic outcomes of regional infrastructure projects through improved sustainability, local employment opportunities and a reduced economic cost of the project compared to sourcing rock material outside of the LGA.

6.11.3 Mitigation Measures

Appropriate mitigation measures, as outlined throughout this EIS, will be implemented to ensure any adverse socio-economic impacts such as those generated by noise, traffic or air quality would be minimised and managed to ensure that local residents and the community are not significantly affected.

6.12 Quarry Closure and Rehabilitation

Issue	Environmental Assessment Requirements	Section
Rehabilitation	■ A detailed description of the proposed rehabilitation measures that would be undertaken throughout the development. ■ 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 ■ Potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc).	6.12.1 6.12.1 & 6.12.3 6.12.3

6.12.1 Rehabilitation

Extractive industries, including quarries, are a temporary land use, and upon completion are subject to rehabilitation and closure. Design and implementation of rehabilitation works is therefore an important element of the project. This section describes the issues relating to closure of the quarry and rehabilitation of the site.

Objectives

As much as possible, rehabilitation would be concurrent with rock extraction. It is important that quarrying operations are integrated with rehabilitation to allow drainage, soil management, earthmoving and landscaping works to be undertaken consistent with rehabilitation objectives. A rehabilitation plan would be implemented as part of the project. The objectives of this plan are to:

- Make the exhausted site safe and stable for future use.
- Prevent the introduction or spread of noxious weeds and pests.
- Reintroduce biodiversity to the quarry site.
- Stabilise the landform using native species.
- Ensure the land is reshaped and suitable for a long-term land use.
- Protect visual amenity and limit visual impacts.
- Minimise erosion.
- Return the land to its original capability and productive capacity.
- Minimise long term site maintenance costs.
- Monitor and manage rehabilitated areas until they are self-sustaining.

Site Stabilisation

As much as possible, rehabilitation would be concurrent with rock extraction. Following the cessation of extractive activities at the quarry, benches would be trimmed and backfilled to create a final slope of approximately 30%. Following this a 500 mm thick layer of overburden will be placed on the surface of the slope, followed by the placement of a layer of topsoil. Topsoil will be respread with a minimum thickness of 100 mm. Soil spreading is to be immediately followed by seeding or planting with tubestock (see below). If appropriate, straw or organic mulch is to be spread over the soil. If erosion occurs on treated surfaces, the area is to be re-topsoiled and sown with cover grass.

The following measures are taken from *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and will be implemented for topsoil spreading:

- Re-spread topsoil in the reverse sequence to its removal so that the organic layer, containing any seed or vegetation, is returned to the surface.
- Spread topsoil along the contour of re-graded spoil by dumping at the top of slopes and grading downwards and across the contour, thus aiding runoff control, minimising erosion and increasing moisture retention.
- Level topsoil to an even surface and avoid a compacted or over-smooth finish.
- Incorporate topsoil into the overburden or waste rock by contour cultivation with a tyned implement in preparation for sowing – this would leave the soil surface in a roughened condition creating a ‘key’ between the soil and the spoil.
- Whenever possible, stripped topsoil should be directly placed on an area undergoing rehabilitation.
- Areas to be topsoiled should be re-shaped prior to placing topsoil.
- Compaction would be avoided when using equipment to spread topsoil.
- The ground would be ripped to a minimum depth of 400 mm along the contour prior to adding topsoil.
- Stop any vehicle traffic entering the
- area once topsoil is spread.

Revegetation

Revegetation of areas which have been disturbed by quarrying and subsequently reshaped is important for erosion control, aesthetics and returning the land to a useful condition. Very few disturbed areas would regenerate successfully without active management such as surface preparation, application of appropriate seed and fertiliser, and monitoring.

As works are completed, progressive rehabilitation will be undertaken, including the following tasks:

- Hydromulch the quarry base to establish grass cover.
- Hydromulch and plant tubestock along berm.
- Establishment maintenance.

Consideration should also be given to hydromulching temporary quarry faces if they are expected to be inactive for long periods of time.

Where possible, seed for hydromulching and the propagation of tubestock will be collected locally. Locally collected seed is likely to be adapted to the conditions of the site and will maintain the genetic integrity of local assemblies. After collection, seeds will be cleaned and stored under conditions that will maintain maximum viability over the period of storage and minimise damage due to pests and fungi.

The vegetation on site has been as identified as being comprised of the following derived and moderate condition PCTs:

- PCT 3352 - Armidale Quartz Hills Stringybark Forest.
- PCT 3359 - New England Hills Stringybark-Box Woodland.

Noting this, the following species will be planted along the berm using tubestock sourced from the nearby area:

- *Eucalyptus caliginosa* (New England Stringybark).
- *Lissanthe strigosa* (Peach Heath).
- *Pimelea linifolia* (Slender Rice Flower).
- *Eucalyptus melliodora* (Yellow Box).
- *Eucalyptus blakelyi* (Blakely's Red Gum).
- *Pultenaea microphylla* (Spreading Bush-pea).
- *Rubus parvifolius* (Native Raspberry).

Seeds from the following groundcover species will be incorporated into the hydromulch sprayed along the berm and quarry base:

- *Sporobolus creber* (Slender Rat's Tail Grass).
- *Eragrostis leptostachya* (Paddock Lovegrass).
- *Themeda triandra* (Kangaroo Grass).
- *Eragrostis alveiformis* (Granite Lovegrass).
- *Chrysocephalum apiculatum* (Yellow Buttons).

Rehabilitation Management

The management of rehabilitated areas will ensure the success of rehabilitation efforts, and would include the following:

- Watering and fertilising of rehabilitation areas as necessary.
- Weed control.
- Re-ripping and re-sowing of bare areas.

The proponent or a local landscape/ rehabilitation contractor on their behalf would establish and maintain the rehabilitation works within the site.

Regular inspections would be made to plan timely maintenance works. Maintenance works would be required for fertilising, watering, repairs to fencing or stakes and plant replacement. Larger bare areas may require re-ripping or some form of cultivation and complete re-sowing. If the topsoil has been completely removed by erosion, it should be replaced prior to cultivation.

Until the vegetation has established, some erosion and sedimentation is expected. Hence the erosion and sediment control measures on the site would be operated and maintained in a proper and efficient condition until the site is stabilised. Any areas found to not be satisfactorily rehabilitating would be investigated to determine the reason for failure. Appropriate remediation action, including replacement of any lost topsoil and re-sowing the area would then be undertaken.

Rehabilitation Monitoring

The monitoring of rehabilitated areas is critical to assessing the effectiveness of rehabilitation efforts and would identify the need for corrective action as required. A rehabilitation monitoring program would be prepared to monitor rehabilitated areas during the operational and post-closure phase of the quarry. The program would incorporate the most appropriate and cost-effective indicators and methods that enable the assessment of rehabilitation efforts with reference to the defined rehabilitation objectives.

Monitoring would be conducted by suitably qualified persons and will be undertaken until it is determined that the site has become self-sustaining. Monitoring results, any required maintenance activities and any refinements of rehabilitation techniques would be reported as required by approval conditions.

6.12.2 Future Land Use

Post extraction land use at this stage is to return to pasture production and light grazing. For the purposes of this assessment, it is assumed that the rehabilitation of the project site would involve establishing a grass cover on the quarry floor allowing for general, all-purpose usage, and establishing native ground covers, shrubs and trees on the benches and batters.

On completion of works, all buildings and infrastructure introduced to the site for the operations would be decommissioned and removed. All plant and equipment would also be removed from the site prior to closure of the quarry.

6.12.3 Final Landform

The landform would comprise a grassed gently sloping free-draining platform. The final form of the quarry would blend with the current landform and consist of a series of benches and batters that would extend in an east west direction and would eventually form an amphitheatre shape. The floor would appear flat to the eye but would have slight fall to allow for water management. The proposed sediment basins would remain to prevent the run-off generated by the site from discharging down the slope in high volumes and velocities. It is likely that the basin would in time become a valuable habitat for flora and fauna. Eventually, the basin would fill with sediment and reform as part of the landscape.

Justification for Final Landform

The final landform of the quarry would be suitable for the area and surrounding environment. The site is situated on a hillside within a naturally undulating landscape. Due to its slope and soil characteristics, the project (pre-clearing) and its surroundings are Land and Soil Capability (LSC) Class 4 land and are best suited to light grazing and improved pastures. Following site rehabilitation, the former quarry site may again be used for these purposes, with steeper areas becoming denser with native vegetation.

6.13 Cumulative Impacts

An assessment of cumulative environmental impacts considers the potential impact of a project in the context of existing developments and future developments to ensure that any potential environmental impacts are not considered in isolation. The Northern Regional Planning Panel with advice from Council would be best equipped to make such a judgement as they would be privy to information regarding existing and proposed developments within the locality and region. Nonetheless, the cumulative impacts of the project are not considered to be significant and are manageable.

The main areas considered to contribute to cumulative impacts include:

- Traffic and transport.
- Noise, Blasting and Vibration.
- Air quality.
- Biodiversity.
- Agricultural use.

Each of these issues have been assessed in the sections above. The existing quarry has been operational for some time. It has been concluded that the proposed expansion is unlikely to cause significant exceedances of the relevant assessment criteria or adversely impact the existing environment. Furthermore, the biodiversity assessment concluded that while the project would impose some negative incremental and cumulative effects, with the effective implementation of the mitigation measures outlined in this report, and the offset requirements, the project is not considered likely to have a significant negative impact.

7. Environmental Management

7.1 Environmental Management Plan

All works/ activities will be delivered in accordance with an environmental management plan (EMP) which incorporates environmental site inductions, toolbox sessions and awareness. The EMP will be developed prior to any works/ activities commencing.

The EMP will incorporate all relevant mitigation measures detailed in this EIS. These will be implemented and complied with throughout all stages of the project. All staff and site personnel will be made aware of their environmental responsibilities and mitigation measures detailed within the EMP to minimise environmental impacts.

7.2 Summary of Mitigation Measures

Mitigation measures outlined in this document will minimise any potential adverse impacts arising from the project on the surrounding environment. All measures to manage the environmental impacts associated with the project are summarised in **Table 7.1**. Any additional requirements required by the development consent or EPL issued for the project has potential to amend the measures detailed in **Table 7.1**.

Table 7.1 Summary of Mitigation Measures

Impact	Mitigation Measures
Noise, Blasting and Vibration	1. A Noise and Vibration Management Plan will be prepared prior to works commencing and in accordance with relevant guidelines and criteria. This will include requirements for ongoing monitoring to ensure actual noise levels are equivalent to or less than the predicted noise levels. The Noise and Vibration Management Plan will also include a Blast Management Plan to ensure all blasts are monitored at the most affected residence. 2. Blasting will be carried out in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration 1990* (ANZEC, 1990). 3. Unless otherwise approved, activities will be undertaken in accordance with the following proposed construction hours: – Overburden stripping, site establishment and truck loading - 6:00 am to 5:00 pm Monday to Saturday). – Truck haulage - 7.00 am to 5.00 pm Monday to Friday, 7.00 am to 1.00 pm Saturday – Processing - 7.00 am to 5.00 pm Monday to Saturday. – Blasting - 10.00 am and 4.00 pm Monday to Friday only, with notification provided to nearby residences. 4. Any noise complaints will be recorded and include suitable identification/ description of the noise source and general location of the complaint. Any noise complaints will be investigated and actioned as required. 5. All vehicles and equipment will be turned off and not left idling when not required for work uses. 6. All plant will be fitted with appropriate exhaust systems to ensure compliance with pollution and noise emission standards.
Air Quality	7. All works are to be undertaken in accordance with the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.

Impact	Mitigation Measures
	8. Works will not be carried out during strong winds (particularly easterly or north-easterly winds) or in weather conditions where high levels of dust or air borne particulates are likely. 9. Weather forecast to be checked daily and prior to any material handling/ processing. 10. Machinery and vehicles are to be turned off when not in use. 11. Adequately maintain the internal access road. 12. Cover all loads before leaving the site. 13. Maintain appropriate moisture level on the internal access road, sections of Rose Hill Road and any stockpiles. 14. Vehicles, machinery and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation. 15. Haulage of material is to use the most efficient route option, in accordance with the approved Traffic Management Plan. 16. The site is to be rehabilitated as soon as possible to minimise exposed soils.
Water	17. A Soil and Water Management Plan will be developed outlining the soil and water management requirements for the project. This plan will include an erosion and sediment control plan (ESCP) for the various stages of construction and measures to manage erosion and sediment issues onsite. As part of this plan, a Water Quality Monitoring Program will also be developed outlining the requirements for surface water and groundwater monitoring. 18. Erosion and sediment controls, including sediment basins, will be implemented in accordance with guidelines contained within *Managing Urban Stormwater, Soils and Construction (*the Blue Book) (Landcom, 2004).and maintained to: – Reduce water velocity and capture sediment onsite. – Divert clean water around the site. – Prevent sediment moving off-site. 19. Erosion and sedimentation controls outlined in the ESCP are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request. 20. Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised. 21. Work areas are to be stabilised progressively during the works. 22. Stockpiles will not be placed within 40 m of Spring Creek or within 5 m of hazard areas such as hardstand areas or roads. Stockpiles will be stabilised if in place for more than 10 days. 23. A spill containment kit is to be available at all times. Staff are to be trained in the effective deployment of the spill containment kit. 24. No waste and/or wastewater will be discharged directly or indirectly in drains or waterways. 25. During construction, visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) within and adjacent to the site is to be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls during construction. 26. Council and the EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on 131 555). 27. The EPL will be complied with and implemented onsite for the life of the project.
Biodiversity	28. Ensure detailed design is consistent with the impact areas assessed under the BDAR.

Impact	Mitigation Measures
	29. Internal speed limits and speeds along Rose Hill Rd will be ≤50 km/hr which would reduce the risk of fauna mortality from vehicle strike. 30. An Erosion and Sediment Control Plan (ESCP) will be prepared for the site and incorporate erosion and sediment control measures in accordance with the Landcom/ Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book) with specific controls installed around watercourses.(Department of Environment and Climate Change 2008, Landcom 2004). 31. Erosion and sedimentation controls outlined in the ESCP are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request. 32. Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised. 33. Work areas are to be stabilised progressively during the works. 34. Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (e.g. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines) (Department of the Environment 2015). 35. Biosecurity risk weeds are to be managed according to requirements under the *Biosecurity Act 2015* and/or Council management measures. 36. The extent of the development footprint must be clearly (i.e. hi-visibility fencing or similar) pegged/ marked on site by a registered surveyor, consistent with final approved plans/ designs. 37. Vegetation clearing must be undertaken via a staged approach so any resident fauna have opportunities for dispersal into retained vegetation outside the construction zone. 38. Pre-clearing surveys must be undertaken by an ecologist or spotter-catcher to ensure nesting or roosting fauna are not present within vegetation to be removed. Surveys would ensure no Koalas are present within any vegetation to be removed. Surveys would ensure no Koalas are present within any vegetation to be removed. In the event that a Koala is identified on the site, clearing would be delayed until the animal moves off the site of its own volition, as determined by an ecologist. 39. Any hollow-bearing trees (identified during pre-clearing surveys not previously identified as part of the BDAR) are to be removed in accordance with a two-stage clearing process with surrounding trees to be cleared initially, with the habitat tree to be cleared at least 48 hrs after this. The felling of hollowbearing trees would be supervised by an ecologist. A hollow-bearing tree inventory will be undertaken during the clearing process – data will be used to identify nest box replacement requirements (if required). 40. Any hollow-bearing trees identified to be removed during pre-clearing surveys will be replaced and offset within retained vegetation at a 2 (nest box) :1 (hollow tree) ratio. If required, nest boxes will be provided, installed and monitored as prescribed in the Vegetation Management Plan (outlined below). Nest boxes will be installed in accordance with advice from a suitably experienced and qualified ecologist. 41. Vegetation to be cleared will not be pushed into adjacent vegetation. 42. Relocation of habitat features (fallen timber, hollow logs) from the development footprint are to be retained and placed into areas identified for revegetation or within adjacent vegetation without causing significant damage (i.e. placing on the edge of retained vegetation). 43. Vegetation removed will not be burnt. Vegetation removed will be chipped and mulch retained for reuse on site. 44. A Vegetation Management Plan (VMP) will be prepared and focus management actions surrounding the proposed development (including other facilities on the lot) and along Spring Creek riparian zones and other areas previously cleared and not associated with development. The plan will include (but not limited to):

Impact	Mitigation Measures
	– Re-establishment/ restoration of native vegetation along Spring Creek and offset planting areas (including previously cleared areas unused). – Weed control surrounding the development area and along Rose Hill Rd. – Nest box replacement and monitoring (if required). 45. Implementation of a Vegetation Management Plan in accordance with the measures outlined above. 46. Signage must be installed along access routes displaying road speed limits (<50km/hr) to reduce potential of vehicle strike to fauna and dust impacts. 47. Stormwater swale and outlet works must be completed to minimise disturbance to native vegetation and appropriate erosion and sediment controls are installed and maintained these will be in accordance with an Erosion and Sediment Control Plan (ESCP).
Heritage	48. All workers will undertake cultural awareness training, either delivered by Aboriginal LALC or Iwata Aboriginal Corporation, and will include operational and reporting conditions of the AHIP, a guide to identify stone artefacts and a summary of mitigation measures around the topsoils relocation and repatriation areas. 49. A topsoil relocation procedure will be developed to ensure intact topsoils on the ridge crest are relocated prior to any further works commencing. 50. An AHIP will be sought for impact to the Williams Quarry Arding Artefact Scatter 01 under Section 90 of the NPW Act. 51. A topsoil repatriation area for the permanent relocation of the topsoils will be located along the eastern boundary fence, outside the project footprint and will be recorded as a new repatriation site on AHIMS. 52. The topsoil repatriation site will be constructed so downslope erosion and loss of artefacts is not increased. Appropriate erosion and sediment controls will be installed, together with revegetation and installation of exclusion fencing and signage. 53. Existing topsoil stockpiles will be quarantined and clearly identified with permanent exclusion fencing and signage. 54. Additional archaeological salvage excavation of the existing topsoil stockpiles will be required (undertaken in accordance with the ACHAR) to understand the archaeological values and to inform the long-term management of stockpiles on the ridge crest. 55. Any artefacts collected during the test excavations or archaeological salvage works on existing topsoils will be repatriated into the permanent topsoil site so they are retained on country. 56. If any suspected heritage items (either Aboriginal or historic) are uncovered during the project, all works will cease in the vicinity of the material/ find. Armidale Regional Council and NSW DPE – Environment and Heritage Group will be contacted immediately. 57. Should skeletal material/human remains be exposed during ground disturbance, work will cease immediately, and contact made with NSW Police.
Traffic and Transport	58. Traffic Management Plan will be prepared in accordance with key guidelines and criteria. This plan will manage the traffic impacts resulting from the construction staging of the project and detail the proposed haulage route. Any mitigation measures relevant to traffic, transport and access will also be included in this plan. 59. All drivers will be inducted in road and traffic safety measures including speed limits, haulage routes, school zones, school bus routes, residential driveway interface and internal access road requirements. 60. Monthly compliance audits will be undertaken to ensure road and traffic safety measures are being implemented. 61. Regard to public safety will be maintained at all times.

Impact	Mitigation Measures
	62. The site access road will be constructed in accordance with the staging drawings provided as part of the concept design plans. Internal roads, circulation and parking areas will be designed in accordance with the relevant standards for the largest likely design vehicle. All vehicles will be able to enter and exit the site in a forward movement. The pavement and surface will be designed for all-weather access. 63. Consultation with Uralla Shire Council will be undertaken to install a 'Give Way' sign and linemarking at the Rose Hill Road/ Arding Road/ Mount Butler Road intersection. 64. Consultation with Armidale Regional Council will be undertaken to improve the pedestrian infrastructure at the Miller Street/ Uralla Road/ Kentucky Street intersection in Armidale.
Land Resources	65. An unexpected contaminated land finds procedure will be developed for the works. In the event contaminated materials are encountered, the EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on Ph: 131 555). 66. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site. 67. Only clean fill will be used on site (if required). 68. Implement topsoil handling measures from *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). 69. Prepare a rehabilitation plan that addresses the site stabilisation requirements, revegetation requirements and overall management and monitoring of the site.
Waste	70. Resource management hierarchy principles are to be followed: – Avoid unnecessary resource consumption as a priority. – Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery). – Disposal is undertaken as a last resort. 71. Waste material awaiting disposal will not within 40m of Spring Creek. 72. Vegetation or other waste will not be burnt on site. 73. Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day. 74. Wastes will be collected and disposed of, or recycled, in accordance with Council waste disposal protocols and EPA guidelines.
Hazards	75. A Bush Fire Emergency Management and Operations Plan will be prepared for the site and all staff will be made aware of the requirements. 76. All hazardous materials will be bunded and stored at the western end of the project site near the entrance. 77. Ensure fire suppression equipment is installed in all plant and machinery for quick response for any ignition on site. 78. An unobstructed clearance of 4 m will be maintained above access ways, including vegetation overhanging roads.
Visual Amenity	79. Vegetation outside of the project footprint will be retained to provide a screening. 80. Vegetation removal and soil disturbance within the project footprint will be kept to the minimum required for the current stage of construction. 81. At the end of the project, the site will be rehabilitated according to the closure and rehabilitation plan detailed in this EIS.

7.3 Licences and Approvals

As discussed in **Section 5.2.5**, the project is identified as integrated development. As such, it requires the following licences and approvals:

- EPL under the POEO Act to authorise carrying out of scheduled activities at any premises.
- AHIP under Section 90 of the NPW Act.
- Controlled Activity Approval under Section 91(2) of the WM Act.
- Aquifer Interference Approval under the Section 91(3) of the WM Act.

The proponent will be required to hold each licence and approval prior to expansion works commencing at the existing site.

8. Justification and Conclusion

8.1 Principles of Ecologically Sustainable Development

The project has been assessed against the Ecologically Sustainable Development principles outlined in Section 193 of the EP&A Regulation which are summarised below.

8.1.1 The Precautionary Principle

Section 193 of the EP&A Regulation states *"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:

75. *"Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment.*
76. *An assessment of the risk-weighted consequences of various options'"*.

In the case of the project, the precautionary principle has been applied in the Environmental Assessment (**Section 6**) undertaken for the project. Potential environmental impacts of the project would not be significant due to the existing operations and rural locality of the site.

8.1.2 Intergenerational Equity

Section 193(4) of the EP&A Regulation defines inter-generational equity as "*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 project would not significantly affect the viability of threatened species, or any TECs. Similarly, the project presents waste management and drainage designs that ensure protection of soil and water quality. The project would not significantly degrade the environment and would use resources efficiently. Therefore, local environmental values would not be substantially adversely affected by the project and would be maintained for future generations.

8.1.3 Conservation of Biological Diversity and Ecological Integrity

Section 193(5) of the EP&A Regulation requires the "*conservation of biological diversity and ecological integrity*", namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

A detailed biodiversity assessment was prepared for the project and is located in **Appendix F**, with a summary provided in **Section 6.4**. While the project would impose some negative incremental and cumulative effects, with the effective implementation of mitigation measures, the project is not considered likely to have a significant negative impact on threatened species likely to occur in the study area or place the subject threatened species at significant risk of local extinction.

8.1.4 Improved Valuation, Pricing and Incentive Mechanisms

Section 193(6) of the EP&A Regulation requires "*improved valuation, pricing and incentive mechanisms*", namely, that environmental factors should be included in the valuation of assets and services. This includes:

75. *"Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
76. *The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, and*
77. *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".*

Council and the Northern Region Planning Panel will include conditions on any development consent issued for the project to ensure these sound environmental practices and outcomes. The capital investment of the project includes expenditure on ensuring that the operation is responsibly managed, and the design includes adequate measures.

Applying an appropriate value to services provided by the natural environment and factoring in externalities can be difficult as these services have traditionally been seen as common and free. Nevertheless, the value and importance of environmental factors is recognised and this EIS has undertaken a thorough assessment of potential impacts and has consequently developed a set of mitigation measures and safeguards to ensure sound environmental practices and outcomes. This would ensure that the integrity of the environment is not degraded, is managed, and where possible enhanced.

8.2 Justification and Conclusion

Williams Quarry is located on the Northern Tablelands of NSW, approximately 10 km north of Uralla and 15 km south-west of Armidale. Land surrounding the site is privately owned, rural land with only three sensitive receivers within 1 km of the project site. The project is well positioned within the natural landscape, with the expansion proposed along the eastern edge of the ridgeline, on the far side of the properties nearby. The distances/ buffers from other developments makes the site suitable in terms of noise and air quality. Additionally, the site is a pre-existing quarry with a history of operations in the area.

If approved, the project would deliver positive socio-economic benefits for the local economy and community. The project's estimated capital investment value of $1.2 million would result in local and regional expenditure and generate up to five full time equivalent jobs. Local expenditure and the use of goods and services driven by the project would also stimulate indirect employment and benefits through economic multiplier effects.

The potential environmental impacts posed by the project have been thoroughly examined through this EIS. Some minor impacts would occur locally. However, it is unlikely that any significant or long-term adverse impacts would eventuate. To help ensure that the extent of impacts is limited and that unavoidable impacts likely to occur are managed and minimised, mitigation measures have been developed and would be implemented and monitored.

The project is considered justifiable taking into account the potential environmental impacts and subsequent mitigation measures. The project supports local and regional development, is generally in accordance with ecologically sustainable development principles and is generally consistent with the objectives of the EP&A Act. The project deserves favourable consideration by the Northern Regional Planning Panel.

References

Austroads, 2020. *Guide to Traffic Management Part 12 – Integrated Transport Assessments for Developments*

Austroads, 2021a. *Guide to Road Design Part 3: Geometric Design*

Austroads, 2021b. *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*

ANZEC, 1990. *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.*

Colquhoun, GP, Hughes, KS, Deyssing, L, Ballard, JC, Folkes, CB, Phillips, G, Troedson, AL, & Fitzherbert, JA 2022, New South Wales Seamless Geology dataset, version 2.2, electronic dataset, Geological Survey of New South Wales, Department of Regional NSW, Maitland.

DEECW, 2010. *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW*.

DECCW, 2009. *Interim Construction Noise Guideline.*

DECCW, 2010. *Aboriginal Cultural Heritage Consultation Requirement for Proponents.*

Department of Planning, 2011. *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33.*

Department of Planning and Environment, 2020. *Biodiversity Assessment Method*.

Department of Planning and Environment, 2021. *NSW Aquifer Interference Policy.*

Department of Planning, Industry and Environment 2012, The land and soil capability assessment scheme: Second approximation, NSW Office of Environment and Heritage, Sydney

Department of Planning, Industry and Environment 2013, Interim protocol for site verification and mapping of biophysical strategic agricultural land, NSW Office of Environment and Heritage, Sydney

Department of Planning, Industry and Environment 2020, Soil Landscapes of Central and Eastern NSW - v2.1, NSW Office of Environment and Heritage, Sydney.

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

NSW Environment Protection Authority, 2022. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.*

Landcom, 2004. *Managing Urban Stormwater, Soils and Construction (*the Blue Book).

NSW OEH, 2011. *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW.*

NSW Rural Fire Service, 2019. *Planning for Bushfire Protection 2019.*

NSW Roads and Traffice Authority, 2002. *Guide to Traffic Generating Developments.*

Copyright and Usage

Appendix A

Secretary's Environmental Assessment Requirements – June 2022

Department of Planning and Environment

Simon Williams
Director/Principal Environmental Planner
Ducats Earthmoving Pty Ltd

Via email: swilliams@geolink.net.au

21 June 2022

Planning Secretary's Environmental Assessment Requirements
Williams Quarry Project (EAR 1638)

Dear Mr Williams,

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 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. 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 require an 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 Agriculture, Water and the Environment (DAWE) to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 1111).

You should also contact the Mine Safety branch of the NSW Resources Regulator in regard to 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 Tanvir Islam on (02) 9995 6389 or tanvir.islam@dpie.nsw.gov.au.

Yours sincerely,

Jessie Evans

Director Resource Assessments
Energy, Resources and Industry
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 Part 8 Division 5 of the *Environmental Planning and Assessment Regulation 2021.*

Designated Development

EAR Number	EAR 1638
Proposal	Expansion and increased extraction of existing gravel quarry (Williams Quarry) from current approximate rate of less than 30,000m^3 per annum to a maximum rate of 150,000m^3 per annum. Extraction methods include blasting and mechanical excavation. Total quarry site area is proposed to double from 20,000m^2 to 40,000m^2 with the product material being crushed on site and sold locally.
Location	75 Rose Hill Road, Arding NSW 2358 (Lot 4 DP 1096564)
Applicant	Ducats Earthmoving Pty Ltd
Date of Issue	21/06/2022
Date of Expiry	21/06/2024
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 190, 192 and 193 of Part 8 Division 5 of the *Environmental Planning and Assessment Regulation 2021.* 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.

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** – including: - proposed hours, frequency, methods and impacts; and - an assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZECC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features; • **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 water licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000 , including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo - an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and - a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts; • **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); and - an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; - consideration of the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Section 2.17 of *State Environmental Planning Policy (Resources and Energy) 2021*, including surrounding pastoral lands; • **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 - potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc).
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 *Uralla Local Environmental Plan 2012* 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 (Resources and Energy) 2021
	State Environmental Planning Policy (Planning Systems) 2021
	State Environmental Planning Policy (Transport and Infrastructure) 2021
	Uralla Local Environmental Plan 2012
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)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)

Biodiversity	
	Biodiversity Assessment Method (DPIE 2020)
	Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (DPIE 2019)
	Policy and Guidelines for Aquatic Habitat Management and Fish Conservation (Fisheries NSW)
	Guidelines for developments adjoining Department of Environment, Climate Change and Water (DECCW, 2010)
	NSW State Groundwater Dependent Ecosystem Policy (NOW)
	Risk Assessment Guidelines for Groundwater Dependent Ecosystems (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	
	NSW Noise Policy for Industry (EPA)
	Interim Construction Noise Guideline (EPA)
	NSW Road Noise Policy (EPA)
Air	
	Protection of the Environment Operations (Clean Air) Regulation 2010
	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 2019 (RFS)
Resource	
	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 (JORC)
Waste	
	Waste Classification Guidelines (EPA)
	Protection of the Environmental Operations (Waste) Regulation 2014
	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)

ATTACHMENT 2

AGENCY CORRESPONDENCE

11/05/2022

Record Number: 22/00069#54

Planning Number: EARs 1638

Williams Quarry

The Department of Planning and Environment – Crown Lands have reviewed the proposal.

No Crown land, roads or waterways are in the proposal planning footprint. Spring Creek to the west of the proposed quarry flows north into Reedy Creek. Reedy Creek is a Crown waterway, and while outside the proposed quarry planning area, Crown Lands notes that Reedy Creek may be impacted by the proposal if suitable protection of flows and water quality in Spring Creek is not adequately addressed. Protection of waterways will be addressed through responses by Department of Planning and Environment – Water and Environment Protection Authority.

Crown Lands has no further comments at this time.

If the proponent requires further information, or has any questions, please contact Warren Martin, Natural Resource Management Project Officer in Crown Lands, on 02 67703118 or at warren.martin@crownland.nsw.gov.au.

Yours sincerely

Rodney O'Brien
Group Leader Armidale/Moree
T 02 67703101 | **E** rodney.obrien@crownland.nsw.gov.au

Department of Primary Industries

OUT22/5614

Tanvir Islam
Environmental Assessment Officer
Department of Planning and Environment
Energy, Resources and Industry

Via email: tanvir.islam@dpie.nsw.gov.au

Dear Ms Islam

Environmental Assessment Requirements– EAR 1638 – Williams Quarry, 75 Rose Hill Road, Arding (Lot 4 DP1096564)

Thank you for your correspondence dated 14 April 2022 requesting Environmental Assessment Requirements (EARs) for the above proposal.

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 nearby agricultural resources and the ability to rehabilitate the land to enable continued agricultural investment.

Councils may wish to consider NSW DPI publications on land use conflict risk assessment and agricultural issues for extractive industries when undertaking its assessment. These publications can be found on our website at dpi.nsw.gov.au/agriculture/lup.

Should you require clarification on any of the information contained in this response, please contact Helen Willis, Agricultural Land Use Planning Officer, by email at landuse.ag@dpi.nsw.gov.au.

Yours sincerely

Helen Willis
Agricultural Land Use Planning Officer

From:	David Ward
To:	Tanvir Islam
Cc:	Lauren Crowe
Subject:	FW: Request for Requirements - EARs 1638 - Williams Quarry
Date:	Thursday, 14 April 2022 2:40:18 PM
Attachments:	EAR 1638 - Williams Quarry - No CL .docx 4079-1006 Letter Requesting Sears.pdf Details - RE Williams Quarry - 75 Rose Hill Road, Arding 2358.pdf Form A - Request for planning secretarys requirements draft.pdf 4079-1003 Scoping Report for SEARs Request.pdf image001.png image002.png image003.png

---

Hi Tanvir,

Thank you for your consultation. The proposed expansion of the quarry does not include any Key Fish Habitat. DPI Fisheries do not have any input for the EAR's.

Cheers
David

David Ward | Fisheries Manager
DPI Fisheries - Freshwater Environment
Department of Primary Industries
4 Marsden Park Road | Calala NSW 2340
T: +61 2 6763 1255 | M: +61 (0) 0429 908 856
E: david.ward@dpi.nsw.gov.au
W: www.dpi.nsw.gov.au

From: DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>
Sent: Thursday, 14 April 2022 12:04 PM
To: David Ward <david.ward@dpi.nsw.gov.au>
Subject: FW: Request for Requirements - EARs 1638 - Williams Quarry

Hey Wardy

Please see below and attached.

Let us know if you would like this put through CM9 or if you'll just respond directly.

Thanks
Loz

Lauren Crowe | Administration Officer
Freshwater Environment
NSW Department of Primary Industries | Fisheries
437 Hunter Street | Newcastle | Awabakal Country | NSW 2300
M: 0422 382 646 | E: lauren.crowe@dpi.nsw.gov.au
W: www.dpi.nsw.gov.au

Note: I cover a DPI central inbox on the following days so this may affect my response time to your email
Tuesday PM - Wednesday AM - Thursday PM - Friday AM

 *The Department of Primary Industries 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 that we live and work on, and we show our respect for Elders past, present and emerging. We are committed to providing places in which First Nations people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.*

From: Tanvir Islam <tanvir.islam@dpie.nsw.gov.au>
Sent: Thursday, 14 April 2022 11:16 AM
To: OLG - Uralla Shire Council <council@uralla.nsw.gov.au>; NRAR Service Desk Mailbox <nrar.servicedesk@dpie.nsw.gov.au>; Environmental Assessments <records@rfs.nsw.gov.au>; DPI Landuse Ag Mailbox <landuse.ag@dpi.nsw.gov.au>; DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>; Development Hunter <development.north@transport.nsw.gov.au>; RRD EO Executive Director Resources Regulator Mailbox <ED.ResourcesRegulator@planning.nsw.gov.au>; EPA Planning Matters Mailbox <planning.matters@epa.nsw.gov.au>; OEH HD Heritage Mailbox <HERITAGEMailbox@environment.nsw.gov.au>; Planning Matters Mailbox <planning.matters@environment.nsw.gov.au>; CL LAM Projects Mailbox <LAM.projects@crownland.nsw.gov.au>; Environmental Assessments <environmental.assessments@waternsw.com.au>
Subject: Request for Requirements - EARs 1638 - Williams Quarry

Good morning,

Request for Requirements - EARs 1638 – Williams Quarry Project

Please find attached information from Simon Williams (GeoLink) on behalf of Ducats Earthmoving Pty Ltd for Williams Quarry (the Applicant) seeking the requirements of the Planning Secretary of the Department of Planning and Environment for the preparation of an Environmental Impact Statement (EIS) for the above local designated development located in the Uralla Shire Council local government area.

The proposal seeks to extend the life of an existing gravel quarry to extract and process up to 225,000 tonnes of gravel per annum over a 10 year period. The overall site is seeking to be extended by approximately 20,000m2 including an area to the south of the existing site. Materials will be extracted from site using blasting, ripping and crushing techniques being sold to local markets.

Under Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, the Planning Secretary is requesting your requirements for the EIS. It would be greatly appreciated to receive

your advice by **14 May 2022.** Please direct all responses to myself on the email address provided below.

I have also attached a copy of a draft set of Secretary Environmental Assessment Requirements for your reference.

Kind regards,

Tanvir Islam
Environmental Assessments Officer
Energy, Resources & Industry | Department of Planning and Environment
P (02) 9995 6389 | **E** tanvir.islam@dpie.nsw.gov.au
www.dpie.nsw.gov.au

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

DOC22/300737-6
2 May 2022

Tanvir Islam
Energy, Resources and Industry
Planning and Assessment
Department of Planning and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Email: tanvir.islam@planning.nsw.gov.au

Dear Mr Islam,

I refer to the request for the NSW Environment Protection Authority (EPA) requirements for the Secretary's Environmental Assessment Requirements (SEARs) for the proposed Williams Quarry Project at 75 Rose Hill Road, Arding 2358 (EAR 1638).

The EPA understands the proposal is for extraction of gravel from an existing quarry site, up to 225,000 tonnes per annum, from a total resource of approximately 1 million tonnes for up to 10 years. The EPA understands that the proposal will involve blasting the quarry face and crushing extracted materials on site.

The EPA has considered the details of the proposal as provided by the Department of Planning and Environment (DPE) 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. **Noise and Vibration -** Proximity to sensitive receptors and impacts of any sources associated with the project, including operational noise and blasting;

2. **Air -** Dust generation and management of potential impacts on adjacent landscape and/or communities;

3. **Water and Soils -** Water balance, water management systems and the implementation of adequate erosion and sediment controls to control runoff from the quarry.

In carrying out the assessment, the proponent should refer to the relevant guidelines as identified in Attachment A and any relevant industry codes of practice and best practice management guidelines.

To assist the EPA in assessing the EIS it is requested that the EIS document follow the format of DPE's EIS guidelines and addresses the EPA's specific requirements outlined in the following attachments. If the necessary information is not adequately addressed in the EIS, then delays in the development assessment process may occur.

The Proponent should be made aware that any commitments made in the Environmental Impact Statement (EIS) may be formalised as approval conditions and may also be placed as formal licence conditions.

Based on the information provided to the EPA, the proponent will require an Environment Protection Licence ("EPL") for extractive activities, clause 19 of Schedule 1 of the *Protection of the Environment Operations Act 1997* ("the POEO Act"), to operate the proposed quarry.

The proponent will need to make a separate application to the EPA at the completion of the assessment process. General information on licence requirements can be obtained from the EPA's Environment Line by calling 131 555 or on the EPA's website at www.epa.nsw.gov.au/licensing/licencePOEO.htm.

The Proponent should be made aware that, consistent with provisions under Part 9.4 of the POEO 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 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 POEO Act.

If you have any queries regarding this matter, please contact the undersigned on 131 555.

Yours sincerely,

LINDSAY FULLOON
Manager Regulatory Operations
Regulatory Operations Regional

ATTACHMENT A: Environmental Assessment Requirements – Williams Quarry – EAR 1638

1. Environmental impacts of the project

1.1. The EIS must address the requirements of Section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) by determining the extent of each impact and providing sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL).

1.2. Impacts related to the following environmental issues need to be assessed, quantified and reported on:

- **Air Issues, including odour**: air quality including dust and odour generation from the operation on the surrounding landscape and/or community;
- **Noise and vibration impacts** associated with blasting, and operational noise particularly machinery and plant movements;
- **Waste** including hazardous materials and radiation. Consideration needs to be given to disposal options for general waste, sanitary waste as well as hazardous materials and radiation, where relevant.
- **Water and Soils** including site water balance and sediment and erosion controls during construction and operation phases.

The Environmental Impact Statement (EIS) should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned.

2. Licensing requirements

2.1. The development is a scheduled activity under the *Protection of the Environment Operations Act 1997* (POEO Act) and will therefore require an Environment Protection Licence (EPL) if approval is granted.

2.2. Should project approval be granted, the proponent will need to make an application to the EPA for its EPL for the proposed facility prior to undertaking any on site works. Additional information is available through the *EPA Guide to Licensing* document.

SPECIFIC ISSUES

3. Air issues

3.1. The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act 1997* and the *POEO (Clean Air) Regulation 2021*. Particular consideration should be given to section 129 of the POEO Act concerning control of "offensive odour".

3.2. The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022).

3.3. The EIS must detail emission control techniques/practices that will be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, *POEO (Clean Air) Regulation* and associated air quality limits or guideline criteria.

4. Noise and Vibration

The EIS must assess the following noise and vibration aspects of the proposed development

4.1. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline (*DECC, 2009).

4.2. Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the *Assessing Vibration: a technical guideline* (DEC, 2006).

4.3. If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in *Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC, 1990).

4.4. Operational noise from all industrial activities (including private haul roads and private railway lines) to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Noise Policy for Industry* (EPA, 2017).

4.5. Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the *NSW Road Noise Policy* and associated application notes (EPA, 2011).

5. Waste, chemicals and hazardous materials and radiation

5.1. The EIS must assess all aspects of waste generation, management and disposal associated with the proposed development.

5.2. The EIS must demonstrate compliance with all regulatory requirements outlined in the POEO Act and associated waste regulations.

5.3. The EIS must identify, characterise and classify the following in accordance with the EPA's *Waste Classification Guidelines (2014)* and associated addendums:

(i) all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste;

(ii) all waste that is proposed to be disposed of to an offsite location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.

5.4. The EIS must outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on-site.

5.5. The EIS must demonstrate that appropriate spill containment will be provided for storage, filling and loading of all fuels and other chemicals to be used on site, in accordance with the relevant Australian Standard.

6. Water

6.1. The EIS must demonstrate how the proposed development will meet the requirements of section 120 of the POEO Act.

6.2. The EIS must include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

6.3. If the proposed development intends to discharge waters to the environment, the EIS must demonstrate how the discharge(s) will be managed in terms of water quantity, quality and frequency of discharge and include an impact assessment of the discharge on the receiving environment. This should include:

- Description of the proposal including position of any intakes and discharges, volumes, water quality and frequency of all water discharges.
- Description of the receiving waters including upstream and downstream water quality as well as any other water users.
- Demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.

6.4. The EIS must refer to Water Quality Objectives for the receiving waters and indicators and associated trigger values or criteria for the identified environmental values of the receiving environment. This information should be sourced from the ANZECC (2018) Guidelines for Fresh and Marine Water Quality.

6.5. The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines *Managing urban stormwater: soils and construction,* vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).

6.6. The EIS must describe any water quality monitoring programs to be carried out at the project site. Water quality monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutant in NSW* (2022).

From:	Matt Clarkson
To:	Tanvir Islam
Subject:	MDP response RE: Request for Requirements - EARs 1638 - Williams Quarry SEARs Ducats 19 May 2022
Date:	Thursday, 19 May 2022 9:46:20 AM
Attachments:	image001.png image006.png image007.png

Hello Tanvir

Apologies for the late reply.

Council is satisfied with the content of the SEARs.

Regards
Matt Clarkson
Manager of Development and Planning

Uralla Shire Council | Po Box 106 Uralla NSW 2358
p 02 6778 6310 | **f** 02 6778 6349 | **m** 0419 861 719

From: Tanvir Islam [mailto:tanvir.islam@dpie.nsw.gov.au]
Sent: Thursday, 19 May 2022 6:32 AM
Subject: RE: Request for Requirements - EARs 1638 - Williams Quarry

Good morning Team;

Agency advice for Williams Quarry EAR 1638 was due on the 14th of May 2022.

Please see below and the attached for supporting documents.

Advice is currently OVERDUE.

If you have any questions, please do not hesitate to contact me.

Tanvir Islam
Environmental Assessments Officer
Energy, Resources & Industry | Department of Planning and Environment
P (02) 9995 6389 | **E** tanvir.islam@dpie.nsw.gov.au

www.dpie.nsw.gov.au

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Tanvir Islam
Sent: Thursday, 14 April 2022 11:16 AM
To: OLG - Uralla Shire Council <council@uralla.nsw.gov.au>; NRAR Service Desk Mailbox <nrar.servicedesk@dpie.nsw.gov.au>; Environmental Assessments <records@rfs.nsw.gov.au>; DPI Landuse Ag Mailbox <landuse.ag@dpi.nsw.gov.au>; DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>; Development Hunter <development.north@transport.nsw.gov.au>; RRD EO Executive Director Resources Regulator Mailbox <ED.ResourcesRegulator@planning.nsw.gov.au>; EPA Planning Matters Mailbox <planning.matters@epa.nsw.gov.au>; OEH HD Heritage Mailbox <HERITAGEMailbox@environment.nsw.gov.au>; Planning Matters Mailbox <planning.matters@environment.nsw.gov.au>; CL LAM Projects Mailbox <LAM.projects@crownland.nsw.gov.au>; environmental.assessments@waternsw.com.au
Subject: Request for Requirements - EARs 1638 - Williams Quarry

Good morning,

Request for Requirements - EARs 1638 – Williams Quarry Project

Please find attached information from Simon Williams (GeoLink) on behalf of Ducats Earthmoving Pty Ltd for Williams Quarry (the Applicant) seeking the requirements of the Planning Secretary of the Department of Planning and Environment for the preparation of an Environmental Impact Statement (EIS) for the above local designated development located in the Uralla Shire Council local government area.

The proposal seeks to extend the life of an existing gravel quarry to extract and process up to 225,000 tonnes of gravel per annum over a 10 year period. The overall site is seeking to be extended by approximately 20,000m2 including an area to the south of the existing site. Materials will be extracted from site using blasting, ripping and crushing techniques being sold to local markets.

Under Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, the Planning Secretary is requesting your requirements for the EIS. It would be greatly appreciated to receive your advice by **14 May 2022.** Please direct all responses to myself on the email address provided below.

I have also attached a copy of a draft set of Secretary Environmental Assessment Requirements for your reference.

Kind regards,

Tanvir Islam
Environmental Assessments Officer
Energy, Resources & Industry | Department of Planning and Environment
P (02) 9995 6389 | **E** tanvir.islam@dpie.nsw.gov.au
www.dpie.nsw.gov.au

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Tanvir Islam
Environmental Assessment Officer
NSW Department of Planning and Environment
12 Darcy Street
Parramatta NSW 2150

Emailed: tanvir.islam@dpie.nsw.gov.au

Our ref: RDOC22/77624
Your ref: EARs 1638

12 May 2022

Dear Tanvir

Subject: **Williams Quarry project (EARs 1638) - Environmental Assessment Requirements**

Thank you for the opportunity to provide advice on the above matter. This is a response from Department of Regional NSW, Mining, Exploration & Geoscience (MEG).

Gravel (including material used for aggregates, road base, fill etc) is not a prescribed mineral under the *Mining Act 1992*. Therefore, MEG has no statutory role in authorising or regulating the extraction of this commodity. However, MEG 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, EA, SoEE 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.

If deemed commercial-in-confidence, the resource assessment summary included in the EIS should commit to providing MEG with full resource assessment documentation separately.

MEG 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 MEG as a condition of any new or amended development consent.

MEG 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 should be directed to the MEG-GSNSW Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely,

Malcolm Drummond
Senior Geoscientist - Land Use
for
Steven Palmer
Manager, Land Use
Geological Survey of NSW – Mining, Exploration & Geoscience

Heritage NSW

Our ref: HMS ID 1059

Tanvir Islam
Planner
Department of Planning and Environment
PO BOX 404, PARRAMATTA NSW 2124

By email: tanvir.islam@dpie.nsw.gov.au

Dear Mr Islam

Request for Secretary's Environmental Assessment Requirements (SEARS) for Williams Quarry Project (EARS 1638)

Thank you for your referral dated 14 April 2022 inviting SEARS input from the Heritage Council of NSW on the above State Significant Development (SSD) proposal.

The subject site is not listed on the State Heritage Register (SHR), nor is it in the immediate vicinity of any SHR items. Further, the site does not contain any known historical archaeological relics. Therefore, no heritage comments are required. The Department does not need to refer subsequent stages of this proposal to the Heritage Council of NSW.

If you have any questions regarding the above advice, please contact Sirena Larsson, Manager Customer Concierge at Heritage NSW via sirena.larsson@environment.nsw.gov.au.

Yours sincerely

Tim Smith OAM
Director Assessments
Heritage NSW
Department of Planning & Environment
As Delegate of the Heritage Council of NSW
28 April 2022

NSW RURAL FIRE SERVICE

Department of Planning and Environment (Sydney Offices)
GPO Box 39
Sydney NSW 2001

Your reference: EAR 1638
Our reference: DA20220419007136-Original-1

ATTENTION: Tanvir Islam

Date: Wednesday 25 May 2022

Dear Sir/Madam,

Development Application
Other – Other Assessment – Extractive Industry
HILLVIEW 75 ROSE HILL RD ARDING NSW 2358, 4//DP1096564

I refer to your correspondence regarding the above proposal which was received by the NSW Rural Fire Service on 14/04/2022.

The NSW RFS has received and reviewed the local SEARs request for the extension of an existing quarry. The development requires consent under part 4 of the EP&A Act and is classified as Designated Development.

The NSW RFS supports the draft SEARs and requires the EIS to include a bush fire report. The bush fire report shall identify the risks to life and property and recommend bush fire prevention measures to reduce those risks.

For any queries regarding this correspondence, please contact Alan Bawden on 1300 NSW RFS.

Yours sincerely,

Timothy Carroll
Manager Planning & Environment Services
Built & Natural Environment

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

Transport for NSW

26 April 2022

File No: NTH22/00229/01
Your Ref: EARs 1638

Department of Planning & Environment
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Tanvir Islam

SSD/SEARS: EARs 1638
EARS REQUEST – EXPANSION OF EXISTING QUARRY, WILLIAMS QUARRY, 75 ROSE HILL ROAD ARDING (LOT: 4 DP: 1096564)

I refer to the request by the Department of Planning and Environment (DPE) dated 14 April 2022 seeking input from Transport for NSW (TfNSW) to the Secretary's Environmental Assessment Requirements (SEARs) for the abovementioned development proposal.

TfNSW key interests are the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with the *Future Transport Strategy 2056*.

TfNSW requests that a Traffic Impact Assessment (TIA) be prepared by a suitably qualified person/s in accordance with the Austroads *Guide to Traffic Management Part 12*, the complementary TfNSW Supplement and *Roads and Maritime Guide to Traffic Generating Developments*.

The TIA should be tailored to the scope of the proposed development and include, but not be limited to, the following:

- A map of the surrounding road network identifying the site access, relevant traffic route/s and connections to the classified (State) road network.
- Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject properties.
- Current traffic counts for all relevant traffic routes and relevant intersections, including connections to the classified (State) road network.
- The anticipated additional vehicular traffic generated from both the construction and operational stages of the project.

6 Stewart Avenue (Locked Bag 2030) Newcastle West NSW 2302
76 Victoria Street (PO Box 576) Grafton NSW 2460
1300 207 783
transport.nsw.gov.au

- The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.

- An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for relevant intersections along the identified transport route/s, including connections to the classified (State) road network.

- Consideration of the traffic impacts on existing and proposed intersections, in particular, the intersection New England HWY and Arding Rd.

  Consideration shall also include access to the site, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area.

- Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council.

- Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model, including:
  - Current traffic counts and 10 year traffic growth projections
  - With and without development scenarios
  - 95th percentile back of queue lengths
  - Delays and level of service on all legs for the relevant intersections
  - Electronic data for TfNSW review.

- Relevant swept path analysis for the largest design vehicle accessing the site.

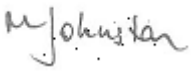
- Any other impacts to the road network including consideration of active transport and public transport facilities.

- Identification of necessary road upgrades that are required to mitigate the impact of the development. Preliminary concept drawings for any road upgrades shall be designed in accordance with Austroads Guidelines, Australian Standards and TfNSW Supplements and be submitted with the EIS. Road upgrades shall be to the satisfaction of TfNSW and/or Council in accordance with relevant Roads Act functions.

- Details of any Traffic Management Plan (TMP) proposed to address the construction phase of the proposed development. The TMP and associated Traffic Control Plans (TCPs) should be prepared by suitably qualified persons in accordance with the *TfNSW Traffic Control at Work Sites Manual*.

Should you require further information please contact Bec Shaw, Development Services Case Officer, on 02 4908 7688 or 0499 269 213 or by emailing development.north@transport.nsw.gov.au.

Yours sincerely



Marg Johnston
Team Leader Development Services
North Region | Community & Place
Regional & Outer Metropolitan

From:	Justine Clarke
To:	Tanvir Islam
Subject:	WaterNSW response - Request for Requirements - EARs 1638 - Williams Quarry
Date:	Tuesday, 3 May 2022 12:25:14 PM
Attachments:	image001.png image002.png

Hi Tanvir

Thank you for requesting WaterNSW's input the EARs for Williams quarry. The subject site is located in the upper reaches of the catchment for WaterNSW's Copeton Dam. However this location is considered sufficiently removed from WaterNSW land or assets, and, as any flood works or licensing approvals will be assessed by others, the risk to water quality is considered to be low and WaterNSW has no comments or particular requirements for the EARs.

If you have any questions please do not hesitate to contact me.

Regards

Justine Clarke
Catchment and Asset Protection Adviser

Level 14, 169 Macquarie Street
PO Box 398
Parramatta NSW 2150
M: 0457 535 955
justine.clarke@waternsw.com.au
www.waternsw.com.au

From: Tanvir Islam <tanvir.islam@dpie.nsw.gov.au>
Sent: Thursday, 14 April 2022 11:16 AM
To: OLG - Uralla Shire Council <council@uralla.nsw.gov.au>; NRAR Service Desk Mailbox <nrar.servicedesk@dpie.nsw.gov.au>; Environmental Assessments <records@rfs.nsw.gov.au>; DPI Landuse Ag Mailbox <landuse.ag@dpi.nsw.gov.au>; DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>; Development Hunter <development.north@transport.nsw.gov.au>; RRD EO Executive Director Resources Regulator Mailbox <ED.ResourcesRegulator@planning.nsw.gov.au>; EPA Planning Matters Mailbox <planning.matters@epa.nsw.gov.au>; OEH HD Heritage Mailbox <HERITAGEMailbox@environment.nsw.gov.au>; Planning Matters Mailbox <planning.matters@environment.nsw.gov.au>; CL LAM Projects Mailbox <LAM.projects@crownland.nsw.gov.au>; Environmental Assessments <Environmental.Assessments@waternsw.com.au>
Subject: Request for Requirements - EARs 1638 - Williams Quarry

Good morning,

Request for Requirements - EARs 1638 – Williams Quarry Project

Please find attached information from Simon Williams (GeoLink) on behalf of Ducats Earthmoving Pty Ltd for Williams Quarry (the Applicant) seeking the requirements of the Planning Secretary of the Department of Planning and Environment for the preparation of an Environmental Impact Statement (EIS) for the above local designated development located in the Uralla Shire Council local government area.

The proposal seeks to extend the life of an existing gravel quarry to extract and process up to 225,000 tonnes of gravel per annum over a 10 year period. The overall site is seeking to be extended by approximately 20,000m2 including an area to the south of the existing site. Materials will be extracted from site using blasting, ripping and crushing techniques being sold to local markets.

Under Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, the Planning Secretary is requesting your requirements for the EIS. It would be greatly appreciated to receive your advice by **14 May 2022.** Please direct all responses to myself on the email address provided below.

I have also attached a copy of a draft set of Secretary Environmental Assessment Requirements for your reference.

Kind regards,

Tanvir Islam
Environmental Assessments Officer
Energy, Resources & Industry | Department of Planning and Environment
P (02) 9995 6389 | **E** tanvir.islam@dpie.nsw.gov.au
www.dpie.nsw.gov.au

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Your ref: SEAR 1638
Our ref: Enter DOC22/300624

Mr Tanvir Islam
Energy, Resources and Industry
Locked Bag 5022
PARAMMATTA NSW 2124

Dear Mr Islam

Re: Request for Biodiversity and Conservation Division's Environmental Impact Statement Environmental Assessment Requirements – 75 Rose Hill Road, Arding (Lot 4 DP 1096564) - SEAR 1638

Thank you for your e-mail dated 14 April 2022 about the proposed quarry expansion at 75 Rose Hill Road, Arding, seeking Environmental Assessment Requirements (EARs) from the Biodiversity and Conservation Division (BCD) in the Biodiversity, Conservation and Science Directorate of the Environment and Heritage Group in the Department of Planning and Environment. I appreciate the opportunity to provide input.

We note that the project will be assessed in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Environmental Impact Statement (EIS) EARs provided by the BCD are limited to biodiversity, NPWS estate and flooding.

The proponent should ensure that the EIS will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts of the proposed development.

In particular, the EIS should consider potential impacts on threatened entities known or likely to occur on the subject land, including but not limited to:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community.

- Threatened flora species, austral toadflax (*Thesium australe*), narrow-leaved peppermint (*Eucalyptus nicholii*), blackbutt candlebark (*E. rubida*), aromatic peppercress (*Lepidium hyssopifolium*) and Capertee stringybark (*E. cannonii*).

- Threatened fauna species, koala (*Phascolarctos cinereus*) and little eagle (*Hieraaetus morphnoides*).

We consider that this information is necessary for a comprehensive EIS for the proposed development.

The full list of our requirements that may need to be addressed in the EIS is provided in **Attachment 1**.

In preparing the EIS, the proponent should refer to the relevant guidance material listed in **Attachment 2** and **Attachment 3**.

If you have any questions about this advice, please do not hesitate to contact Mr Don Owner, Senior Conservation Planning Officer, at don.owner@environment.nsw.gov.au or 6659 8239.

Yours sincerely

11 May 2022

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Biodiversity and Conservation

Enclosures:
Attachment 1 - BCD Recommended SEARs – EIS – quarry expansion – 75 Rose Hill Road, Arding - SEAR 1638
Attachment 2 - EIS Guidance Material
Attachment 3 - BCD North East Branch – Principles for Mapping the Extent of Woodland Critically Endangered and Endangered Ecological Communities

Attachment 1

Biodiversity and Conservation Division's Recommended Secretary's Environmental Assessment Requirements (SEARs) for Preparation of an Environmental Impact Statement

for the

Quarry expansion – 75 Rose Hill Road, Arding

SEAR 1638

TABLE OF CONTENTS

A. The Proposed Development

The Environmental Impact Statement (EIS) should fully and clearly describe the proposed development, including any environmental impact mitigation measures, and identify all the processes and activities intended for the site during the life of the proposed development.

The description of the proposed development in the EIS should, where relevant, include:

1. the location of the proposal and details of the surrounding environment;
2. the land use zoning;
3. the size and type of the proposal and its operation;
4. the proposed layout of the site;
5. the staging and timing of the proposal;
6. the proposal's relationship to any other proposal.
7. all equipment proposed for use at the site;
8. chemicals, including fuel, used on the site and proposed methods for the transportation, storage, use and emergency management;
9. waste generation, storage and disposal;
10. the anticipated environment impacts of the proposal, both direct and indirect,
11. a plan showing the distribution of any threatened flora or fauna species and the vegetation communities on or adjacent to the subject site, and the extent of vegetation proposed to be cleared; and
12. ownership details of any residence and/or land likely to be affected by the proposal;
13. maps/diagrams showing the location of residences and properties likely to be affected and other industrial developments, conservation areas, wetlands, etc. in the locality that may be affected by the proposal;
14. methods to mitigate any expected environmental impacts of the proposal; and
15. the anticipated level of performance in meeting required environmental standards.

B. Environmental Impacts of the Proposed Development

Impacts related to Biodiversity, NPWS Estate, Acid Sulfate Soils, Flooding, Coastal Processes and Associated Hazards, and Cumulative Impacts, should be assessed, quantified, and reported on in the EIS, as required.

The EIS should address the specific requirements outlined under each heading below, where necessary, and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is at **Attachment 2**.

C. Biodiversity

1. The EIS must assess the impacts 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 whether the proposed development is to be carried out in a declared area of outstanding biodiversity value.

   B. If the proposed development is not carried out in a declared area of outstanding biodiversity value, then the EIS must demonstrate and document whether the proposed development exceeds the biodiversity offset scheme threshold, as set out in section 7.4 of the BC Act 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 of an area declared by clause 7.23 of the BC Regulation as exceeding the threshold, or

      II. The clearing of native vegetation, or other action prescribed by clause 6.1 of the BC Regulation, on land included on the Biodiversity Values Map published under clause 7.3 of the BC Regulation.

   C. If the biodiversity offset scheme threshold is not exceeded, then the EIS must document *the test for determining whether proposed development is likely to significantly affect threatened species or ecological communities* as outlined in Section 7.3 of the BC Act, by preparing an ecological assessment that should include:

      I. A field survey of the site conducted and documented in accordance with relevant guidelines, including:

         a. *Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species* (OEH undated) https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf

         b. *NSW Survey Guide for Threatened Frogs* (DPIE 2020) https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs

         c. *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020) https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method

         d. *Species credit' threatened bats and their habitats (OEH 2018)* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf

e. *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC 2004), https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf.

If a proposed field survey methodology is likely to vary significantly from the methods in the guidelines above, then the proponent should discuss the proposed methodology with the Biodiversity and Conservation Division prior to undertaking surveys for the EIS, to determine whether the Biodiversity and Conservation Division considers the proposed methodology appropriate.

The results of recent (less than five years old) field surveys may be used. However, the results of previous field surveys should not be used if they have:

- been undertaken in seasons, weather conditions or following extensive disturbance events when the subject species are unlikely to be detected or present, or
- utilised methodologies, survey sampling intensities, timeframes or baits that are not the most appropriate for detecting the target subject species,

unless these differences can be clearly demonstrated to have had an insignificant impact upon the outcomes of the field surveys.

If the results of previous field surveys are used, then field surveys for any additional threatened entities listed under the BC Act since the previous field surveys took place, must be undertaken and documented.

The list of potential threatened species, populations, ecological communities, or their habitats for the site should be determined in accordance with:

- the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC 2004) https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment, and
- the Department's Threatened Species website http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species ,and
- the *Bionet Atlas of NSW* http://www.environment.nsw.gov.au/wildlifeatlas/about.htm , and
- the Vegetation Information System (BioNet Vegetation Classification) http://www.environment.nsw.gov.au/research/Visclassification.htm , and
- other data sources (e.g. PlantNET, Online Zoological Collections of Australian Museums (http://www.ozcam.org/), previous or nearby surveys etc.) may also be used to compile the list.

II. The following information as a minimum:

a. A description, spatial data files, and geo-referenced mapping of the study area, (overlays on topographic maps, satellite images and /or aerial photos, including details of map datum, projection and zone), showing all field survey locations, vegetation communities classified in accordance with the BioNet Vegetation Classification (http://www.environment.nsw.gov.au/research/Visclassification.htm), key

habitat features and reported locations of threatened species and ecological communities present in the subject site and study area.

b. A description of survey methodologies used, including timing, location and weather conditions.

c. Details, including qualifications and experience, of all staff undertaking the surveys, mapping and assessment of impacts as part of the EIS.

d. Identification of national and state listed threatened biota known or likely to occur in the study area and their conservation status.

e. A description of the likely impacts of the proposed development on biodiversity values, including direct and indirect impacts and construction and operation impacts, with impacts quantified, wherever possible, such as the amount of each vegetation community or species habitat to be cleared or impacted, and/or the degree of fragmentation of a habitat connectivity.

f. Identification of the avoidance, mitigation and management measures that will be put in place as part of the proposed development to avoid or minimise biodiversity impacts, including details about alternative options considered and how long-term management arrangements will be guaranteed.

g. A description of the residual impacts of the proposed development.

III. The '*test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats'* as outlined in Section 7.3 of the BC Act undertaken in accordance with the gazetted *Threatened Species Test of Significance Guidelines* (OEH 2018) available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf.

2. If the EIS determines under 1 above that the proposed development is likely to significantly affect threatened species, then in accordance with Section 7.7 of the BC Act the EIS must be accompanied by a Biodiversity Development Assessment Report prepared in accordance with Part 6, Division 3 of the BC Act.

3. If the EIS determines under 1 above that the proposed development is unlikely to significantly affect threatened species, then the proposed development should:

   a. be designed to avoid and minimise impacts on biodiversity values to the fullest extent possible, and

   b. include a biodiversity offset package to offset remaining direct and indirect impacts on biodiversity values, prepared in accordance with the Department's 13 offsetting principles available at http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm:

Note:

For the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999,* the EIS should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action.

D. NPWS Estate

The EIS should address the following with respect to land reserved under the *National Parks and Wildlife Act 1974*.

1. Where appropriate, likely impacts (both direct and indirect) of the proposed development on any adjoining and/or nearby NPWS estate reserved under the National Parks and Wildlife Act 1974 should be considered, with reference to the *Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE 2020)* available at:

   https://www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands

Note: Proposed development which may impact marine protected areas should be referred to the Regions, Industry, Agriculture and Resources Group in the Department of Planning, Industry and Environment to determine the assessment and approval requirements.

E. Flooding

The EIS should include an assessment of the following referring to the relevant guidelines in Attachment 2:

1. Whether the proposed development is consistent with any floodplain risk management plans.
2. Whether the proposed development is compatible with the flood hazard of the land.
3. Whether the proposed development will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.
4. Whether the proposed development will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
5. Whether the proposed development incorporates appropriate measures to manage risk to life from flood.
6. Whether the proposed development is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.
7. The implications of flooding over the full range of potential flooding, including the probable maximum flood, should be considered as set out in the NSW Government Floodplain Development Manual. This should include the provision of:
   a. Full details of the flood assessment and modelling undertaken in determining any design flood levels (if applicable), including the 1 in 100 year flood levels.
   b. A sensitivity assessment of the potential impacts of an increase in rainfall intensity and runoff (10%, 20% and 30%) and sea level rise on the flood behaviour for the 1 in 100 year design flood if applicable.

8. All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the proposed development should be detailed.

F. Cumulative Impacts

The EIS should include an assessment of the following:

1. The cumulative impacts, including both construction and operational impacts, from all clearing activities and operations, associated edge effects and other indirect impacts on cultural heritage, biodiversity and NPWS Estate in accordance with the *Environmental Planning and Assessment Act 1979*.

2. The cumulative impacts, including both construction and operational impacts, of the proponent's existing proposals and other proposals and associated infrastructure (such as access tracks etc.) as well as the cumulative impact of the proposed development in the context of other proposals located in the vicinity.

Attachment 2 – EIS 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
Biodiversity	
Biodiversity Assessment Method (DPIE, 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-2020
Biodiversity Development Assessment Report	https://www.legislation.nsw.gov.au/#/view/act/2016/63/part6/div3/sec6.12
Biodiversity Development Assessment Report Template	https://www.environment.nsw.gov.au/research-and-publications/publications-search/guidance-for-the-biodiversity-development-assessment-report-template
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

Title	Web address
Accreditation Scheme for Application of the Biodiversity Assessment Method Order 2017	https://www.legislation.nsw.gov.au/regulations/2017-471.pdf
Biodiversity conservation actions	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-biodiversity-actions-170496.pdf
Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-reasonable-steps-170498.pdf
Threatened Species Website	www.environment.nsw.gov.au/threatenedspecies/
NSW BioNet (Atlas of NSW Wildlife)	www.bionet.nsw.gov.au/
Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
Threatened biodiversity survey and assessment - Guidelines for developments and activities (2004 working draft)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment
Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species (OEH undated)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf
NSW Survey Guide for Threatened Frogs (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
'Species credit' threatened bats and their habitats (OEH 2018)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf
BioNet Vegetation Classification - NSW Plant Community Type (PCT) database	www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm
SEED Data Portal (access to online spatial data)	http://data.environment.nsw.gov.au/

Title	Web address
Department of Primary Industry Policy and guidelines for fish habitat conservation and management (update 2013)	https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/fish-habitat-conservation
NPWS Estate	
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-policies/revocation-recategorisation-and-road-adjustment
Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands
Acid Sulfate Soils	
Acid Sulfate Soils Planning Maps via Data.NSW	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. (Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018a)	https://www.waterquality.gov.au/sites/default/files/documents/dewatering-acid-sulfate-soils.pdf
National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. (Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018b)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/sampling-and-identification-methods-manual.pdf

Title	Web address
National Acid Sulfate soils Guidance: Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands, Department of Agriculture and Water Resources, Canberra ACT. (Sullivan, LA, Ward, NJ, Bush, RT, Toppler, NR, Choppala, G. 2018c)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/monosulfidic-black-ooze-accumulation.pdf
National Acid sulfate soils guidance: Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management, Department of Agriculture and Water Resources, Canberra, ACT (Simpson, SL, Mosley, L, Batley, GE and Shand P. 2018)	https://www.waterquality.gov.au/sites/default/files/documents/dredging-sediments-spoil.pdf
National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of Agriculture and Water Resources, Canberra, ACT. (Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/dewatering-groundwater-environments.pdf
Flooding, Coastal Processes and Associated Hazards	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Guidelines for Preparing Coastal Zone Management Plans	http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf
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

Attachment 3

BCD North East Branch – Principles for Mapping the Extent of Woodland Critically Endangered and Endangered Ecological Communities

Introduction

The NSW Threatened Species Scientific Committee's final determinations for woodland endangered ecological communities (EECs) must be considered when preparing vegetation maps for impact assessments. The determination for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland states it covers all occurrences of this ecological community independent of their condition and the determination for Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland describes the ecological community in several condition states. Hence, vegetation mapping must ensure that all condition states referenced in these determinations are mapped appropriately.

The Biodiversity and Conservation Division (BCD) North East Branch has prepared these guidelines to assist proponents and their consultant ecologists with identifying, describing, and mapping the extent of these EECs in accordance with those final determinations.

Underpinning Considerations from Hnatiuk et al. (2009) (see Tables 6 and 7 below)

1. Open Forest has crowns touching or slightly separated – up to 0.25 crown widths apart.
2. Woodland has crowns clearly separated – up to one crown width apart.
3. Open Woodland has crowns well separated – up to 20 crown widths apart.
4. Isolated trees - more than 20 crown widths apart.

Table 6: Visual estimation of crown cover class

Code	Criteria assessed in field	Described as	Crown separation ratio	Crown cover %	Foliage cover %
D	Crowns touching to overlapping	Closed or dense	<0	>80%	>70%
M	Crowns touching or slightly separated	Mid-dense	0–0.25	50–80%	30–70%
S	Crowns clearly separated	Sparse or open	0.25–1	20–50%	10–30%
V	Crowns well separated	Very sparse	1–20	0.25–20%	0.2–10%
I	Isolated plants: for trees about 100 metres apart, shrubs about 20 m apart	Isolated plants	>20	<0.25%	<0.20%
L	Isolated clumps of 2 to many plants about 200 metres apart	Isolated clumps	>20	<0.25%	<0.20%
E	Emergent	Emergents	>3	<5% of total crown cover	<3% of total foliage cover

Table 7: Converting crown separation ratio to crown cover

	Overlap		Touching																						
	Crowns separate																								
Crown separation ratio	-.01	-.05	-.02	0	.05	0.1	0.15	0.2	0.25	0.3	0.4	0.5	0.6	0.75	1.0	1.25	1.5	2.0	3.0	4.0	8.0	10	15	20	30
Percentage crown cover (%)	100	89	84	81	73	67	60	56	52	48	41	34	31	26	20	16	13	9	5	3	1	0.6	0.3	0.2	0.1

Principles for Mapping the Extent of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC)

- based on NSW Scientific Committee Final Determination
- can be a woodland, open woodland or derived native grassland
- open woodland tree crown separation is based on the definition of scattered trees in Appendix B of the Biodiversity Assessment Method 2020 (i.e. scattered trees are more than 50 metres apart)

1. Woodland Form (trees up to one average crown width apart)

    a. For areas with tree crowns up to one average crown width apart, map all the following as CEEC - the outer edges of tree crowns up to one average crown width apart (including those of regenerating canopy trees) plus a buffer with a width of one average crown width from the outer edges of those tree crowns, noting that there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than one average crown width apart, follow the open woodland form procedures in 2 below.

2. Open Woodland Form (trees more than one average crown width apart and up to 50 metres apart)

    a. For areas with tree crowns more than one average crown width apart and up to 50 metres apart, map all the following as CEEC - the outer edges of tree crowns more than one average crown width apart and up to 50 metres apart (including those of regenerating canopy trees) plus a buffer with a width of 50 metres from the outer edges of those tree crowns, noting that there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than 50 metres apart, map all the following as CEEC - the outer edges of each tree crown more than 50 metres apart, including those of regenerating canopy trees.

3. Treeless Form

    a. For areas beyond the buffers in 1a and 2a above, or beyond the tree crowns in 2b above, or areas with no canopy trees or regenerating canopy trees, map all the following as CEEC - areas of understorey and/or groundcover containing native species.

Principles for Mapping the Extent of Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland Endangered Ecological Community (EEC)

- based on NSW Scientific Committee Final Determination
- can be an open forest, woodland or derived native grassland
- woodland tree average crown separation is used to define scattered trees (i.e. scattered trees are more than one average crown width apart)

1. Open Forest Form (trees up to 0.25 average crown widths apart)

    a. For areas with tree crowns up to 0.25 average crown widths apart, map all the following as EEC - the outer edges of tree crowns up to 0.25 average crown widths apart (including those of regenerating canopy trees) plus a buffer with a width of 0.25 average crown widths to the outer edges of those tree crowns, noting there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than 0.25 average crown widths apart, follow the woodland form procedures in 2 below.

2. Woodland Form (trees more than 0.25 average crown widths apart and up to one average crown width apart)

    a. For areas with tree crowns more than 0.25 average crown widths apart and up to one average crown width apart, map all of the following as EEC - the outer edges of tree crowns more than 0.25 average crown widths apart and up to one average crown width apart (including those of regenerating canopy trees) plus a buffer with a width of one average crown width to the outer edges of those tree crowns, noting there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than one average crown width apart, map all the following as EEC - the outer edges of each tree crown more than one average crown width apart, including those of regenerating canopy trees.

3. Treeless Form

    a. For areas beyond the buffers in 1a and 2a above, or beyond the tree crowns in 2b above, or areas with no canopy trees or regenerating canopy trees, map all the following as EEC – areas of understorey and/or groundcover containing native species.

Appendix B

Secretary's Environmental Assessment Requirements – November 2024

Department of Planning, Housing and Infrastructure

Simon Williams
GeoLINK
PO Box 1267
Armidale NSW 2350

Via email: swilliams@geolink.net.au

25 November 2024

Planning Secretary's Environmental Assessment Requirements
Williams Quarry Project (EAR 1948)

Dear Simon Williams,

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 development. These requirements have been prepared in consultation with relevant government agencies based on the information your company has provided to date. Comments from several agencies are outstanding and will be provided for consideration in the EIS once received by the Department. 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. 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

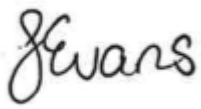
- determine the number of copies (hard-copy and digital) of the EIS that will be required for reviewing purposes.

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an 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 Climate Change, Energy the Environment and Water to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 111).

You should also contact the Mine Safety branch of NSW Resources in regard to 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 Kristina Robinson on 02 9860 1543 or email at Kristina.robinson@dpie.nsw.gov.au

Yours sincerely,



Jessie Evans

Director Resource Assessments
Energy, Resources and Industry
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 Part 8 of the *Environmental Planning and Assessment Regulation 2021.*

Designated Development

EAR Number	EAR 1948
Proposal	Expansion of an existing quarry over an approximate 8.1 ha area to extract, process, stockpile and transport up to 225,000 tonnes of hard rock per year over 30 years.
Location	Operations include blasting, excavation, crushing on site and stockpiling prior to removal of product via trucks for delivery to local market.
Applicant	75 Rose Hill Road Arding NSW 2358 (Lot 4 DP1096564)
Date of Issue	25 November 2024
Date of Expiry	25 November 2026
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 190, 192 and 193 of Part 8 Division 5 of the *Environmental Planning and Assessment Regulation 2021.* 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 activities 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; and - 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.
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 – including: - proposed hours, frequency, methods and impacts; and - an assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZECC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features; • 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 facility; • Water – including: - a detailed site water balance and an assessment of any water licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; - an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and - a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts; • 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 Aboriginal Cultural Heritage Assessment Report (ACHAR), prepared in accordance with relevant policy and guidelines, identifying, describing and assessing any impacts to Aboriginal cultural heritage sites or values associated with the project.
    - The ACHAR must be prepared in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of thorough archaeological survey and test excavations (where required); and
    - Include evidence of adequate and continuous consultation with Aboriginal stakeholders in determining and assessing impacts, developing and selecting options for avoidance of Aboriginal cultural heritage; and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010).);
- 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) paying particular attention to the agricultural land use in the region; and
  - an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts;
- Waste – including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams;
- 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; and
- Rehabilitation – including
  - a detailed description of the proposed rehabilitation measures that would be undertaken throughout the development.
  - a detailed rehabilitation strategy, including justification for the proposed final landform and consideration of the objectives of any relevant strategic land use plans or policies; and

	- potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc).
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 https://www.planning.nsw.gov.au/sites/default/files/2023-02/extractive-industries-quarries-eis-guideline.pdf In addition, the EIS must assess the development against *Uralla Local Environmental Plan 2012* 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.

Environmental Planning Instruments, Policies, Guidelines & Plans

Environmental Planning Instruments - General	
	State Environmental Planning Policy (Resources and Energy) 2021
	State Environmental Planning Policy (Planning Systems) 2021
	State Environmental Planning Policy (Transport and Infrastructure) 2021
	State Environmental Planning Policy (Codes) 2021
	State Environmental Planning Policy (Biodiversity and Conservation) 2021
	State Environmental Planning Policy (Resilience and Hazards) 2021
	Uralla Local Environmental Plan 2012
Risk Assessment	
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	AS ISO 31000:2018 Risk Management - Guidelines (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
	DPI Land Use Conflict Risk Assessment Guide
Land	
	State Environmental Planning Policy (Resilience and Hazards) 2021
	Agricultural Land Classification (DPI)
	Rural Land Capability Mapping (OEH)
	Soil and Landscape Issues in Environmental Impact Assessment (NOW)
	DPI Land Use conflict Risk Assessment (LUCRA) Guide
	Land and Soil Capability Assessment Scheme: second approximation (2012)
	Draft State Significant Agricultural Map (DPI)
	Agricultural Issues for Extractive Industry Development (DPI)
	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)
	Guide to Groundwater Management in NSW (DPE)
	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)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)
Biodiversity	
	Biodiversity Assessment Method (DPIE 2020)
	Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (DPIE 2019)
	Ancillary rules: Biodiversity conservation actions
	Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying variation rules
	NSW Surveying threatened plants and their habitats (DPIE 2019)
	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 (DPIE 2019)
	Threatened Species Test of Significance Guidelines (OEH, 2018)
	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 investigatng, 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	
	NSW Noise Policy for Industry (EPA)
	Interim Construction Noise Guideline (EPA)
	NSW Road Noise Policy (EPA)

Air	
	Protection of the Environment Operations (Clean Air) Regulation 2022
	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
	Future Transport Strategy 2056
	Austroads Guide to Traffic Management
Hazards	
	Hazardous and Offensive Development Application Guidelines – Applying SEPP 33
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
	Planning for Bushfire Protection 2019 (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

AGENCY CORRESPONDENCE

Department of Planning, Housing and Infrastructure

Crown Lands

Our ref: 24/06269#88

Your ref: EARs 1948

13 November 2024

Subject: Williams Quarry, Arding

Dear Sir/Madam

The Department of Planning, Housing and Infrastructure – Crown Lands have reviewed the proposal.

No Crown land or roads are in the vicinity of the proposal or are affected by the proposal, and therefore Crown Lands has no further comment in this regard at this time.

No Crown waterways are within the development footprint, however it is noted that Crown waterway known as Reedy Creek is within the vicinity and the development drains into Spring Creek which in turn flows into the Crown waterway of Reedy Creek. Crown Lands would require protection of Crown waterways from sedimentation, pollution and alteration to local hydrology to be considered in the preparation of the Environmental Impact Statement.

If the proponent requires further information, or has any questions, please contact Warren Martin, Natural Resource Management Project Officer in Crown Lands, on 02 67703118 or at warren.martin@crownland.nsw.gov.au.

Yours sincerely

Rodney O'Brien

Group Leader Armidale/Moree

Crown Lands

NSW Resources

RDOC24/207208
15 November 2024

Kristina Robinson
Department of Planning, Housing and Infrastructure
kristina.robinson@dpie.nsw.gov.au
Via: Email

ADVICE RESPONSE: Williams Quarry -Arding

Stage: Secretary's Environmental Assessment Requirements

Development Application: EAR 1948

Dear Kristina,

I refer to your correspondence dated 6 November 2024 inviting the Department of Primary Industries and Regional Development - NSW Resources to provide comments on the Williams Quarry -Arding (the Project) submitted by Ducats Earthmoving Pty Ltd (the Proponent).

NSW Resources has reviewed the information supplied and notes that the Project does not involve the recovery of Scheduled Minerals identified under Schedule 1 of the Mining Regulation 2016. Accordingly, NSW Resources has no further comment to make at this stage.

Please refer to NSW Resources Regulator advice Attachment A.

For further advice on this matter, please contact Sarah Maiorana, A/Senior Advisory Officer, Industry Advisory and Mining Concierge unit - Industry Development branch on 02 4063 6860 or mining.concierge@regional.nsw.gov.au.

Sincerely

G. Carney

Giselle Carney
Acting Manager Industry Advisory and Mining Concierge
Industry Development
Department of Primary Industries and Regional Development – NSW Resources

for

Tony Linnane
Executive Director Strategy, Performance and Industry Development
Department of Primary Industries and Regional Development - NSW Resources

Attachment A

Resources Regulator
Department of Primary Industries and Regional Development

Thursday, 14 November 2024

Kristina Robinson
Department of Planning, Housing and Infrastructure
Kristina.robinson@planning.nsw.gov.au

Via: Major Projects Portal

Dear Kristina,

I refer to the Williams Quarry, Arding request submitted to the Resources Regulator on 7th November 2024 (EAR1948). The Resources Regulator has reviewed the request and has no specific comment.

The Mine Safety Inspectorate within the Resources Regulator is responsible for ensuring the mine operators' compliance with the Work Health and Safety (WHS) legislation, in particular the effective management of risks associated with the principal hazards as specified in the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022.

The Resources Regulator may undertake assessments of the mine operators' proposed mining activities under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and Regulation as well as other WHS regulatory obligations.

Should you require any further information or clarification, please contact the Regulator on 1300 814 609 (Press Option 2 Press Option 5) or email nswresourcesregulator@service-now.com.

Yours sincerely,

Anthony Margetts

Chief Inspector

Resources Regulator

Department of Primary Industries and Regional Development

OUT24/17704

Department of Planning, Housing and Infrastructure
Ms Kristina Robinson
C/- Major Projects Portal

kristina.robinson@dpie.nsw.gov.au

Arding Williams Quarry Expansion Project EARs 1948

Dear Ms Robinson

Thank you for your referral via the email on 6 November 2024 and the opportunity to provide comment into Environmental Assessment Requirements on the Arding Quarry Expansion Project.

The NSW Department of Primary Industries (DPI) Agriculture collaborates and partners with our stakeholders to protect and enhance the productive and sustainable use and resilience of agricultural resources and the environment.

DPI Agriculture has reviewed the scoping report provided. We understand the regionally significant project proposes to extend an existing quarry on Rose Hill Road at Arding in Uralla LGA. We note it is estimated that over 676,000m^3 or 1,014,000 tonnes of resource material is proposed to be extracted at a rate of up to 225,000 tonnes or 66,600m^3 p/annum over approximately 10 years or until the resource is exhausted. We also note that there is no information provided on the previous approval(s) for the existing quarry.

Lot 4 DP1096564 is 213ha in area and the 10ha project site within Lot 4 has identified Biophysical Strategic Agricultural Land (BSAL) and State Significant Agricultural Land (SSAL) as identified on the preliminary draft SSAL map, directly to the north. This land is associated with Reedy Creek and part of a large contiguous area of high-quality agricultural land to the north and south east of the subject site. These areas also align with the land identified as Class 3 Land and Soil Capability.

Agriculture is predominant within the surrounding area, with a history of both extensive and intensive industries including orcharding due to the fertile soils including BSAL to the north and east of the site. However, the Scoping Report does not address or assess agricultural values or activities.

The Department considers the further issues outlined in Appendix 1 should be included in the EARs document to ensure consideration of agriculture is appropriately undertaken in the preparation of the Environmental Impact Statement.

105 Prince Street | Locked Bag 21
Orange NSW 2800

E: landuse.ag@dpird.nsw.gov.au
dpird.nsw.gov.au

Should you require clarification on any of the information contained in this response, please do not hesitate to contact me by email at landuse.ag@dpi.nsw.gov.au.

Sincerely

Nita Scott

Soils and Water | Agricultural Land Use Planning
New England and North West Region

12 November 2024

Encl – Appendix 1 – DPI Agriculture SEARs requirements

Appendix 1

DPIRD EARs requirements - Arding Quarry Project (EARs 1948)

Land Resources

In addition to the following as set out in the draft EARs: '*potential impacts on soils and land capability (including potential erosion, land contamination and biosecurity risks) and the proposed mitigation, management and remedial measures (as appropriate)';* Include: ***'paying particular attention to the agricultural land use in the region'***

Cumulative impacts

Cumulative impacts on agricultural resources and developments can result from the combined effects of developments over time and multiple developments in a locality. Assessment should identify potential impacts on rural enterprises and landholders, assess the relative risks and consider possible cumulative effects. Aspects to consider include:

- Areas removed from agricultural use due to quarrying operations, infrastructure, plant or access requirements as well as the storage or processing of materials.
- Any areas to be excluded (temporarily or permanently) from agricultural use to ensure a safe working environment and prevent injury to livestock and wildlife.

Biosecurity issues

- Include a biosecurity (pests, weeds, and disease) risk assessment outlining the likely plant, animal, and community risks. The relevant weed or pest animals for a region are addressed in the regional plans or strategies issued by NSW Local Lands Services.
- Include details of how the proposal will deal with identified biosecurity risks as well as contingency plans for any failures. Include monitoring and mitigation measures for weed and pest management prior to operations commencing, during operation and rehabilitation.

Land Use Conflict Risk Assessment (LUCRA)

- A Land Use Conflict Risk Assessment (LUCRA) should be undertaken by a suitably qualified person to identify potential impacts the proposal may impose on or in the reverse experience from, lawful agricultural land uses and activities in the vicinity and detail effective mitigation measures.

Land Stewardship

- Provide details of any proposed earthworks including, an assessment of the overall footprint where the natural contours of the land will be modified, the total amount of material involved, how any stockpiled material will be managed and an outline of how this material will or will not be used for rehabilitation purposes.
- Provide a complete soil survey, undertaken prior to works commencing, as a benchmark for rehabilitation.

The SEARs document should refer to the following references:

- DPI Land Use Conflict Risk Assessment (LUCRA) Guide
- Land and Soil Capability Assessment Scheme: second approximation (2012)
- Draft State Significant Agricultural Map (DPI)
- Agricultural Issues for Extractive Industry Development (DPI)

Transport for NSW

14 November 2024

File No: NTH24/00810/001
Your Ref: EAR 1948

The Director
Department of Planning, Housing & Infrastructure
NSW Major Projects Portal

Attention: Kristina Robinson

Request for input to Environmental Assessment Requirements for the expanded operation of Williams Quarry at Lot 4 DP1096564); 75 Rose Hill Road Arding

I refer to your email of 6 November 2024 requesting input from Transport for NSW to the Secretary's Environmental Assessment Requirements (SEARs) for the abovementioned designated development proposal.

TfNSW key interests are the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with the *Future Transport Strategy*.

New England Highway (HW09) is a classified (State) road and all other roads within the site location are local roads. Council is the roads authority for both roads and all other public roads in the area, in accordance with Section 7 of the *Roads Act 1993*.

TfNSW requests that a Transport Impact Assessment (TIA) be prepared by suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and TfNSW Guide to Transport Impact Assessment, 2024. The TIA should include, but not necessarily be limited to, an assessment of the considerations outlined in **Attachment A**.

If you have any further enquiries regarding the above comments, please do not hesitate to contact Kane Hitchcock, Development Services Case Officer or the undersigned on 1300 207 783 or via email at: development.north@transport.nsw.gov.au

Yours faithfully,

Court Walsh
Team Leader, Development Services
Transport Planning
Planning, Integration & Passenger

Enc. ***ATTACHMENT A - Requested considerations – Transport Impact Assessment***

ATTACHMENT A - Requested considerations – Transport Impact Assessment

For context, this attachment must be read with TfNSW letter of 14 November 2024 reference number NTH24/00810/001

The Transport Impact Assessment (TIA) should be prepared by suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, the complementary TfNSW Supplement and TfNSW Guide to Transport Impact Assessment, 2024.

The TIA is to identify the impacts of the development and the proposed on-site and off-site measures proposed to mitigate the impacts of the development on any road related infrastructure. The TIA must explain and justify all inputs informing the proposed mitigation measures and TIA conclusions.

The TIA should be tailored to the scope of the proposed development and include, but not necessarily be limited to, consideration of the following;

- A map of the surrounding road network identifying the site access, nearby accesses, intersections and transport related facilities.
- A map of the proposed transport route/s identifying all public roads proposed to obtain access from the classified (State) road/s to the development site.
- The total impact of existing and proposed development on the road network with consideration for a 10 year horizon. This should include;
  - Identify Annual Average Daily Traffic (AADT) volumes with percentage heavy vehicles along the transport route/s and diagrammatically demonstrate AM and PM peak hour movements at key intersections.
  - Background traffic data from published sources and/or recent survey data. The source of data and any assumptions are to be clearly explained and justified, including the growth rate applied to the future horizon.
  - The volume and distribution of existing and proposed trips to be generated by the construction, operational and decommission phases of the development. This should identify the maximum daily and hourly demands generated by the development, particularly where they coincide with the network peak hour.
  - The type and frequency of design vehicles accessing the development site.
- Details of the road geometry and alignment along the identified transport route/s, including existing formations, crossings, intersection treatments and any identified hazards. This should include;
  - Available sight distances at intersections along the proposed transport routes and any constraint to achieving the required sight distance for the posted speed limit.
  - An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for intersections along the identified transport route/s, identifying the existence of the minimum basic turn treatments and addressing the need for any warranted higher order treatments.
  - Swept path analysis demonstrating the largest design vehicle entering and leaving the development, and moving in each direction through intersections along the proposed transport route/s.

- Capacity analysis using SIDRA or other relevant application, to identify an acceptable Level of Service (LOS) at intersections with the classified (State) road/s, and where relevant, analysis of any other intersections along the proposed transport route/s.
- A review of crash data along the identified transport route/s for the most recent 5 year reporting period and an assessment of road safety along the proposed transport route/s considering the safe systems principles adopted under Future Transport 2056.
- Strategic (2D) design drawings of all proposed road works and the site access demonstrating scope, estimated cost and constructability of works required to mitigate the impacts of the development on road safety, traffic efficiency and the integrity of transport infrastructure. Works must be appropriately designed for the existing posted speed limit.
- Site plan demonstrating site access, internal manoeuvring, servicing and parking areas consistent with the relevant parts of AS2890 and Council requirements.
- Details of measures to address impacts and/or provide connections for public transport services and active transport modes, such as, public and school bus services, walking and cycling.
- Details of measures to ameliorate the impacts of road traffic noise, dust, and/or glare generated along the proposed transport route/s.
- Details of any Traffic Management Plan (TMP) proposed to address the construction and operation phases of the proposed development. The TMP should be prepared and implemented in accordance with *Australian Standard 1742.3* and the *Work Health and Safety Regulation 2017.* It is recommended that any TMP include, but not necessarily limited to, the following;
  - A map of the primary transport route/s highlighting critical locations.
  - An induction process for vehicle operators and regular toolbox meetings.
  - Procedures for travel through residential areas, school zones and/or bus route/s.
  - any proposed temporary measures such a Traffic Guidance Scheme (TGS)
  - A Driver Code of Conduct for heavy vehicle operators.
  - A complaint resolution and disciplinary procedure.
  - Community consultation measures proposed for peak periods.

Where road safety concerns are identified at a specific location along the proposed haulage routes, TfNSW suggests that the TIA be supported by a targeted Road Safety Audit undertaken by suitably qualified persons in accordance with the Austroads Guidelines.

Any roadwork on classified (State) road/s is to be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and TfNSW Supplements.

DOC24/908474-3

12 November 2024

Kristina Robinson
Energy, Resource and Industry
Department of Planning, Housing and Infrastructure
Locked Bag 5022
PARRAMATTA NSW 2124

By Email: kristina.robinson@dpie.nsw.gov.au

Re: EPA's Recommended Secretary's Environmental Assessment Requirements (Williams Quarry Expansion, 75 Rose Hill Road (Lot 4 on DP 1096564), Arding – EARs 1948)

Dear Ms Robinson,

I am writing in response to your request for the Environment Protection Authority's ("EPA") Secretary's Environmental Assessment Requirements ("SEARs/EARs") for Williams Quarry Expansion, 75 Rose Hill Road (Lot 4 on DP 1096564), ARDING, NSW 2358 – EARs 1948.

The EPA has reviewed the following documents;

- *'Scoping Report – Request for Secretary's Environmental Assessment Requirements, Williams Quarry, Arding',* prepared by GeoLink Consulting Pty Ltd, Doc No. 4079-1030, Version 1, dated 5 August 2024.

The EPA understand the proposal is to expand the existing quarry operations at 75 Rose Hill Road, Arding to extract up to 150,000 m3 of material per annum (up to 225,000 tonnes per annum). The material Is proposed to be crushed on site and sold locally. Extraction methods propose to involve blasting and mechanical excavation.

In summary, the EPA's key information requirements for the proposal include an adequate assessment of:

1. **Noise and Vibration –** Consideration needs to be given to the proximity of the proposed quarry to sensitive receptors and the impacts of any sources of noise or vibration associated with the quarry, including operational noise and blasting;

2. **Air –** The generation and management of dust and the potential impacts on the adjacent landscape and/or communities need to be considered in the Environmental Impact Statement ("EIS") for the proposed quarry expansion;

3. **Water and Soils –** The EIS should include a water balance study, consideration of appropriate water management systems and the implementation of adequate erosion and sediment controls to control runoff from the quarry.

The EPA has considered the details of the proposal and provides the recommended SEARs/EARs as **Attachment A**. In carrying out the assessment, the proponent should refer to the relevant

guidelines listed, as well as any relevant industry codes of practice and best practice management guidelines.

To assist the EPA in assessing the EIS it is requested that the EIS document follow the format of DPIE's EIS guidelines and addresses the EPA's specific requirements outlined in the following attachments. If the necessary information is not adequately addressed in the EIS then delays in the development assessment process may occur.

The Proponent should be made aware that any commitments made in the EIS may be formalised as approval conditions and may also be placed as formal licence conditions.

Based on the information provided to the EPA, the proponent will require an Environment Protection Licence ("EPL") for extractive activities under clause 19, and for crushing, grinding or separating, under clause 16 of Schedule 1 of the *Protection of the Environment Operations Act 1997* ("POEO Act"), to operate the proposed quarry.

The Proponent will need to make a separate application to the EPA for an EPL at the completion of the assessment process should the proposal be issued with development consent. General information on licence requirements can be obtained from the EPA's Environment Line by calling 131 555 or on the EPA's website at www.epa.nsw.gov.au/licensing/licencePOEO.htm.

The Proponent should be made aware that, consistent with provisions under Part 9.4 of the POEO 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 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.

If you have any questions about this request, please contact Ingrid Morrison on 131 555 or via email at info@epa.nsw.gov.au.

Yours sincerely

LINDSAY FULLOON
Manager Operations
Western Districts

Attachment A: Environment Assessment Requirements – Williams Quarry Expansion, 75 Rose Hill Road (Lot 4 on DP 1096564), ARDING, NSW 2358 – EARs 1948

ATTACHMENT A

EPA's Recommended Secretary's Environmental Assessment Requirements – Williams Quarry Expansion, 75 Rose Hill Road (Lot 4 on DP 1096564), ARDING, NSW 2358 – EARs 1948

1. Environmental impacts of the project

1.1. The description should include the following for both the construction and operation of the project:

a. Details of the premises covered by the project including any relationship with any existing Environment Protection Licences

b. the layout of all the physical elements of the project within the project area, including all buildings, structures, works, haulage activities, pollution controls, stockpile and material handling areas, sealed and unsealed areas, landscaping and open space.

c. all mitigation measures that will be built into the physical layout and design of the project (such as noise walls)

d. any ancillary infrastructure for which approval is being sought (such as upgrades to utilities or surrounding roads)

e. identify those components of the physical layout and design that may change during the detailed design of the project, and set clear limits within which this change may occur without requiring amendments to the DA or modifications to the development consent if the project is approved

f. plans showing the layout and design in plan-view and cross section.

1.2. Identify any likely interactions between the development and any existing/approved developments and land uses in the area.

1.3. Identify all sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways.

1.4. Identify all potential environmental emissions, assess the likely environmental impacts, and describe the proposed mitigation measures to minimise environmental pollution to achieve compliance with relevant environmental legislation, policies, and guidelines.

1.5. The EIS must accurately summarise the key findings of the detailed technical studies in the appendices of the EIS and use suitable cross-referencing to reduce repetition between the two parts of the EIS.

1.6. The EIS must address the requirements of Section 45 of the Protection of the Environment Operations Act 1997 (POEO Act) by determining the extent of each impact and providing sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL).

2. EPA Licensing and Approval Requirements

2.1. Identify all approvals and licences required under environment protection legislation including details of all scheduled activities under schedule 1 of the *Protection of the Environment Operations Act 1997.*

2.2. Should project approval be granted, the proponent will need to make an application to the EPA for its EPL for the proposed facility prior to undertaking any on site works. Additional information is available through the *EPA Guide to Licensing* document (www.epa.nsw.gov.au/licensing/licenceguide.htm).

2.3. Outline how the proposal and its environmental protection measures would be implemented and managed 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).

3. Construction Works

3.1. The EIS must include detail of the construction works including:

a. any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site).

b. Identify, characterise and classify the following in accordance with the EPA's *Waste Classification Guidelines (2014)*:

i. all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste;

ii. all waste that is to be removed to an offsite location, including proposed quantities. Include the commitment to ensure this waste is taken to a facility that can lawfully receive it.

Note: The EPA's W*aste Classification Guidelines (2014)* are available at: https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste

c. construction timetable and staging; hours of construction; proposed construction methods.

d. environment protection measures, including noise mitigation measures - in accordance with the Interim Construction Noise Guideline (DECC, 2009), dust control measures and erosion, and sediment control measures- in accordance with Managing urban stormwater: Soils and construction, vol. 1 (Landcom 2004).

3.2. Include a site diagram showing the site layout and location of environmental controls.

3.3. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline (*DECC, 2009). These are available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/construction-noise

4. Air issues

4.1. The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the POEO Act and the *Protection of the Environment Operations (Clean Air) Regulation 2022*. This consideration should include section 129 of the POEO Act concerning control of "offensive odour".

4.2. The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022). These are available at: https://www.epa.nsw.gov.au/your-environment/air/industrial-emissions/approved-methods-for-the-modelling-and-assessment-of-air-pollutants

4.3. The EIS must detail emission control techniques/practices that will be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, *POEO (Clean Air) Regulation* (2022) and criteria within *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022).

5. Noise and Vibration

The EIS must assess the following noise and vibration aspects of the proposed development:

5.1. Operational and construction activities on the premises that maybe considered vibration intensive should be assessed using the guidelines contained in the *Assessing Vibration: a technical guideline* (DEC, 2006). These are available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/assessing-vibration

5.2. If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying

with the guidelines contained in *Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC, 1990). These are available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/construction-noise

5.3. Operational noise from noise intensive activities to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Noise Policy for Industry* (EPA, 2017). Available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)

5.4. If applicable, noise on public roads from increased road traffic generated by land use developments other than road projects should be assessed using the guidelines contained in the *NSW Road Noise Policy* (EPA, 2011) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.

5.5. If applicable, noise on rail lines from increased rail traffic generated by land-use developments other than rail projects should be assessed using the guidelines contained in the *Rail Infrastructure Noise Guideline* (EPA, 2013) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.

6. Waste, chemicals and hazardous materials and radiation

The EIS must assess the following waste, chemical and hazardous materials related aspects of the proposed development:

6.1. Assess and describe all aspects of waste generation, management and disposal associated with the proposed development.

6.2. The EIS must identify, characterise and classify the following in accordance with the EPA's *Waste Classification Guidelines (2014)* and associated addendums:

(i) all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste;

(ii) all waste that is proposed to be disposed of to an offsite location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.

Note: The EPA's Waste Classification Guidelines (2014) and associated addendums are available at: https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste

6.3. Demonstrate compliance with all regulatory requirements outlined in the POEO Act and associated waste regulations.

6.4. Outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on-site.

6.5. Demonstrate that appropriate spill containment will be provided for storage, filling and loading of all fuels and other chemicals to be used on site, in accordance with all relevant Australian Standards, and/or NSW EPA's *Storing and Handling of Liquids: Environment Protection-Participants Manual* (DECC, 2007).

6.6. Demonstrate compliance with Part 9.3E of the POEO Act for the use of any industrial chemicals, including details of activities involving Schedule 6 or Schedule 7 chemicals listed on the IChEMS register. Additionally, demonstrate a system for periodic review to ensure that any new IChEMS Register requirements are incorporated.

6.7. Identify the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21.* Available at: https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/warr-strategy.

7. Water

The EIS surface water quality assessment must:

7.1. Demonstrate that all practical measures to prevent, control, abate or mitigate water pollution have been implemented, including a description of options that were explored (such as reuse to avoid a discharge or treatment).

7.2. Provide details of the proposal that are essential for predicting and assessing potential impacts to receiving waters. This could include (but is not limited to):

a. Site layout, including details of the existing and proposed water management system.

b. Drainage map for the entire site identifying sub-catchments, flow paths, drainage infrastructure, design sizing of structures, water storages, discharge points, and any potential flow paths to receiving waters.

c. How stormwater will be managed in all phases of the project. Information should include, where appropriate, measures to avoid or minimise erosion, leachate generation, and sediment mobilisation at the site.

d. Any in-water activities (such as piling or dredging).

7.3. Include water balance(s) for ground and surface water, including any intake and discharge locations, volumes, frequency and duration.

7.4. Identify and estimate the quality and 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. This should be undertaken for construction and operational phases.

7.5. Include a water pollution impact assessment undertaken consistent with the guidance available at https://www.epa.nsw.gov.au/your-environment/water/managing-water-pollution-in-nsw/environment-protection-licensing/water-pollution-discharge-assessments. The level of assessment should be commensurate with the risk to the environment and human health.

7.6. Describe any surface water quality monitoring programs, including proposed monitoring locations, frequency and indicators of surface water quality. Analytical limits of reporting should have regard to any identified guideline values. Water quality monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (2004) available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/22p3488-approved-methods-for-water-in-nsw.pdf.

7.7. The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines *Managing urban stormwater: soils and construction,* vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).

8. Groundwater

8.1. Provide details of the project that are essential for predicting and assessing impacts to groundwater with a description of the existing environment, including:

a. Geological, topographical, and hydrogeological resource descriptions, maps, and cross-sections.

b. Assessment of groundwater quality, users of groundwater, existing bores including depths and construction, assessment of local land use.

c. A hydrogeological interpretation of water-bearing geological units, depth to water table, groundwater gradient, Conceptual hydrogeological model, assessment of groundwater dependent ecosystems.

d. Site map and cross-sections showing and characterising any proposed excavations and spoil emplacement (relative to water table) with topography.

e. Proposed groundwater monitoring program.

9. Soils

9.1. The EIS should include an assessment of the potential impacts on soil and land resources should be undertaken, being guided by the *Soil and Landscape Issues in Environmental Impact Assessment* (DLWC 2000). The nature and extent of any significant impacts should be identified. Particular attention should be given to:

a. Soil erosion and sediment transport- in accordance with *Managing urban stormwater: Soils and construction, vol. 1* (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C Unsealed Roads; D Main Roles) (DECC2008).

b. Mass movement (landslides) – in accordance with *Landslide risk management guidelines* presented in *the Australian Geomechanics Society* (2007).

c. Urban and regional salinity – guidance given in the *Local Government Salinity Initiative* booklets which includes *Site Investigation for Urban Salinity* (DLWC, 2002).

9.2. A description of the mitigation and management options that will be used to prevent, control, abate or minimise identified soil and land resource impacts associated with the project. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented. Where required, add any specific assessment requirements relevant to the project.

10. Contamination

10.1. Identify the likelihood of contamination at the site and surrounding land (on different media such as soils, groundwater, ground gas, surface water and sediments, where applicable) by considering the context of past, current, and proposed land uses. The EIS must document how the assessment of contaminated land has been undertaken with regard to the relevant guidelines for contaminated land made or approved by the NSW EPA.

10.2. All reports on contamination must be prepared by a suitably qualified contaminated land consultant(1) who is also certified(2).

(1) A suitably qualified and experienced contaminated land consultant is a contaminated land consultant who meets the competencies outlined in the Guideline on the Competencies and Acceptance of Environmental Auditors and Related Professionals (Schedule B9) as provided in the ASC National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013)."

(2) A certified consultant is a consultant certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme;

Note: If an auditor is being engaged for the project, the requirement for a certified consultant to prepare the contaminated land reports is still recommended as it will help ensure all assessment work is done as efficiently as possible, but it is optional. However, it must still be required for all reports to be prepared by a suitably qualified contaminated land consultant.

10.3. Where contamination is considered likely based on past or current land uses or other factors (such as offsite contamination migrating onto the site), undertake detailed site investigation/s to determine the nature and extent of the contamination.

10.4. Where contamination exists, assess if remediation of the land is required, having regard to current and future land uses; and the ecological and human health risks posed by the contamination to both onsite and offsite receptors.

10.5. Where a detailed site investigation is prepared and/or remediation is considered necessary, a NSW EPA accredited Site Auditor must be engaged to undertake an audit. The EIS must include copies of any Interim Audit Advice provided by the auditor and a Site Audit Statement and Site Audit Reports issued by the auditor which certifies the site can be made suitable for the proposed use

10.6. The following references should be included as relevant guidelines that must be followed when assessing contaminated land:

a. *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA, 1998) - https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/clm/managing-contaminated-land-guidelines-remediation.pdf?la=en&hash=6AAE054645C2A0264515ABF7121AEF7F47E5FC85*

b. *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015)*

c. *Contaminated land sampling design guidelines - Part 1 and 2 (EPA, 2022)*

d. *Consultants reporting on contaminated land: contaminated land guidelines (EPA, 2020)*

e. *Guidelines for the NSW Site Auditor scheme 3rd edition (EPA, 2017)*

f. Any other relevant guidelines made or approved by the EPA under s105 of the *Contaminated Land Management Act 1997 - https://www.epa.nsw.gov.au/your-environment/contaminated-land/statutory-guidelines*

11. Climate Change

11.1. The proponent must prepare a Greenhouse Gas Assessment in accordance with the EPA's *Greenhouse Gas Assessment Guide for Large Emitters* (or its most recent version that is available on the EPA website). Input data and assumptions must also be robustly justified by providing supporting evidence to assist the EPA's assessment.

11.2. For projects estimated to emit 25,000 tonnes or more of scope 1 and 2 emissions (CO2-e) in any financial year during the operational life of the project (based on planned operational throughput and as designed), a GHG Mitigation Plan must be provided in accordance with the EPA's *Greenhouse Gas Assessment Guide for Large Emitters* (or its most recent version that is available on the EPA website).

11.3. For projects estimated to emit 25,000 tonnes or more of scope 1 and 2 emissions (CO2-e) in any financial year during the operational life of the project (based on planned operational throughput and as designed), the proponent must prepare a Climate Change Adaptation Plan that incorporates the following components:

a. A climate change risk assessment that addresses predicted climatic changes and the potential impacts of climate hazards on the environmental performance of the project.

Notes:

- A climate hazard is defined as a physical event (hydro-meteorological or oceanographic) that can harm human health, livelihoods, or natural resources. These could be direct climate hazards such as flooding of a sewage treatment plant, causing water pollution to nearby waterways, or indirect hazards such as a drought, where water is not available for dust suppression.

- A climate risk is the potential for adverse consequences for human or ecological systems from climate hazards (adapted from IPCC).
- The risk assessment must take into account AdaptNSW regional climate change projections, for the near future and for the life of the project.
- Regional climate change projections are available on the AdaptNSW website.

b. An assessment of measures to reduce climate risk, including:

   i. a description of measures that would be implemented to reduce likely climate change risks and potential impacts on the environmental performance of the project.

   ii. an assessment of:

   - the likely effectiveness of these measures
   - whether these measures will remain effective over time as climate change risks increase
   - whether contingency plans will be necessary to manage any residual risks.

   iii. if contingency measures are deemed necessary under (ii) above, a description of how the project is designed so that these contingency measures can be readily implemented if and when necessary.

c. A description of how the effectiveness of measures to reduce climate risk will be monitored over time, including:

   i. a description of metrics that will be used to periodically evaluate the effectiveness of the adaptation management measures.

   ii. a description of the measures that would be implemented to monitor and periodically report on against these metrics.

d. A timetable for review of the project's Climate Change Adaptation Plan that reflects the project's lifespan and incorporates at each review the latest knowledge about predicted climate risks in the short and long term.

Notes:

Further guidance on considering climate adaptation can be found in the following resources:

- ISO 31000
- ISO/TS 14092
- AS 5334
- Climate Risk Ready NSW Guide (while this guide was developed for NSW Government agencies, the principles, steps and resources may assist the proponent to prepare a Climate Change Adaptation Plan).

**Department of Climate Change,
Energy, the Environment and Water**

Our ref: HMS ID#7797
Your ref: SEAR 1948

Kristina Robinson
Environmental Assessment Officer
Department of Planning, Housing and Infrastructure
kristina.robinson@dpie.nsw.gov.au

Local SEARS – Williams Quarry, Arding

Dear Kristina

Thank you for the opportunity to provide advice on the draft Local Secretary's Environmental Assessment Requirements (draft SEARs) 1948 for Williams Quarry, Arding.

We note that the proposal is for the expanded operation of Williams Quarry at 75 Rose Hill Road, Arding. The quarry is located approximately 10km north of Uralla and 15km south-west of Armidale. The proposal seeks consent for use of the land to extract up to 150,000m^3 of material per annum. The material will be crushed on site and sold locally.

We support the requirements in the draft SEARs, that the Environmental Impact Statement must be informed by an Aboriginal Cultural Heritage Assessment Report (ACHAR), and that the ACHAR must:

- be prepared in accordance with the relevant policy and guidelines
- including results of thorough archaeological survey and test excavations (where required)
- include evidence of adequate and continuous consultation with Aboriginal stakeholders.

If you require further assistance please contact Paul Houston, Aboriginal Senior Assessments Officer, at Heritage NSW on 02 6883 5361 or paul.houston@environment.nsw.gov.au.

Yours sincerely

James Sellwood
A/Practice Lead, Planning Referrals and Advice
Heritage NSW
20 November 2024

Your ref: SEAR 1948
Our ref: DOC24/908048-5

Energy, Resource & Industry
Department of Planning and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Attention: Ms Kristina Robinson

Dear Ms Robinson

Re: Request for input to Planning Secretary's Environmental Assessment Requirements - Environmental Impact Statement – Expansion of Williams Quarry at 75 Rose Hill Road, Arding – SEAR 1948

Thank you for your email dated 6 November 2024 about the proposed expansion of Williams Quarry at Rose Hill Road, Arding, seeking input to the Planning Secretary's Environmental Assessment Requirements (SEARs) from the Biodiversity, Conservation and Science Group (BCS) of the NSW Department of Climate Change, Energy, the Environment and Water for the preparation of an Environmental Impact Statement (EIS). I appreciate the opportunity to provide advice.

We note the project will be assessed as designated development in accordance with Part 4 Division 4.3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The environmental assessment requirements (EARs) provided by BCS for the EIS are limited to biodiversity, NPWS estate, acid sulfate soils, flooding, and coastal processes and associated hazards.

BCS anticipates the EIS will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts on biodiversity, particular on state and/or commonwealth listed threatened endangered ecological communities and species known to occur in the locality, including but not limited to:

- Koala *(Phascolarctos cinereus)*
- Little Eagle *(Hieraaetus morphnoides)*
- Bolivia Hill Rice-flower *(Pimelea venosa)*
- Aromatic Peppercress *(Lepidium hyssopifolium)*
- Bluegrass *(Dichanthium setosum)*
- New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion Critically Endangered Ecological Community
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast Critically Endangered Ecological Community
- Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion Endangered Ecological Community

The Scoping Report prepared by GeoLINK indicates that adjacent areas, such as Spring Creek, may be subject to changes in ground and surface hydrology and thus will require ecological surveys and assessment. In addition to the proposed Mine Closure Plan, any revegetation works associated with bank stability or visual screening are to be guided by an approved management plan. Also, the consent authority must be satisfied the EIS adequately considers any previous consents and conditions, given it applies to the current operational quarry in the subject land.

BCS expects the EIS will map the extent of any woodland EECs or CEECs in accordance with the BCS North East Branch Principles set out in **Appendix 1** of our EARs. Early and accurate identification of the locations and condition of these communities on the subject land can enable the proponent to design the proposal so it maximises avoiding impacts to these communities.

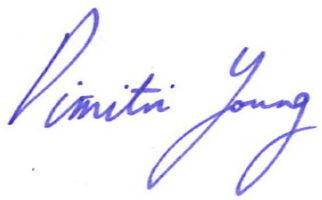
The applicant will need to confirm the location and extent of Category 1 Exempt Land within the subject land by undertaking site-based floristic assessment to verify the presence or absence of CEECs, critically endangered plants and grasslands that are not low conservation grasslands. BCS expects the applicant will apply the BCS guidance on land categorisation and the Native Vegetation Regulatory Map provided in **Appendix 2** of our EARs.

We consider this information is necessary to assess the EIS for the proposed development and BCS requests the opportunity to review the EIS and its supporting documents prior to the consent authority determining the application.

The full list of our EARs that may need to be addressed in the EIS is provided in **Attachment 1**. In preparing the EIS, the proponent can refer to the relevant guidance material in **Attachment 2.**

If you have any further questions about this issue, please contact Ms Elisha Taylor, Senior Conservation Planning Officer North East, BCS, on 6659 8279 or at elisha.taylor@environment.nsw.gov.au.

Yours sincerely



DIMITRI YOUNG
Senior Team Leader Planning North East
Biodiversity, Conservation and Science

20 November 2024

Enclosures:
Attachment 1 - DCCEEW BCS Recommended EARs – EIS – Williams Quarry SEAR 1948
Attachment 2 - EIS Guidance Material

Attachment 1

NSW Department of Climate Change, Energy, the Environment and Water

Biodiversity, Conservation and Science Group

Environmental Assessment Requirements (EARs)

Environmental Impact Statement

Williams Quarry, 75 Rose Hill Road, Arding

SEAR 1948

TABLE OF CONTENTS

A. The Proposed Development

1. The Environmental Impact Statement (EIS) should fully and clearly describe the proposed development, including any environmental impact mitigation measures, and identify all the processes and activities intended for the site during the life of the proposed development, including, where relevant:

   a. the location of the proposal and details of the surrounding environment

   b. the land use zoning

   c. the size and type of the proposal and its operation

   d. the proposed layout of the site

   e. the staging and timing of the proposal

   f. the proposal's relationship to any other proposal

   g. all equipment proposed for use at the site

   h. chemicals, including fuel, used on the site and proposed methods for the transportation, storage, use and emergency management

   i. waste generation, storage and disposal

   j. the anticipated environment impacts of the proposal, both direct and indirect

   k. a plan showing the distribution of any threatened flora or fauna species and the vegetation communities on or adjacent to the subject site, and the extent of vegetation proposed to be cleared

   l. ownership details of any residence and/or land likely to be affected by the proposal

   m. maps/diagrams showing the location of residences and properties likely to be affected and other industrial developments, conservation areas, wetlands, etc. in the locality that may be affected by the proposal

   n. methods to mitigate any expected environmental impacts of the proposal

   o. the anticipated level of performance in meeting required environmental standards.

B. Environmental Impacts of the Proposed Development

1. Impacts related to Biodiversity, NPWS Estate, Acid Sulfate Soils, Flooding, Coastal Processes and Associated Hazards, and Cumulative Impacts, should be assessed, quantified, and reported on in the EIS, as required.

2. The EIS should address the specific requirements outlined under each heading below, where necessary, and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is at **Attachment 2**.

C. Biodiversity

1. The EIS must assess the impacts 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 whether the proposed development is to be carried out in a declared area of outstanding biodiversity value.

   B. If the proposed development is not carried out in a declared area of outstanding biodiversity value, then the EIS must demonstrate and document whether the proposed development exceeds the biodiversity offset scheme threshold, as set out in section 7.4 of the BC Act 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 of an area declared by clause 7.23 of the BC Regulation as exceeding the threshold, or

      II. The clearing of native vegetation, or other action prescribed by clause 6.1 of the BC Regulation, on land included on the Biodiversity Values Map published under clause 7.3 of the BC Regulation.

   C. If the biodiversity offset scheme threshold is not exceeded, then the EIS must document *the test for determining whether proposed development is likely to significantly affect threatened species or ecological communities* as outlined in Section 7.3 of the BC Act, by preparing an ecological assessment that should include:

      I. A field survey of the site conducted and documented in accordance with relevant guidelines, including:

         a. *Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species* (OEH undated) https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf

         b. *NSW Survey Guide for Threatened Frogs* (DPIE 2020) https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs

         c. *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020) https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method

         d. *Species credit' threatened bats and their habitats (OEH 2018)* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf

         e. *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC 2004), https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf.

If a proposed field survey methodology is likely to vary significantly from the methods in the guidelines above, then the proponent should discuss the proposed methodology with the Biodiversity, Conservation and Science Group (BCS) prior to undertaking surveys for the EIS, to determine whether BCS considers the proposed methodology appropriate.

The results of recent (less than five years old) field surveys may be used. However, the results of previous field surveys should not be used if they have:

- been undertaken in seasons, weather conditions or following extensive disturbance events when the subject species are unlikely to be detected or present, or
- utilised methodologies, survey sampling intensities, timeframes or baits that are not the most appropriate for detecting the target subject species,

unless these differences can be clearly demonstrated to have had an insignificant impact upon the outcomes of the field surveys.

If the results of previous field surveys are used, then field surveys for any additional threatened entities listed under the BC Act since the previous field surveys took place, must be undertaken and documented.

The list of potential threatened species, populations, ecological communities, or their habitats for the site should be determined in accordance with:

- the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC 2004) https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment
- the Department's Threatened Species website http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species
- the *Bionet Atlas of NSW* http://www.environment.nsw.gov.au/wildlifeatlas/about.htm
- the Vegetation Information System (BioNet Vegetation Classification) http://www.environment.nsw.gov.au/research/Visclassification.htm
- other data sources (e.g. PlantNET, Online Zoological Collections of Australian Museums (http://www.ozcam.org/), previous or nearby surveys etc.) may also be used to compile the list.

II. The following information as a minimum:

a. A description, spatial data files, and geo-referenced mapping of the study area, (overlays on topographic maps, satellite images and /or aerial photos, including details of map datum, projection and zone), showing all field survey locations, vegetation communities classified in accordance with the BioNet Vegetation Classification (http://www.environment.nsw.gov.au/research/Visclassification.htm), key habitat features and reported locations of threatened species and ecological communities present in the subject site and study area.

b. A description of survey methodologies used, including timing, location and weather conditions.

c. Details, including qualifications and experience, of all staff undertaking the surveys, mapping and assessment of impacts as part of the EIS.

d. Identification of national and state listed threatened biota known or likely to occur in the study area and their conservation status.

e. A description of the likely impacts of the proposed development on biodiversity values, including direct and indirect impacts and construction and operation impacts, with impacts quantified, wherever possible, such as the amount of each vegetation community or species habitat to be cleared or impacted, and/or the degree of fragmentation of a habitat connectivity.

f. Identification of the avoidance, mitigation and management measures that will be put in place as part of the proposed development to avoid or minimise biodiversity impacts, including details about alternative options considered and how long-term management arrangements will be guaranteed.

g. A description of the residual impacts of the proposed development.

III. The '*test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats'* as outlined in Section 7.3 of the BC Act undertaken in accordance with the gazetted *Threatened Species Test of Significance Guidelines* (OEH 2018) available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf.

2. If the EIS determines under 1 above that the proposed development is likely to significantly affect threatened species, then in accordance with Section 7.7 of the BC Act the EIS must be accompanied by a Biodiversity Development Assessment Report prepared in accordance with Part 6, Division 3 of the BC Act.

3. If the EIS determines under 1 above that the proposed development is unlikely to significantly affect threatened species, then the proposed development should:

   a. be designed to avoid and minimise impacts on biodiversity values to the fullest extent possible, and

   b. include a biodiversity offset package to offset remaining direct and indirect impacts on biodiversity values, prepared in accordance with the Department's 13 offsetting principles available at http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm.

Note:

For the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999,* the EIS should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action.

D. National Parks and Wildlife Service Estate

1. Where appropriate, likely impacts (both direct and indirect) of the proposed development on any adjoining and/or nearby National Parks and Wildlife Service estate reserved under the *National Parks and Wildlife Act 1974* should be considered, with reference to the *Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE 2020)* available at:

   https://www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands

Note: Proposed development which may impact marine protected areas should be referred to the Department of Primary Industries to determine the assessment and approval requirements.

E. Acid Sulfate Soils

1. The potential impacts of the proposed development on acid sulfate soils must be assessed in accordance with the relevant guidelines including the following:

    - Assessment Guidelines in the Acid Sulfate Soils Manual (Stone et al. 1998),
    - National Acid Sulfate Soils Identification and Laboratory Methods Manual (Sullivan et al. 2018a),
    - National Acid Sulfate Soils Sampling and Identification Methods Manual (Sullivan et al. 2018b), and where relevant,
    - Overview and Management of Monosulfidic Black Ooze (MBO) Accumulations in Waterways and Wetlands (Sullivan et al. 2018c),
    - Guidelines for the Dredging of Acid Sulfate Soil Sediments and Associated Dredge Spoil Management (Simpson et al. 2018), and
    - Guidance for the Dewatering of Acid Sulfate Soils in Shallow Groundwater Environments (Shand et al. 2018).

    Samples must be tested according to procedures in National Acid Sulfate Soils Identification and Laboratory Methods Manual (Sullivan et al. 2018a).

2. A sound conceptual model must be developed for the site, including an understanding of local hydrogeological conditions, of the stratigraphic and lateral distribution of sulfide minerals, and of the presence of sensitive environmental receptors. This must include:

    a. Identifying whether sufficient pyrite is present in sediments to cause significant acidification on oxidation,

    b. Determining whether mining activities are likely to cause oxidation of pyrite and leach acidity and soluble metals into groundwater or surface waterways,

    c. Determining the likely extent and severity of groundwater or surface water contamination that may be caused by acidic leachate from oxidising sediments, and

    d. Identifying whether there are ecosystems or groundwater users in the vicinity of the mine site that are likely to be exposed to contamination from acidic leachate.

3. Describe mitigation and management measures that will be used to prevent, control, abate or minimise potential impacts from the disturbance of acid sulfate soils associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This must include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

4. Describe the contingency plan, incorporating a commitment to appropriate monitoring.

F. Flooding, Coastal Processes and Associated Hazards

1. The EIS should include an assessment of the following referring to the relevant guidelines in Attachment 2:

    a. The potential effect of coastal processes and coastal hazards including potential impacts of sea level rise:

        i. on the proposed development; and

        ii. arising from the proposed development.

b. Whether the proposed development is consistent with any coastal zone management plans.

c. Whether the proposed development is consistent with any floodplain risk management plans.

d. Whether the proposed development is compatible with the flood hazard of the land.

e. Whether the proposed development will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.

f. Whether the proposed development will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.

g. Whether the proposed development incorporates appropriate measures to manage risk to life from flood.

h. Whether the proposed development is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

2. The implications of flooding over the full range of potential flooding, including the probable maximum flood, should be considered as set out in the NSW Government Floodplain Development Manual and should include:

    a. Full details of the flood assessment and modelling undertaken in determining any design flood levels (if applicable), including the 1 in 100 year flood levels.

    b. A sensitivity assessment of the potential impacts of an increase in rainfall intensity and runoff (10%, 20% and 30%) and sea level rise on the flood behaviour for the 1 in 100 year design flood if applicable.

3. All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the proposed development should be detailed.

G. Cumulative Impacts

1. The cumulative impacts, including both construction and operational impacts, from all clearing activities and operations, associated edge effects and other indirect impacts on cultural heritage, biodiversity and NPWS Estate in accordance with the *Environmental Planning and Assessment Act 1979*.

2. The cumulative impacts, including both construction and operational impacts, of the proponent's existing proposals and other proposals and associated infrastructure (such as access tracks etc.) as well as the cumulative impact of the proposed development in the context of other proposals located in the vicinity.

Appendix 1: BCS NE Branch Principles for Mapping the Extent of Woodland CEECs and EECs

Introduction

The NSW Threatened Species Scientific Committee's final determinations for woodland endangered ecological communities (EECs) must be considered when preparing vegetation maps for impact assessments. The determination for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland states it covers all occurrences of this ecological community independent of their condition and the determination for Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland describes the ecological community in several condition states. Hence, vegetation mapping must ensure that all condition states referenced in these determinations are mapped appropriately.

The Biodiversity, Conservation and Science Group (BCS) North East Branch has prepared these guidelines to assist proponents and their consultant ecologists with identifying, describing, and mapping the extent of these EECs in accordance with those final determinations.

Underpinning Considerations from Hnatiuk et al. (2009) (see Tables 6 and 7 below)

1. Open Forest has crowns touching or slightly separated – up to 0.25 crown widths apart.
2. Woodland has crowns clearly separated – up to one crown width apart.
3. Open Woodland has crowns well separated – up to 20 crown widths apart.
4. Isolated trees - more than 20 crown widths apart.

Table 6: Visual estimation of crown cover class

Code	Criteria assessed in field	Described as	Crown separation ratio	Crown cover %	Foliage cover %
D	Crowns touching to overlapping	Closed or dense	<0	>80%	>70%
M	Crowns touching or slightly separated	Mid-dense	0–0.25	50–80%	30–70%
S	Crowns clearly separated	Sparse or open	0.25–1	20–50%	10–30%
V	Crowns well separated	Very sparse	1–20	0.25–20%	0.2–10%
I	Isolated plants: for trees about 100 metres apart, shrubs about 20 m apart	Isolated plants	>20	<0.25%	<0.20%
L	Isolated clumps of 2 to many plants about 200 metres apart	Isolated clumps	>20	<0.25%	<0.20%
E	Emergent	Emergents	>3	<5% of total crown cover	<3% of total foliage cover

Table 7: Converting crown separation ratio to crown cover

	Overlap		Touching																						
	Crowns separate																								
Crown separation ratio	-.01	-.05	-.02	0	.05	0.1	0.15	0.2	0.25	0.3	0.4	0.5	0.6	0.75	1.0	1.25	1.5	2.0	3.0	4.0	8.0	10	15	20	30
Percentage crown cover (%)	100	89	84	81	73	67	60	56	52	48	41	34	31	26	20	16	13	9	5	3	1	0.6	0.3	0.2	0.1

Principles for Mapping the Extent of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC)

- based on NSW Scientific Committee Final Determination
- can be a woodland, open woodland or derived native grassland
- open woodland tree crown separation is based on the definition of scattered trees in Appendix B of the Biodiversity Assessment Method 2020 (i.e. scattered trees are more than 50 metres apart)

1. Woodland Form (trees up to one average crown width apart)

    a. For areas with tree crowns up to one average crown width apart, map all the following as CEEC - the outer edges of tree crowns up to one average crown width apart (including those of regenerating canopy trees) plus a buffer with a width of one average crown width from the outer edges of those tree crowns, noting that there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than one average crown width apart, follow the open woodland form procedures in 2 below.

2. Open Woodland Form (trees more than one average crown width apart and up to 50 metres apart)

    a. For areas with tree crowns more than one average crown width apart and up to 50 metres apart, map all the following as CEEC - the outer edges of tree crowns more than one average crown width apart and up to 50 metres apart (including those of regenerating canopy trees) plus a buffer with a width of 50 metres from the outer edges of those tree crowns, noting that there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than 50 metres apart, map all the following as CEEC - the outer edges of each tree crown more than 50 metres apart, including those of regenerating canopy trees.

3. Treeless Form

    a. For areas beyond the buffers in 1a and 2a above, or beyond the tree crowns in 2b above, or areas with no canopy trees or regenerating canopy trees, map all the following as CEEC - areas of understorey and/or groundcover containing native species.

Principles for Mapping the Extent of Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/Woodland Endangered Ecological Community (EEC)

- based on NSW Scientific Committee Final Determination
- can be an open forest, woodland or derived native grassland
- woodland tree average crown separation is used to define scattered trees (i.e. scattered trees are more than one average crown width apart)

1. Open Forest Form (trees up to 0.25 average crown widths apart)

    a. For areas with tree crowns up to 0.25 average crown widths apart, map all the following as EEC - the outer edges of tree crowns up to 0.25 average crown widths apart (including those of regenerating canopy trees) plus a buffer with a width of 0.25 average crown widths to the outer edges of those tree crowns, noting there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than 0.25 average crown widths apart, follow the woodland form procedures in 2 below.

2. Woodland Form (trees more than 0.25 average crown widths apart and up to one average crown width apart)

    a. For areas with tree crowns more than 0.25 average crown widths apart and up to one average crown width apart, map all of the following as EEC - the outer edges of tree crowns more than 0.25 average crown widths apart and up to one average crown width apart (including those of regenerating canopy trees) plus a buffer with a width of one average crown width to the outer edges of those tree crowns, noting there can be exotic or native understorey and/or groundcover, or bare earth, within each mapped polygon.

    b. For areas with tree crowns more than one average crown width apart, map all the following as EEC - the outer edges of each tree crown more than one average crown width apart, including those of regenerating canopy trees.

3. Treeless Form

    a. For areas beyond the buffers in 1a and 2a above, or beyond the tree crowns in 2b above, or areas with no canopy trees or regenerating canopy trees, map all the following as EEC – areas of understorey and/or groundcover containing native species.

Appendix 2 – BCS Guidance - Land Categorisation - Native Vegetation Regulatory Map

Although clearing of native vegetation on land that meets the definition of Category 1 - Exempt Land, as defined under the Local Land Services Act 2013 (LLS Act), does not require assessment or offsetting under the Biodiversity Conservation Act 2016, the following must still be considered:

- Prescribed impacts, as outlined in chapter 6 of the Biodiversity Assessment Method 2020 (BAM). For example, there are threatened fauna species whose habitat may include land which meets Category 1- Exempt criteria. Fauna survey on Category 1 land may be necessary to meet the requirements of the BAM.
- Potential impacts to Matters of National Environmental Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* on Category 1 – exempt land.

Section 60F of the LLS Act provides the transitional arrangements that are in place until a comprehensive Native Vegetation Regulatory (NVR) Map is published. During the 'transitional period' assessors can make a reasonable approximation of land categorisation for unpublished layers, in consultation with the landholder.

Where a reasonable approximation is required, the Biodiversity, Conservation and Science Group (BCS) of the NSW Department of Climate Change, Energy, the Environment and Water recommends that assessors first identify whether land meets the criteria for Category 2 - Regulated Land, prior to Category 1 - Exempt Land, noting that:

- in some circumstances, land may meet multiple map criteria i.e. criteria for Category 2 - Regulated Land, AND criteria for Category 1 - Exempt land
- In most circumstances' Category 2 - Regulated Land criteria will determine the categorisation of the land, rather than Category 1 - Exempt Land criteria.

For State Significant Development and State Significant Infrastructure proposals that affect rural land as defined under Part 5A of the LLS Act, a draft NVR Map is available at *https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=DraftNVRmap*. This map as it relates to the development site must be considered during preparation of the Biodiversity Development Assessment Report (BDAR) and prior to the BDAR being submitted to the consent authority.

Where Category 2 – Regulated land is mapped as present on a development site, this will be identified on the draft map and is land where the BAM must be applied. However, there are some Category 2 criteria for which state-wide comprehensive mapping is not currently incorporated within the draft NVR map.

Where the draft map indicates that Category 1 – Exempt Land is present on a development site, early engagement with the Department's Biodiversity, Conservation and Science Group (BCS) is encouraged. To confirm at the site scale whether the criteria for Category 1 – Exempt Land are met:

- Site-based floristic assessment is required to verify the presence or absence of critically endangered ecological communities (CEECs), critically endangered plants, or grasslands that are not low conservation value grasslands.
- Review of any *Environmental Planning and Assessment Act 1979* development consents or approvals applicable to the land is required to demonstrate whether the land has an existing obligation to be set aside for nature conservation; revegetation of native vegetation; or as a native vegetation offset

Prior to the BDAR being submitted to the consent authority, BCS requests the accredited assessor submit their proposed land categorisation method and outcomes to the BCS North East Branch Planning team at *planning.northeast@environment.nsw.gov.au* for review.

For more information, see *Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme*.

Attachment 2 – EIS 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	https://legislation.nsw.gov.au/view/html/inforce/current/act-1979-203
Fisheries Management Act 1994	https://legislation.nsw.gov.au/view/html/inforce/current/act-1994-038
Marine Estate Management Act 2014	https://legislation.nsw.gov.au/view/html/inforce/current/act-2014-072
National Parks and Wildlife Act 1974	https://legislation.nsw.gov.au/view/html/inforce/current/act-1974-080
Protection of the Environment Operations Act 1997	https://legislation.nsw.gov.au/view/whole/html/inforce/current/act-1997-156
Water Management Act 2000	https://legislation.nsw.gov.au/view/html/inforce/current/act-2000-092
Wilderness Act 1987	https://legislation.nsw.gov.au/view/html/inforce/current/act-1987-196
Biodiversity	
Biodiversity Assessment Method (DPIE, 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-2020
Biodiversity Development Assessment Report	https://www.legislation.nsw.gov.au/#/view/act/2016/63/part6/div3/sec6.12
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH, 2017)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf

Title	Web address
Accreditation Scheme for Application of the Biodiversity Assessment Method Order 2017	https://www.legislation.nsw.gov.au/regulations/2017-471.pdf
Biodiversity conservation actions	https://www.environment.nsw.gov.au/research-and-publications/publications-search/ancillary-rules-biodiversity-conservation-actions
Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	https://www.environment.nsw.gov.au/research-and-publications/publications-search/ancillary-rules-reasonable-steps-to-seek-like-for-like-biodiversity-credits
Threatened Species Website	www.environment.nsw.gov.au/threatenedspecies/
NSW BioNet (Atlas of NSW Wildlife)	www.bionet.nsw.gov.au
Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
Threatened biodiversity survey and assessment - Guidelines for developments and activities (2004 working draft)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment
Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species (OEH undated)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf
NSW Survey Guide for Threatened Frogs (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/koala-phascolarctos-cinereus-biodiversity-assessment-method-survey-guide-220249.pdf
'Species credit' threatened bats and their habitats (OEH 2018)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-

Title	Web address
	species/species-credit-threatened-bats-survey-guide-180466.pdf
Bionet Vegetation Classification - NSW Plant Community Type (PCT) database	www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm
SEED Data Portal (access to online spatial data)	http://data.environment.nsw.gov.au/
Threatened Reptiles Biodiversity Assessment Method survey guide (DPE 2022)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/threatened-reptiles-biodiversity-assessment-method-survey-guide-20220563.pdf
Department of Primary Industry Policy and guidelines for fish habitat conservation and management (2013)	https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/fish-habitat-conservation
NPWS Estate	
List of national parks	https://www.nationalparks.nsw.gov.au/visit-a-park
Revocation, recategorisation and road adjustment policy (OEH, 2012)	https://www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-policies/revocation-recategorisation-and-road-adjustment
Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands
Acid Sulfate Soils	
Acid Sulfate Soils Planning Maps	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. (Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018a)	https://www.waterquality.gov.au/sites/default/files/documents/dewatering-acid-sulfate-soils.pdf

Title	Web address
National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. (Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018b)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/sampling-and-identification-methods-manual.pdf
National Acid Sulfate soils Guidance: Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands, Department of Agriculture and Water Resources, Canberra ACT. (Sullivan, LA, Ward, NJ, Bush, RT, Toppler, NR, Choppala, G. 2018c)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/monosulfidic-black-ooze-accumulation.pdf
National Acid sulfate soils guidance: Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management, Department of Agriculture and Water Resources, Canberra, ACT (Simpson, SL, Mosley, L, Batley, GE and Shand P. 2018)	https://www.waterquality.gov.au/sites/default/files/documents/dredging-sediments-spoil.pdf
National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of Agriculture and Water Resources, Canberra, ACT. (Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/dewatering-groundwater-environments.pdf
Flooding, Coastal Processes and Associated Hazards	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Floodplains/flood-risk-management-manual-2023-230220.pdf
Coastal Management Manual	Coastal management manual | Coasts | Environment and Heritage

Title	Web address
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

Appendix C

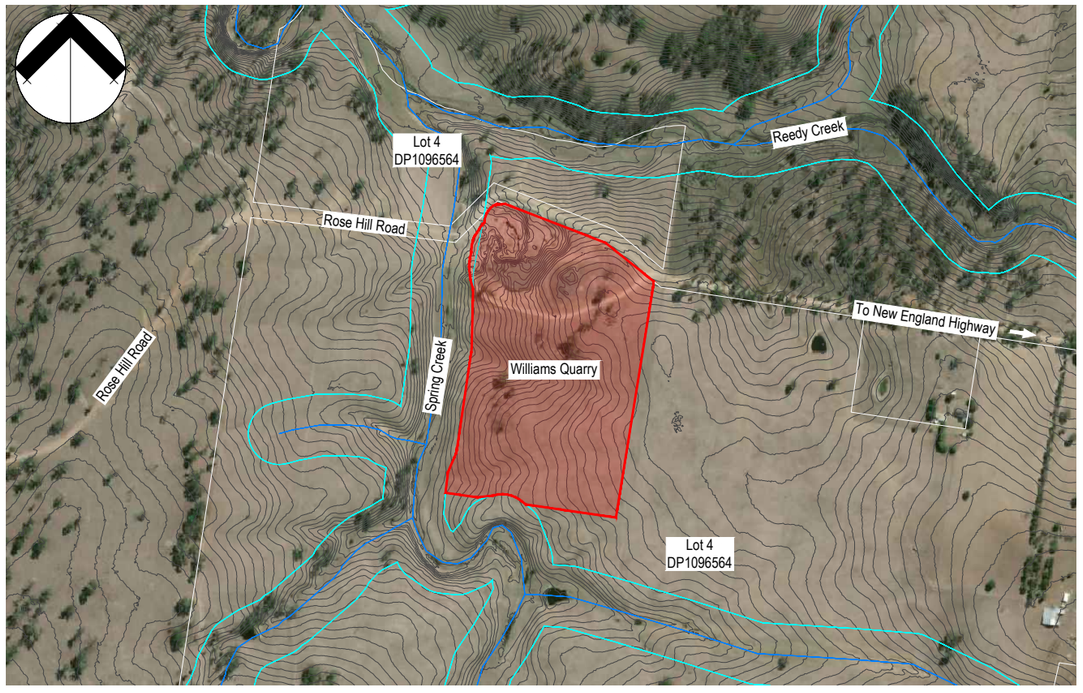
Concept Plans

75 ROSE HILL ROAD, ARDING NSW 2358
LOT 4 DP 1096564

WILLIAMS QUARRY

ENGINEERING CONCEPT

Drawing Schedule		
Dwg No.	**Title**	**Revision**
4079/SK001-1	Cover Sheet and Drawing Schedule	-
4079/SK001-2	Concept Overall Staging Plan	-
4079/SK001-3	Concept Catchment Plan	-
4079/SK001-4	Concept Stage 1	-
4079/SK001-5	Concept Stage 2	-
4079/SK001-6	Concept Stage 3	-
4079/SK001-7	Concept Stage 4	-
4079/SK001-8	Concept Stage 5	-
4079/SK001-9	Concept Stage 6	-
4079/SK001-10	Concept Stage 7	-
4079/SK001-11	Concept Stage 8	-
4079/SK001-12	Concept Stage 9	-
4079/SK001-13	Concept Stage 10 (Final)	-
4079/SK001-14	Concept Typical Details	-



Locality Plan

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	

XREFs

Scale

metres — Not To Scale

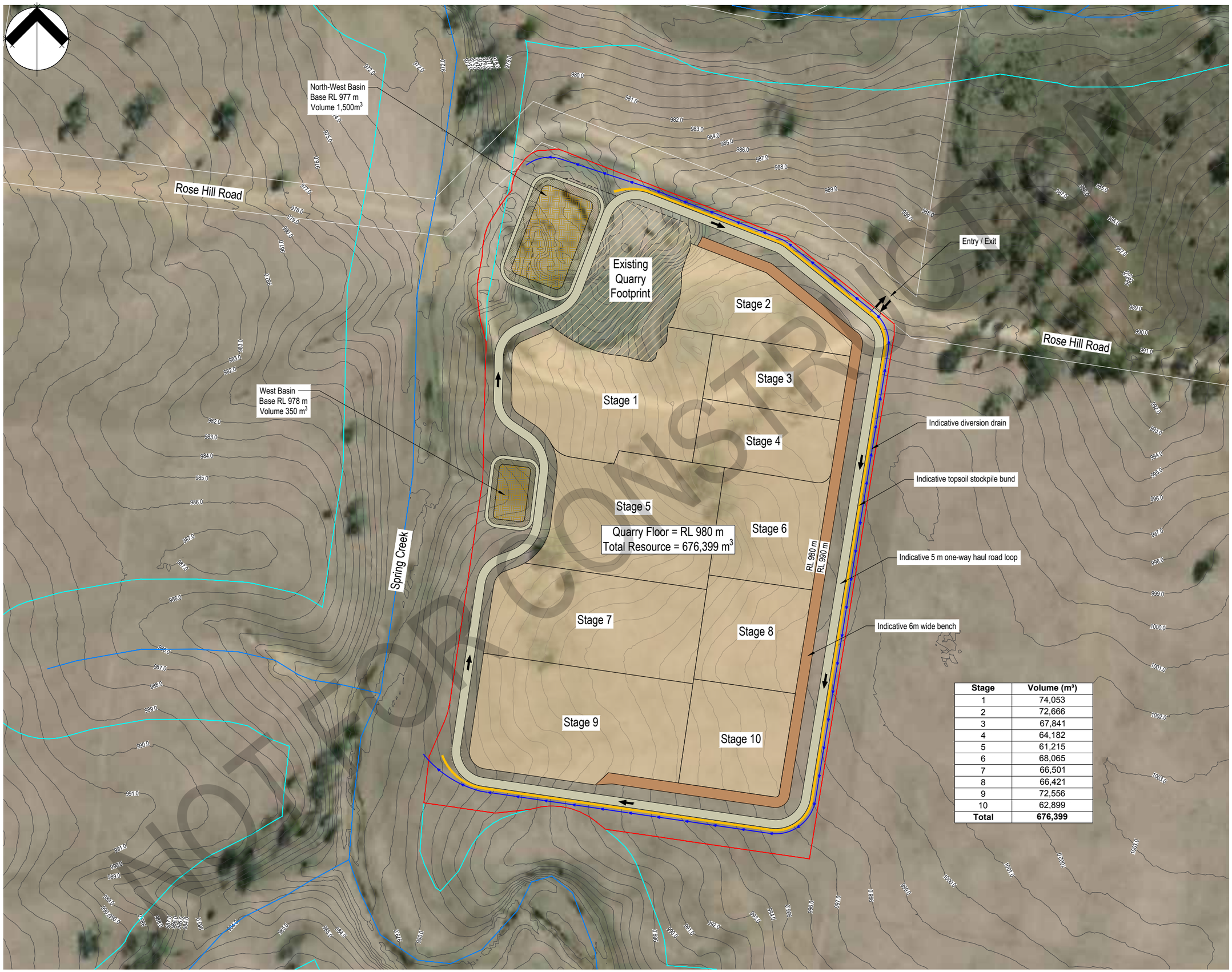
Drawing Title

Cover Sheet and Drawing Schedule

4079-1016

Drawing Number — *Revision*

4079/SK001-1



Stage	Volume (m³)
1	74,053
2	72,666
3	67,841
4	64,182
5	61,215
6	68,065
7	66,501
8	66,421
9	72,556
10	62,899
Total	**676,399**

LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		

XREFs

Scale

metres 0 10 20 30 40 50

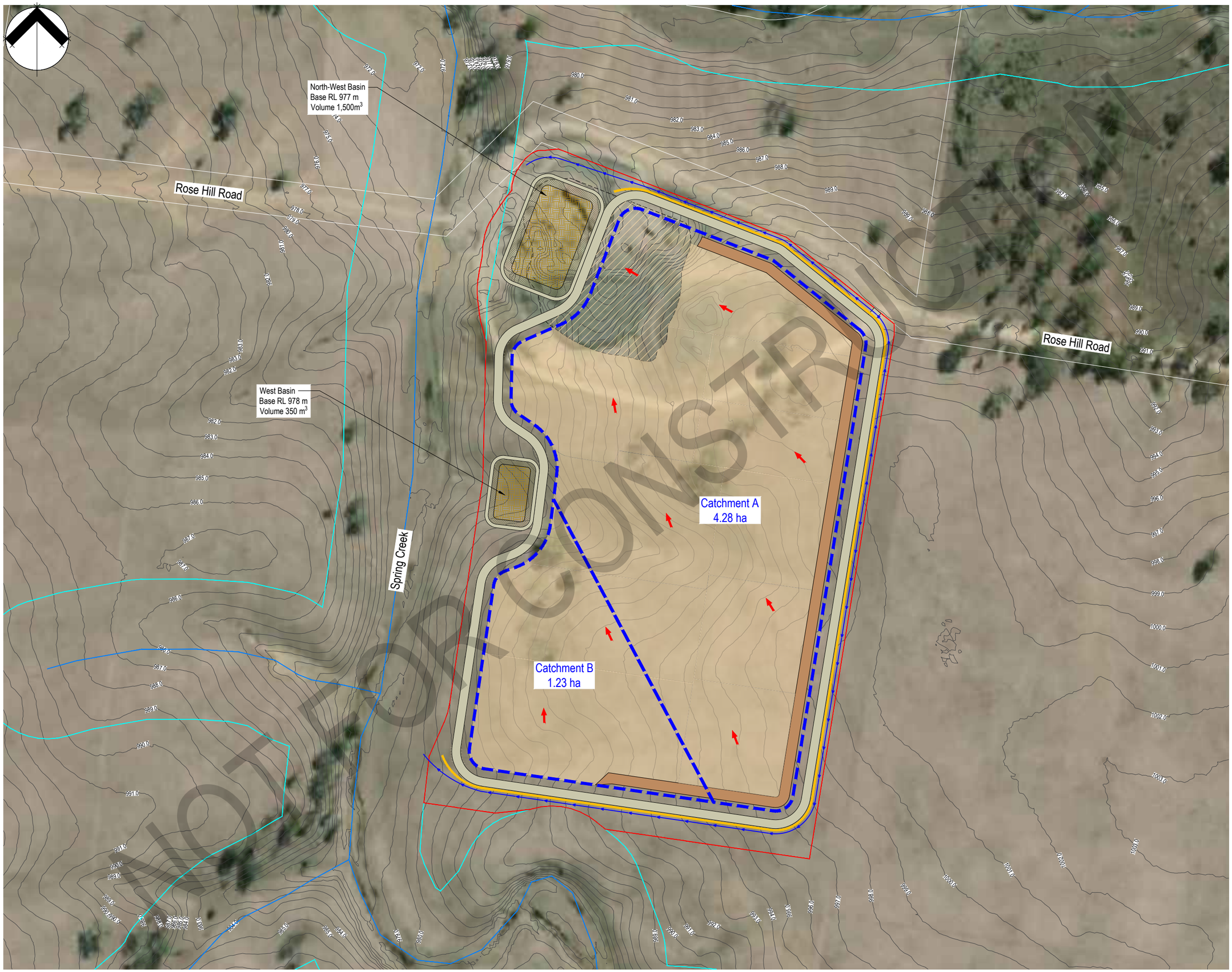
Drawing Title

Concept
Overall Staging Plan

4079-1016

Drawing Number *Revision*

4079/SK001-2



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain
- Catchment boundary
- Site water flow direction

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

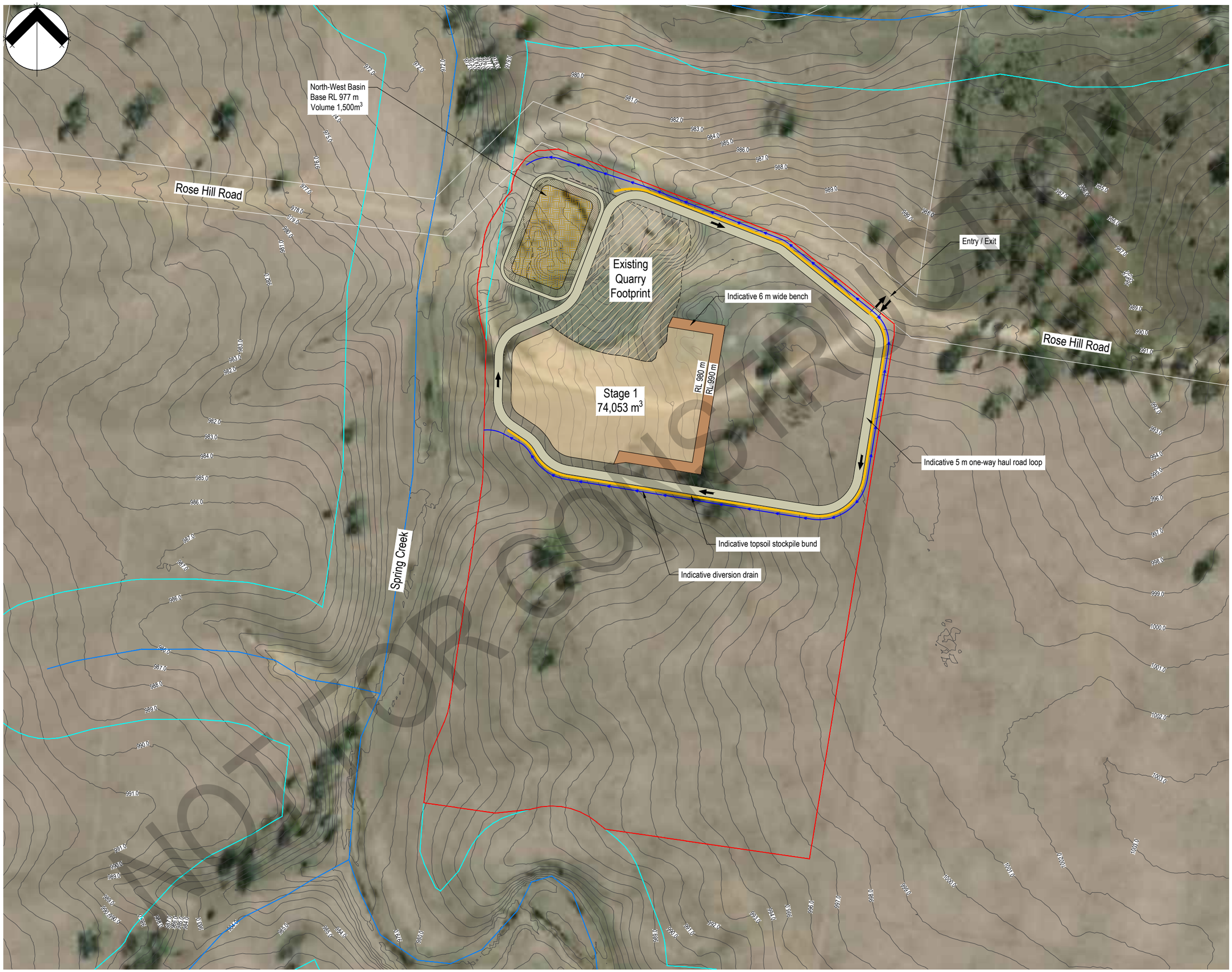
Drawing Title

Concept
Catchment Plan

4079-1016

Drawing Number *Revision*

4079/SK001-3



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				

Scale

metres 0 10 20 30 40 50

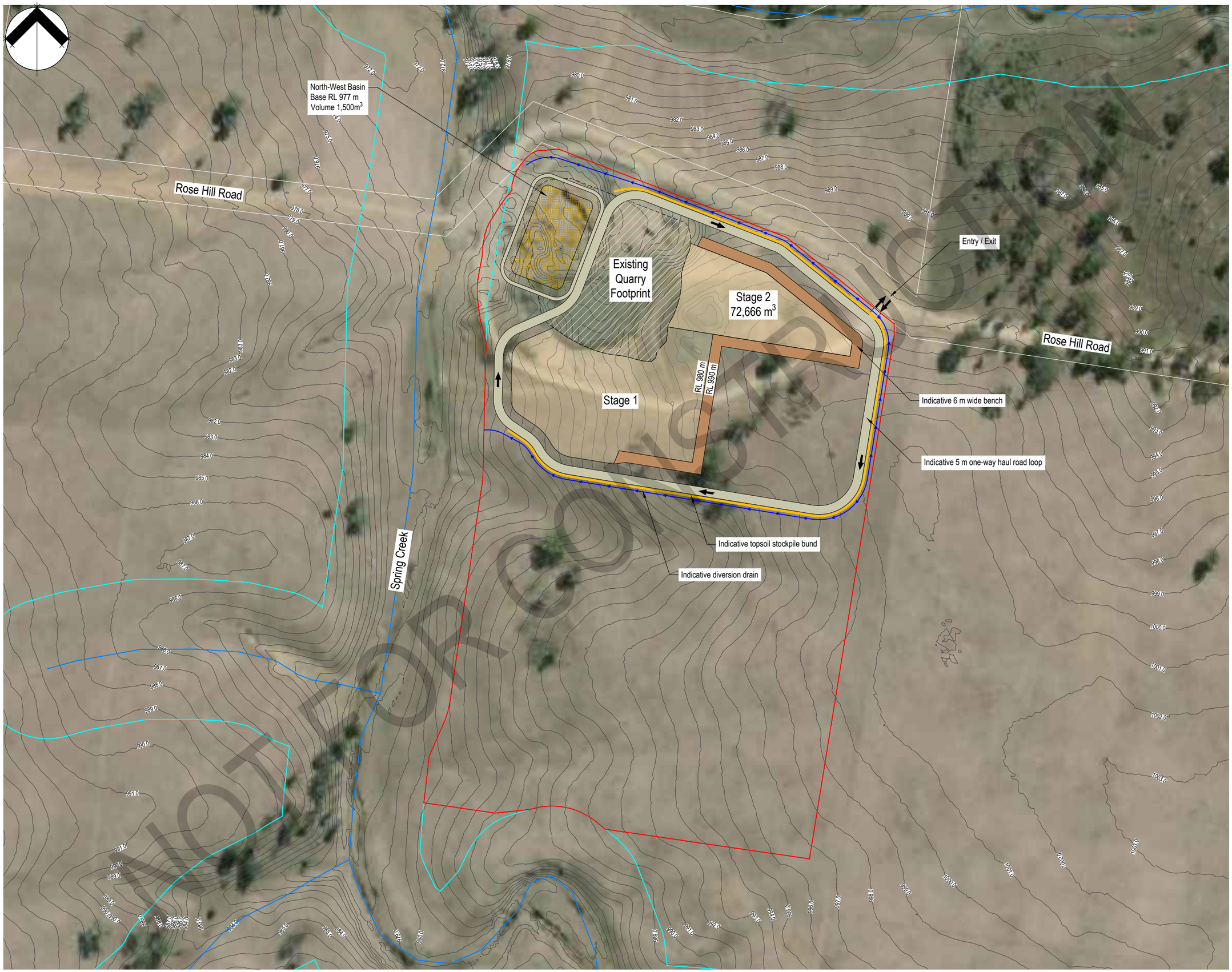
Drawing Title

Concept
Stage 1

4079-1016

Drawing Number *Revision*

4079/SK001-4



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

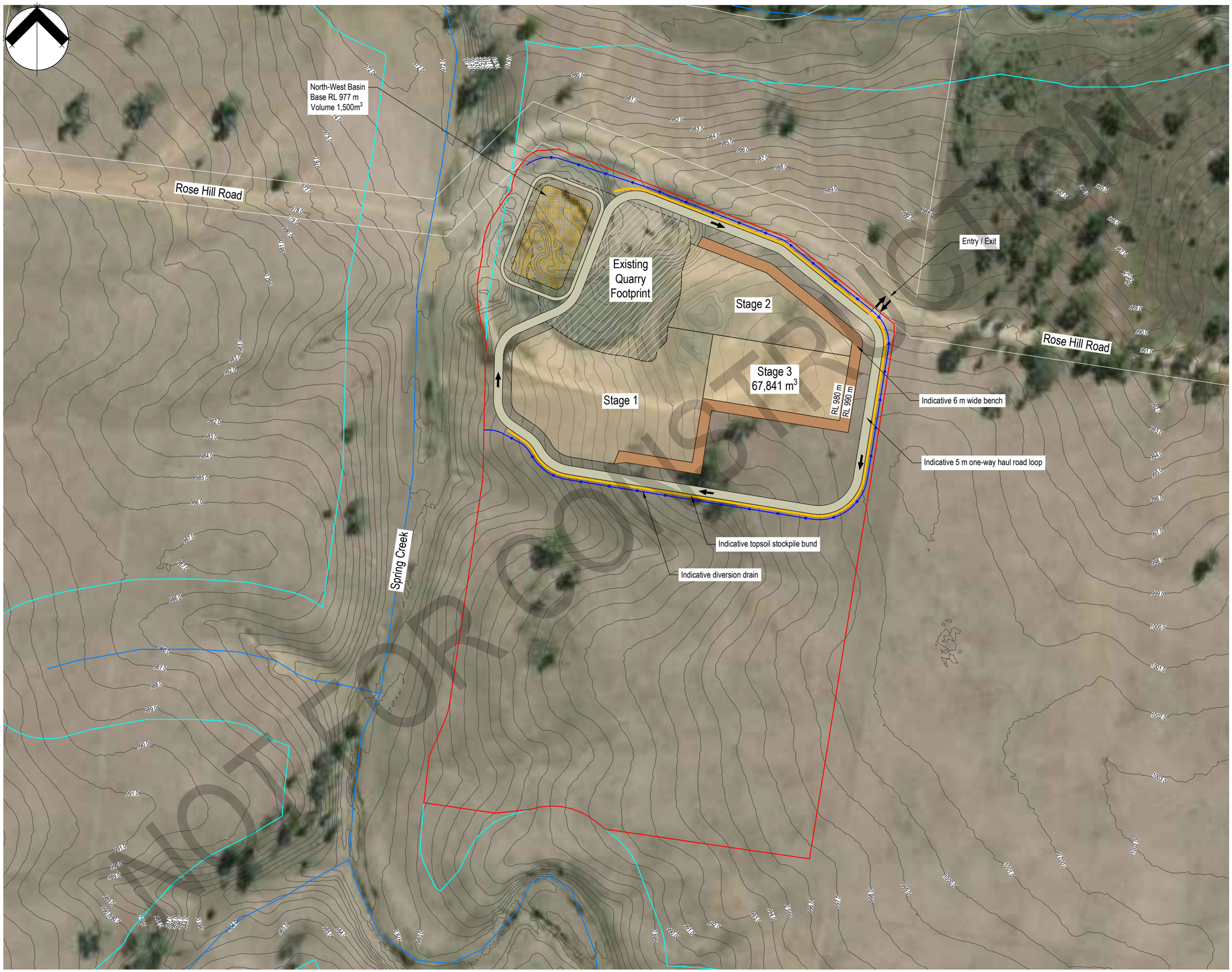
Drawing Title

Concept
Stage 2

4079-1016

Drawing Number *Revision*

4079/SK001-5



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

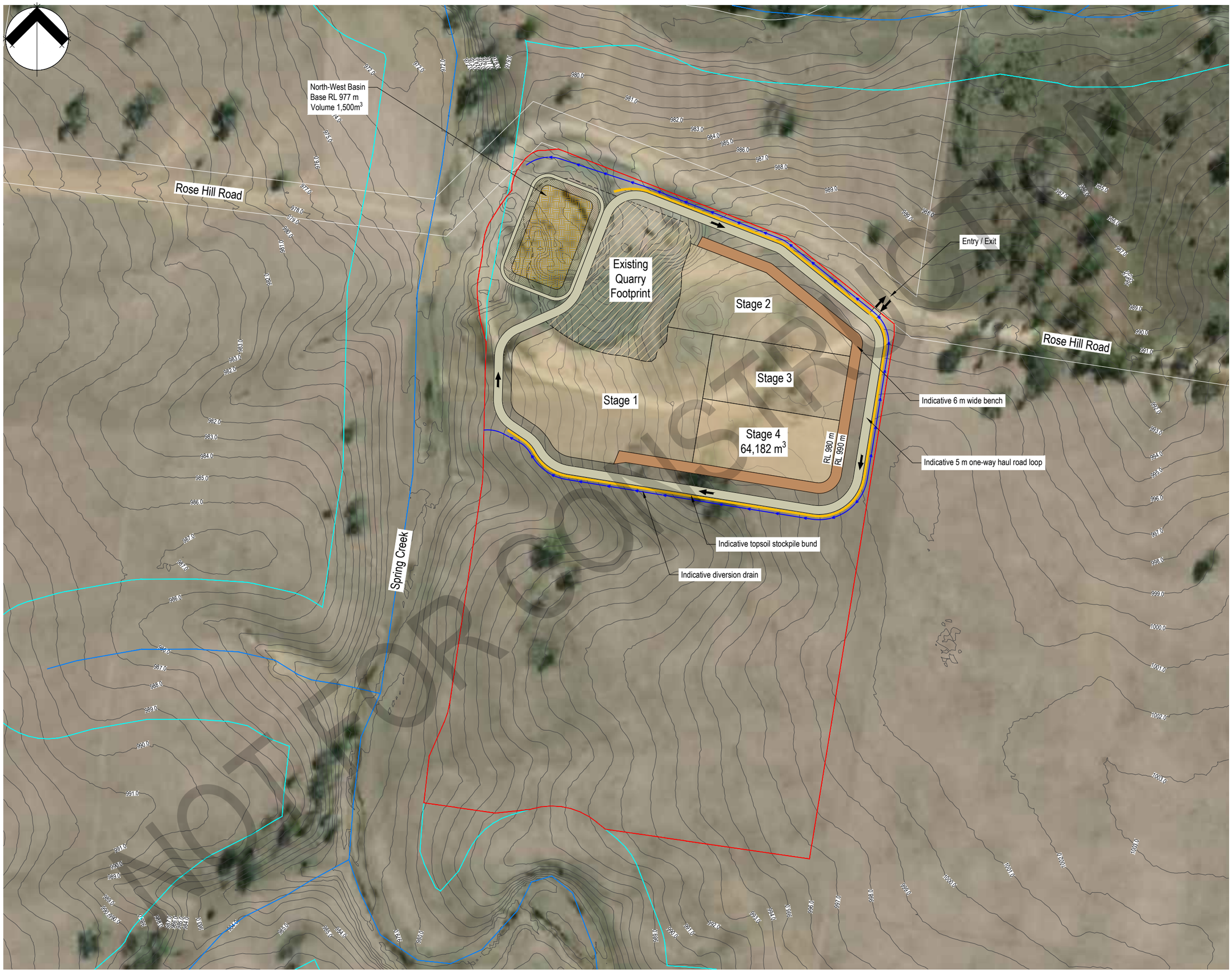
Drawing Title

Concept
Stage 3

4079-1016

Drawing Number *Revision*

4079/SK001-6



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

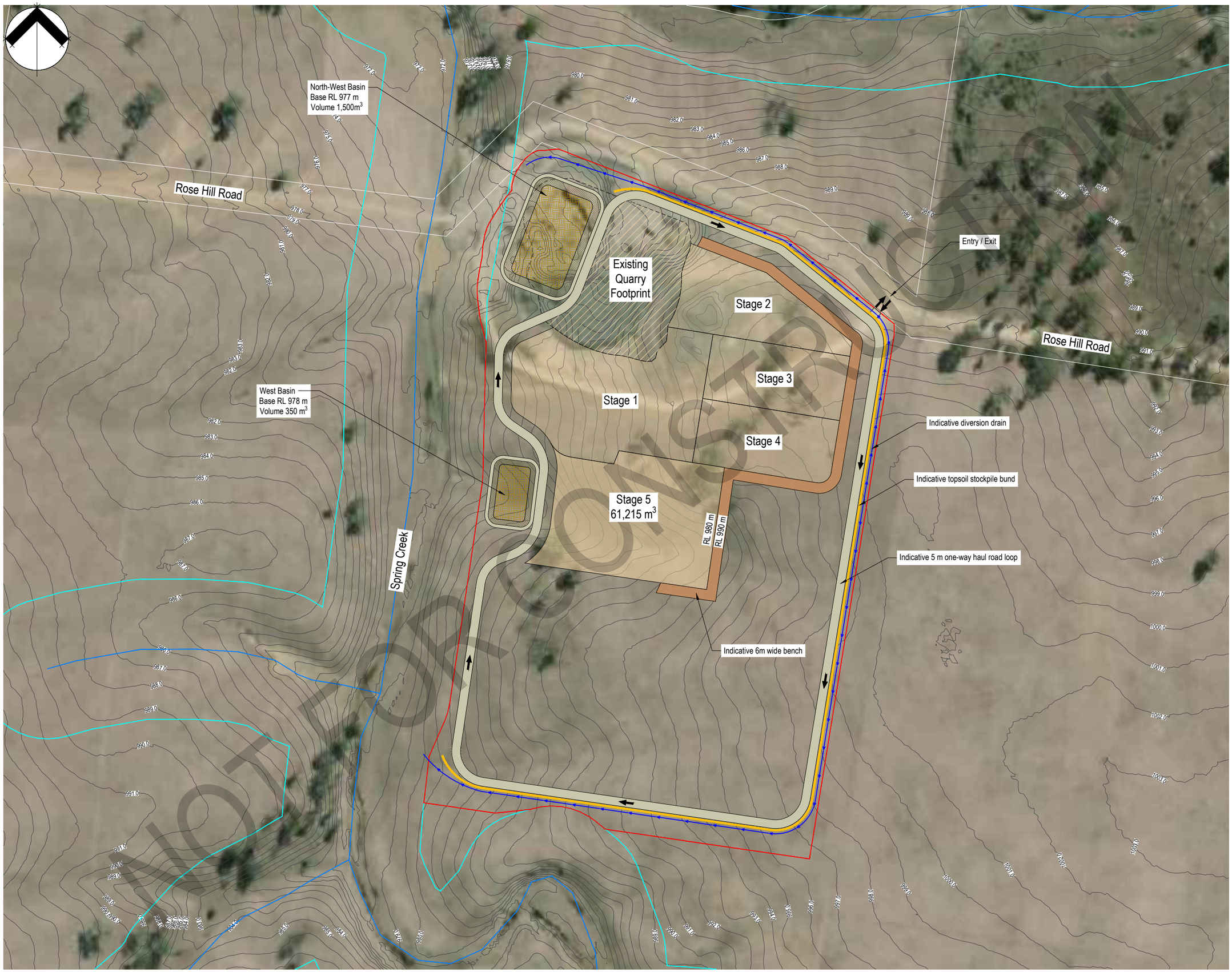
Drawing Title

Concept
Stage 4

4079-1016

Drawing Number *Revision*

4079/SK001-7



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		

XREFs

Scale

metres 0 10 20 30 40 50

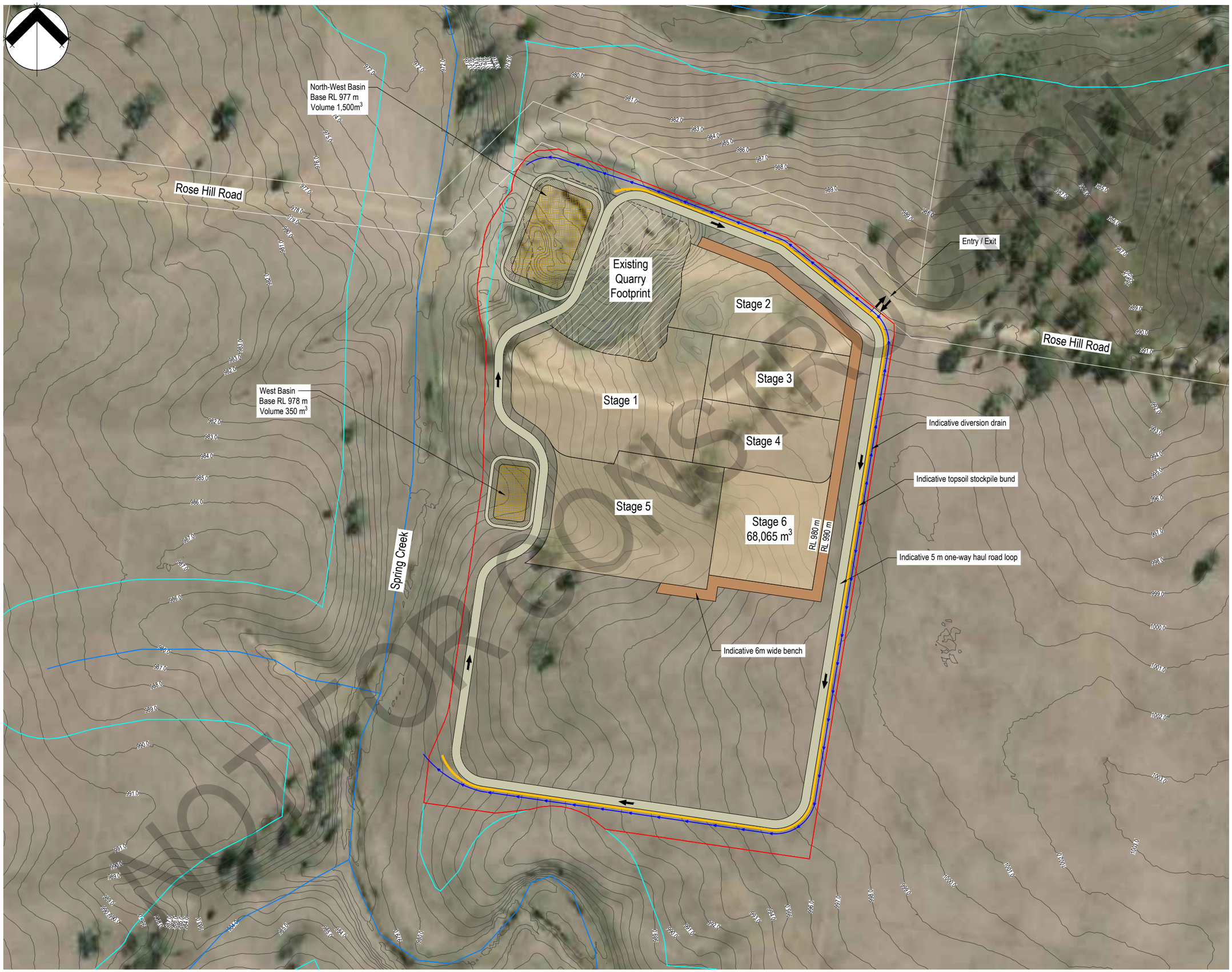
Drawing Title

Concept
Stage 5

4079-1016

Drawing Number *Revision*

4079/SK001-8



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

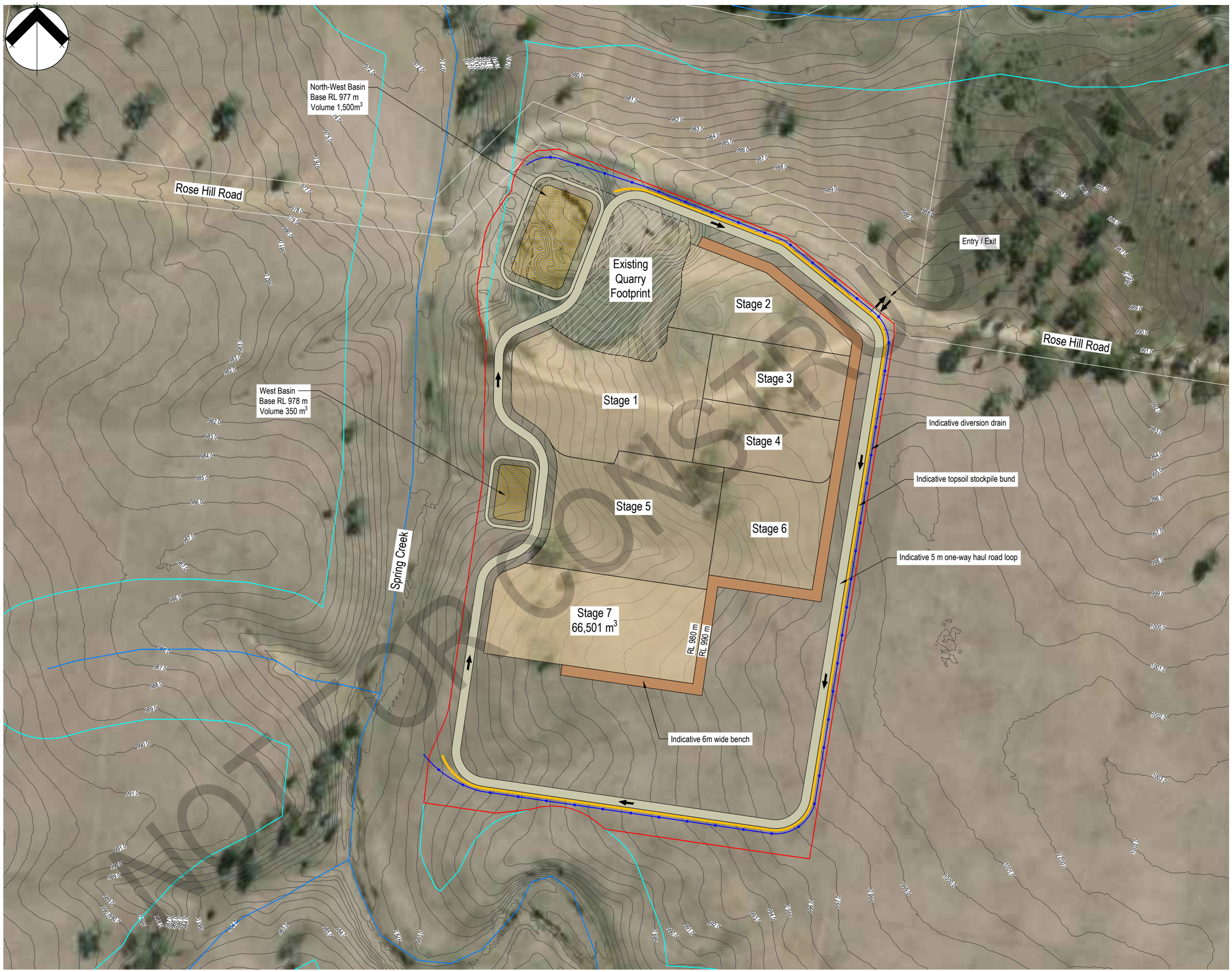
Drawing Title

Concept
Stage 6

4079-1016

Drawing Number *Revision*

4079/SK001-9



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				

Scale

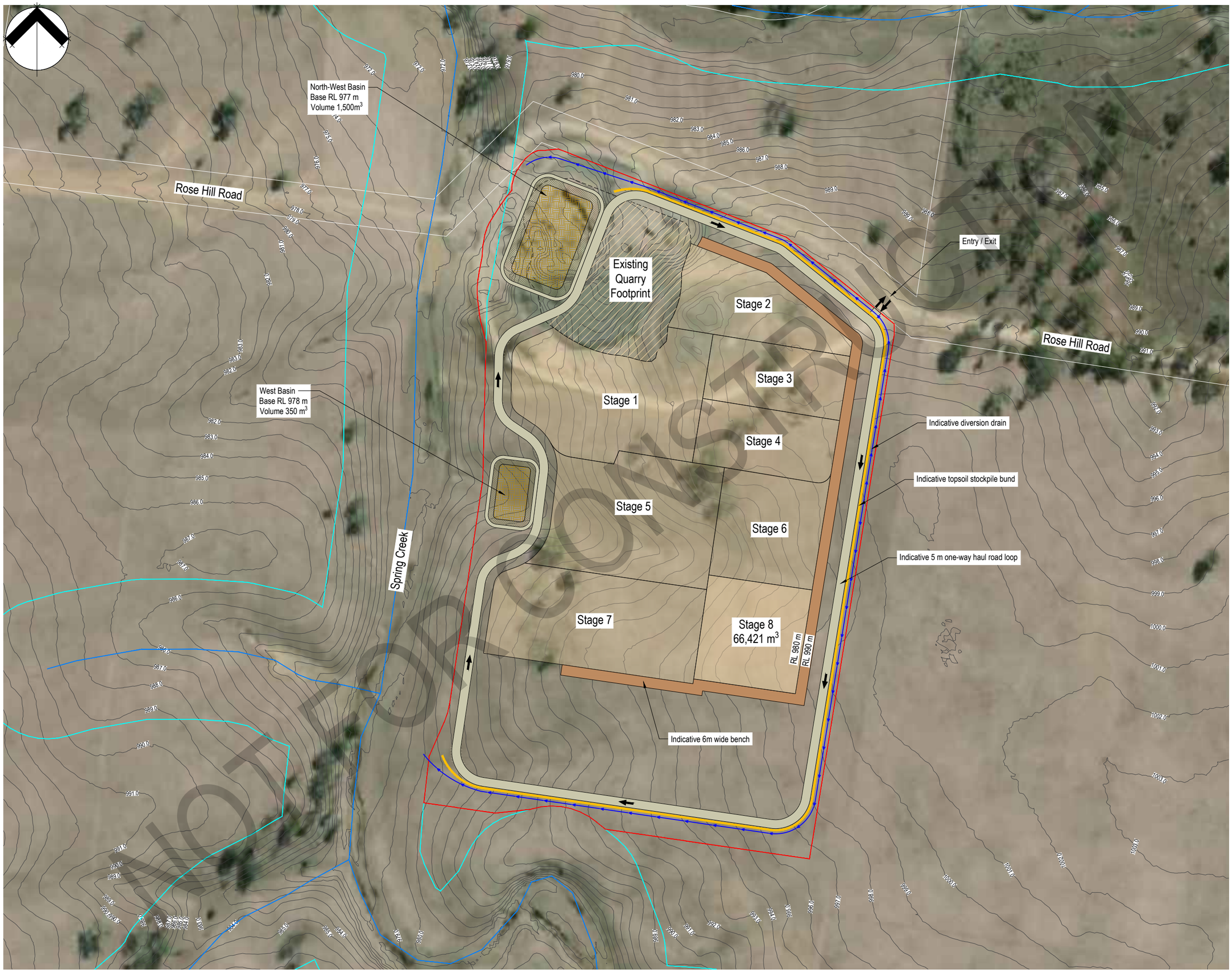
metres 0 10 20 30 40 50

Drawing Title

Concept
Stage 7

4079-1016

Drawing Number 4079/SK001-10 *Revision*



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

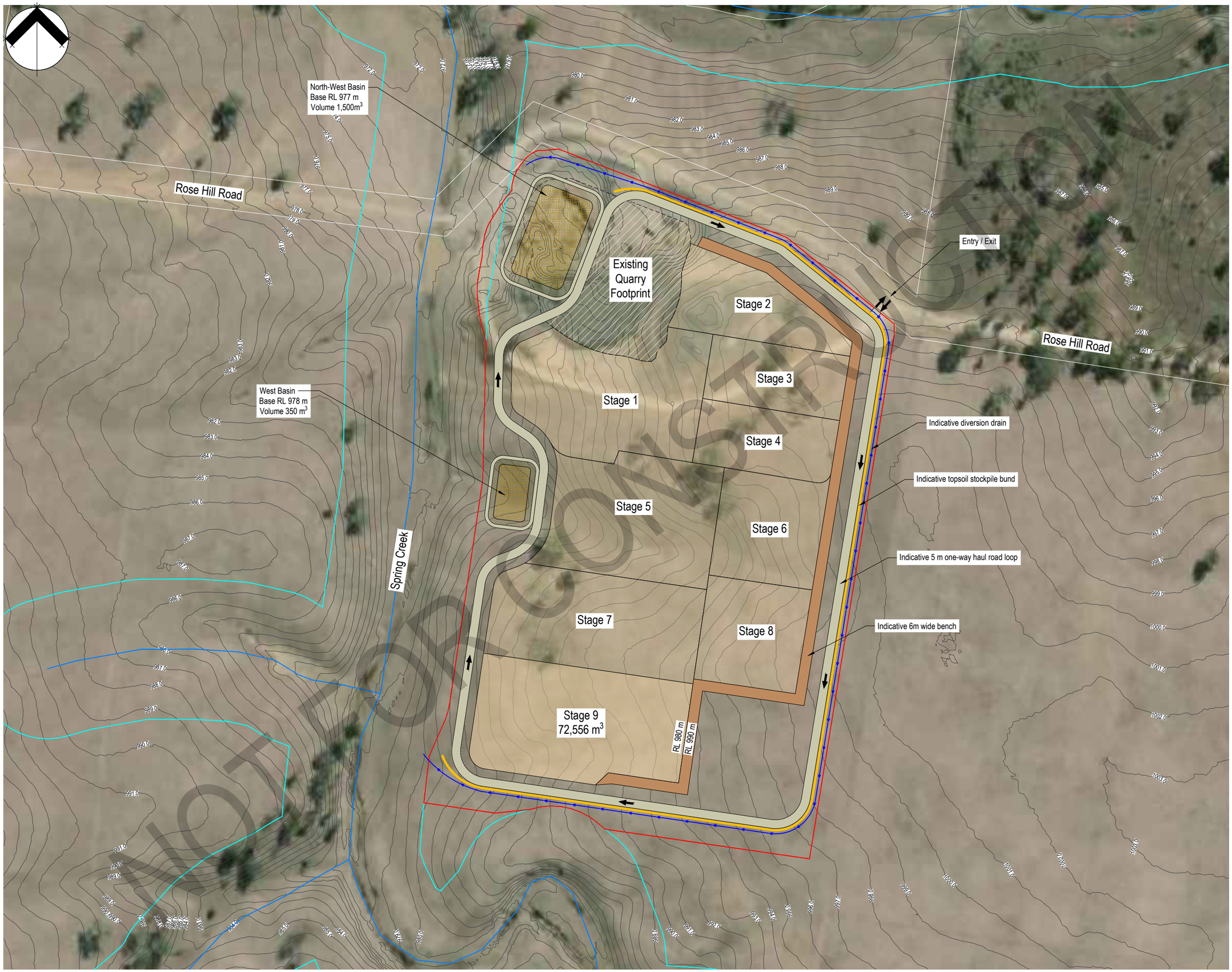
Drawing Title

Concept
Stage 8

4079-1016

Drawing Number *Revision*

4079/SK001-11



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

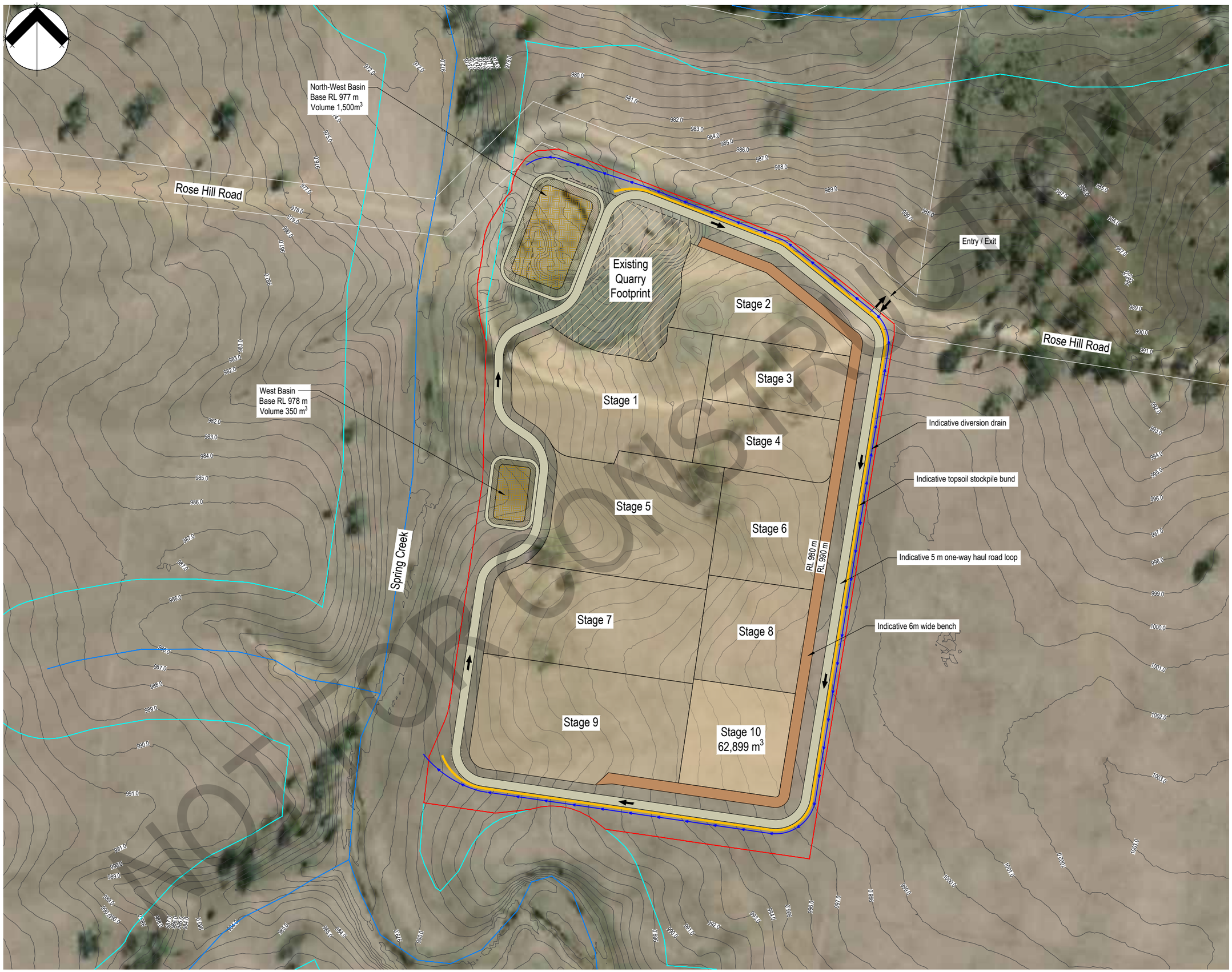
Drawing Title

Concept
Stage 9

4079-1016

Drawing Number *Revision*

4079/SK001-12



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

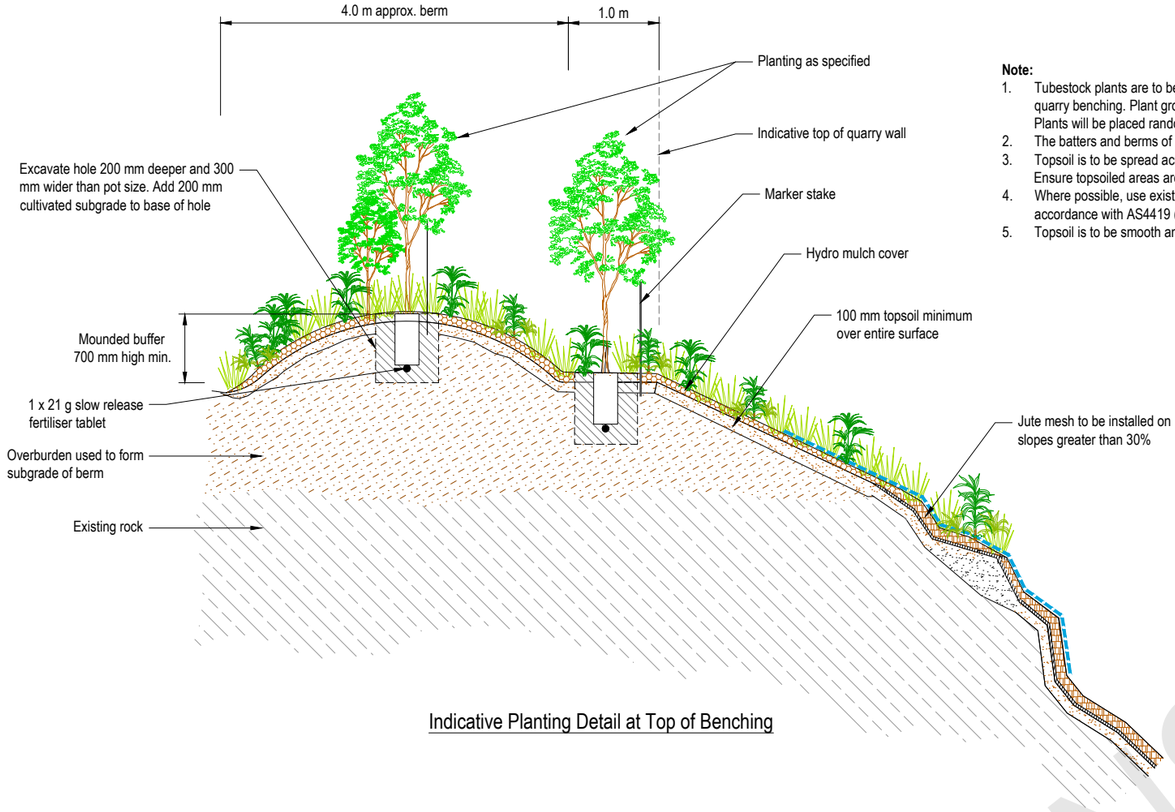
Drawing Title

Concept
Stage 10 (Final)

4079-1016

Drawing Number *Revision*

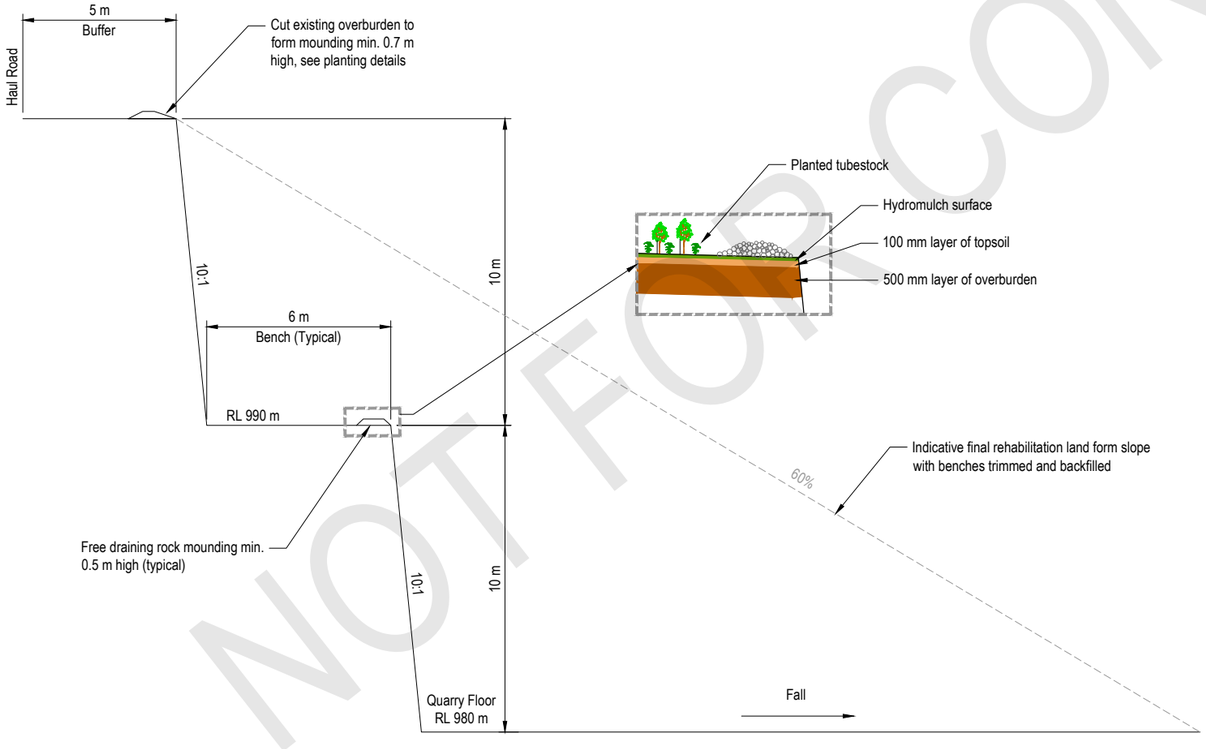
4079/SK001-13



Indicative Planting Detail at Top of Benching

Note:

1. Tubestock plants are to be installed in groups within the berm along the top of the quarry benching. Plant groups will consist of smaller groups of at least three species. Plants will be placed randomly at between 1 - 5 m centres.
2. The batters and berms of the quarry benching are to be hydroseeded.
3. Topsoil is to be spread across the prepared subgrade of the quarry base and berm. Ensure topsoiled areas are graded to enable free drainage without ponding.
4. Where possible, use existing stockpiled site topsoil. Good quality imported topsoil in accordance with AS4419 (1998) is to be used if there is insufficient site topsoil.
5. Topsoil is to be smooth and free of stones, vegetative material or weed seed.



Indicative Benching Detail

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK
environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn KWG	Checked PJS
Approved	TJC	Date 1/11/2022	

XREFs

Scale

metres Not To Scale

Drawing Title

Concept
Typical Details

4079-1016

Drawing Number *Revision*

4079/SK001-14

Appendix D

Noise, Vibration and Blasting assessment

RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT R211093R1

Revision 1

Noise Impact Assessment

Proposed Quarry

75 Rose Hill Road, Arding

PREPARED FOR:
Williams Quarry Arding

13 March 2023

PO Box 522
Wahroonga NSW 2076
P 02 9943 5057
F 02 9475 1019
mail@rodneystevensacoustics.com.au

ABN 78 149 311 455
rodneystevensacoustics.com.au

Noise Impact Assessment

Proposed Quarry

75 Rose Hill Road, Arding

PREPARED BY:

Rodney Stevens Acoustics Pty Ltd
Telephone: 61 2 9943 5057 Facsimile 61 2 9475 1019
Email: info@rodneystevensacoustics.com.au
Web: www.rodneystevensacoustics.com.au

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R211093R1	Revision 0	20 January 2023	Camilo Castillo	Rodney Stevens	Rodney Stevens
R211093R1	Revision 1	13 March 2023	Camilo Castillo	Rodney Stevens	Rodney Stevens

TABLE OF CONTENTS

1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Ducats Earthmoving Pty Ltd to prepare a Noise Impact Assessment for the proposed expansion of the quarry at 75 Rose Hill Road, Arding.

This report details the results of an ambient noise survey and establishes the noise criteria for the operation of the quarry.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix A.

2 PROPOSED DEVELOPMENT

2.1 Development Site

The existing quarry is to be located at 75 Rose Hill Road, Arding. There are a number of sensitive receivers surrounding the proposed development, these receivers will be affected by noise generated by the proposed development. The following table shows the most affected receivers

Table 2-1 Sensitive Receivers

Receiver	Sensitive Receiver's Address
R1	107 Rose Hill Road
R2	76 Rose Hill Road
R3	75 Rose Hill Road

Figure 2-1 shows an aerial image of the site area and the surrounding environment.

2.2 Hours of Operation

The proposed quarry will be in operation as follows:

- Overburden stripping and site establishment 6.00 am to 5.00 pm Monday to Saturday.
- Truck loading hours 6.00 am to 5.00 pm Monday to Saturday.
- Truck Haulage 7.00 am to 5.00 pm Monday to Friday.
- Truck Haulage 7.00 am to 1.00 pm Saturday.
- Processing 7.00 am to 5.00 pm Monday to Saturday.

Figure 2-1 Site Location

Image Courtesy of Six Maps © 2022.

3 BASELINE NOISE SURVEY

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area unattended noise monitoring was conducted between the dates of Tuesday 15th November and Tuesday 22nd November 2022 at the logging location shown in Figure 2-1

Logger location was selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from residents and landowners.

Instrumentation for the survey comprised of a RION NL-42 environmental noise logger (serial number 885460) fitted with microphone windshield. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for definitions in Appendix A). Detailed results at the monitoring location are presented in graphical format in Appendix B. The graphs show measured values of L_{A1}, L_{A10}, L_{A90} and L_{Aeq} for each 15-minute monitoring period

3.2 Data Processing

3.2.1 Noise Emission (*Noise Policy for Industry*)

In order to assess noise emission from the proposed quarry, the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPfI, 2017) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in Table 3-1.

Table 3-1 Measured Baseline Noise Levels Corresponding to Defined NPfI Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Logger at 76 Rose Hill Road	L_{Aeq}	52	43	42
	RBL (Background)	30	27	22

Notes: All values expressed as dB(A) and rounded to nearest 1 dB(A);

L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

L_{A90} Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

4 NOISE GUIDELINES AND CRITERIA

4.1 Operational Noise Project Trigger Noise Levels

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the EPA. The EPA oversees the Noise Policy for Industry (NPfI) October 2017 which provides a framework and process for deriving project trigger noise level. The NPfI project noise levels for industrial noise sources have two (2) components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity for particular land uses for residents and sensitive receivers in other land uses.

4.1.1 Intrusiveness Noise Levels

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness noise level essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15 minute period.

4.1.2 Amenity Noise Levels

The amenity noise level is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The noise levels relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured.

If it approaches the project trigger noise level value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the project trigger noise level.

4.1.3 Area Classification

The NPfI characterises the “Rural” noise environment as an area with an acoustical environment that:

- is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels.

- Settlement patterns would be typically sparse

The area surrounding the proposed development falls under the “Rural” area classification.

4.1.4 Project Specific Trigger Noise Levels

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific project trigger noise levels. The intrusive and amenity project trigger noise levels for nearby residential premises are presented in Table 4-1. These project trigger noise levels are nominated for the purpose of assessing potential noise impacts from the proposed development.

In this case, the ambient noise environment is not controlled by industrial noise sources and therefore the project amenity noise levels are assigned as per Table 2.2 of the NPfI (Recommended Amenity Noise Levels) and standardised as per Section 2.2 of the NPfI. For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive project trigger noise levels are adopted. These are shown in bold text in Table 4-1.

Table 4-1 Operational Project Trigger Noise Levels

Receiver	Time of Day	ANL [1] L_{Aeq}	Measured		Project Trigger Noise Levels	
			RBL [2] $L_{A90(15min)}$	Existing $L_{Aeq(Period)}$	Intrusive $L_{Aeq(15min)}$	Amenity $L_{Aeq(15min)}$
Residential	Day	50	35*	52	**40**	53
	Evening	45	30*	43	**35**	48
	Night	40	30*	42	**35**	43

Note 1: ANL = “Amenity Noise Level” for residences in Rural Areas.

Note 2: RBL = “Rating Background Level”.

* The RBLs have been adjusted in accordance with section 2.3 of the Noise Policy for Industry 2017

4.1.5 Shoulder Periods

The proposed hours for truck loading and site establishment will be from 6:00 am to 7:00 am. It may be unreasonable to expect operations between 6:00 am and 7:00 am to be assessed against the night-time project noise trigger levels since the existing background noise levels are steadily rising in the early morning hours. For this situation the shoulder period assessment will be use to derive the relevant criteria in accordance to Fact Sheet A, Section A3 of the NPfI 2017. The resulting intrusiveness criteria is presented below.

Table 4-2 Shoulder Period Noise Criteria

Receiver	$L_{AF90(6\text{-}7am)}$ dB	Criteria
Residential	35*	40

* The RBLs have been adjusted in accordance with section 2.3 of the Noise Policy for Industry 2017.

4.2 Sleep Disturbance

The NSW EPA Noise Policy for Industry (NPfI) provides a guidance for sleep disturbance or sleep arousal assessment. The NPfI states the following:

> *The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.*
> *Where the subject development/premises night-time noise levels at a residential location exceed:*
> *• LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
>
> *• LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *a detailed maximum noise level event assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy*
>
> *Other factors that may be important in assessing the extent of impacts on sleep include:*
>
> *• how often high noise events will occur*
>
> *• the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development*
>
> *• whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)*
>
> *• current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*
>
> *Maximum noise level event assessments should be based on the LAFmax descriptor on an event basis under 'fast' time response.*
>
> *The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels*

Based on the minimum ambient noise level of 30 dB(A), the sleep disturbance criteria is LAeq,15min 40 dB(A) and LAFmax 52 dB(A)

5 OPERATIONAL NOISE IMPACT

5.1 Machinery Schedule

Williams Quarry has provided the following equipment schedule. This includes the machinery that will be used in the quarry.

Table 5-1 Machinery Schedule

Plant Description	Sound Power Levels (SWL) dB(A)
Crusher (Jaw, Cone, Impact	116
Excavator	107
Loader (wheeled)	105
Scalper	109
Dozer	108
Truck	107
Truck Dump	117
Generator	99
4WD	106

5.2 Site Noise Emission

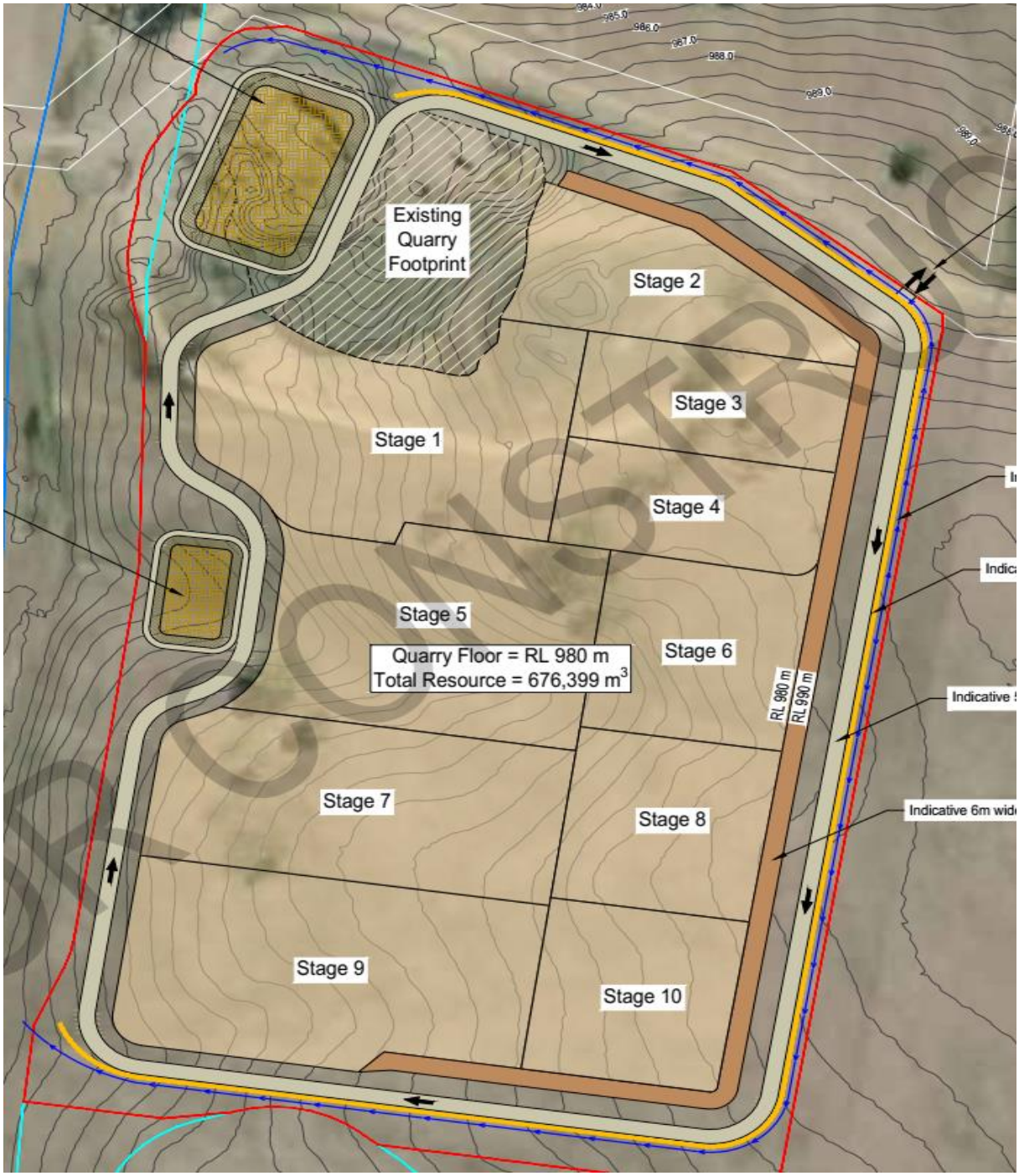
Calculations of the noise levels from the operation of the proposed quarry have been carried out using the data in Table 5-1.

There are 10 proposed stages which will encompass a portion of lot 4 (DP1096564). Based on the SEARs provided by GeoLink, a maximum of 4 machinery items will operate simultaneously. We have assumed the worst case scenario where a crusher, scalper, excavator and truck (truck dump) will be in use in each stage. Calculations take into account factors such as distance, shielding from buildings and barriers.

The following figure presents the proposed development and all sensitive receivers

Figure 5-1 Sensitive Receiver Location

Figure 5-2 Proposed Quarry Stages



5.3 Predicted Noise Levels

Predictive resultant noise levels have been calculated for the worst-case where the noisiest activities occur. Noise emissions at the nearest residential receivers are presented in the table below. The predicted noise calculations take into account the following:

- Heights of receivers are assumed to be 1.5 meters above respective level.
- A crusher, scalper, excavator and truck (truck dump) will be in use per stage
- 2 truck movements (entering or leaving) per 15 minutes (worst-case), this is based on a 90 vehicle movements per day (SEARs)
- Shoulder period activities will consist of 1 truck coming into the site and being loaded
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers

Table 5-2 Predicted Noise Levels At Sensitive Receivers.

Receiver	Period	Calculated Noise Level L_{Aeq} – dB(A)	Criteria	Compliance
		Stage 1		
R1	Day	35	40	Yes
R2		31		Yes
R3		33		Yes
R1	Shoulder Period	31	40	Yes
R2		27		Yes
R3		29		Yes
		Stage 2		
R1	Day	36	40	Yes
R2		37		Yes
R3		30		Yes
R1	Shoulder Period	34	40	Yes
R2		35		Yes
R3		27		Yes

Stage 3				
R1	Day	35	40	Yes
R2		33		Yes
R3		30		Yes
R1	Shoulder Period	30	40	Yes
R2		28		Yes
R3		26		Yes
Stage 4				
R1	Day	33	40	Yes
R2		29		Yes
R3		29		Yes
R1	Shoulder Period	29	40	Yes
R2		26		Yes
R3		26		Yes
Stage 5				
R1	Day	36	40	Yes
R2		32		Yes
R3		34		Yes
R1	Shoulder Period	32	40	Yes
R2		28		Yes
R3		29		Yes
Stage 6				
R1	Day	33	40	Yes
R2		30		Yes
R3		30		Yes

R1		30		Yes
R2	Shoulder Period	26	40	Yes
R3		26		Yes
Stage 7				
R1		36		Yes
R2	Day	31	40	Yes
R3		36		Yes
R1		33		Yes
R2	Shoulder Period	27	40	Yes
R3		32		Yes
Stage 8				
R1		33		Yes
R2	Day	30	40	Yes
R3		30		Yes
R1		30		Yes
R2	Shoulder Period	26	40	Yes
R3		26		Yes
Stage 9				
R1		36		Yes
R2	Day	31	40	Yes
R3		37		Yes
R1		34		Yes
R2	Shoulder Period	27	40	Yes
R3		35		Yes
Stage 10				
R1	Day	33	40	Yes
R2		30		Yes

R3		31		Yes
R1		29		Yes
R2	Shoulder Period	26	40	Yes
R3		28		Yes

Noise enhancing meteorological conditions have been included in the noise model, we have assumed a category D

Table 5-3 Predicted Noise Levels At Sensitive Receivers – Sleep Disturbance

			Criteria		
Receiver	**Calculated L_{Aeq} dB(A)**	**Calculated L_{AMAX} dB(A)**	**Level L_{Aeq} – dB(A)**	**L_{AMAX} – dB(A)**	**Compliance**
		Stage 1			Yes
R1	31	36			Yes
R2	27	32	40	52	Yes
R3	29	34			Yes
		Stage 2			
R1	34	39			Yes
R2	35	40	40	52	Yes
R3	27	32			Yes
		Stage 3			
R1	30	35			Yes
R2	28	32	40	52	Yes
R3	26	31			Yes
		Stage 4			
R1	29	34			Yes
R2	26	31	40	52	Yes
R3	26	31			Yes
		Stage 5			
R1	32	37	40	52	Yes
R2	28	33			Yes

R3	29	34			Yes
		Stage 6			
R1	30	35	40	52	Yes
R2	26	31			Yes
R3	26	31			Yes
		Stage 7			
R1	33	38	40	52	Yes
R2	27	32			Yes
R3	32	37			Yes
		Stage 8			
R1	30	35	40	52	Yes
R2	26	31			Yes
R3	26	31			Yes
		Stage 9			
R1	34	39	40	52	Yes
R2	27	32			Yes
R3	35	40			Yes
		Stage 10			
R1	29	34	40	52	Yes
R2	26	31			Yes

6 BLASTING ASSESMENT

It is proposed to expand the operation and activities associated with the existing quarry and extract a higher rate of material using blasting. Materials are crushed on site and sold within the local market. The proposal is seeking to obtain approval to extract up to 150,000m3 of material per annum to meet anticipated demands.

Bench development would involve conventional multi level benching, with active bench thicknesses commonly in the order of 15 to 25 metres width with bench heights of 10 m chosen for a safe and stable profile. This material would be removed primarily by conventional drill and blast methods.

6.1 Blast Emissions Assessment Criteria

The Department of Planning and Environment (DPE) has issued Planning Secretary's Environmental Assessment Requirements for Williams Quarry Project (EAR 1638, dated 21 June 2022).

The EAR requires the blasting emissions to be assessed to demonstrate that the Project is be capable of complying with the guidelines contained in Australian and New Zealand Environment Council - Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC guideline, 1990).

The ANZEC criteria for the control of blasting impact at residences are as follows:

- The recommended maximum level for airblast is 115 dBLinear.
- The level of 115 dBLinear may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dBLinear at any time.
- The recommended maximum level for ground vibration is 5mm/s (peak particle velocity (ppv)).
- The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.
- Blasting should generally only be permitted during the hours of 9.00 am to 5.00 pm Monday to Saturday. Blasting should not take place on Sundays and Public Holidays.

6.2 Proposed Blasting Practices

The proposed method of material extraction for the Project is by drill and blast techniques incorporating free-face blasting. A summary of indicative blast design details is presented in

Table 6-1 Proposed Indicative Blast Design Details

Parameter	Indicative Design Ranges
Bench height	Typically 7 m to 15 m
Sub-drill	Typically 0.5 m
Stemming (using aggregate)	Typically 2.7 m to 4.7 m
Blasthole diameter	Typically 89 mm
Number of Holes	Typically 150 to 300
Blasthole inclination (to vertical)	Typically 0^{o}
Blasthole spacing	Typically 2.5 m to 3 m
Blasthole burden	Typically 2.5 m to 3 m
Explosives type	Typically ANFO or Powergel
Delay Detonator type	Typically Nonel
Holes per Delay	Typically 1 hole
Maximum Instantaneous Change (MIC)	Typically 25-80 kg (one hole per delay)

6.3 Blast Emission Impact Assessment

Based on the proposed indicative blast design presented in Table 6-1, the level of blast emissions (ground vibration and airblast) can be predicted using the formula given in the Orica Explosives Blasting Guide and AS 2187.2-1993, applicable to blasting to a free face in average rock. Also given in the Guide, and in the Standard, is a formula in relation to the prediction of airblast emissions. Both methods of blast emissions estimation are considered conservative.

The relevant formulae are as follows:

- PVS = $1{,}140\ (R/Q^{0.5})^{-1.6}$
- SPL = $164.2 - 24(\log_{10} R - 0.33 \log 10\ Q)$

Where,

- PVS = Peak Vector Sum ground vibration level (mm/s)
- SPL = Peak airblast level (dB Linear)
- R = Distance between charge and receiver (m)
- Q = Charge mass per delay (kg)

The predicted levels of Peak Vector Sum (PVS) ground vibration velocity and peak airblast at the nearest potentially affected properties to the quarry blasting are presented in Table 6-2, based on the nearest distances to the quarry pit boundaries

Table 6-2 Predicted Levels of Blast Emissions for 25 kg to 80kg MIC

Residence	Nearest Distance from Blasting (m)	PVS Ground Vibration (mm/s)	Peak Airblast (dB Linear)
R1	360	1.2 - 3.1	114 - 118
R2	600	0.5 - 1.4	109 - 113
R3	570	0.6 - 1.5	109 - 113

The following information is derived from the predicted levels of blast emissions:

- The predicted levels of ground vibration at all nearby residences comply with the ANZEC's general human comfort criterion (of 5 mm/s) and consequently with the maximum human comfort criterion of 10 mm/s.
- The maximum predicted ground vibration level of 3.1 mm/s occurs at the R1 residence using an MIC of 80 kg at an offset distance of 360 m.
- The predicted levels of peak airblast at all residences comply with the ANZEC's general human comfort criterion of 115 dB Linear except at the R1 residence. Here, the maximum levels of airblast predicted (from blasting at the nearpoint of the quarry pit) is 118 dB Linear. This corresponds to the absolute worst case with an MIC of 80 kg at the closest point of blasting throughout the life of the quarry pit.
- Although a marginal (3 dB Linear) exceedance of the ANZEC's general human comfort criterion of 115 dB Linear is predicted under the worst case circumstances, compliance is clearly met at all residences with the ANZEC's maximum human comfort criterion of 120 dB Linear.
- Further, the 115 dB Linear criterion is met at the R1 residence for an MIC of 34 kg. This would provide sufficient energy, with an appropriate blast design, achieve a bench height of up to 10 m.

Notwithstanding the above, it is recommended that all blasts are monitored at the closest/potentially most affected residence in order to establish, and to progressively update, blast emissions site laws (for ground vibration and airblast) in order to optimise future blast designs, based on actual site conditions. In this way, the site laws can be used to assist with the blast designs in order to ensure compliance with the respective blast emission criteria.

By adopting this approach, in conjunction with the future introduction of improved blasting products, it is anticipated that the blast emissions criteria can be met without imposing any significant constraints on the blast designs throughout the life of the quarry.

7 CONCLUSION

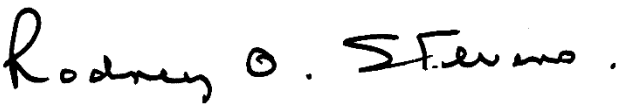
A noise impact assessment has been conducted in relation to the operation of the extension of the existing quarry at 75 Rose Hill Road, Arding

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Uralla Shire Council's requirements.

This report shows that under the most conservative operating scenarios and the implementation of the recommendations, operational noise emission from the proposed quarry will achieve the established criteria at neighbouring residences.

RSA has undertaken a Blasting Impact Assessment for the proposed expansion and increased extraction of Williams Quarry, Arding. Assessment of blast emissions was determined using the distances from the quarry pit boundary to the nearest receivers. With an MIC of 34 kg, airblast and ground vibration levels at the nearest receivers (maximum of 115 dB Linear airblast and 1.6 mm/s ground vibration) are predicted to comply with the ANZEC Guideline, as is required under the DPE Planning Secretary's Environmental Assessment Requirements for Williams Quarry Project.

Approved:-



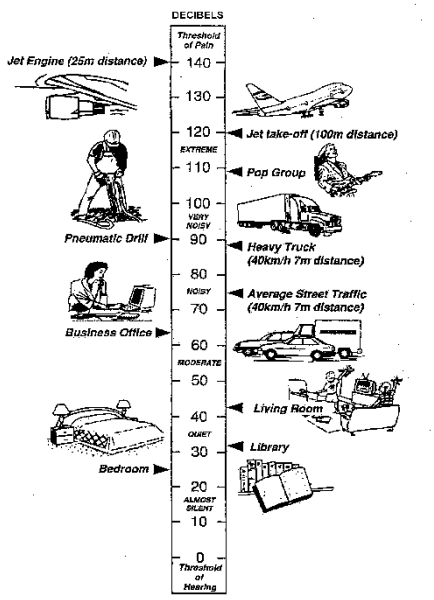
Rodney Stevens

Manager/Principal

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) ▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry) ▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) ▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: ▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected). ▪ Cost of mitigation (cost of mitigation versus benefit provided). ▪ Community views (aesthetic impacts and community wishes). ▪ Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.

Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10^{th} percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

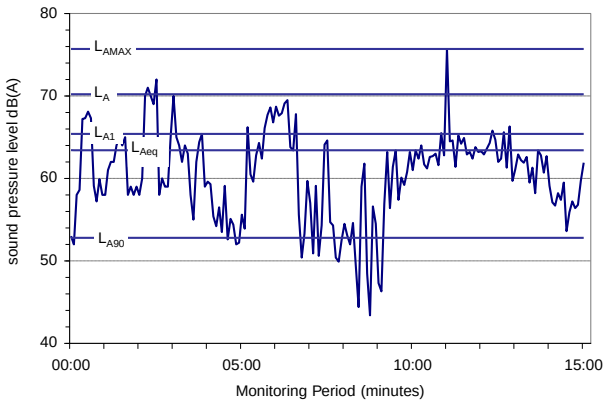
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.

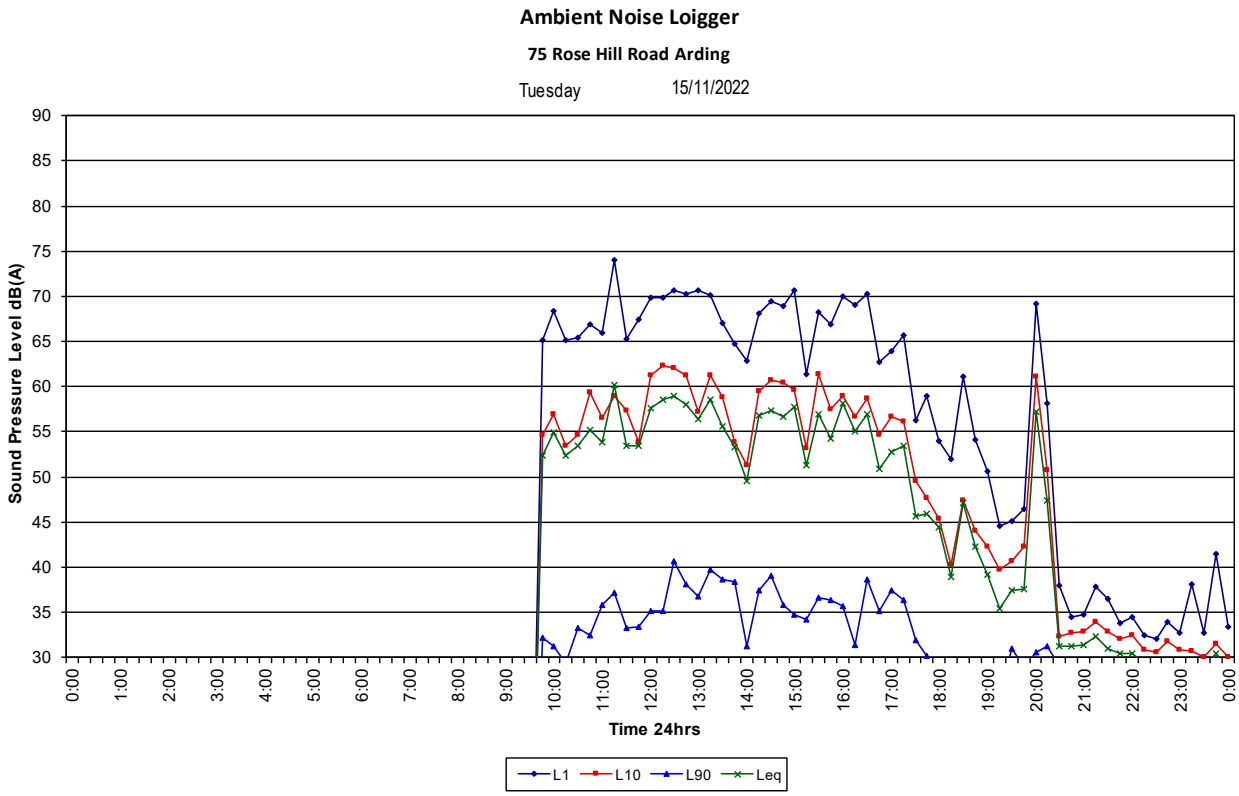
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

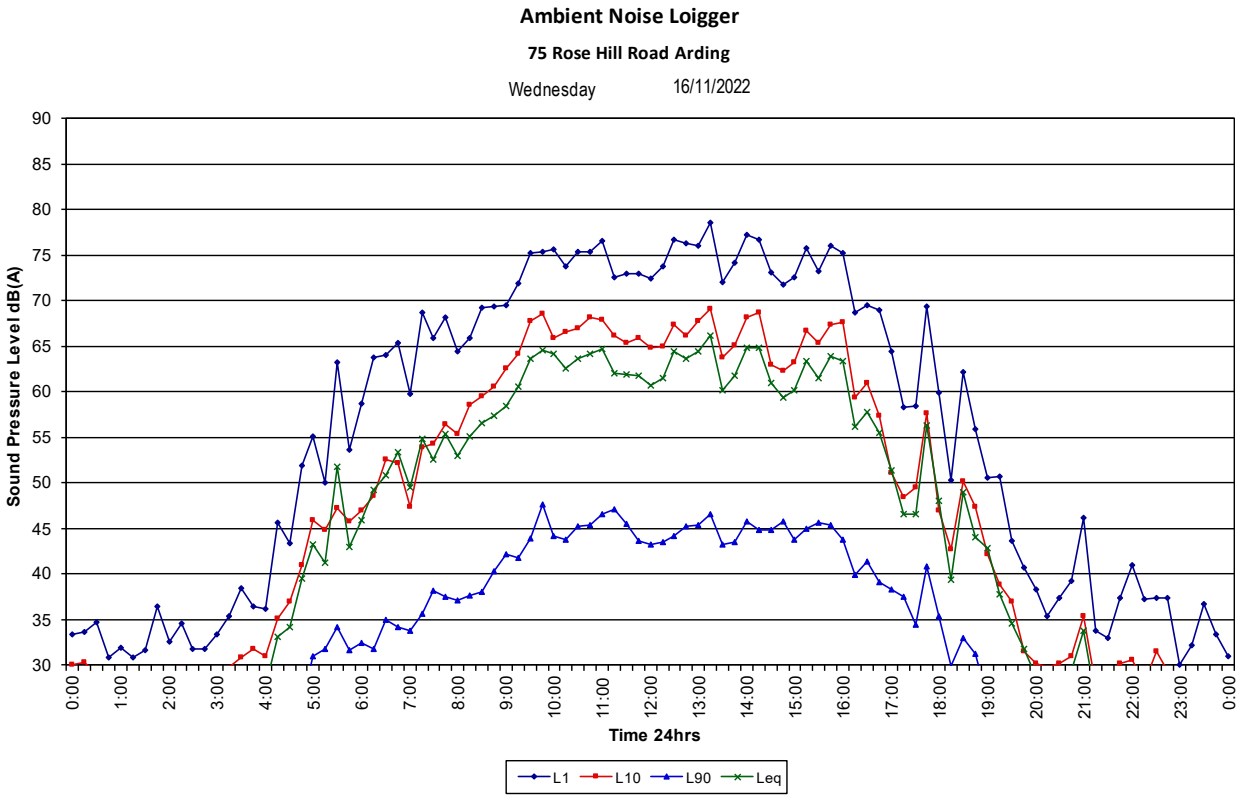
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

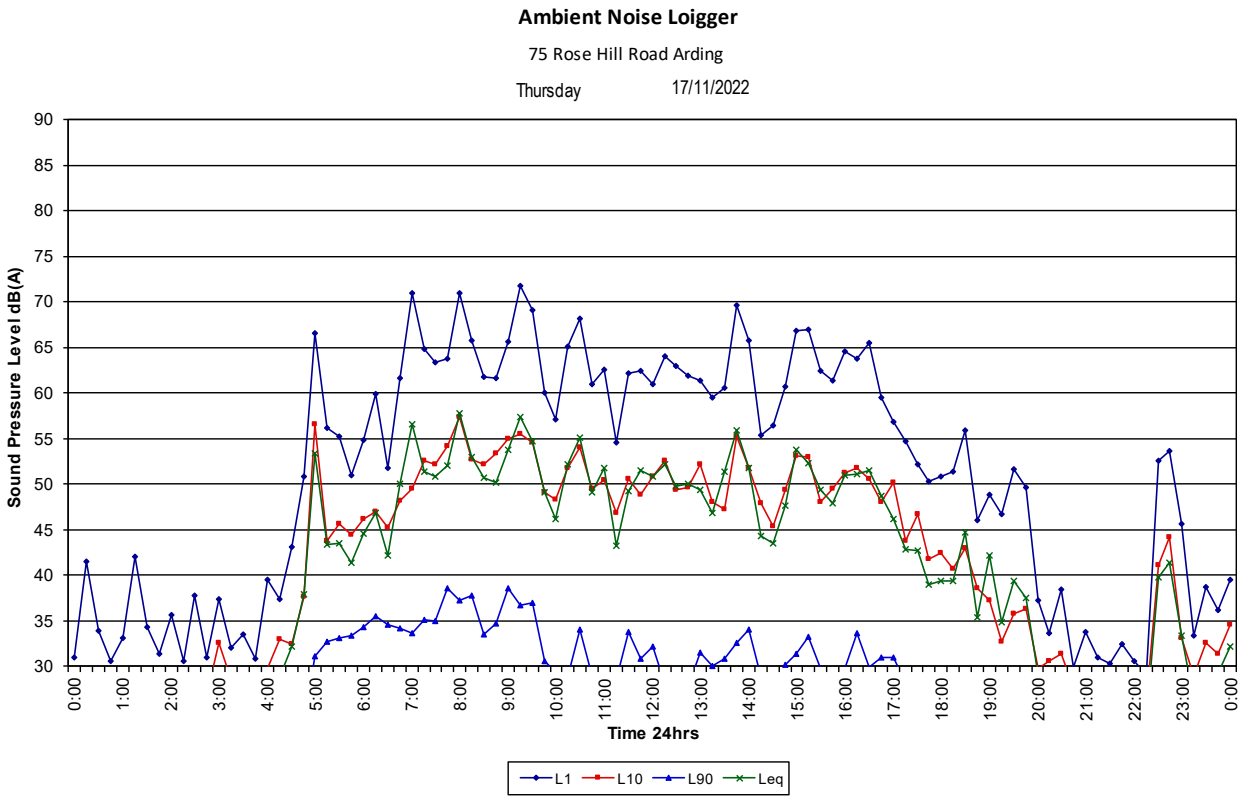
Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

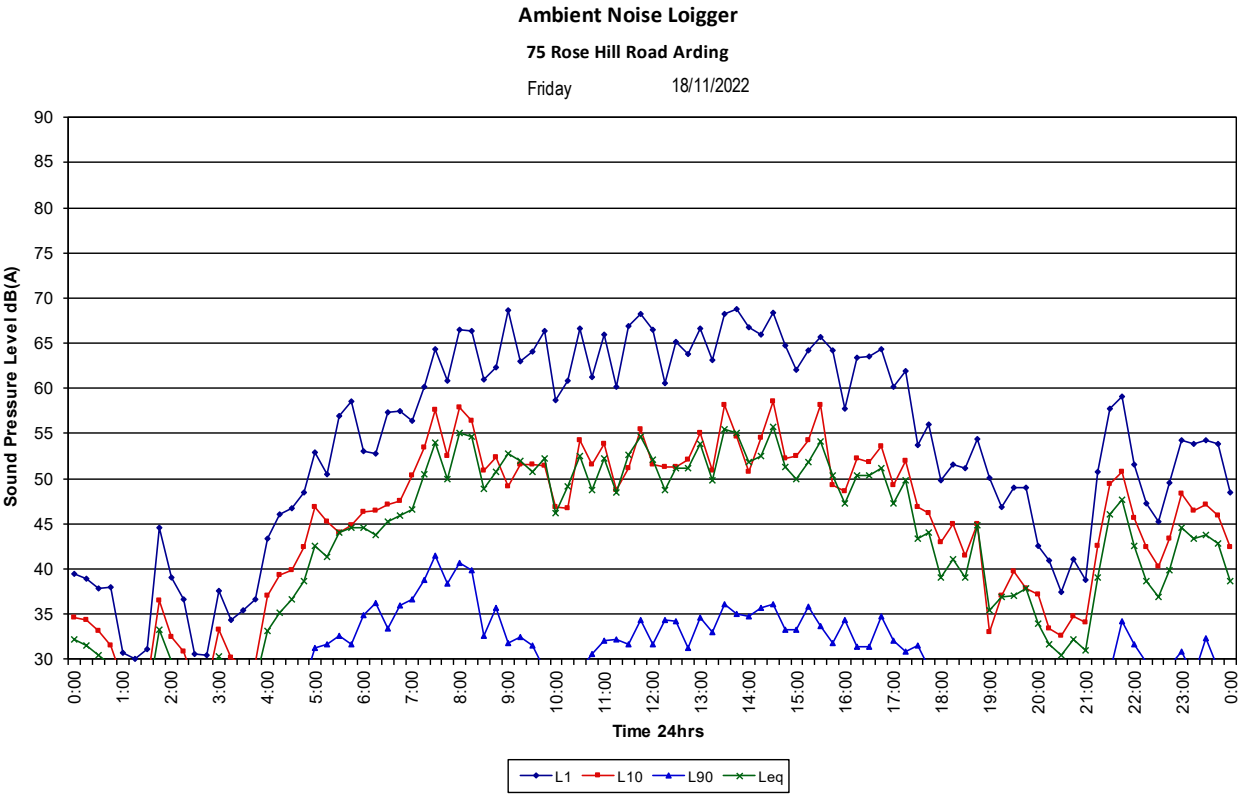
Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

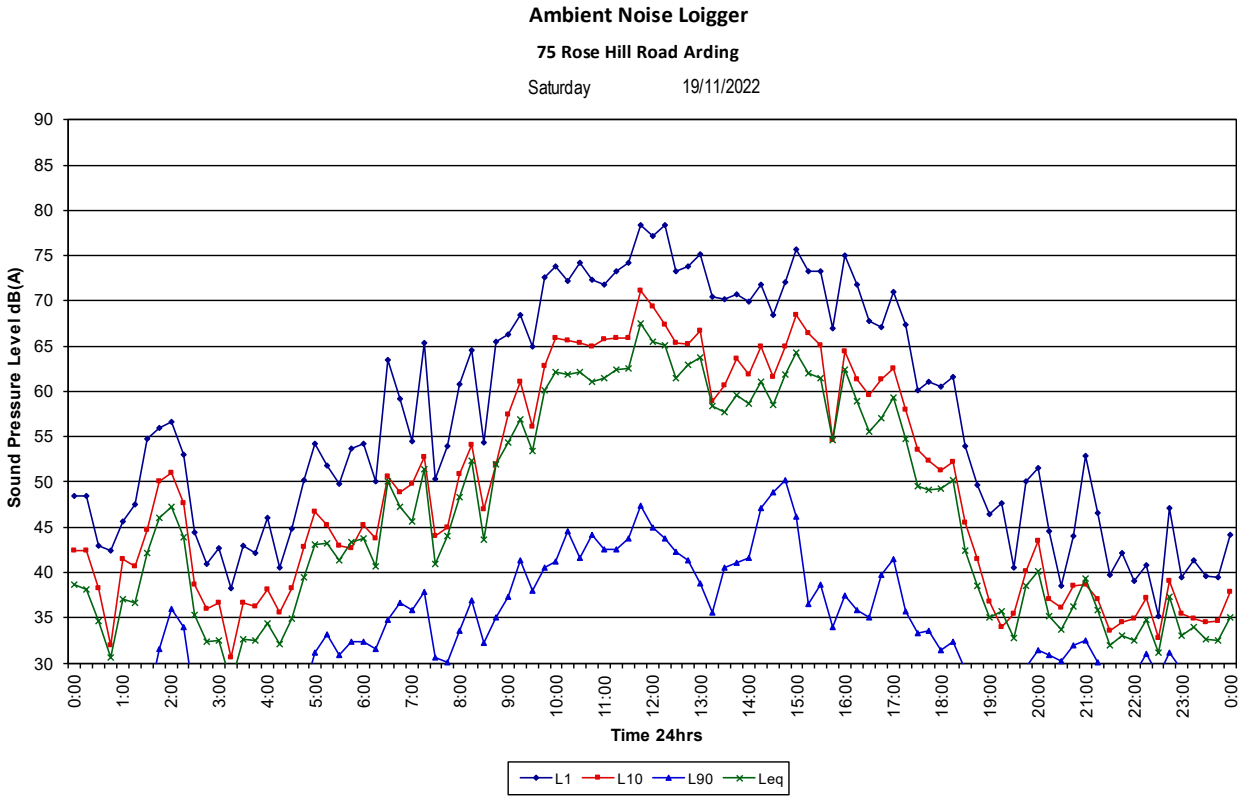
Appendix B – Logger Graphs

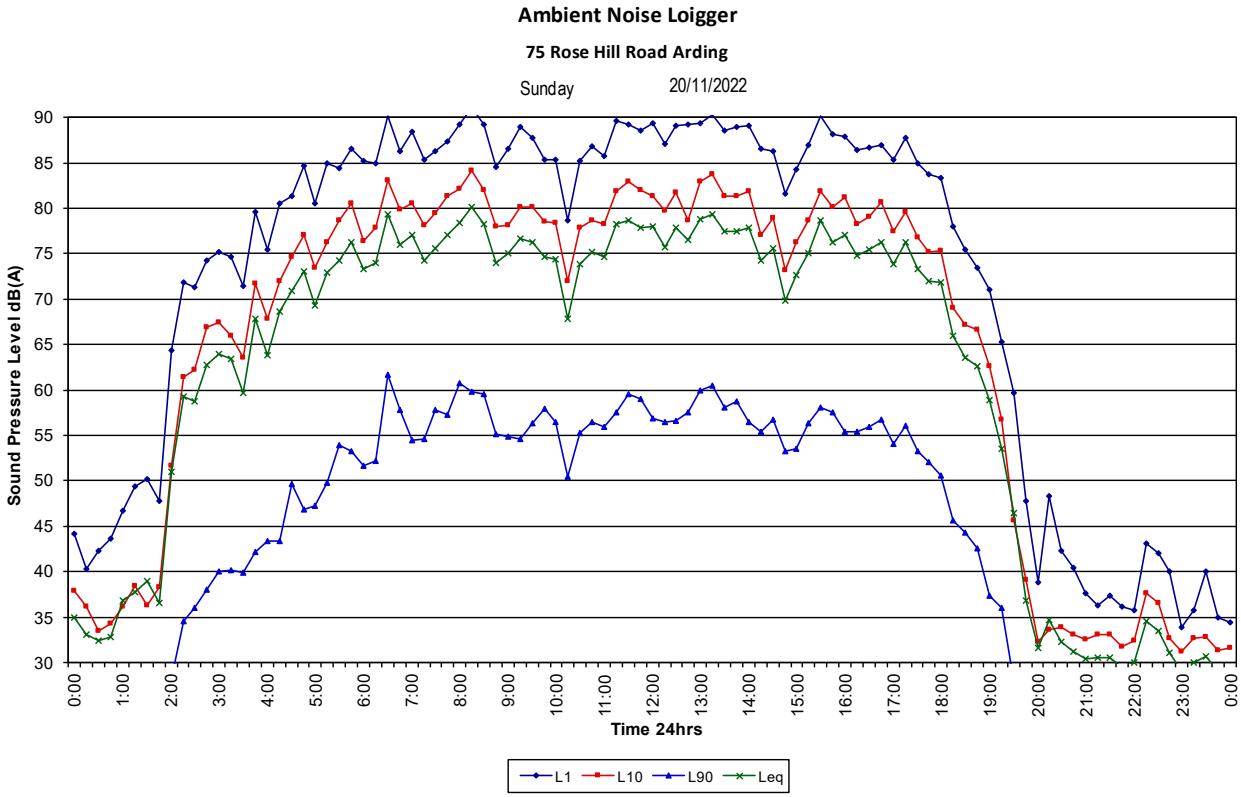


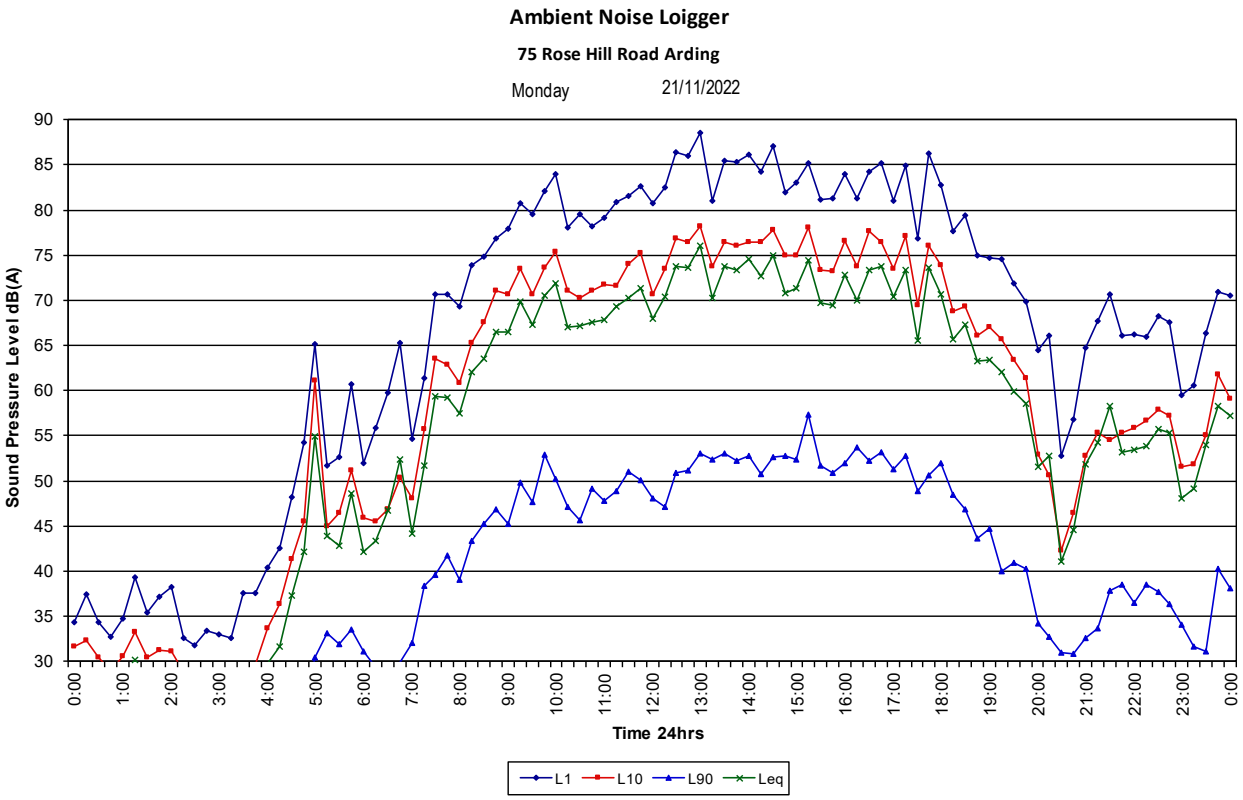


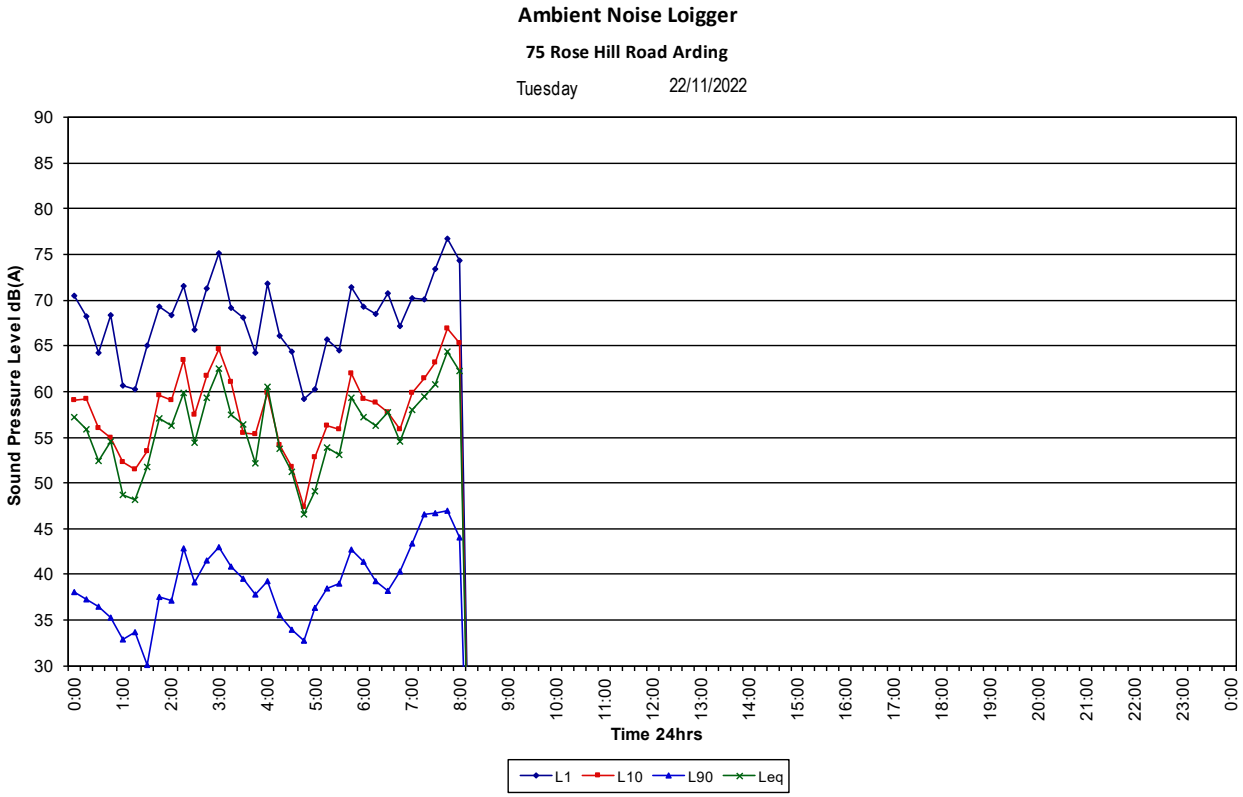

Ambient Noise Loigger
75 Rose Hill Road Arding
Thursday 17/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Ambient Noise Loigger
75 Rose Hill Road Arding
Friday 18/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Ambient Noise Loigger
75 Rose Hill Road Arding
Saturday 19/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Ambient Noise Loigger
75 Rose Hill Road Arding
Sunday 20/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Ambient Noise Loigger
75 Rose Hill Road Arding
Monday 21/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Ambient Noise Loigger
75 Rose Hill Road Arding
Tuesday 22/11/2022
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq

Appendix C – Calibration Certificate

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C22466

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Road North Rocks NSW 2151
Equipment Tested/ Model Number :	Rion NL-42EX
Instrument Serial Number :	00885460
Microphone Serial Number :	176935
Pre-amplifier Serial Number :	86282

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	23.5°C	**Ambient Temperature :**	23.8°C
Relative Humidity :	44.9%	**Relative Humidity :**	44.1%
Barometric Pressure :	100.14kPa	**Barometric Pressure :**	100.17kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Shaheen Boaz
Calibration Date : 13 Jul 2022
Report Issue Date : 15 Jul 2022

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

PAGE 1 OF 1

Appendix E

Air Quality Assessment

AIR QUALITY IMPACT ASSESSMENT
WILLIAMS QUARRY EXTENSION

GeoLINK

19 January 2023

Job Number 22061434

Prepared by
Todoroski Air Sciences Pty Ltd
Suite 2B, 14 Glen Street
Eastwood, NSW 2122
Phone: (02) 9874 2123
Fax: (02) 9874 2125
Email: info@airsciences.com.au

Air Quality Impact Assessment
Williams Quarry Extension

DOCUMENT CONTROL

Report Version	Date	Prepared by	Reviewed by
DRAFT - 001	10/01/2023	E Aragnou	P Henschke (CAQP)
FINAL - 001	19/01/2023	E Aragnou	

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Todoroski Air Sciences has prepared this report for GeoLINK on behalf of Ducats Earthmoving Pty Ltd for the extension of the Williams Quarry on Lot 4 DP 1096564 at 75 Rosehill Road, Arding, New South Wales (NSW) (hereafter referred to as the Project). The report presents an assessment of potential air quality impacts associated with the Project.

The existing operations include extracting gravel and rock resource using standard drill and blast methods with processing via a mobile plant. The existing annual production rate is approximately 30,000 cubic metres (m^3) per annum. The Project is seeking an expansion to allow for an increase in the annual production rate to 150,000m^3 (approx. 288,000 tonnes per annum [tpa]) as well as expanding the quarry progression further south in ten stages.

This air quality impact assessment has been prepared in general accordance with the New South Wales (NSW) Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

To assess the potential air quality impacts associated with the Project, this report comprises:

- A background to the Project and description of the proposed site and operations;
- A review of the existing meteorological and air quality environment surrounding the site;
- A description of the dispersion modelling approach and emission estimation used to assess potential air quality impacts; and,
- Presentation of the predicted results and discussion of the potential air quality impacts and associated mitigation and management measures.

2 PROJECT BACKGROUND

2.1 Project setting

The Project site is located approximately 14.5 kilometres (km) southwest of Armidale. The area surrounding the site is predominately comprised of rural agricultural land with the nearest identified residential dwelling located approximately 890 metres (m) east-southeast of the quarry.

Figure 2-1 presents the location of the Project with reference to the assessment locations considered in this assessment.

Figure 2-2 presents a pseudo three-dimensional visualisation of the topography in the general vicinity of the Project. The local topography is undulating, with increasing elevations moving northwest of the site.

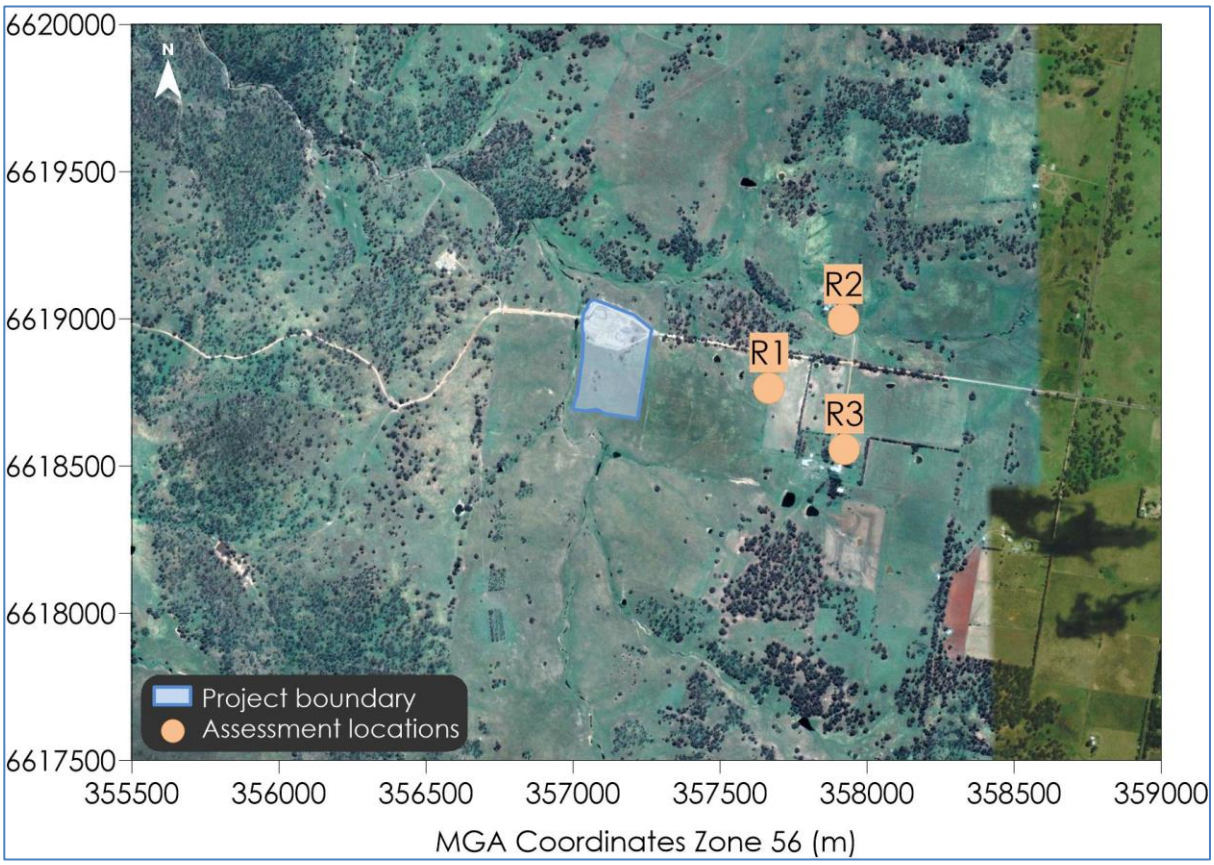


Figure 2-1: Project setting

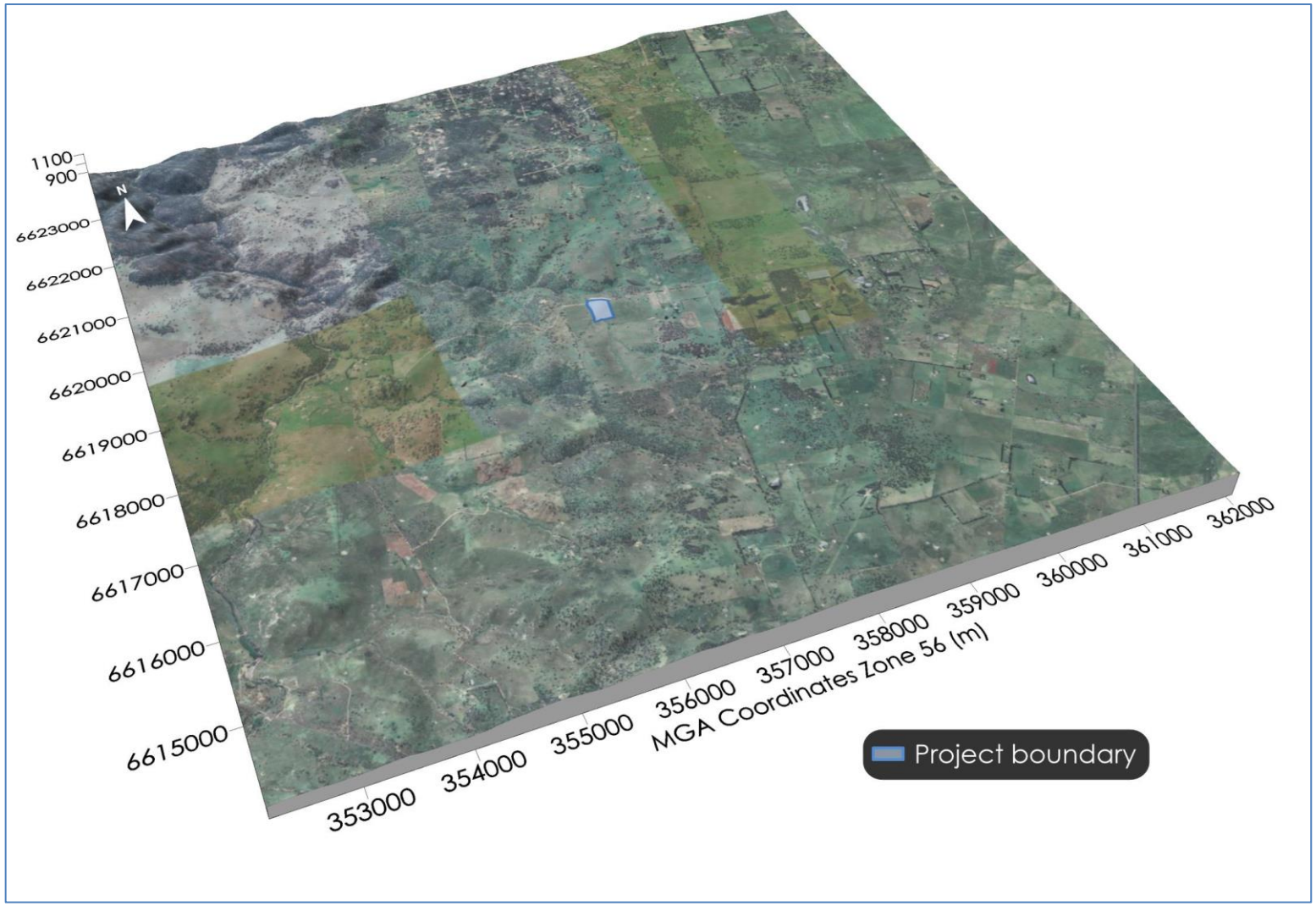


Figure 2-2: Representative visualisation of topography in the area surrounding the Project

2.2 Project description

2.2.1 Existing operations

The site currently extracts gravel and rock resource at a rate of approximately 30,000m^3 per annum using standard drilling and blasting methods with crushing and screening processes occurring onsite via a mobile plant. All processed material is transported from the site via road registered trucks along Rose Hill Road.

2.2.2 Proposed operations

The Project is seeking to continue its extraction operations at an increased rate of up to 150,000m^3 as well as expand the current footprint of the existing quarry from 20,000m^2 to 40,000m^2. The Project would progress in 10 stages, with extraction and processing activities progressing to the south as the quarry expands.

The Project would operate in a similar manner to existing operations with the continued extraction of gravel and rock material using drilling and blasting methods and processing occurring via a mobile plant.

Table 2-1 presents the proposed operating hours for the Project. Plant and machinery servicing, general site maintenance and office work may be undertaken during Sundays or public holidays between normal business hours.

Table 2-1: Proposed operating hours

Activity	Monday to Friday	Saturday	Sunday/ Public holidays
Overburden stripping and site establishment	6:00am to 5:00pm	6:00am to 5:00pm	-
Truck loading	6:00am to 5:00pm	6:00am to 5:00pm	-
Truck haulage	7:00am to 5:00pm	7:00am to 1:00pm	-
Processing	7:00am to 5:00pm	7:00am to 5:00pm	-
Blasting	10:00am to 4:00pm	-	-

Figure 2-3 provides an indicative site layout of the Project.

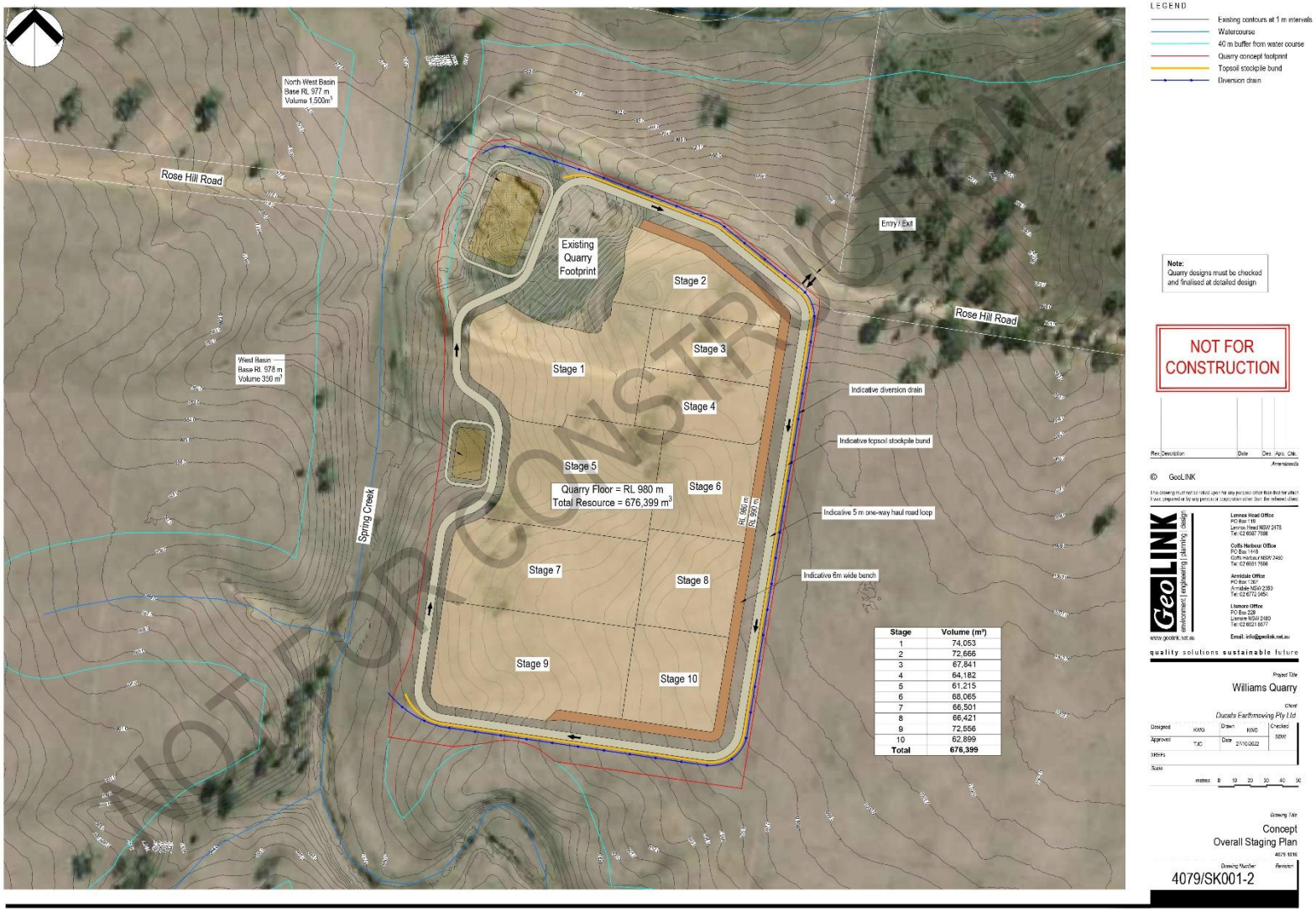


Figure 2-3: Site layout for the Project

3 STUDY REQUIREMENTS

The purpose of this report is to provide an assessment of the likely effects on air quality which may arise from the Project. The assessment presented in this report addresses planning and regulatory agency requirements, as set out below.

3.1 Secretary's Environmental Assessment Requirements

In preparing this Air Quality Impact Assessment, the Secretary's Environmental Assessment Requirements (EAR) issued for the Project in June 2022 have been addressed and the key matters raised for consideration in the Air Quality Impact Assessment are outlined in **Table 3-1** along with a reference as to where the requirements are addressed in the report.

Table 3-1: Secretary's Environmental Assessment Requirements (EAR Number 1638)

Aspect	Requirement	Section
Air Quality & Odour	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.	1-10

3.2 NSW EPA

This Air Quality Impact Assessment has been prepared in general accordance with the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**) and the specific requirements outlined therein as well as the requirements accompanying the EARs requested by the NSW EPA as outlined in **Table 3-2**.

Table 3-2: NSW EPA agency comments for air quality (EAR Number 1638)

Air quality and Odour	Section
Dust generation and management of potential impacts on adjacent landscape and/or communities	7 & 8
Air quality including dust and odour generation from the operation on the surrounding landscape and/or community	6.4, 6.5, 6.6 & 7
The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act 1997* and the *POEO (Clean Air) Regulation 2021*. Particular consideration should be given to section 129 of the POEO Act concerning control of "offensive odour".	4.4 & 7
The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022).	1-10
The EIS must detail emission control techniques/practices that will be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, *POEO (Clean Air) Regulation* and associated air quality limits or guideline criteria.	4.3 & 8

4 AIR QUALITY CRITERIA

4.1 Particulate matter

Particulate matter consists of dust particles of varying size and composition. Air quality goals refer to measures of the total mass of all particles suspended in air defined as the Total Suspended Particulate matter (TSP). The upper size range for TSP is nominally taken to be 30 micrometres (µm) as in practice particles larger than 30 to 50µm will settle out of the atmosphere too quickly to be regarded as air pollutants.

Two sub-classes of TSP are also included in the air quality goals, namely PM_{10}, particulate matter with equivalent aerodynamic diameters of 10µm or less, and $PM_{2.5}$, particulate matter with equivalent aerodynamic diameters of 2.5µm or less.

Particulate matter, typically in the upper size range, that settles from the atmosphere and deposits on surfaces is characterised as deposited dust. The deposition of dust on surfaces may be considered a nuisance and can adversely affect the amenity of an area by soiling property in the vicinity.

4.2 NSW EPA impact assessment criteria

Table 4-1 summarises the air quality goals that are relevant to this assessment as outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

The air quality goals for total impact relate to the total pollutant burden in the air and not just the contribution from the Project. Consideration of background pollutant levels needs to be made when using these goals to assess potential impacts.

Table 4-1: NSW EPA air quality impact assessment criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90 µg/m^3
PM_{10}	Annual	Total	25 µg/m^3
	24 hour	Total	50 µg/m^3
$PM_{2.5}$	Annual	Total	8µg/m^3
	24 hour	Total	25 µg/m^3
Deposited dust	Annual	Incremental	2 g/m^2/month
		Total	4 g/m^2/month

Source: **NSW EPA, 2022**

µg/m^3 = micrograms per cubic metre

g/m^2/month = grams per square metre per month

4.3 Protection of the Environment Operations Act, 1997

The general obligations of the NSW *Protection of the Environment Operations Act, 1997* and the Regulations made under the Act (namely the NSW *Protection of the Environment Operations (Clean Air) Regulation, 2022*) would be followed for the Project. The Project would operate in accordance with the relevant regulatory framework for air quality and odour to ensure compliance with this legislation.

5 EXISTING ENVIRONMENT

This section describes the existing environment including the climate and ambient air quality in the area surrounding the Project.

5.1 Local climatic conditions

Long-term climatic data from the closest Bureau of Meteorology (BoM) automatic weather station (AWS) at Armidale Airport AWS (Site No. 056238) were analysed to characterise the local climate in the proximity of the Project. Armidale Airport AWS is located approximately 10.5km northeast of the Project.

Table 5-1 and **Figure 5-1** present a summary of data from the Armidale Airport AWS collected over a 15 to 28 year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 26.2 degrees Celsius (ºC) and July is the coldest month with a mean minimum temperature of 1.4ºC.

Rainfall decreases during the cooler months, with an annual average rainfall of 772.2 millimetres (mm) over 79.3 days. The data indicate that December is the wettest month with an average rainfall of 102.9mm over 9.1 days and April is the driest month with an average rainfall of 35.1mm over 4.3 days.

Relative humidity levels exhibit variability over the day and seasonal fluctuations. Mean 9am relative humidity ranges from 60% in October to 82% in June. Mean 3pm relative humidity levels range from 46% in September and October to 60% in June.

Wind speeds exhibit daily variations with lower wind speed records for 9am and higher observations for 3pm. Mean 9am wind speeds range from 15.6 kilometres per hour (km/h) in May to 19.9km/h in September. Mean 3pm wind speeds range from 17.6km/h in April to 21.2km/h in August.

Table 5-1: Monthly climate statistics summary – Armidale Airport AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temp. (ºC)	26.2	25.0	23.1	19.8	15.8	12.7	12.2	14.0	17.6	20.6	22.9	25.0	19.6
Mean min. temp. (ºC)	13.5	13.1	11.5	7.8	4.4	2.4	1.4	1.8	4.7	7.4	10.1	12.1	7.5
Rainfall													
Rainfall (mm)	91.9	96.1	67.7	35.1	40.4	48.2	44.0	46.0	52.1	72.6	96.5	102.9	772.2
No. of rain days (≥1mm)	8.2	7.9	6.8	4.3	5.0	6.2	5.3	5.1	5.5	7.4	8.5	9.1	79.3
9am conditions													
Mean temp. (ºC)	18.7	17.3	16.0	13.8	10.3	7.3	6.3	8.1	12.1	14.9	16.0	18.0	13.2
Mean R.H. (%)	73.0	79.0	79.0	73.0	78.0	82.0	81.0	71.0	64.0	60.0	70.0	68.0	73.0
Mean W.S. (km/h)	17.8	17.0	16.2	16.4	15.6	16.1	16.5	18.8	19.9	19.8	18.3	18.2	17.6
3pm conditions													
Mean temp. (ºC)	24.1	22.5	21.3	18.3	14.4	11.3	10.6	12.7	16.1	18.4	20.0	22.5	17.7
Mean R.H. (%)	52.0	58.0	53.0	49.0	55.0	60.0	56.0	48.0	46.0	46.0	54.0	51.0	52.0
Mean W.S. (km/h)	18.9	18.6	18.0	17.6	17.9	18.9	19.5	21.2	21.1	19.8	19.0	19.4	19.2

Source: **Bureau of Meteorology, 2022**

R.H. – Relative Humidity, W.S. – wind speed

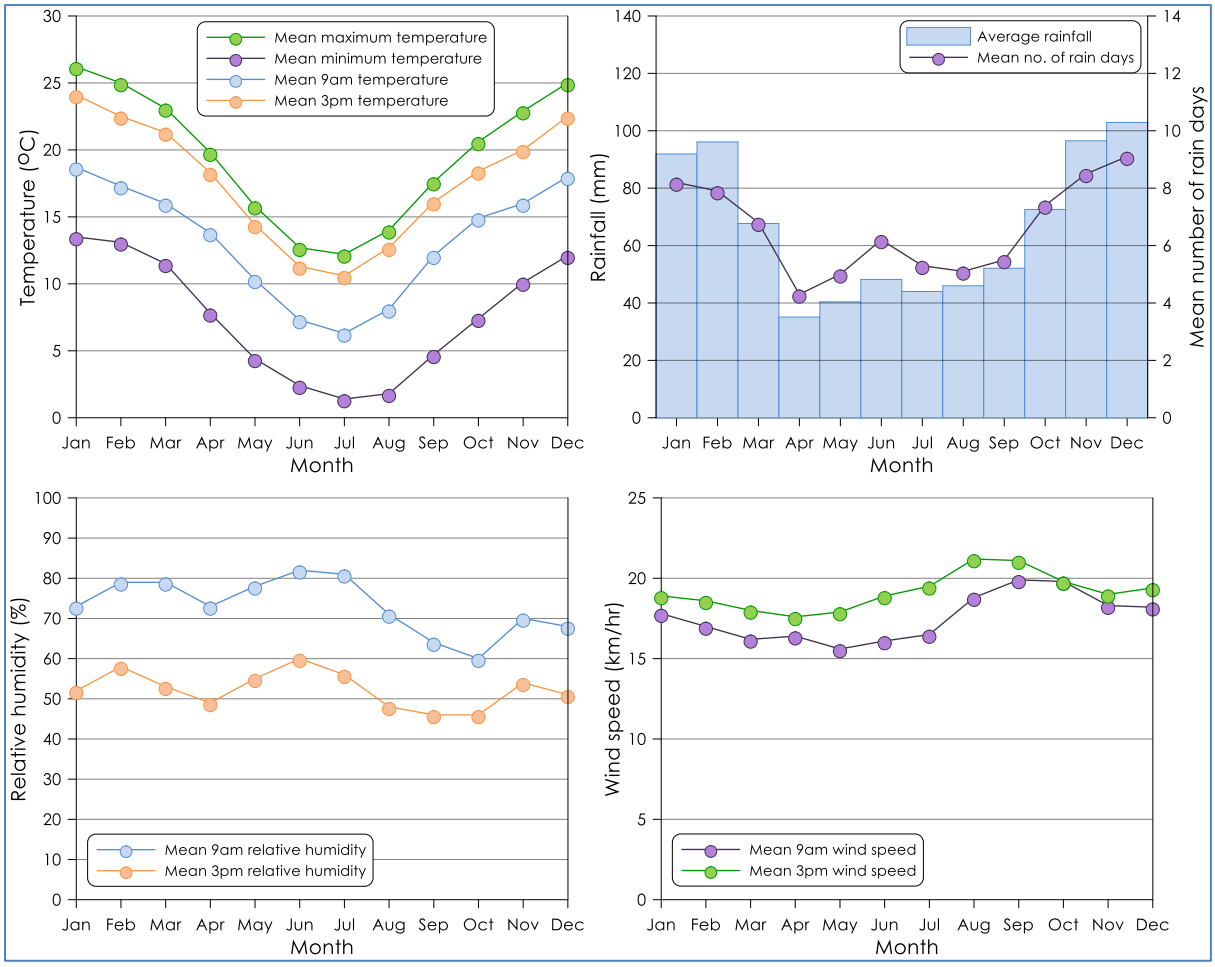


Figure 5-1: Monthly climate statistics summary – Armidale Airport AWS

5.2 Local meteorological conditions

Annual and seasonal windroses for the Armidale Airport AWS during the 2021 calendar period are presented in **Figure 5-2**.

The 2021 calendar year was selected as the meteorological year for the dispersion modelling based on an analysis of long-term data trends in meteorological data recorded and appropriate monitoring data for the area as outlined in **Appendix A**.

Analysis of the windroses shows that the wind directions follow an east to west axis. The summer windrose shows the greatest proportion of winds from the east. In autumn and spring, winds follow a similar distribution to the annual windrose with winds following along an east to west axis. During winter, winds from the west to the northwest are most frequent.

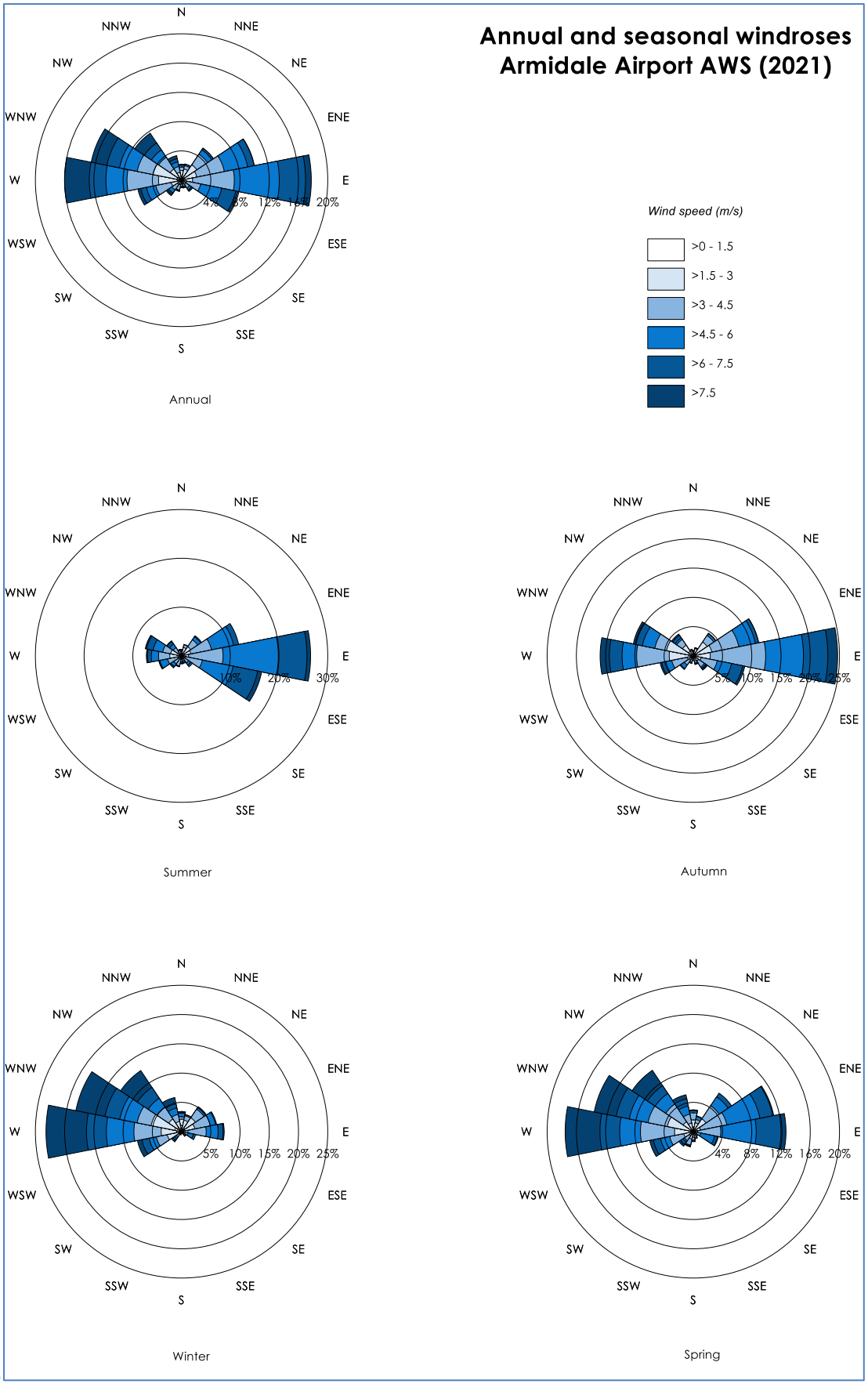


Figure 5-2 : Annual and seasonal windroses – Armidale Airport AWS (2021)

5.3 Local air quality monitoring

The main sources of air pollutants in the area surrounding the Project would include emissions from agricultural activities and other anthropogenic activities such as domestic wood heaters and motor vehicle exhaust.

Ambient air quality monitoring data from the Project site are not available. Therefore, the available data from the nearest air quality monitor operated by the NSW Department of Planning and Environment (DPE) at Armidale was used to characterise the background levels for the Project site.

The Armidale monitoring station is located approximately 15.3km northeast of the Project and is located in a more urban setting which is subject to higher levels of particulate matter. Therefore, the Armidale station are considered to be conservative as they would likely overestimate levels for the Project area.

5.3.1 PM_{10} monitoring

A summary of the available PM_{10} data for the Armidale monitoring station from 2017 to 2021 are presented in **Table 5-2**. Recorded 24-hour average PM_{10} concentrations are presented in **Figure 5-3**. The 2017 to 2021 period coincides with the period analysed to determine the meteorological year for the dispersion modelling as outlined in **Appendix A**.

A review of **Table 5-2** indicates that the annual average PM_{10} concentrations at the monitoring station were below the relevant criterion of 25µg/m^3 for all years except in 2019. It should be noted that annual periods which contain less than 75% data are excluded for estimating an annual average in **Table 5-2**.

The maximum 24-hour average PM_{10} concentrations were found to exceed the relevant criterion of 50µg/m^3 on occasion during the review period, except in 2021.

Anomalously high PM_{10} concentrations recorded in December 2019 and January 2020 in **Figure 5-3** are attributed to wildfires and the drought period (**NSW DPIE 2019 & NSW DPIE 2020**).

A seasonal trend is observed in the PM_{10} monitoring data, with higher levels recorded during the cooler months compared to the warmer months which can be attributed to an increased use of domestic wood heaters.

Table 5-2: Summary of PM_{10} levels from monitoring stations (µg/m^3)

Year	Annual average	Criterion
2017	ND	**25**
2018	-	**25**
2019	**27.9**	**25**
2020	13.7	**25**
2021	10.4	**25**
Year	**Maximum 24-hour average**	**Criterion**
2017	ND	**50**
2018	**157.5**	**50**
2019	**309.7**	**50**
2020	**112.5**	**50**
2021	41.0	**50**

- Less than 75% data ND – No data

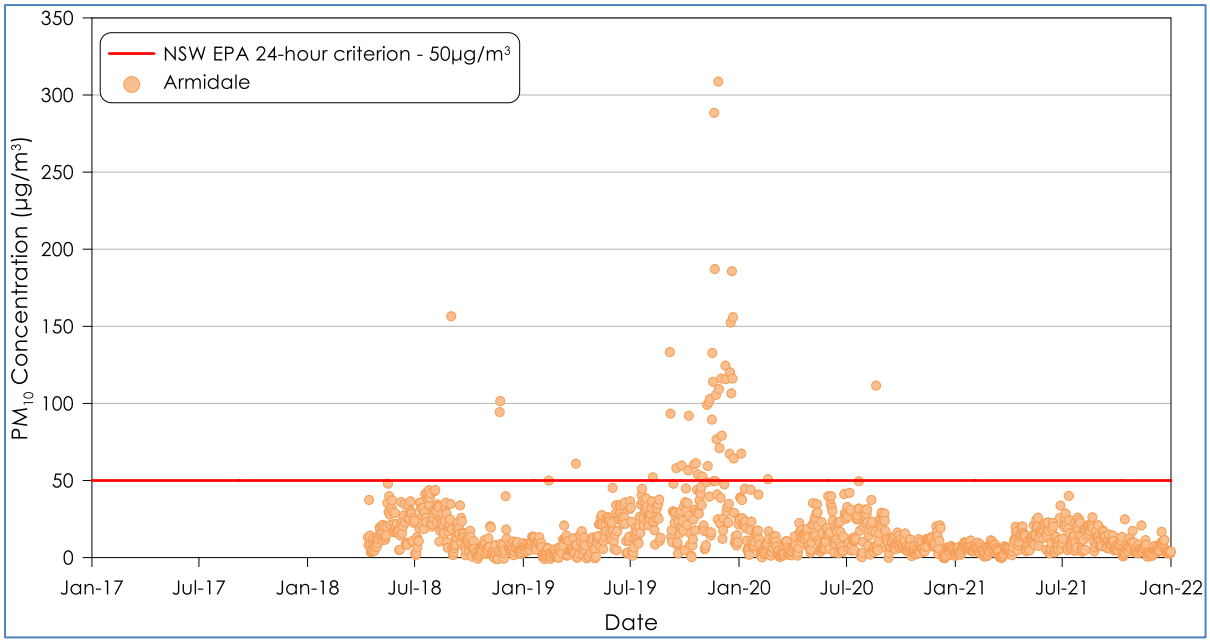


Figure 5-3: 24-hour average PM_{10} concentrations

5.3.2 $PM_{2.5}$ monitoring

A summary of the available $PM_{2.5}$ data for the Armidale monitoring station from 2017 to 2021 are presented in **Table 5-3**. Recorded 24-hour average $PM_{2.5}$ concentrations are presented in **Figure 5-4**.

Table 5-3 indicates that the annual average $PM_{2.5}$ concentrations were above the relevant criterion of 8µg/m³ for all years with the exception of 2021. It should be noted that annual periods which contain less than 75% data are excluded for estimating an annual average in **Table 5-3**.

The maximum 24-hour average $PM_{2.5}$ concentrations were found to exceed the relevant criterion of 25µg/m³ for all years of the review period. Similar to the PM_{10} monitoring data, the mass bushfires affecting NSW in 2019 and 2020 are seen in the $PM_{2.5}$ monitoring data in **Figure 5-4**. In addition, a seasonal trend is observed in the $PM_{2.5}$ data with higher levels recorded during the cooler months.

Table 5-3: Summary of $PM_{2.5}$ levels from monitoring stations (µg/m³)

Year	Annual average	Criterion
2017	ND	**8**
2018	-	**8**
2019	**17.2**	**8**
2020	**9.2**	**8**
2021	7.2	**8**
Year	**Maximum 24-hour average**	**Criterion**
2017	ND	**25**
2018	**40**	**25**
2019	**267.3**	**25**
2020	**53.7**	**25**
2021	**35**	**25**

- Less than 75% data ND – No data

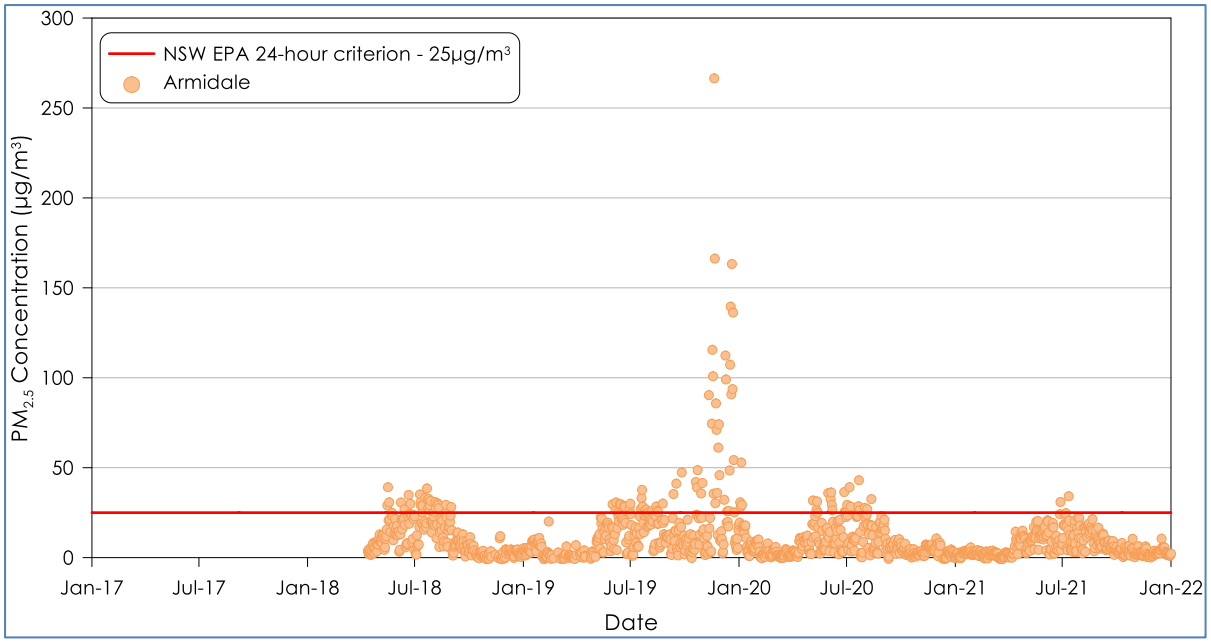


Figure 5-4: 24-hour average $PM_{2.5}$ concentrations

5.3.3 Estimated background levels

As outlined above, there are no readily available site-specific monitoring data, and therefore the background air quality levels from the closest DPE monitoring station at Armidale for the 2021 calendar year were used to represent background levels for the Project.

In the absence of available data, estimates of the annual average background TSP and deposited dust concentrations can be determined from a relationship between $PM_{10,}$ TSP and deposited dust concentrations and the measured PM_{10} levels. This relationship assumes that an annual average PM_{10} concentration of 25µg/m^3 corresponds to an annual average TSP concentration of 90µg/m^3 and an annual average dust deposition value of 4g/m^2/month. These relationships are based on the NSW EPA air quality impact criteria as outlined in **Table 4-1**.

Applying this relationship with the measured annual average PM_{10} concentration of 10.4µg/m^3 indicates an approximate annual average TSP concentration and deposition value of 37.6µg/m^3 and 1.7g/m^2/month, respectively.

The background air quality levels applied in this assessment are summarised in **Table 5-4**.

Table 5-4: Summary of background levels

Pollutant	Background level	Units
Annual average TSP	37.6	µg/m³
24-hour average PM_{10}	Daily varying	µg/m³
Annual average PM_{10}	10.4	µg/m³
24-hour average $PM_{2.5}$	Daily varying	µg/m³
Annual average $PM_{2.5}$	7.2	µg/m³
Annual average deposited dust	1.7	g/m²/month

6 DISPERSION MODELLING APPROACH

6.1 Introduction

The following sections are included to provide the reader with an understanding of the model and modelling approach applied for the assessment. The CALPUFF is an advanced air dispersion model which can deal with the effects of complex local terrain on the dispersion meteorology over the modelling domain in a three-dimensional, hourly varying time step.

The model was set up in general accord with the methods provided in the NSW EPA document *Generic Guidance and Optimum Model Setting for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (**TRC**, **2011**).

6.2 Modelling methodology

Modelling was undertaken using a combination of the CALPUFF Modelling System and The Air Pollution Model (TAPM). The CALPUFF Modelling System includes three main components: CALMET, CALPUFF and CALPOST and a large set of pre-processing programs designed to interface the model to standard, routinely available meteorological and geophysical datasets.

6.2.1 Meteorological modelling

The TAPM model was applied to the available data to generate a three dimensional upper air data file for use in CALMET. The centre of analysis for the TAPM modelling used is 30deg 33min south and 151deg 30min east. The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The CALMET domain was run on a domain of 10 x 10km with a 0.1km grid resolution. The available meteorological data for January 2021 to December 2021 from the BoM Armidale Airport AWS and the DPE Armidale meteorological monitoring sites were included in the simulation.

Local land use and detailed topographical information was included to produce realistic fine scale flow fields (such as terrain forced flows) in surrounding areas, as shown in **Figure 6-1**.

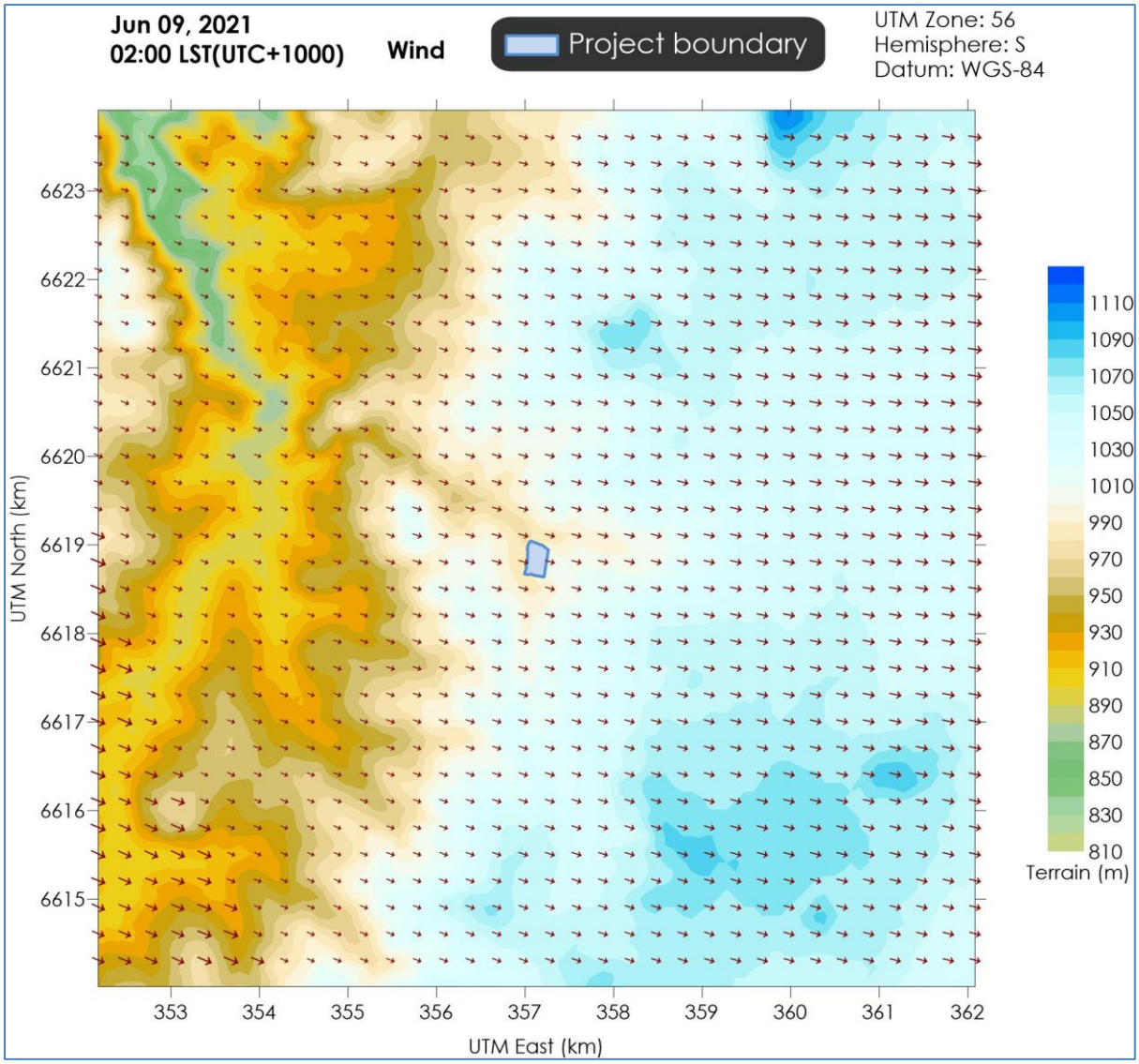


Figure 6-1: Representative 1-hour average snapshot of wind field for the Project

CALMET generated meteorological data were extracted from a point within the CALMET domain and are graphically represented in **Figure 6-2** and **Figure 6-3**.

Figure 6-2 presents the annual and seasonal windroses from the CALMET data. Overall, the windroses generated in the CALMET modelling reflect the expected wind distribution patterns of the area as determined based on the available measured data and the expected terrain effects on the prevailing winds. **Figure 6-3** includes graphs of the temperature, wind speed, mixing height and stability classification over the modelling period and shows sensible trends considered to be representative of the area.

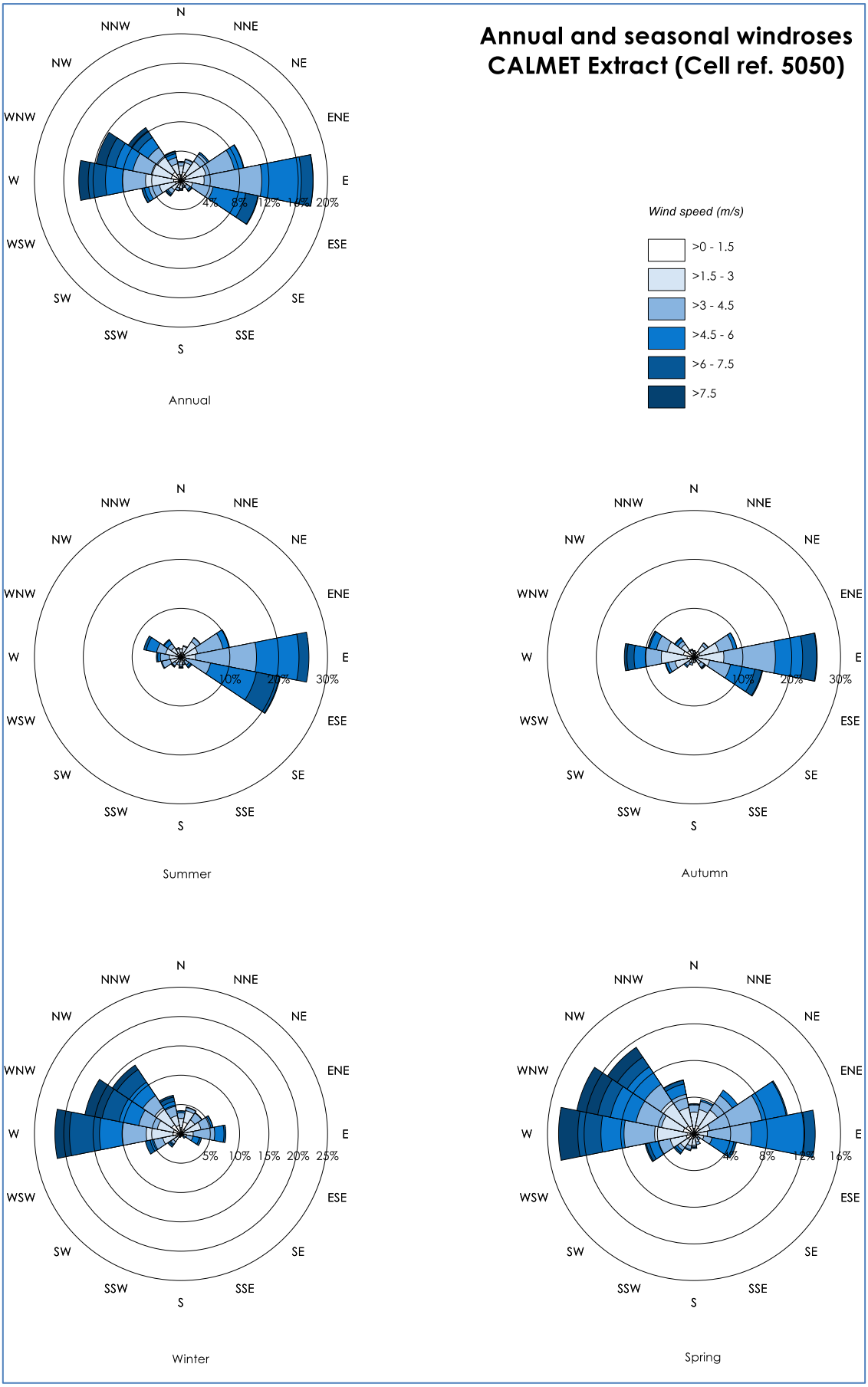


Figure 6-2: Annual and seasonal windroses from CALMET (Cell ref 5050)

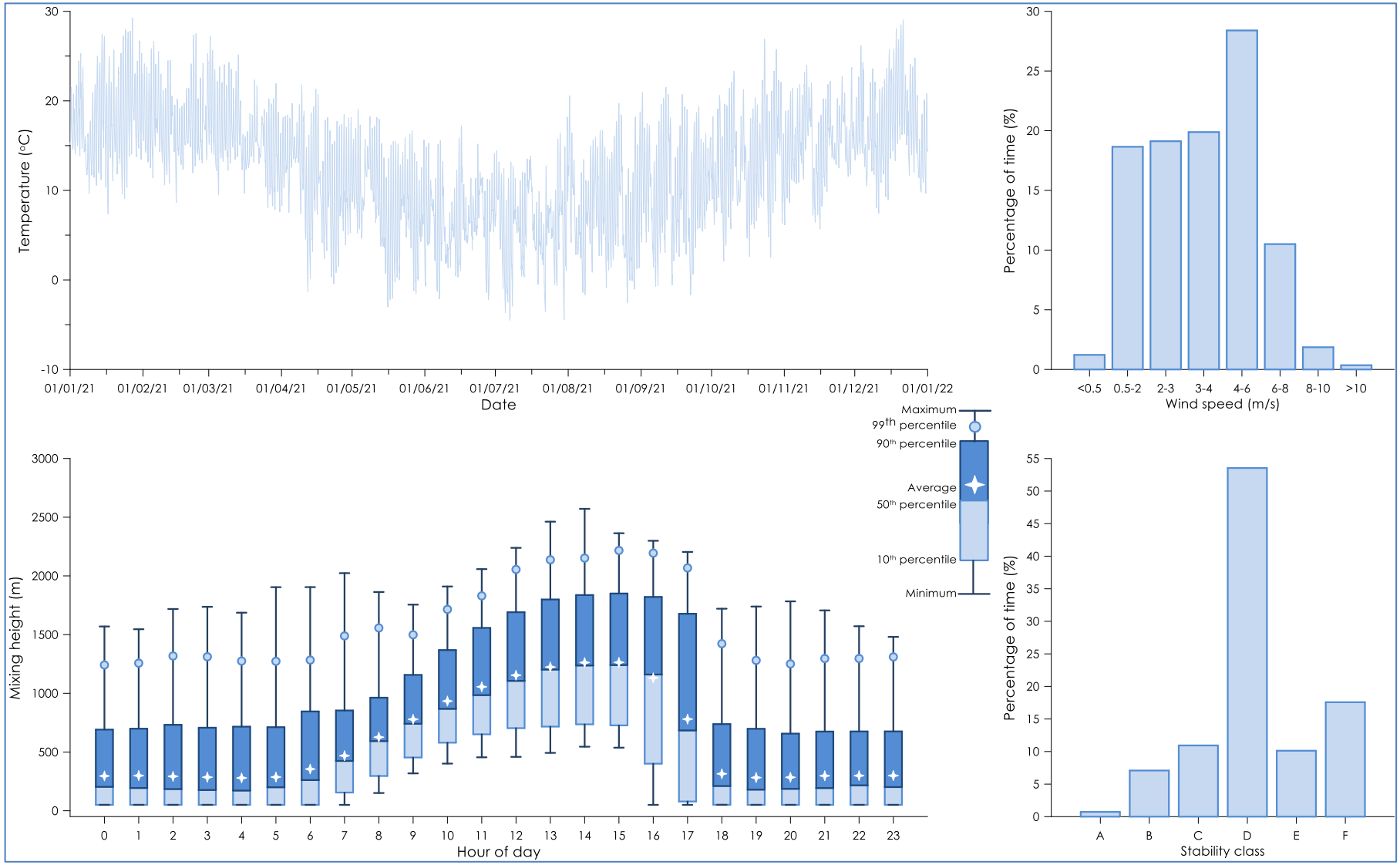


Figure 6-3: Meteorological analysis of CALMET (Cell Ref 5050)

6.3 Dispersion modelling

Dust emissions from each operational activity of the Project were represented by a series of volume sources and were included in the CALPUFF model via an hourly varying emission file. Meteorological conditions associated with dust generation (such as wind speed) and levels of dust generating activity were considered in calculating the hourly varying emission rate for each source.

It should be noted that as a conservative measure, the effect of the precipitation rate (rainfall) in reducing dust emissions has not been considered in this assessment.

6.4 Dust emissions

The main dust generating activities associated with operation of the Project are identified as the loading/unloading of material, vehicles travelling on-site and off-site, crushing and screening processes, and windblown dust from stockpiles. The on-site plant equipment also have the potential to generate particulate emissions from the diesel exhaust.

Dust emission estimates have been calculated by analysing the various types of dust generating activities taking place and utilising suitable emissions sourced from both locally developed and United States Environmental Protection Agency (US EPA) developed documentation.

The assessment considers one indicative quarry stage (scenario) to represent the potential worst-case impacts in regard to the maximum amount of material handled on an annual basis, the location of the extraction and processing activities, the haulage route adopted for the quarry plan, the total area proposed to be extracted and the potential to generate dust at the receptor locations.

This scenario is based on the stage 10 quarry plan, which considers extraction and processing activities occurring in the most southern part of the site with the greatest haulage distance. The scenario also considers the largest extent of total exposed area that could occur at the Project and the potential for greatest wind erosion due to areas in the other stages already being disturbed or exposed. Moreover, the proposed operational activities during this stage occur closest to the assessed receptors and would result in potential worst-case air quality impacts at these locations. The proposed maximum annual tonnage of 288,000tpa of material extracted and processed at the site has been assessed for this scenario.

The indicative stage 10 quarry plan is presented in **Figure 6-4**.

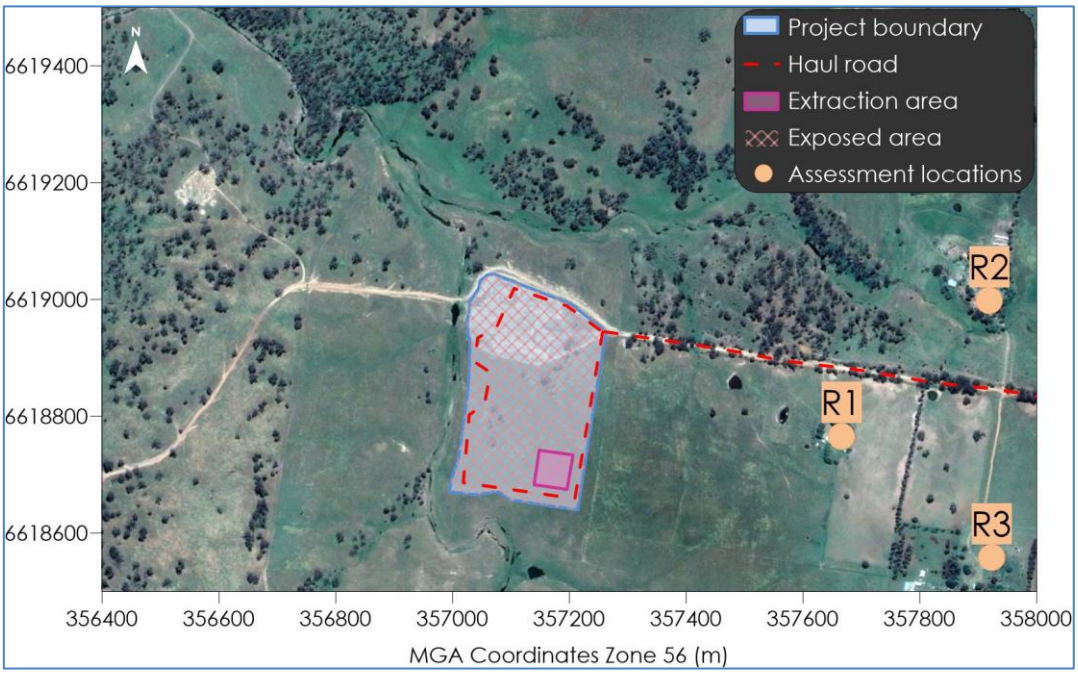


Figure 6-4: Modelling scenario – Stage 10

A summary of the estimated TSP, PM_{10} and $PM_{2.5}$ emissions is presented in **Table 6-1**. Detailed calculations of the dust emission estimates are provided in **Appendix B**.

Table 6-1: Summary of estimated dust emissions for the Project (kg/yr)

Activity	Dust emissions (kg/yr)		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	1,899	268	199
Loading topsoil to haul truck	0.3	0.2	0.02
Hauling topsoil to stockpile	1	0.1	0.01
Unloading topsoil to stockpile	0.3	0.2	0.02
Loading overburden to haul truck	714	338	51
Hauling overburden to emplacement area	566	144	14
Unloading overburden to stockpile	714	338	51
Drilling	74	37	6
Blasting	2,387	1,241	72
Dozer ripping material	3,784	564	397
Excavator loading extracted material to haul truck	714	338	51
Hauling extracted material to processing area	566	144	14
Unloading extracted material at processing area	714	338	51
FEL loading extracted material to crusher	714	338	51
Crushing	173	78	14
Screening	317	107	7
FEL loading processed material to dispatch truck	714	338	51
Hauling processed material	5,117	1,304	130
Hauling processed material offsite to processing facility	4,880	1,244	124
Wind erosion	3,328	1,664	250
Exhaust emissions	474	474	459
Total emissions (kg/yr)	**27,851**	**9,297**	**1,995**

6.5 Odour emissions

Odour emissions have some potential to arise from the diesel exhaust emissions of on-site plant equipment. These odorous emissions are generally considered to be too low to generate any significant off-site pollutant concentrations and have not been assessed further in this study. In addition, the material handled onsite is not considered odorous and will not result in any offsite odour impacts.

6.6 Construction emissions

The progression of the Project would involve the construction of the associated infrastructure. This construction activity has the potential to generate dust emissions.

Potential construction dust emissions will be primarily generated due to material handling, vehicle movements, windblown dust generated from exposed areas and stockpiles. Exhaust emissions will be from the operation of construction vehicles and plant.

The potential dust impacts due to these activities are difficult to accurately quantify on any given day due to the short sporadic periods of dust generating activity which may occur over the construction time frame. The sources of dust are temporary in nature and will only occur during the construction period.

The total amount of dust generated from the construction process is unlikely to be significant given the nature of the activities. Additionally, the potential dust emissions generated by the construction activities would be less than the emissions produced during the operational stages of the Project. Also, as the activities would occur for a limited period, no significant or prolonged effect at any off-site receptor is predicted to arise.

7 DISPERSION MODELLING RESULTS

The dispersion model predictions presented in this section include those for the operation of the Project in isolation (incremental impact) and the operation of the Project with consideration of other sources (total cumulative impact). The results show the predicted:

- Maximum 24-hour average $PM_{2.5}$ and PM_{10} concentrations;
- Annual average $PM_{2.5,}$ PM_{10} and TSP concentrations; and,
- Annual average dust (insoluble solids) deposition rates.

It is important to note that when assessing impacts per the maximum 24-hour average levels, these predictions are based on the highest predicted 24-hour average concentrations which were modelled at each point within the modelling domain for the worst day (i.e. a 24-hour period) during the one year long modelling period.

Associated isopleth diagrams of the dispersion modelling results are presented in **Appendix C**.

Table 7-1 presents the predicted incremental and cumulative particulate dispersion modelling results at each of the assessed residential receptor locations. The cumulative (total) impact is defined as the modelling impact associated with the operation of the Project combined with the estimated ambient background levels in **Section 5.3.3**.

The predicted incremental results show that minimal incremental effects would arise at the receptor locations due to the Project. The predicted cumulative results indicate that all of the assessed receptors are predicted to experience levels below the relevant criteria for each of the assessed dust metrics.

Table 7-1: Dust dispersion modelling results for residential receptors

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	TSP (µg/m³)	DD* (g/m²/mth)
	Incremental						Cumulative			
	24-hr ave.	Ann. ave.	24-hr ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.	Ann. ave.
	Air quality impact criteria									
	-	-	-	-	-	2	8	25	90	4
R1	1.3	0.2	3.4	0.8	2.0	0.2	7.4	11.2	39.6	1.9
R2	0.6	<0.1	2.0	0.3	0.7	<0.1	7.3	10.7	38.3	1.8
R3	0.7	<0.1	2.0	0.3	0.8	<0.1	7.3	10.7	38.4	1.8

*Deposited dust

7.1 Assessment of Total (Cumulative) 24-hour average $PM_{2.5}$ and PM_{10} Concentrations

The results for incremental 24-hour average $PM_{2.5}$ and PM_{10} concentrations indicate there are no predicted exceedances of the relevant criteria at the receptors for the assessed scenario.

When assessing the total (cumulative) 24-hour average impacts based on model predictions an assessment of cumulative 24-hour average $PM_{2.5}$ and PM_{10} impacts was undertaken in accordance with

Section 11.2 of the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA**, **2022**). The "Level 2 assessment - Contemporaneous impact and background approach" was applied to assess potential impacts for $PM_{2.5}$ and PM_{10}. In simple terms, the Level 2 assessment involves matching one year of ambient air quality monitoring data with meteorological data representing the same period.

Table 7-2 provides a summary of the findings from the Level 2 assessment for the most impacted residential receptor (R1) for both $PM_{2.5}$ and PM_{10}. The results in **Table 7-2** indicate that the Project does not increase the number of days above the 24-hour average criterion at the assessed receptors for $PM_{2.5}$ and PM_{10}. Based on this result it can be inferred that the Project does not increase the number of days above the 24-hour average $PM_{2.5}$ and PM_{10} criterion at any of the receptor locations surrounding the Project.

Detailed tables of the contemporaneous assessment results are provided in **Appendix D**.

Table 7-2: NSW EPA contemporaneous assessment - maximum number of additional days above 24-hour average criterion

Receptor ID	$PM_{2.5}$	PM_{10}
R1	0	0

Time series plots of the predicted cumulative 24-hour average $PM_{2.5}$ and PM_{10} concentrations for the receptor R1 are presented in **Figure 7-1** to **Figure 7-2**.

The orange bars in the figures represent the contribution from the Project and the blue bars represent the applied background levels. It is clear from the figures that the Project has a small influence at the assessed receptor locations and in most cases would be difficult to discern beyond the existing background level.

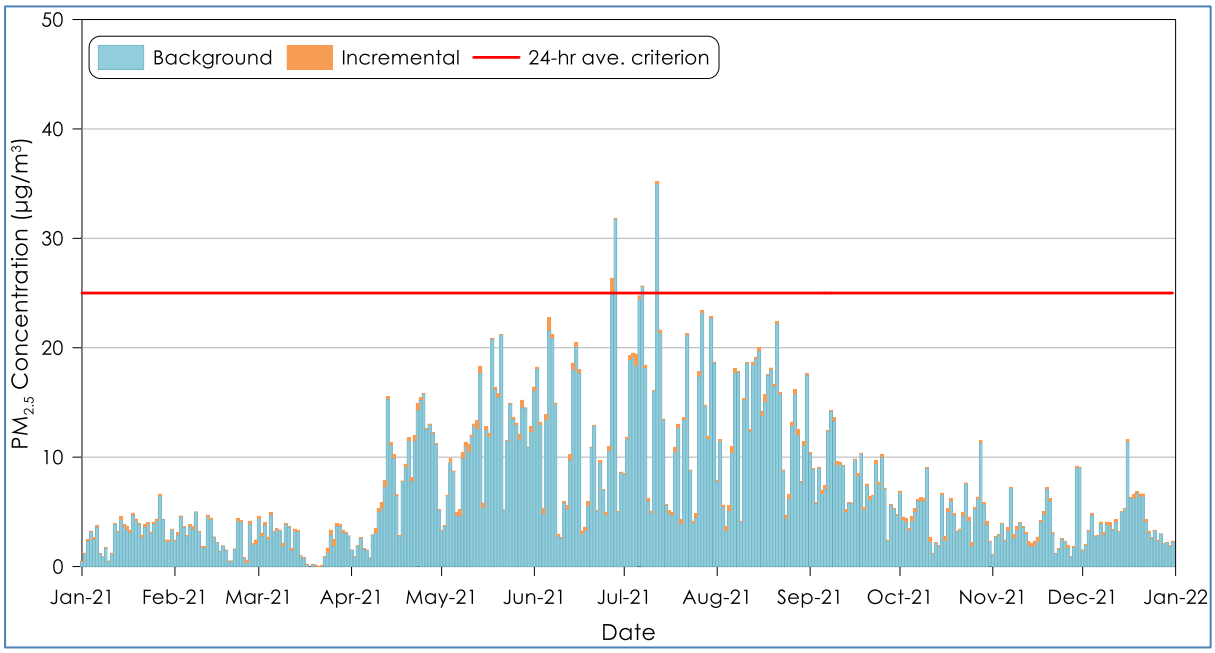


Figure 7-1: Time series plots of predicted cumulative 24-hour average $PM_{2.5}$ concentrations for R1

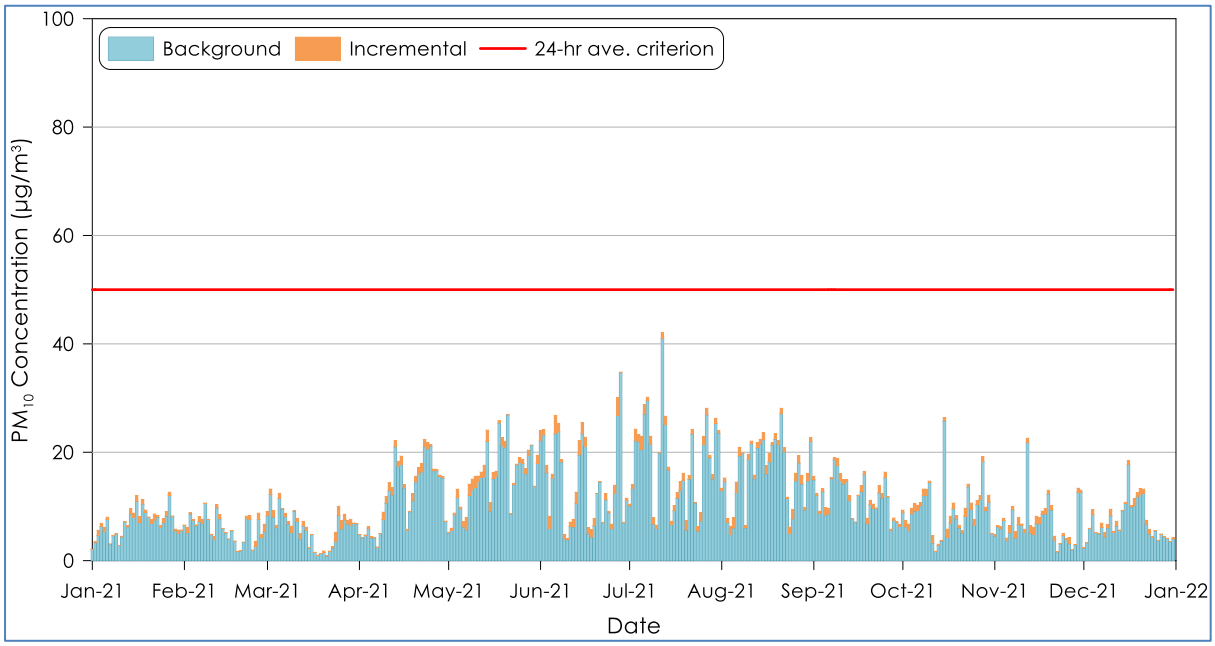


Figure 7-2: Time series plots of predicted cumulative 24-hour average PM_{10} concentrations for R1

8 DUST MITIGATION AND MANAGEMENT

The proposed operations at the Project have the potential to generate dust emissions. To ensure that activities associated with the Project have a minimal effect on the surrounding environment and at residential receptor locations, it is recommended that all reasonable and practicable dust mitigation measures be utilised.

Suggested reasonable and practicable dust mitigation measures for the Project are listed in **Table 8-1**.

Table 8-1: Potential operational dust mitigation measures

Source	Mitigation Measure
General	Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means).
	Weather forecast to be checked prior to undertaking material handling or processing.
	Engines of on-site vehicles and plant to be switched off when not in use.
	Vehicles and plant are to be fitted with pollution reduction devices where practicable.
	Vehicles are to be maintained and serviced according to manufacturer's specifications.
	Visual monitoring of activities is to be undertaken to identify dust generation.
Exposed areas/stockpiles	The extent of exposed surfaces and stockpiles is to be kept to a minimum.
	Exposed areas and stockpiles are either to be covered or are to be dampened with water as far as is practicable if dust emissions are visible, or there is potential for dust emissions outside operating hours.
	Minimise dust generation by undertaking rehabilitation earthworks when topsoil and subsoil stockpiles are moist and/or wind speed is below 10 m/s.
	Grassing of constructed landforms
Material handling	Reduce drop heights from loading and handling equipment where practical.
	Dampen material when excessively dusty during handling.
	Crushing and screening units fitted with dust controls.
Hauling activities	Haul roads should be watered using water carts such that the road surface has sufficient moisture to minimise on-road dust generation but not so much as to cause mud/dirt track out to occur.
	Haulage of material would utilise the most efficient route option.
	Regularly inspect haul roads and maintain surfaces to remove potholes or depressions
	Driveways and hardstand areas to be swept/cleaned regularly as required etc.
	Vehicle traffic is to be restricted to designated routes.
	Speed limits are to be enforced.
	Vehicle loads are to be covered when travelling off-site.

The operational air quality management and mitigation measures employed at the site are more than adequate to control dust emissions generated by the Project and significantly reduce the potential for impacts at the nearby residential locations and within the surrounding area. Therefore, it is determined that the Project will meet the requirements of the POEO Act for controlling emissions.

9 SUMMARY AND CONCLUSIONS

This report has assessed the potential air quality impacts associated with the proposed expansion of operations of gravel extraction at Williams Quarry, Arding.

Air dispersion modelling was used to predict the potential for off-site dust impacts in the surrounding area due to the operation of the Project. The estimated emissions of dust applied in the modelling are likely to be conservative and would overestimate the actual impacts.

It is predicted that all the assessed air pollutants generated by the operation of the Project would comply with the applicable assessment criteria at the assessed receptors and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area.

Nevertheless, the site would apply appropriate dust management measures to ensure it minimises the potential occurrence of excessive air emissions from the site.

Overall, the assessment demonstrates that even using conservative assumptions, the Project can operate without causing any significant air quality impact at residential receptors in the surrounding environment.

10 REFERENCES

Bureau of Meteorology (2022)

Climate statistics for Australian locations, Bureau of Meteorology website, accessed November 2022. http://www.bom.gov.au/climate/averages

NSW EPA (2015)

"NSW Coal Mining Benchmarking Study Best-practice measures for reducing non-road diesel exhaust emissions", August 2015.

NSW EPA (2022)

"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales", NSW Environment Protection Authority, August 2022.

NSW DPIE (2019)

"Dustwatch Report November 2019", prepared by NSW Department of Planning, Industry and Environment, November 2019.

NSW DPIE (2020)

"Dustwatch Report January 2020", prepared by NSW Department of Planning, Industry and Environment, February 2020.

TRC (2011)

"Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia", Prepared for the NSW Office of Environment and Heritage by TRC Environmental Corporation.

US EPA (1985 and update)

"Compilation of Air Pollutant Emission Factors", AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

Appendix A

Selection of Meteorological Year

Selection of meteorological year

A statistical analysis of the latest five contiguous years of meteorological data from the nearest BoM weather station with suitable available data, Armidale Airport AWS weather station, is presented in **Table A-1**.

The standard deviation of the latest five years of meteorological data spanning 2017 to 2021 was analysed against the available measured wind speed, temperature and relative humidity. The analysis indicates that 2020 dataset is closest to the mean for wind speed, 2021 is closest to the long term mean for wind direction and 2018 is closest for relative humidity. On the basis of a score weighting analysis, 2021 was found to be most representative.

Table A-1: Statistical analysis results for Armidale

Year	Wind speed	Temperature	Relative humidity
2017	0.3	1.0	7.9
2018	0.4	1.0	5.4
2019	0.5	1.6	9.7
2020	0.2	0.8	6.7
2021	0.3	0.5	7.0

Figure A-1 shows the frequency distributions for wind speed, temperature and relative humidity for the 2015 year compared with the mean of the 2017 to 2021 data set. The 2021 year data appear to be well aligned with the mean data.

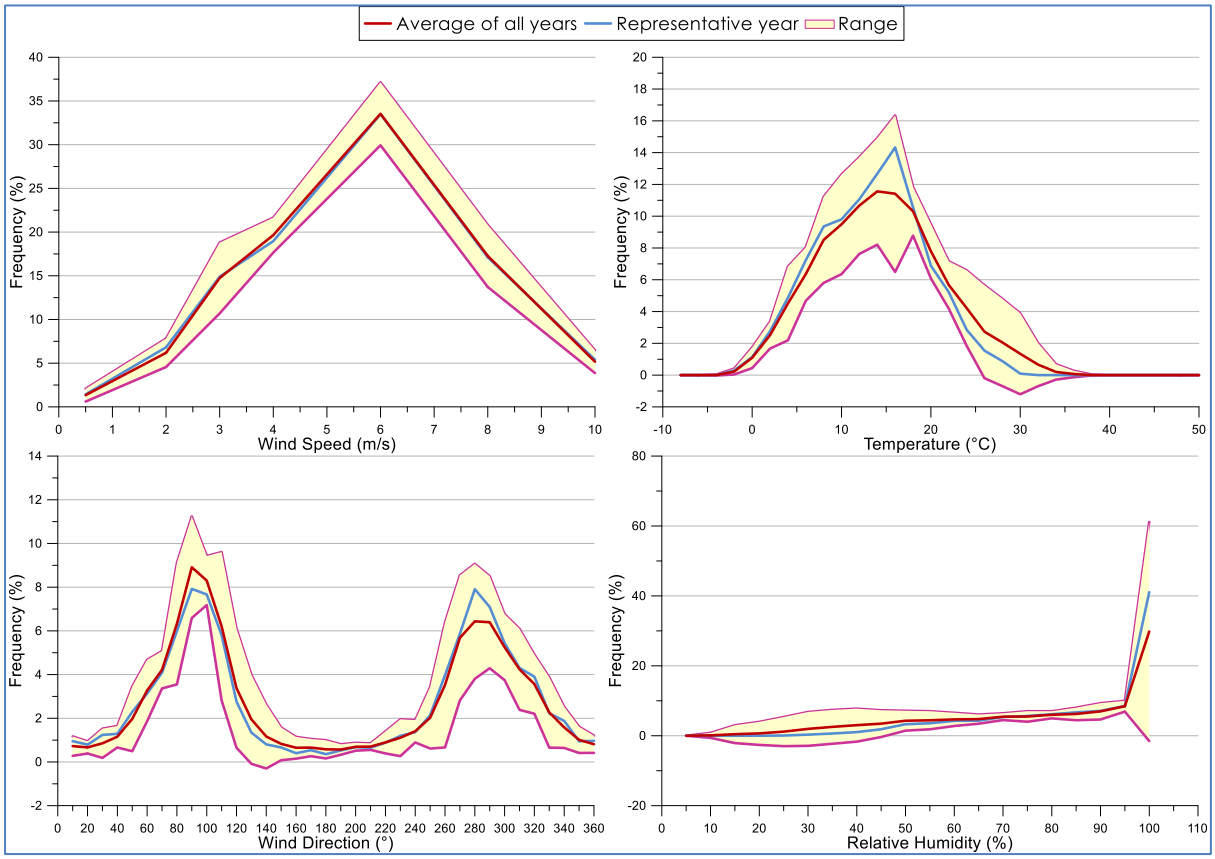


Figure A-1: Frequency distributions for wind speed, wind direction, temperature and relative humidity

Appendix B

Emission Calculations

Emission Calculation

The dust emissions from the Project have been estimated from the operational description of the proposed activities provided by the Proponent and have been combined with emissions factor equations and utilising suitable emission and load factors that relate to the quantity of dust emitted from particular activities based on intensity, the prevailing meteorological conditions and composition of the material being handled.

Emission factors and associated controls have been sourced from:

- United States (US) EPA AP42 Emission Factors (**US EPA, 1985 and Updates**);
- Office of Environment and Heritage document, "NSW Coal Mining Benchmarking Study: Best Practise Measures for Reducing Non-Road Diesel Exhaust Emissions, Final Report" (**NSW EPA, 2015**).

The emission factor equations used for each dust generating activity are outlined in **Table B-1** below. A detailed dust emission inventory for the modelled scenario is presented in **Table B-2**.

Control factors include the following:

- Hauling on unpaved surfaces – 75% control for watering of trafficked areas;
- Crushing and screening activities – controls applied to operational activities; and,
- Wind erosion from exposed areas – 50% control for watering of exposed areas.

Table B-1: Emission factor equations

Activity	Emission factor equation		
	TSP	PM_{10}	$PM_{2.5}$
Loading / emplacing material	$EF = 0.74 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)$ $kg/tonne$	$EF = 0.35 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)$ $kg/tonne$	$EF = 0.053 \times 0.0016 \times \left(\frac{U}{2.2}^{1.3} / \frac{M}{2}^{1.4}\right)$ $kg/tonne$
Hauling on unsealed surfaces	$EF = \left(\frac{0.4536}{1.6093}\right) \times 4.9 \times (s/12)^{0.7} \times (1.1023 \times M/3)^{0.45}$ kg/VKT	$EF = \left(\frac{0.4536}{1.6093}\right) \times 1.5 \times (s/12)^{0.9} \times (1.1023 \times M/3)^{0.45}$ kg/VKT	$EF = \left(\frac{0.4536}{1.6093}\right) \times 0.15 \times (s/12)^{0.9} \times (1.1023 \times M/3)^{0.45}$ kg/VKT
Drilling	0.59	$0.30 \times TSP$	$0.04 \times TSP$
Blasting	$0.00022 \times A^{1.5}$	$0.52 \times TSP$	0.03
Tertiary crushing (controlled)	0.0006	0.00027	0.00005
Screening (controlled)	$EF = 0.0011$ $kg/$tonne	$EF = 0.00037$ $kg/$tonne	$EF = 0.000025$ $kg/tonne$
Dozers on overburden	$EF = 2.6 \times s^{1.2} / M^{1.3}$ kg/hr	$EF = (0.45 \times s^{1.5} / M^{1.4}) \times 0.75$ kg/hr	$EF = (2.6 \times s^{1.2} / M^{1.3}) \times 0.105$ kg/hr
Wind erosion on exposed areas, stockpiles	$EF = 850$ $kg/ha/year$	$0.5 \times TSP$	$0.075 \times TSP$

A = horizontal area (m^2) with blasting depth ≤ 21m, EF = emission factor, U = wind speed (m/s), M = moisture content (%), s = silt content (%), s.L. = silt loading (g/m^2), W = average weight of vehicle (tonne), VKT = vehicle kilometres travelled (km).

Table B-2: Dust Emissions Inventory

Activity	TSP emission (kg/y)	PM10 emission (kg/y)	PM25 emission (kg/y)	Intensity	Units	EF - TSP/PM10/PM25	Units	Var 1	Units	Var 2	Units	Var 3 - TSP/PM10/PM25	Units	Var 4	Units	Var 5	Units	Var 6	Units
Dozer stripping topsoil	1,899	268	199	1,560	hr/yr	1.217/0.172/0.128	kg/h	2	S.C. %	3.4	M.C. %								
Loading topsoil to haul truck	0.3	0.2	0.02	276	t/yr	0.001/0.001/0.00008	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	3.4	M.C %								
Hauling topsoil to stockpile	1	0.1	0.01	276	t/yr	0.008/0.002/0.0002	kg/t	32	t/load	0.1	km/return	2.205/0.562/0.05619	kg/VKT	4.8	S.C %	32	ave weight (t)	75	C %
Unloading topsoil to stockpile	0.3	0.2	0.02	276	t/yr	0.001/0.001/0.00008	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	3.4	M.C %								
Loading overburden to haul truck	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
Hauling overburden to emplacement area	566	144	14	288,000	t/yr	0.008/0.002/0.0002	kg/t	32	t/load	0.1	km/return	2.205/0.562/0.05619	kg/VKT	4.8	S.C %	32	ave weight (t)	75	C %
Unloading overburden to stockpile	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
Drilling	74	37	6	126	holes/yr	0.59/0.295/0.044	kg/hole												
Blasting	2,387	1,241	72	177	blasts/yr	13.486/7.013/0.405	kg/blast	1,555	area of blast in square metres										
Dozer ripping material	3,784	564	397	1,560	hr/yr	2.426/0.362/0.255	kg/h	2	S.C. %	2	M.C. %								
Excavator loading extracted material to haul truck	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
Hauling extracted material to processing area	566	144	14	288,000	t/yr	0.008/0.002/0.0002	kg/t	32	t/load	0.1	km/return	2.205/0.562/0.05619	kg/VKT	4.8	S.C %	32	ave weight (t)	75	C %
Unloading extracted material at processing area	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
FEL loading extracted material to crusher	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
Crushing (controlled)	173	78	14	288,000	t/yr	0.001/0/0.00005	kg/t												
Screening (controlled)	317	107	7	288,000	t/yr	0.001/0/0.00003	kg/t												
FEL loading processed material to dispatch truck	714	338	51	288,000	t/yr	0.002/0.001/0.00018	kg/t	2.09	ave ws (ws/2.2)^1.3 (m/s)	2	M.C %								
Hauling processed material	5,117	1,304	130	288,000	t/yr	0.071/0.018/0.002	kg/t	32	t/load	1.0	km/return	2.205/0.562/0.056	kg/VKT	4.8	S.C %	32	ave weight (t)	75	C %
Hauling processed material offsite to processing facility	4,880	1,244	124	288,000	t/yr	0.068/0.017/0.002	kg/t	32	t/load	1.0	km/return	2.205/0.562/0.056	kg/VKT	4.8	S.C %	32	ave weight (t)	75	C %
WE - whole site	3,328	1,664	250	8	ha	850/425/64	kg/ha/year											50	C %
Exhaust emissions	474	474	459																
Total TSP emissions (kg/yr.)	**27,851**	**9,297**	**1,995**																

Appendix C

Isopleth Diagrams

Figure C-1: Predicted incremental maximum 24-hour average $PM_{2.5}$ concentrations (µg/m³)

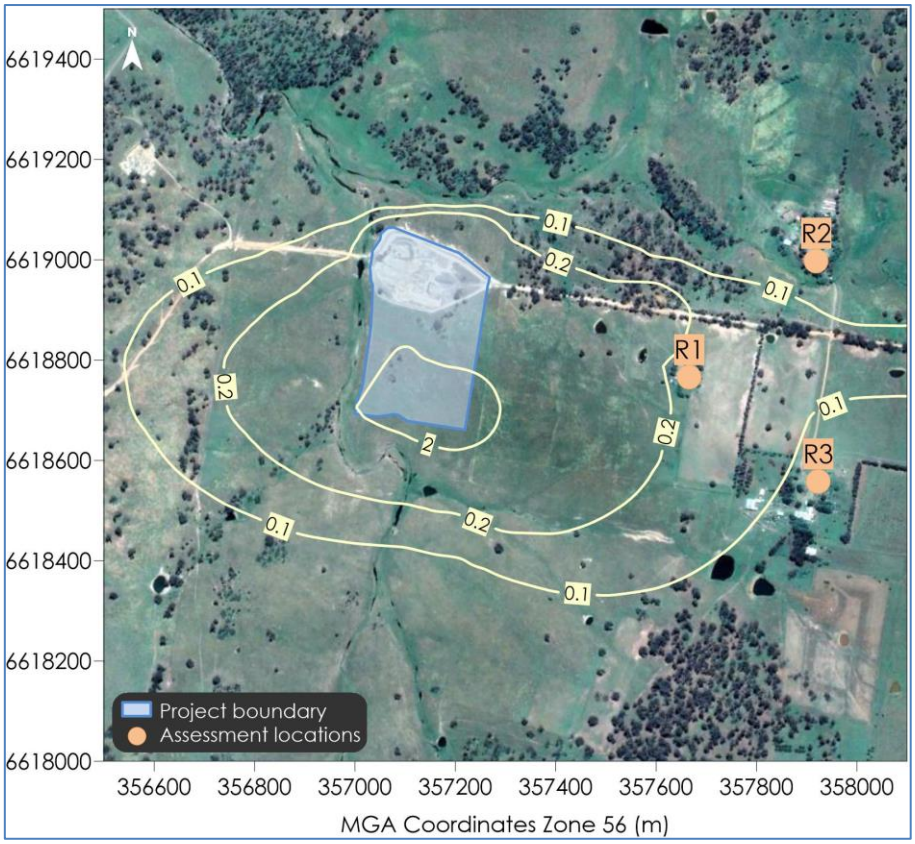


Figure C-2: Predicted incremental annual average $PM_{2.5}$ concentrations (µg/m³)

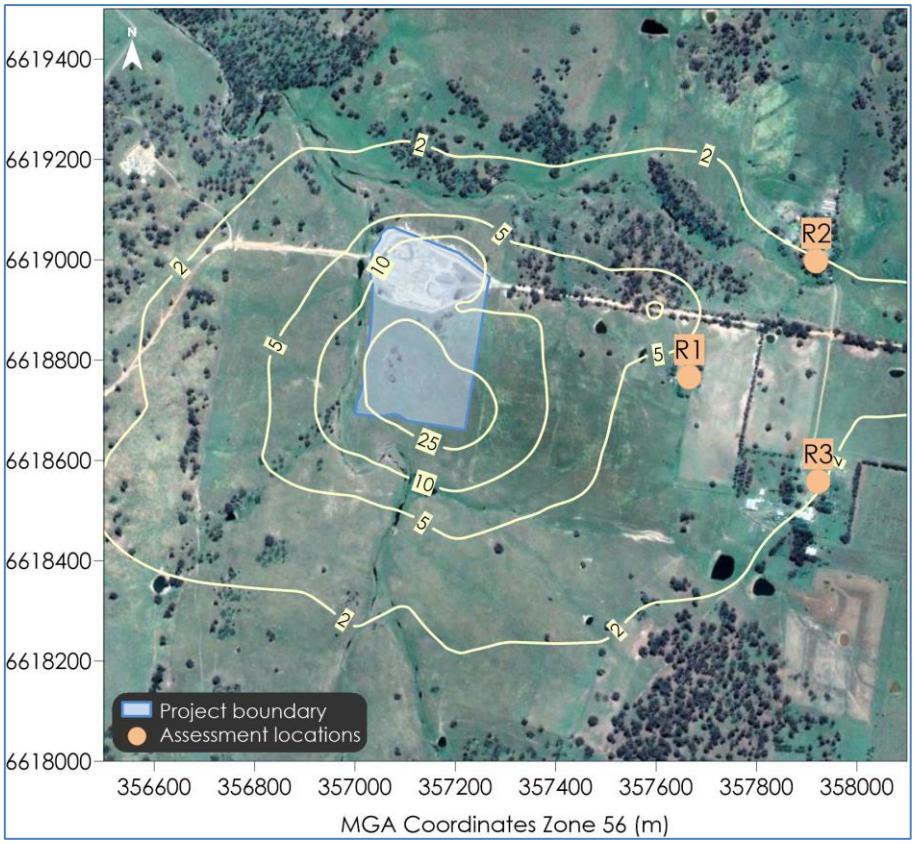


Figure C-3: Predicted incremental maximum 24-hour average PM_{10} concentrations (µg/m³)

Figure C-4: Predicted incremental annual average PM_{10} concentrations (µg/m³)

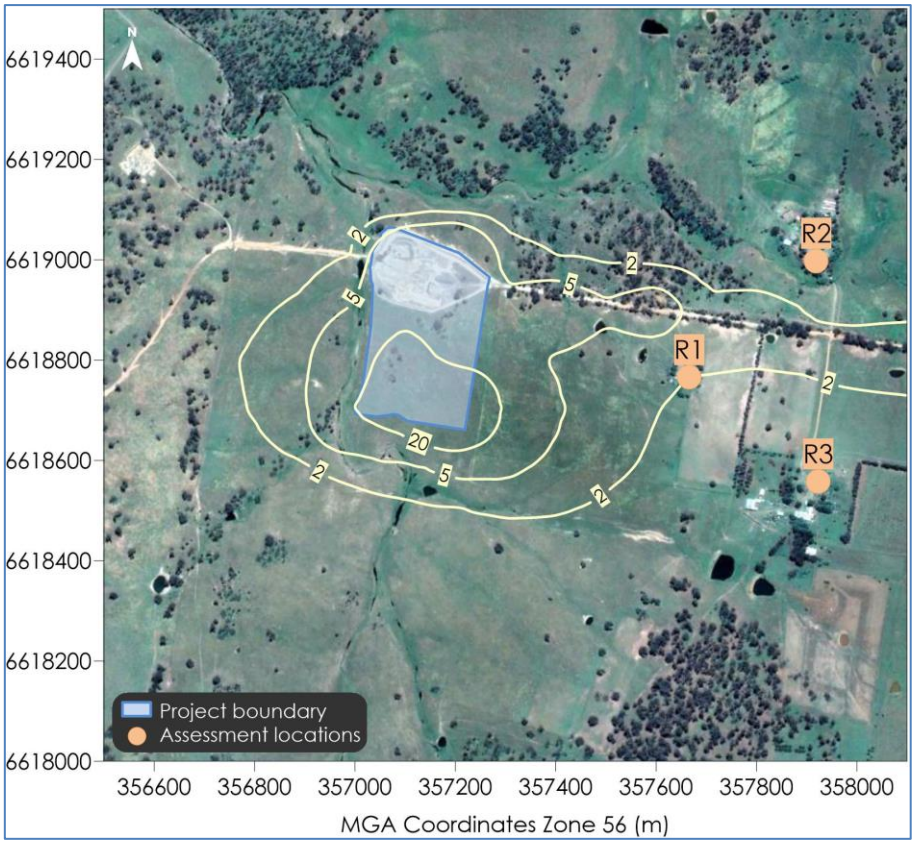


Figure C-5: Predicted incremental annual average TSP concentrations (µg/m³)

Figure C-6: Predicted incremental annual average dust deposition levels (g/m²/month)

Figure C-7: Predicted cumulative annual average $PM_{2.5}$ concentrations (µg/m³)

Figure C-8: Predicted cumulative annual average PM_{10} concentrations (µg/m³)

Figure C-9: Predicted cumulative annual average TSP concentrations (µg/m³)

Figure C-10: Predicted cumulative annual average dust deposition levels (g/m²/month)

Appendix D

Further detail regarding 24-hour $PM_{2.5}$ and PM_{10} analysis

Further detail regarding 24-hour average $PM_{2.5}$ and PM_{10} analysis

The analysis below provides a cumulative 24-hour $PM_{2.5}$ and PM_{10} impact assessment in accordance with the NSW EPA Approved Methods; refer to the worked example on Page 51 to 52 of the Approved Methods.

The background level is the ambient level at the Armidale monitoring station for $PM_{2.5}$ and PM_{10}.

The predicted increment is the predicted level to occur at the R1 receptor due to the Project.

The total is the sum of the background level and the predicted level. The totals may have minor discrepancies due to rounding.

Table D-1 to **Table D-2** assesses receptor R1 and shows the predicted maximum cumulative levels at the receptor. The left half of the table examines the cumulative impact during the periods of highest background levels and the right half of the table examines the cumulative impact during the periods of highest contribution from the project.

The green shading represents days ranked per the highest background level but below the criteria.

The blue shading represents days ranked per the highest predicted increment level but below the criteria.

The orange shading represents days where the measured background level is already over the criteria.

Any value above the $PM_{2.5}$ criterion of 25µg/m^3 or above the PM_{10} criterion of 50µg/m^3 is in **bold red.**

Table D-1: Cumulative 24-hour average $PM_{2.5}$ concentration (µg/m³) – Receptor R1

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
12/07/2021	35	0.2	35.2				
28/06/2021	31.8	0.0	31.8				
7/07/2021	25.6	0.1	25.7				
27/06/2021	25.1	1.3	26.4				
6/07/2021	24.4	0.4	24.8	27/06/2021	25.1	1.2	26.4
27/07/2021	23.2	0.2	23.4	6/06/2021	21.6	1.1	22.7
30/07/2021	22.7	0.2	22.9	5/07/2021	18.4	1.0	19.4
21/08/2021	22.2	0.2	22.4	13/05/2021	12.6	0.8	13.4
6/06/2021	21.6	1.1	22.7	10/05/2021	10.5	0.7	11.2
13/07/2021	21.4	0.3	21.7	17/08/2021	15.1	0.6	15.8
21/05/2021	21.2	0.0	21.2	7/05/2021	4.6	0.6	5.2
22/07/2021	21.2	0.1	21.3	14/05/2021	17.7	0.6	18.3
7/06/2021	20.9	0.3	21.2	14/06/2021	18	0.6	18.6

Table D-2: Cumulative 24-hour average PM_{10} concentration (µg/m³) – Receptor R1

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
12/07/2021	41	1.1	42.1	6/06/2021	23.4	3.4	26.8
28/06/2021	34.7	0.2	34.9	27/06/2021	26.8	3.3	30.1
7/07/2021	29.5	0.7	30.2	14/06/2021	19.5	2.7	22.2
21/08/2021	27.1	1.0	28.1	5/07/2021	20.5	2.5	23.0
6/07/2021	27	1.8	28.8	7/05/2021	5.7	2.2	7.9
21/05/2021	26.9	0.1	27.0	4/06/2021	6	2.2	8.2
27/07/2021	26.9	1.2	28.1	3/07/2021	22.1	2.2	24.3
27/06/2021	26.8	3.3	30.1	14/05/2021	22	2.1	24.1
15/10/2021	25.8	0.6	26.4	10/05/2021	13.5	2.1	15.6
18/05/2021	25.4	0.4	25.8	13/06/2021	10.6	2.1	12.7
30/07/2021	25.3	1.0	26.3	15/06/2021	23.4	2.0	25.4

Appendix F

Biodiversity Development Assessment Report

Biodiversity Development Assessment Report

William's Quarry

Quality solutions. Sustainable future.



GeoLINK
environment | engineering | planning | design

GeoLINK Consulting Pty Ltd

PO Box 119
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

PO Box 1267
Armidale NSW 2350
T 02 6772 0454

info@geolink.net.au

Prepared for: Ducats Earthmoving Pty Ltd

Certification

As required under *Section 6.15 Currency of biodiversity assessment report* of the NSW BC Act, I certify this BDAR (Case 40230) has been prepared in accordance with requirements of (and information provided under) the Biodiversity Assessment Method 2020 as at 03/03/2025.

Troy Jennings

Biodiversity Accredited Assessor (BAAS #18172)

Date: 03/03/2025

NOTE: This BDAR must be submitted must be within 14 days of the date shown on the finalised credit report generated using the BAM Calculator (refer to Appendix F).

	Name	Signature	Date
Prepared by	Troy Jennings		03/03/2025
Reviewed by	Grant McLean		03/03/2025

UPR	Description	Issued By	Date Issued
4079-1026	Version 1	Troy Jennings	03/03/2025

Table of Contents

Illustrations

Tables

Plates

Figures

Appendices

Executive Summary

The Site

The site occurs on Lot 1 DP 1302364, 75 Rose Hill Road, Arding NSW 2358.

The Proposal

This Biodiversity Development Assessment Report (BDAR) has been prepared in relation to the proposed expansion of the existing Williams Quarry at 75 Rose Hill Road, Arding NSW 2358. Ducats Earthmoving Pty. Ltd. proposes to expand the footprint of the existing quarry to extract gravel and rock from Williams Quarry to supply gravel and rock for use in local construction. This proposal seeks consent for use of the land to extract up to 150,000 m^3 of material per annum. The material will be crushed on site and sold locally. Extraction methods would involve blasting and mechanical excavation.

The Biodiversity Offset Scheme (BOS) is triggered due to the proposed development impacting native vegetation over the clearing threshold (1 ha native vegetation) for a minimum lot of 400 ha. Additionally, areas being impacted (indirectly) are mapped as Biodiversity Value land (associated with Spring Creek), as such a BDAR is required.

Native Vegetation Overview

A total of two native plant community type (PCT) were recorded within the site:

- PCT 3352 - Armidale Quartz Hills Stringybark Forest
- PCT 3359 - New England Hills Stringybark-Box Woodland.

The above PCTs were recorded in two different vegetation condition states being 'derived' and 'moderate' condition.

One threatened ecological community was recorded within the investigation area, being:

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – listed as Critically Endangered (*NSW Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) and associated with PCT 3359 - New England Hills Stringybark-Box Woodland.

Threatened Species Overview

In accordance with the Biodiversity Assessment Methodology (BAM) threatened species have been assessed as predicted ecosystem credit species and/ or candidate species credit species.

- Predicted species (ecosystem credit species):
  - A total of 24 threatened fauna species have been identified as predicted ecosystem credit species associated with the development footprint.
- Candidate species (species credit species):
  - A total of three threatened flora species were identified as candidate flora species credit species associated with the development footprint and were subject to targeted surveys. No candidate flora species were identified within the site and as such no candidate flora species would be impacted
  - A total of five threatened fauna species were identified as candidate fauna species credit species associated with the development footprint and were subject to targeted surveys. No

candidate fauna species were identified during targeted surveys and as such no candidate fauna species would be impacted.

Impact Summary

Impacts unable to be avoided by the Project have been assessed in accordance with Stage 2 of the BAM (2020).

The following direct impact on PCTs would occur as a result of the Project, 6.28 ha of native vegetation which includes:

- 5.72 ha of PCT 3352 'derived' condition
- 0.56 ha of PCT 3352 'moderate' condition.

No impacts to PCT 3359 - New England Hills Stringybark-Box Woodland are expected to occur as these areas occurred outside the development footprint. As such no impacts to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC are expected.

The following impacts on threatened species in accordance with BAM based on ecosystem credits and species credit species, include the loss of habitat for 23 threatened fauna species identified as predicted ecosystem credit species.

Mitigation measures

Mitigation measures have been prepared in accordance with Section 8.1 of the BAM (2020). Mitigation and management measures have been prepared to address and minimise the biodiversity impacts associated with the Project. A total of 20 mitigation measures will be implemented to address residual impacts as a result of the Project.

Other Statutory Matters

Other relevant statutory matters addressed in this BDAR include:

- *State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020*.

Credit Requirements

Biodiversity offset obligations have been determined using the BAM calculator. The Project will require a total of 14 ecosystem credits.

The offset requirement identified by this BDAR will be satisfied either via retirement of suitable biodiversity credits available on the biodiversity credit register or payment into the Biodiversity Conservation Fund.

1. Introduction

1.1 Overview

This Biodiversity Development Assessment Report (BDAR) has been prepared for Ducats Earthmoving Pty Ltd.

The Project has been entered into the Biodiversity Accredited Assessor System (BAAS) as Case 40230.

This BDAR has been prepared to address the requirements of the *Biodiversity Conservation Act 2016* (BC Act) for future development of the site. Based on the smallest minimum lot size for the site of 400 ha, up to 1 ha of native vegetation (including groundcover/ grasses) may be cleared before triggering entry into the BOS and requiring preparation of a BDAR as set out in the BC Act. Clearing calculations indicate that approximately 6.28 ha of 'native vegetation' is currently proposed to be cleared as part of the quarry Project. On this basis, the Biodiversity Offset Scheme (BOS) is triggered and a BDAR is required. Additionally, proposed development would impacting native vegetation within riparian buffer areas mapped as Biodiversity Value land (associated with Spring Creek), this would also trigger the BOS.

Details of the Project are summarised in **Table 1.1**.

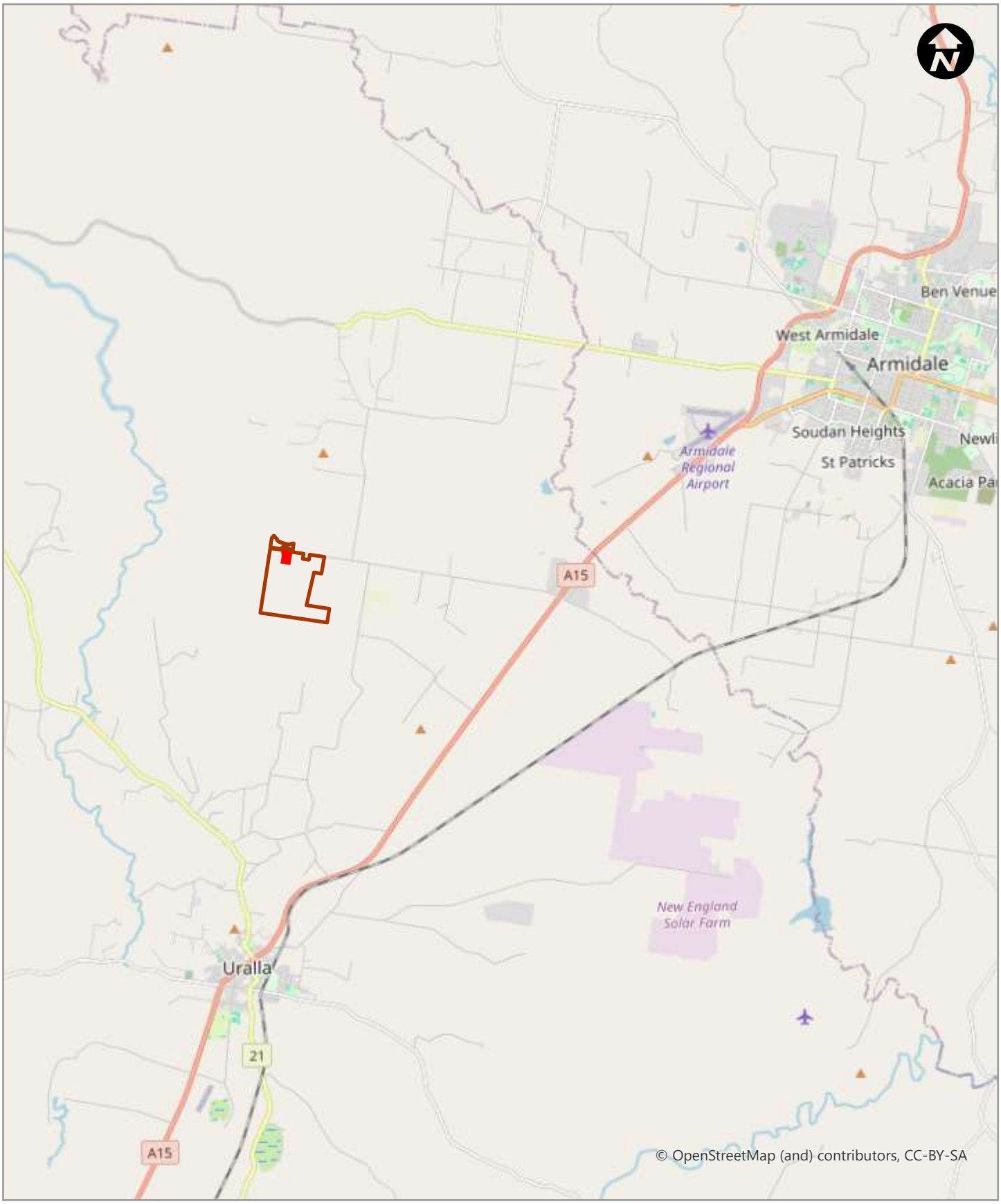
Table 1.1 Project Details

Site Details	
LGA	Uralla Shire
Subject lot	Lot 1 DP 1302364
Address	75 Rose Hill Road, Arding, NSW
Development site	Area subject to development – 8.13 ha
Zoning	RU2 – Rural Landscape
Minimum lot size	400 ha
Development type	Extractive Industries

Illustration 1.1 shows the site location and **Illustration 1.2** shows the site itself.

1.2 Site Description

The site occurs within a rural landscape on hilly terrain with small patches of dry sclerophyll forest within and surrounding the development site. The western and southern edges of the subject site are bordered by Spring Creek which is mapped as 'Biodiversity Value land'. The northern border of the subject site consists of the existing quarry and Rose Hill Road. The eastern border of the site consists of cleared grassland utilised for primary production purposes. Within the greater locality, the landscape generally consists of rural properties utilised for primary production purposes. The locality of the site and subject site are displayed in **Illustration 1.1**and **Illustration 1.2**. Photographs of the site are shown at **Plate 1.1** to **Plate 1.6**.



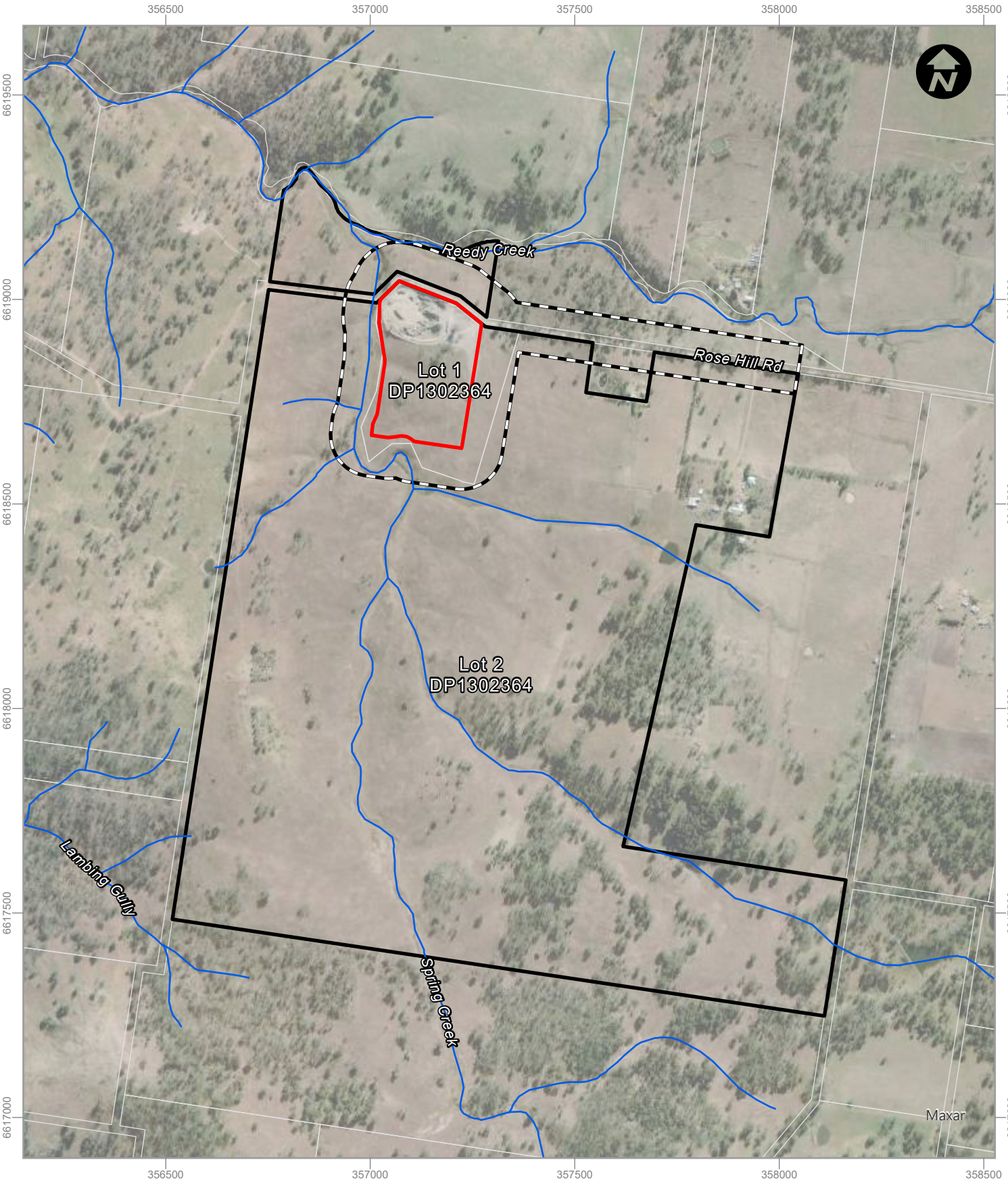
LEGEND

Development footprint Lot boundary

0 2.5 km

Site Locality - Illustration 1.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: OpenStreet Map
Date: 27/02/2025



LEGEND

- Development footprint
- Investigation area
- Lot boundary
- Cadastre
- Watercourse

0 250 Metres

The Site - Illustration 1.2

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

Plate 1.1 Photo of existing quarry along the northern border of the site

Plate 1.2 Photo of Spring Creek (background) and existing detention basin (foreground) along the western border of the site

Plate 1.3 Photo of Rose Hill Road at the northern border of the site

Plate 1.4 Photo of stockpile site at the north-eastern corner of the site

Plate 1.5 Photo of the Southern border of the site showing Spring Creek in the background

Plate 1.6 Photo of native vegetation within the development area

1.3 Project description

Williams Quarry is situated on Lot 1 in DP 1302364. The quarry has been operating under an existing approval to extract less than 30,000 m^3 of material per annum. Ducats Earthmoving Pty. Ltd. proposes to expand the footprint of the existing quarry to extract gravel and rock from Williams Quarry to supply gravel and rock for use in local construction. This Project seeks consent for use of the land to extract up to 150,000 m^3 of material per annum (up to 225,000 tonnes per annum, assuming density of gravel being 1.5t/ m3). The anticipated total resource is approximately 676,000 m^3 (approximately 1,014,000 tonnes) and the average annual extraction rate is estimated to be approximately 66,600 m^3 (approximately 100,000 tonnes). The quarry life would be until the quarry is no longer required or the material has been exhausted. The material will be crushed on site and sold locally. Extraction methods would involve blasting and mechanical excavation.

The remaining vegetation within the quarry site would be cleared. Native vegetation would be taken off site to be mulched and stockpiled at designated stockpile sites and non-native vegetation would be disposed of according to Uralla Shire Council (USC) and Department of Environment Climate Change and Water (DECCW) guidelines. Topsoil would be removed and stored at designated stockpile sites. The stored topsoil would be stockpiled in low, domed mounds with sediment and erosion measures installed to prevent sediment runoff.

Overburden materials extracted from within the quarry site would be used to extend and shape the existing floor of the quarry, and to construct the sediment pond and environmental controls.

The floor area of the quarry would be initially increased by extracting hard rock material from the lowest existing bench and reducing its width.

A primary and secondary crusher and supporting plant and equipment would be established on the quarry floor alongside the raw and crushed material stockpiles. The crushed material would be loaded into trucks and hauled to the Ducats processing facility for further processing.

Extraction – Operation

It is proposed to extract the rock and gravel by blast techniques, which will generally involve:

- Blasting the quarry face
- Ripping and removal of the material to the stockpile area
- Crushing and sorting of raw material
- Establish stockpiles of gravel material ready for transport.

The quarry already has established areas to access material, facilitate crushing and stockpiling and support transport movements through the site.

The quarry would require minor clearing of vegetation (including recent regrowth) in order to access the material.

Blasting

Blasting would extract rock and gravel material from the source and then quarried material would be crushed, screened and stored on site prior to transport. It would be transported to the Ducats processing facility as required for local market use.

Processing

It is considered that continuation of the currently existing workings would continue for new workings.

Equipment

Plant and infrastructure on site may include the following, or equivalent:

- Crushing Equipment:
  - Jaw crusher.
  - Cone crusher.
  - Impact crusher.
  - Scalper.
  - Triple Deck Screen.
- Mobile Equipment:
  - Excavator(s).
  - Loader(s).
  - Dozer.
  - Truck and Dog (32t load).
  - Dump truck.
- Ancillary Equipment:
  - Generators.
  - Staff vehicles.
  - Site Facilities.

Not all this equipment will be operating at the same time, but up to three or four pieces of equipment may be operating at any given time depending on material demands and quarry extraction management.

Operation and Transport

Quarried material would be crushed, screened and temporarily stored on site before being taken to Ducats processing facility.

Raw material stockpiles would be located near the crushing plant for easy loading into the crusher. Dozers would push raw material from the quarry face to the raw material stockpiles near the crushing plant. All blasted rock would be fed through the primary crusher with some also being processed through the secondary crusher. Oversize rock would be broken down using an excavator with hammer.

The quarry would process around 384 tonnes per day of raw material which would be removed from site to the Ducats processing facility for further processing.

Typical transportation would be using a truck and dog with a 32 tonne pay load. This equates to approximately ten loads per day or 20 truck movements. In summary:

- Typical haulage per day: Ten loads or 20 movements
- Haulage times: 7am to 5pm Monday to Friday and 7am to 1pm Saturday.

These haulage schedules are based on the maximum haulage movements required for transporting the proposed 225,000 tonnes of material over the ten year primary operating period.

Quarry material would be hauled from Williams Quarry to Ducats processing facility.

On Site Facilities

The Project is anticipated to require approximately four full-time staff to operate crushing machinery and up to three contractors for transportation activities. A crib room, change room, office and ablutions

facility would be required for employees. Non-potable water would be delivered by water tanks for dust suppression of quarry operations.

Water Usage

Water demands on site would be predominantly for dust suppression resulting from the crusher operation, quarry floor and the material stockpiles. The following figures provide estimates of the Project's daily water usage:

- Dust suppression: 50,000L per day
- Crusher Operation: None.

It is envisaged water for dust suppression would be primarily sourced from off-site and where needed, from the sediment and erosion dams associated with the quarry.

Water carts with capacities of 10,000 litres would be used for non-potable water purposes.

Hours of Operation

Ducats Earthmoving Pty Ltd proposes the following hours of operation.

Operation tasks	Days	Hours
Overburden stripping and site establishment	Monday to Saturday	6.00 am to 5.00 pm
Truck loading hours	Monday to Saturday	6.00 am to 5.00 pm
Truck Haulage	Monday to Friday	7.00 am to 5.00 pm.
Truck Haulage (Saturday)	Saturday	7.00 am to 1.00 pm.
Processing	Monday to Saturday	7.00 am to 5.00 pm.
Blasting	Monday to Friday	10.00 am and 4.00 pm.

Plant and machinery servicing, general site maintenance and office work may be undertaken during Sundays or public holidays between normal business hours. Any work undertaken during these times must be of an inaudible nature.

Rehabilitation and Closure

Williams Quarry has been operated by Uralla Shire Council (USC) before the recent utilisation by Ducats Earthmoving Pty Ltd. During this period, little rehabilitation or assisted revegetation occurred due to the need for floor space for occasional product extraction and ongoing quarrying from time to time.

A site closure and rehabilitation plan will be prepared for the Project, to be provided in the EIS. The plan will include erosion control, quarrying and revegetation, supplied details of final landform, the planting regime including species and maintenance requirements. In summary, the closure and rehabilitation will include the following initiatives:

- Manage the closure and rehabilitation during the operation of the quarry
- Selection of similar plant species with that of surrounding vegetation communities
- Creation of quarry benches to facilitate visual blending and stimulate vegetation growth
- Management of weeds and vertebrate pests
- Integrated final form water management
- Common maintenance program.

The final form of the quarry would blend with the current landform and consist of a series of benches and batters that would extend in an east west direction and would eventually form an amphitheatre

shape. The floor would appear flat to the eye, but would have slight fall to allow for water management.

At this time, the final landform of the Project can only be considered conceptual, as local variation in rock strength and quality may vary the final benching and batters grades.

Biodiversity Offsets Scheme Entry

The BOS is triggered due to the proposed development impacting native vegetation over the clearing threshold (1 ha native vegetation) for a minimum lot of 400 ha. Additionally, areas being impacted (indirectly) are mapped as Biodiversity Value land (associated with Spring Creek), as such a BDAR is required.

1.4 Secretary's Environmental Assessment Requirements

The NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) and Biodiversity, Conservation Science (BCS) have provided the Secretary's Environmental Assessment Requirements (SEARs) (#1948) for the EIS. The requirements specific to this assessment and where these aspects are addressed in this technical report are outlined in **Table 1.2**.

Table 1.2 Secretary's Environmental Assessment Requirements

Reference	Secretary's Environmental Assessment Requirements	Where addressed
EAR 1948	Accurate predictions of any vegetation clearing on site;	Section 9.1.1 of this BDAR
	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;*	Section 9 of this BDAR
	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.	Section 11 and 12 of this BDAR.
BCS EARs (DOC24/908048-5)		
1. A)	The EIS must demonstrate whether the proposed development is to be carried out in a declared area of outstanding biodiversity value	Section 3.1; Table 3.1
B)	If the proposed development is not carried out in a declared area of outstanding biodiversity value, then the EIS must demonstrate and document whether the proposed development exceeds the biodiversity offset scheme threshold, as set out in section 7.4 of the BC Act 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 of an area declared by clause 7.23 of the BC Regulation as exceeding the threshold, or II) The clearing of native vegetation, or other prescribed by clause 6.1 of the BC Regulation, on land included on the Biodiversity Values Map published under clause 7.3 of the BC Regulation	Project exceeds clearing threshold and involves clearing on land that is mapped as Biodiversity Values – as such BDAR (this report) has been undertaken in accordance with the BC Act and BAM.
C)	If the biodiversity offset scheme threshold is not exceeded, then the EIS must document *the test for determining whether the proposed development is likely*	**N/A** - Project exceeds clearing threshold and involves clearing on land

Reference	Secretary's Environmental Assessment Requirements	Where addressed
	to significantly affect threatened species or ecological communities as outlined in Section 7.3 of the BC Act, by preparing an ecological assessment.	that is mapped as Biodiversity Values – as such a BDAR (this report) has been undertaken in accordance with the BC Act and BAM.
2.	If the EIS determines under 1 above that the proposed development is likely to significantly affect threatened species, then in accordance with Section 7.7 of the BC Act the EIS must be accompanied by a Biodiversity Development Assessment Report prepared in accordance with Part 6, Division 3 of the BC Act	**N/A** - Project exceeds clearing threshold and involves clearing on land that is mapped as Biodiversity Values – as such a BDAR (this report) has been undertaken in accordance with the BC Act and BAM.
3.	If the EIS determines under 1 above that the proposed development is unlikely to significantly affect threatened species, then the proposed development should: a) Be designed to avoid and minimise impacts on biodiversity values to the fullest extent possible, and b) Include a biodiversity offset package to offset remaining direct and indirect impacts on biodiversity values, prepared in accordance with the Department's 13 offsetting principles	**N/A** - Project exceeds clearing threshold and involves clearing on land that is mapped as Biodiversity Values – as such BDAR (this report) has been undertaken in accordance with the BC Act and BAM.

1.5 Personnel

The contributors to the preparation of this BDAR, their qualifications and roles are listed in **Table 1.3**.

All assessors involved with the Project have extensive experience in assessing native vegetation and threatened species within the tableland region including all candidate threatened species identified by the BAM Calculator (BAM-C) for the site. All content and fieldwork are in accordance with the Biodiversity Assessment Method 2020 (NSW Department of Planning and Environment 2020a).

Table 1.3 Personnel

Name	Qualifications	Position and Role
David Andrighetto	■ Bachelor of Science ■ Accredited BAM Assessor (BAAS 20015)	Senior Ecologist – field survey
Troy Jennings	■ Master of Wildlife Management ■ Bachelor of Biodiversity and Conservation ■ Cert III in Conservation and Land Management ■ BAM Accredited Assessor (BAAS 18172)	Senior Ecologist – report preparation, BAM calculations
Ben Millan	■ Bachelor of Zoology	Ecologist – field survey
Heidi Lunn	■ Bachelor of Plant Science ■ Cert IV in Bush Regeneration	Ecologist – field survey
Quinn Green	■ Bachelor of Zoology	Ecologist – field survey
Grant McLean	■ Bachelor of Environmental Science ■ Accredited BAM Assessor (BAAS 19056)	Senior Ecologist – technical review, field survey

Name	Qualifications	Position and Role
Greg Ford	■ Bachelor of Applied Science and Biology (Zoology and Botany)	Balance Environmental – Anabat data analysis
Anna Barca	■ Associate Degree of Spatial Science Major Geographic Information Systems	GIS specialist – data management and illustration preparation

1.6 Report Terminology

The following terms are discussed throughout this report and are defined as:

- **The site**: Lot in which the proposed development occurs within
- **The subject site**: land in which the proposed development occurs and buffer area surrounding the development footprint
- **Investigation area:** land in which ecological assessment was undertaken in, including areas of the development footprint and surrounding
- **Development footprint**: the area of land that is directly impacted by a proposed development, including access roads, APZs and areas used to store construction materials
- **Locality**: the area within 10 km of the site.

1.7 Report Scope and Limitations

This BDAR has been prepared based on field assessment and use of the BAM-C and is based on vegetation clearing impacts and proposed development described in Section 1.3. Biodiversity credits were generated by utilising the BAM-C, which is established and managed by the NSW DCCEEW. GeoLINK has entered data in the BAM-C in good faith and any errors or deficiencies in the calculator results are attributed to NSW DCCEEW.

While comprehensive surveys have been completed more broadly across the site, the focus of high-level survey efforts for target threatened flora and fauna occurred mainly within the development footprint and areas of native vegetation which would be directly and indirectly impacted by the Project.

Field Survey Limitations

No sampling technique can eliminate the possibility that a species is present within the site. For example, some species of plant may be present in the soil seed bank and some fauna species use habitats on a sporadic or seasonal basis and may not be present within the site during surveys. The conclusions in this report are based upon data acquired for the Project and the environmental field surveys, therefore, they are merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of species. It should be recognised that site conditions, including the presence of threatened species, can change with time.

Targeted surveys have been conducted to detect target sedentary animal species and threatened flora species that are considered likely to occur within the site based on habitat characteristics and previous records. As the actual distribution and the range of habitat utilised by some species is not fully understood, there is always a small possibility that other species could occur on the site despite being considered to have a low likelihood of occurrence based on their known range and known habitats.

2. Methodology

This section provides a detailed description of the methodologies used in the preparation of this BDAR. Methodologies used included a combination of desk-based searches of relevant databases and historical records, as well as a field inspection of the site to identify and assess biodiversity values in accordance with Stage 1 and Stage 2 of the BAM (2020).

2.1 Information Sources

Data and resources used or consulted in this assessment include:

- The Biodiversity Assessment Method (NSW Department of Planning and Environment 2020a).
- The Biodiversity Assessment Method Operational Manual – Stage 1(NSW Department of Planning and Environment 2022).
- The Biodiversity Assessment Method Operational Manual – Stage 2 (NSW Department of Planning and Environment 2023).
- Threatened entity surveys guidelines (amphibians, microchiropteran bats, mammals and flora and their habitat) (Department of Environment and Conservation 2004).
- BioNet Vegetation Classification (NSW Department of Planning and Environment 2025a).
- BioNet Threatened Biodiversity Data Collection (TBDC) (NSW Department of Planning and Environment 2025b).
- Biodiversity Assessment Method Calculator (BAM-C).
- BioNet Threatened Species Profiles (NSW Department of Planning and Environment 2025c).
- PlantNET NSW (Royal Botanic Gardens 2025).
- Biodiversity Offsets and Agreement Management System (BOAMS).

Spatial data used in this report has included data from the following sources:

- NSW Department of Finance and Services (via Six Maps).
- IBRA Regions and Subregions (Thackway & Cresswell 1995).
- NSW (Mitchell) Landscapes - Version 3.1 (Planning Industry and Environment 2016).
- Directory of Important Wetlands in Australia (Department of Climate Change Energy the Environment and Water 2025a).
- Fauna Corridors (Scotts 2003).
- Important Habitat Map (BOAMS).

2.2 Nomenclature

Names of vegetation communities used in this report are based on the Plant Community Types (PCT) used in the NSW BioNet Vegetation Classification (NSW Department of Planning and Environment 2025a). PCTs used in this report are the new revised PCT classification for eastern NSW.

These names are cross-referenced with those used for threatened ecological communities listed under the BC Act and/ or the EPBC Act.

Names of plants used in this document follow PlantNet (Royal Botanic Gardens 2025). Scientific names are used in this report for species of plant. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the BioNet Atlas of NSW Wildlife (NSW Department of Planning and Environment 2025c) are also provided where these differ from the names used in the PlantNet database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the DCCEEW (Department of Climate Change Energy the Environment and Water 2025b). Common names are used in the report for species of animal. Both common and scientific names are provided in appendices (**Appendix C** and **Appendix D**).

For threatened species of animals, the names used in the BioNet Atlas of NSW (NSW Department of Planning and Environment 2025c) and DPI Spatial Data Portal ((Department of Primary Industries 2025) are provided.

2.3 Database Searches

The aim of the background research was to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed migratory species or critical habitat recorded previously or predicted to occur in the locality of the site.

This allowed for known habitat characteristics to be compared with those present in the site to determine the habitat suitability of each species or population. It further enabled justification for inclusion of any additional predicted or candidate threatened flora and fauna species not identified by the BAM-C.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the site were obtained from a range of databases as detailed in **Table 2.1**.

Table 2.1 Database Searches

Database	Search Date	Area Searched	Reference
BioNet Atlas of NSW Wildlife search tool	12/11/2024	10 km x 10 km centred on the site	(NSW Department of Planning and Environment 2025c)
EPBC Act Protected Matters Search Tool (PMST)	12/11/2024	10 km x 10 km centred on the site	(Department of Climate Change Energy the Environment and Water 2025c)
Biodiversity Assessment Calculator (BAM-C)	12/11/2024	Based on IBRA Bioregion/ Subregions and PCT VI plot data collected and imported.	(NSW Government 2025)
NSW Department of Primary Industries – Fisheries Spatial Data Portal	12/11/2024	10 km x 10 km centred on the site	(Department of Primary Industries 2025)

2.4 Likelihood of Occurrence Assessment

An assessment was completed to assess the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the site. All threatened biodiversity identified during background research conducted (refer to **Table 2.1**) were considered in this assessment. This likelihood of occurrence assessment was utilised to inform the identification of appropriate targeted surveys. The assessment was based on the habitat profile for the species and other habitat information in the TBDC and the Species Profile and Threats Database

(Department of Climate Change Energy the Environment and Water 2025d). The assessment also included consideration of the dates and locations of nearby records and information about species populations in the locality.

For this assessment, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Appendix C** and **Appendix D**.

2.5 Identification of Relevant Threatened Species

Relevant threatened species are those that have been assessed as having a moderate to high likelihood of occurring in the site based on desktop assessment and field assessment. Threatened species can fall under either the ecosystem credit species or species credit species as defined under the BAM:

- **Ecosystem credit species:** are threatened species whose occurrence can generally be predicted by vegetation surrogates and/ or landscape features, or that have a low probability of detection using targeted surveys.
- **Species credit species (candidate species)**: are threatened species for which vegetation surrogates and/ or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Targeted surveys were undertaken for candidate species as outlined in **Section 5.4.1.3** and **5.4.2.3**.

As stated in the BAM (2020) subsection 5.2.3.2, a candidate species credit species will be considered unlikely to occur on the site if:

- After carrying out a field assessment of the habitat constraints or microhabitats on the site, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the site; or
- An expert report that is prepared in accordance with subsection 6.5.2 states that the species is unlikely to be present on the site or specific vegetation zones.

A candidate species credit species that is not considered to have suitable habitat on the site does not require further assessment on the site (NSW Department of Planning and Environment 2020a). A likelihood of occurrent assessment has been undertaken for all identified threatened species in **Appendix C** and **Appendix D**.

2.6 Survey Dates and Weather Conditions

Weather conditions during the field surveys were conducted over mild to warm and wet conditions. A summary of the weather conditions during the survey periods is provided in **Table 2.2**.

Table 2.2 Weather Conditions During Survey Periods

Date	Temperate (C°)		Rain (mm)	Wind (direction / speed (km/hr))	
	Minimum	Maximum		9am	3pm
27/10/2022	10.5	24	0	NW / 24	NW / 13
14/12/2022	6.5	19.7	0	W / 22	WSW / 33
16/12/2022	5.4	21.4	0	S / 7	WSW / 15
19/12/2022	4.3	19.5	0	E / 19	SE / 17

Date	Temperate (C°)		Rain (mm)	Wind (direction / speed (km/hr))	
	Minimum	Maximum		9am	3pm
20/12/2022	3	21.1	0	E / 24	SSE / 9
21/12/2022	7.1	23.2	0	NE / 11	SW / 13
22/12/2022	7.4	24.6	0	WNW / 24	WSW / 17
23/12/2022	14.4	20.7	6	WNW / 26	WNW / 19
02/02/2023	15.4	28.7	0	NNW / 26	NW / 30
09/02/2023	13.6	21.1	1.8	E / 22	S / 15
20/02/2023	13.4	25.8	0	NE / 9	NE / 13
30/03/2023	11.4	18.2	11.2	WNW / 19	SW / 28
04/04/2023	11	21.5	0	SE / 9	S / 15
06/04/2023	10.6	19.8	0.4	ENE / 20	E / 13
12/04/2023	3.8	18.4	0	WNW / 20	WNW / 17
17/04/2023	6	19.4	0	E / 20	ESE / 20
18/04/2023	8.8	18.4	0	E / 26	ESE / 19
19/04/2023	7.5	19.6	0	E / 13	E / 13

Source: Bureau of Meteorology – Automatic Weather Station (AWS) 056238 – Armidale Airport (Bureau of Meteorology 2025)

2.7 Vegetation Surveys

The following flora and vegetation mapping methods were undertaken for the site.

2.7.1 Mapping of Native Vegetation

The vegetation within the site was firstly assessed to a PCT level and then aligned to a vegetation zone which is defined in the BAM as 'an area of native vegetation on the site that is the same PCT and has a similar broad condition state' (NSW Department of Planning and Environment 2020a). A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

Broad condition state is used for stratifying areas of the same PCT into a vegetation zone for determining the vegetation integrity score. Broad condition states used for this report are outlined in **Table 2.3**.

Table 2.3 Native Vegetation Broad Condition States

Broad Condition State	Description
Intact	Native vegetation where all tree, shrub, grass and/ or forb structural growth form groups expected for a plant community type are present. Exotic weed cover is generally <10%.

Broad Condition State	Description
Moderate	Native vegetation where one or more structural understorey components of the vegetation is absent or severely reduced. Vegetation integrity scores are generally less than 60 and exotic cover is generally >30%.
Derived	Native vegetation generally lacking a native over-storey and mid stratum. For this Project, it includes PCTs that have changed to an alternative stable state because of land management practices since European settlement. Over-storey structural components of derived communities have either entirely been removed or are severely reduced (i.e. derived native grasslands with or without scatted paddock trees). Derived grassland was assigned to patches of vegetation where native perennial cover was greater than 50%. Exotic weed cover is generally >40%.

2.7.2 Vegetation Integrity Plots

Vegetation integrity plots were completed in accordance with BAM (2020) and BAM Operational Manual – 1 (NSW Department of Planning and Environment 2022) and as described below. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in **Figure 2.1**.

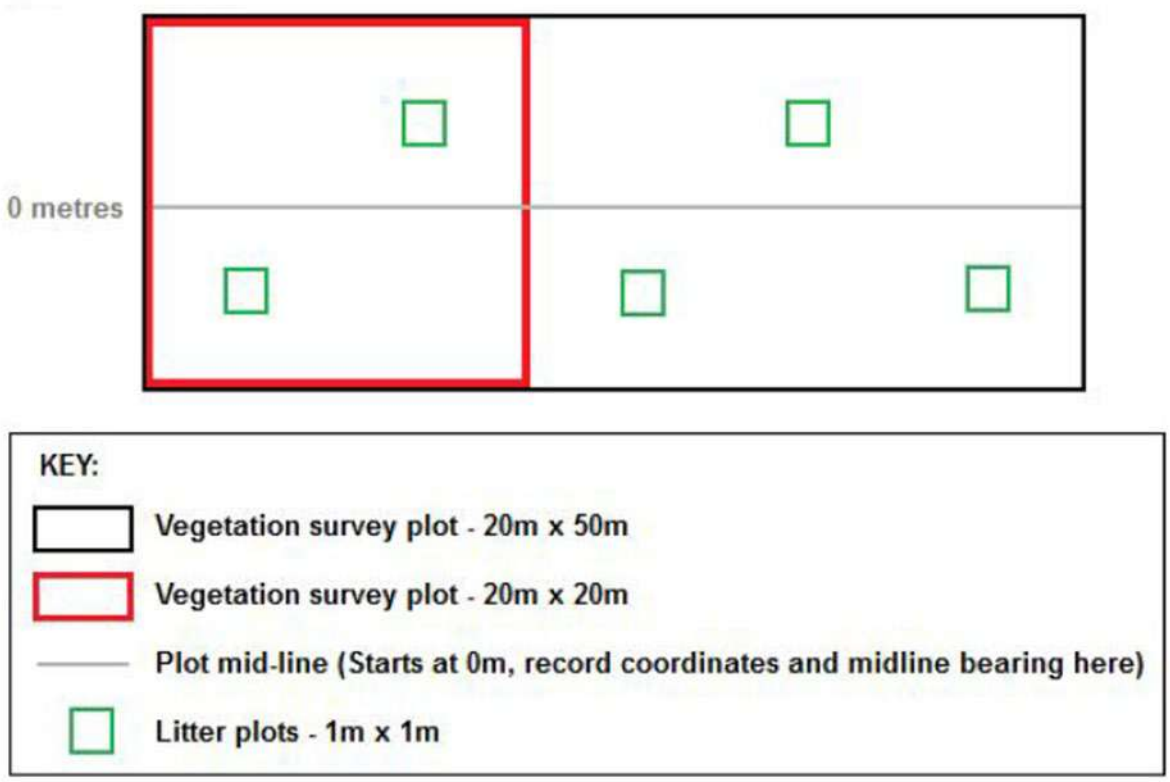


Figure 2.1 Vegetation Integrity Plot Layout

The following site attributes were recorded at each vegetation integrity plot location:

- Location (easting – northing grid type MGA 94, Zone 56).
- Vegetation structure and dominant species and vegetation condition. Vegetation structure was recorded through estimates of percentage foliage cover, average height, and height range for each vegetation layer.

- Native and exotic species richness (within a 400-m squared quadrat): This consisted of recording all species by systematically walking through each 20 m x 20 m plot. The cover and abundance (percentage of area of quadrat covered) of each species was estimated. The growth form, stratum/ layer and whether each species was native/ exotic/ high threat weed was also recorded.
- Number of trees with hollows (1000 m squared quadrat): This was the frequency of hollows within living and dead trees within each 50 m x 20 m plot. A hollow was only recorded if (a) the entrance could be seen: (b) the estimated entrance width was at least 5 cm across: (c) the hollow appeared to have depth: (d) the hollow was at least 1 m above ground and (e) the centre of the tree was located within the sampled quadrat.
- Number of large trees and stem size diversity (1000 m squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 m from the ground) of all living trees (>5 cm DBH) within each 50 m x 20 m plot. For multi-stemmed living trees, only the largest stem was included in the count. Number of large trees was determined by comparing living tree stem DBH against the PCTs benchmarks.
- Total length of fallen logs (1000 m squared quadrat): This was the cumulative total of logs within each 50 m x 20 m plot with a diameter of at least 10 cm and a length of at least 0.5 m.
- Litter cover: This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter <10 cm which is detached from a living plant) from within five 1 m x 1 m sub-plots spaced evenly either side of the 50 m central transect.
- Evaluation of regeneration: This was estimated as the presence/ absence of overstorey species present at the site that was regenerating (i.e. saplings with a diameter at breast height ≤5 cm).

Prior to establishing plot survey locations, vegetation stratification was undertaken to provide a representative vegetation zone for sampling. Stratification involved marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the site and establishing the required number of plots at some of these waypoints.

2.7.3 Native Vegetation Survey Effort

A total of 12 vegetation integrity plots were undertaken as outlined in the methodology contained within the BAM (2020) as described above. The location of these vegetation integrity plots are presented in **Illustration 5.1**.

The co-ordinates, orientations and vegetation type sampled for at each plot is summarised in **Table 2.4** whilst a comparison of the plots completed against BAM plot requirements is provided in **Table 2.5**. Full vegetation integrity plot data is presented in **Appendix B**.

Table 2.4 Location and Orientation of Vegetation Integrity Plots Completed

Plot ID	PCT and Zone	Easting	Northing	Orientation
1	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Moderate**	357089	6618802	193°
2	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Derived**	357115	6618833	293°
3	PCT 3359 - New England Hills Stringybark-Box Woodland - **Moderate**	357350	6618972	6°
4	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Derived**	357004	6618949	175°
5	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Derived**	357024	6618560	39°

Plot ID	PCT and Zone	Easting	Northing	Orientation
6	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Derived**	357189	6618691	287°
7	PCT 3352 - Armidale Quartz Hills Stringybark Forest - **Derived**	357115	6619093	109°
8	PCT 3359 - New England Hills Stringybark-Box Woodland - **Moderate**	357462	6618944	96°
9	PCT 3359 - New England Hills Stringybark-Box Woodland - **Moderate**	357625	6618924	111°
10	PCT 3359 - New England Hills Stringybark-Box Woodland - **Derived**	357365	6618889	90°
11	PCT 3359 - New England Hills Stringybark-Box Woodland - **Derived**	357777	6618842	276°
12	PCT 3359 - New England Hills Stringybark-Box Woodland - **Derived**	358003	6618787	88°

Table 2.5 Minimum Number of Vegetation Integrity Plots Required per Vegetation Zone

Plant Community Type	Vegetation Zone	Extent in Development Footprint (ha)	BAM Minimum Plot Requirement	Plots Completed
PCT 3352 - Armidale Quartz Hills Stringybark Forest	**Moderate**	0.56	1	Plot 1
	Derived	5.72	3	Plot 2, 4, 5, 6 & 7
PCT 3359 - New England Hills Stringybark-Box Woodland	**Moderate**	0	0	Plot 3, 8 & 9
	Derived	0	0	Plot 10, 11 & 12
	Total	**6.28**	**4**	**12**

2.8 Threatened Flora Surveys

This section outlines the flora survey effort completed for candidate threatened flora species that were predicted to have a moderate to high likelihood of occurrence within the site based on the BAM-C, database searches and habitat assessments outlined provided in **Appendix C**. Threatened flora survey effort is provided in **Illustration 5.1.**

2.8.1 Vegetation Integrity Plots

Thirty-minute searches were conducted at each vegetation integrity plot location. Across the site (focusing within development footprint), a total of 12 vegetation integrity plots were undertaken equating to 12 hours of searches for threatened flora species at vegetation integrity plot locations.

2.8.2 Random Meanders

The floristic diversity and possible presence of threatened species was assessed using the random meander survey method. Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (Cropper 1993) and DPE (NSW Department of Planning and Environment 2020b), whereby the recorder walks in a random manner throughout each site undertaking habitat assessments and presence of threatened species. The time spent in each vegetation patch was proportional to the suitability of habitat for candidate threatened flora species.

2.8.3 Parallel Transects

Targeted threatened species surveys employed parallel line traverses where known or potential habitat for candidate threatened flora species occurred within the development footprint and surrounding areas. This survey technique involved ecologists walking parallel line traverses with approximately 5 metres distance between team members. This methodology is consistent with the guidelines for NSW threatened plant surveys (NSW Department of Planning and Environment 2020b).

2.8.4 Flora Microhabitat and Habitat Constraint Assessments

Microhabitat assessments were undertaken for each candidate threatened flora species. This included a review of the habitat constraints listed in the Threatened Biodiversity Data Collection (NSW Department of Planning and Environment 2025b) and comparison to the attributes recorded during field survey.

Habitat constraint assessments included a review of vegetation integrity scores of associated vegetation and observations during field surveys to determine if the potential habitat is degraded to the point where the species is unlikely to be present.

2.9 Threatened Fauna Surveys

This section outlines the fauna survey effort completed for candidate species that were predicted to have a moderate to high likelihood of occurrence within the site based on database searches outlined in **Section 2.3**. Threatened fauna surveys completed within the site were carried out as described below and where applicable, considering the methodology detailed in:

- Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities – Working Draft 2004 (Department of Environment and Conservation 2004)
- Survey Guidelines for Australia's Threatened Birds (Magrath et al. 2010)(Department of Environment Water Heritage and the Arts 2010).
- Threatened Species survey and assessment guidelines: field survey and methods for fauna-Amphibians (Department of Environment and Climate Change 2009)
- Survey guidelines for Australia's threatened frogs (Department of the Environment Water Heritage and the Arts 2010)
- NSW Survey Guide for Threatened Frogs and their habitats- NSW survey guide for the BAM (NSW Department of Planning and Environment 2020c)

- Koala (*Phascolarctos cinereus*) – Biodiversity Assessment Method Survey Guide (Department of Planning and Environment, 2022a)
- 'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (Office of Environment & Heritage 2018)
- Threatened Species Profile Database (NSW Department of Planning and Environment 2025b)

Threatened fauna survey effort within the site is provided in **Section 5.4.2.3** and shown in **Illustration 5.2**.

2.9.1 Fauna Habitat Stratification

Two PCTs were identified within the site, however, different condition classes were identified, which contain various types of habitats for fauna within the site and the development footprint. Both PCT 3352 and 3359 can be categorised into two fauna habitat stratification units, being:

- Grassy woodland (moderate condition state).
- Derived grassland areas (derived condition state).

Fauna habitat stratification units were identified to ensure that fauna surveys were undertaken within the representative habitat type for the target threatened fauna species. The fauna habitat stratification units are outlined in **Table 2.6**.

Table 2.6 Fauna Habitat Stratification Types

Fauna Stratification Units and Related PCTs	Impact area (ha)
Grassy Woodland	
PCT 3352 Armidale Quartz Hills Stringybark Forest - **Moderate**	0.56
PCT 3359 New England Hills Stringybark-Box Woodland - **Moderate**	0
Grassland	
PCT 3352 Armidale Quartz Hills Stringybark Forest - **Derived**	5.72
PCT 3359 New England Hills Stringybark-Box Woodland - **Derived**	0

2.9.2 Fauna Habitat Assessments

Fauna habitat assessments were undertaken to assess the likelihood of a threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the site. Fauna habitat assessments were used to assess whether threatened species were likely to occur within the site. Fauna habitat characteristics assessed included:

- Structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- Presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, forest owls, birds and reptiles
- Presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- Presence of waterways (ephemeral or permanent) and water bodies
- Presence of man-made structures (e.g. culverts) for roosting/ breeding microchiropteran bats.

Table 2.7 Fauna Habitat Assessment Criteria

Habitat Condition	Evaluation Criteria
Good	A full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
Moderate	Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
Poor	Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing in the past.

2.9.3 Diurnal Bird Surveys

Formal 20-minute diurnal bird searches were completed within the site. Bird surveys were completed by actively walking through the site over a period of 20 minutes, a total of 18 bird surveys were undertaken along with other opportunistic surveys during other targeted surveys. All birds were identified to the species level, either through direct observation or identification of calls. Bird surveys were completed during different times of the day, but generally occurred during morning hours (5am-10am) or late afternoon (4pm-6pm). Birds were also recorded opportunistically during all other surveys. Bird surveys also involved looking for habitat features including stick nests (i.e. threatened raptor nests) and large hollow-bearing trees and potential use of these features by threatened birds.

Wherever threatened bird species were absent from the site, habitat assessments were conducted to determine the likelihood that the site might support those species that are known to occur in the region.

2.9.4 Microchiropteran Bat Surveys

Passive Ultrasonic Anabat Bat detection (Anabat Express unit (Titley Scientific, Brendale QLD) was used to record and identify the echolocation calls of microchiropteran bats foraging at within the site where potential habitat was identified. Passive monitoring of survey sites was achieved by setting Anabat Bat detectors to record throughout the night. Two Anabat units were deployed over eight consecutive nights (totalling 17 trap nights).

Anabat Bat detectors recorded bat vocalisations throughout the full night, with the recording starting before dusk and finishing at dawn. Bat activity throughout the night does vary ((Department of Environment and Conservation, 2004);(Taylor & Oneill 1988)), but the peak in activity is usually within a few hours of dusk. Bat activity is used as a substitute for abundance and is based on the number of microchiropteran bat calls recorded during the survey period, including those calls assigned to a species complex (i.e. not positively attributable to an individual species). Calls were analysed using Anabat Insight (Version 2.0.6) software and Decision Tree Analysis with regionally relevant reference calls and published call descriptions (e.g. (Reinhold et al. 2001, Pennay et al. 2004)) and other published call descriptions. The likelihood of species' occurrence on site was further confirmed by referring to distribution maps in the online BatMap application (Australasian Bat Society 2023) and other published distributional information (e.g. (Churchill 2008)). Refer to **Appendix G** for Anabat Analysis.

2.9.5 Herpetological Searches

Herpetofauna active searches were undertaken during the late afternoon and at night. For frogs, the searches targeted wet areas and inundated areas (where applicable). Specimens were either identified visually, by aural recognition of call (frogs only) or were collected and identified. Herpetofauna surveys were completed by two persons over a 30-minute to 60-minute period over numerous surveys with all ground shelter returned to their original position.

2.9.6 Spotlighting

Spotlighting was used to target a variety of arboreal, flying and ground-dwelling mammals, as well as nocturnal birds, reptiles and amphibians. Spotlighting was completed after dusk and completed on foot using high-powered headlamps and hand torches. Sighted animals were identified to the species level.

2.9.7 Call Playback

Call playback was used to survey for nocturnal birds (i.e., Bush-stone Curlew) and amphibians, using standard methods (Debus 1995). Call playback was completed after dusk within the site around key fauna habitat such as ephemeral creek lines, wetlands or woodland patches.

For each survey, an initial listening period of 10 to 15 minutes was undertaken, followed by a spotlight search for 10 minutes to detect any animals in the immediate vicinity. The calls of the target species were then played intermittently for five minutes followed by a 10-minute listening period. Calls from Nature Sound (Stewart 2016) were broadcast using a portable media player and megaphone.

2.9.8 Koala Surveys

2.9.8.1 Koala spot assessment technique (SATs)

Targeted searches for the Koala were completed at eight locations in the site in areas of suitable habitat. Koala feed trees observed in the site predominately consisted of *Eucalyptus caliginosa* (New England Stringybark), *Eucalyptus melliodora* (Yellow Box) and *Eucalyptus blakelyi* (Blakely's Red Gum). At each sampling point, Spot Assessment Technique (SAT) methodology (Department of Planning and Environment, 2022a; Phillips & Callaghan, 2011) was employed, which involved actively searching for Koala faecal pellets for approximately one metre around the trunk of each of 30 trees; specifically targeting feed tree species where possible.

2.9.8.2 Koala spotlighting surveys

Koala spotlighting was done in accordance with the Koala BAM survey guideline (Department of Planning and Environment, 2022a). This involved undertaking two 200m transects (approximately 5.24 ha of Koala habitat within the investigation area) evenly spread throughout suitable habitat (minimum spacing of ≥100m between transects). Spotlighting surveys are undertaken on foot using a hand-held spotlight in order to eye shine and/ or presence of Koalas within the site. Spotlighting transects were repeated on a second night. Due to the isolated patches of potential Koala habitat, spotlighting focused on areas where Koala habitat was present.

BAM STAGE 1 – BIODIVERSITY ASSESSMENT

3. Landscape Context

This chapter addresses the landscape context in accordance with Section 3 of the BAM and provides information on a range of landscape features that occur in the site and surrounding areas. The landscape features outlined below are used to inform the habitat suitability of the site for threatened species and the potential movement of species across the landscape.

3.1 Landscape Features

Landscape features associated with the site are outlined in **Table 3.1** and shown in **Illustration 3.1** to **Illustration 3.6**.

Table 3.1 Summery of the Site Landscape Features

Landscape Feature	Occurrence in the Site
IBRA bioregion	New England Tablelands
IBRA subregion	Armidale Plateau
NSW landscape regions (Mitchell landscapes)	Dingo Spur Meta-sediments (DSM) and Uralla Basalts and Sands (URS)
Local Government Area (LGA)	Uralla
Local Land Service (LLS) region	Northern Tablelands
Botanical subregion	NNT - Northern Tablelands
Rivers, streams and estuaries	Two mapped tributaries occur within the site, these include Spring Creek (2nd order stream) and Reedy Creek (2nd order stream). Spring Creek occurs immediately adjacent to the development footprint and runs in a south to north direction and links with Reedy Creek in northern part of the site. Reedy Creek occurs along the northern boundary of the site and runs in an east to west direction. Reedy Creek is mapped as key fish habitat and also potential threatened fish habitat (Southern Purple Spotted Gudgeon) (Department of Primary Industries 2025). The Project would not impact this tributary.
Important and local wetlands	No mapped important wetlands occur within the site or in close proximity to the site (Department of Climate Change Energy the Environment and Water 2025a).
Connectivity features	No mapped corridors occur within the site; however, one mapped corridor (Eastern Tablelands Complex) occurs to the west of the site (approx. 500 m). Eastern Tablelands Complex corridor broadly links patches of vegetation from east to west. In regard to the site, due to historical clearing, limited connectivity is present in the form of intact patches of vegetation and the site does not provide any significant corridor links within the locality.
Areas containing karst, caves, crevices, cliffs, rocks or other geological features of significance	No areas containing significant geological features occur within the site.
Areas of soil hazard features	No soil hazard features occur within the site.
Areas of outstanding biodiversity value	No areas of outstanding biodiversity value have been declared within the site.

3.2 Native Vegetation Extent

As per the BAM methodology (Section 3.2) a buffer of 1500 m was established around the site and a calculation of native vegetation cover was derived using native vegetation mapping (Department of Planning Industry and Environment 2021) summing values of 'tree cover' and 'tree cover matrix' values.

Approximately 399 ha of native (woody) vegetation was identified within 1500 m of the site (within a total area of 888 ha), therefore a native vegetation cover of approximately 45% was estimated for the purposes of the BAM-C (**Table 3.2**).

Native vegetation extent is shown in **Illustration 3.3**.

Table 3.2 Native Vegetation Cover Assessment

Assessment Area	Total Assessment Area (ha)	Area of Native Vegetation Cover (ha)	Native Vegetation Percentage Cover (%)	Native Vegetation Cover Class
Buffer area	888	399	45%	>30-70%

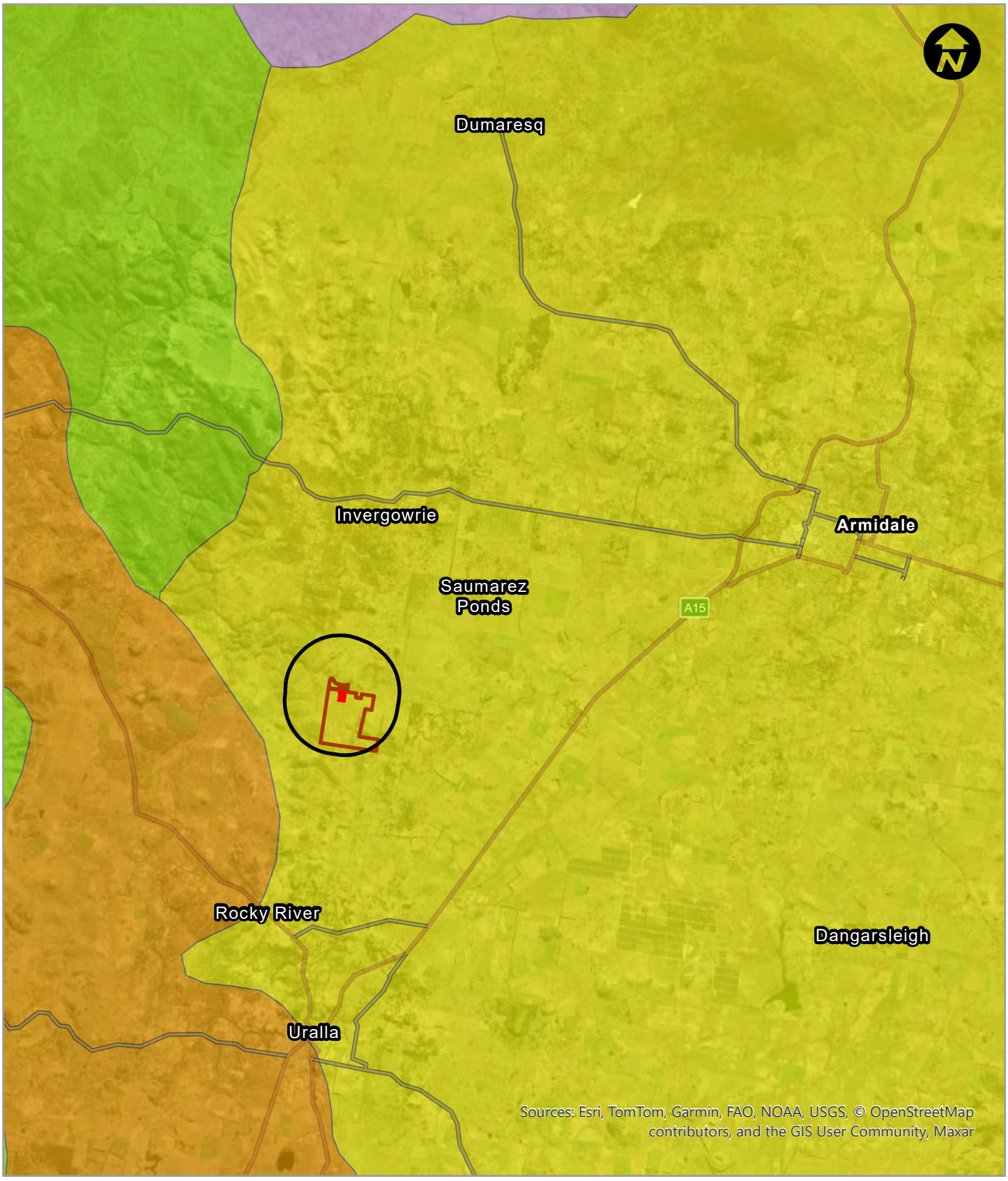
3.3 Patch Size

Patch size is defined under the BAM (NSW Department of Planning and Environment 2020a) as an area of native vegetation that:

- Occurs on the site;
- Includes native vegetation that has a gap of less than 100 m from the next area of moderate to good native vegetation (or ≤ 30 m for non-woody ecosystems); and
- Patch size may extend onto adjoining land that is not part of the site.

Patch size area is assigned to each vegetation zone as a class, being < 5ha, 5-24 ha, 25-100 ha or ≥ 100 ha. A patch size class of ≥ 100 ha was assigned to all moderate vegetation zones patches due to patches having a gap of less than 100 m and patches extending onto adjoining land, in which cumulatively are > 100 ha.

Vegetation Type and Zone	Patch Size Class
PCT 3352 Armidale Quartz Hills Stringybark Forest – **Moderate**	≥ 100 ha
PCT 3359 New England Hills Stringybark-Box Woodland – **Moderate**	≥ 100 ha



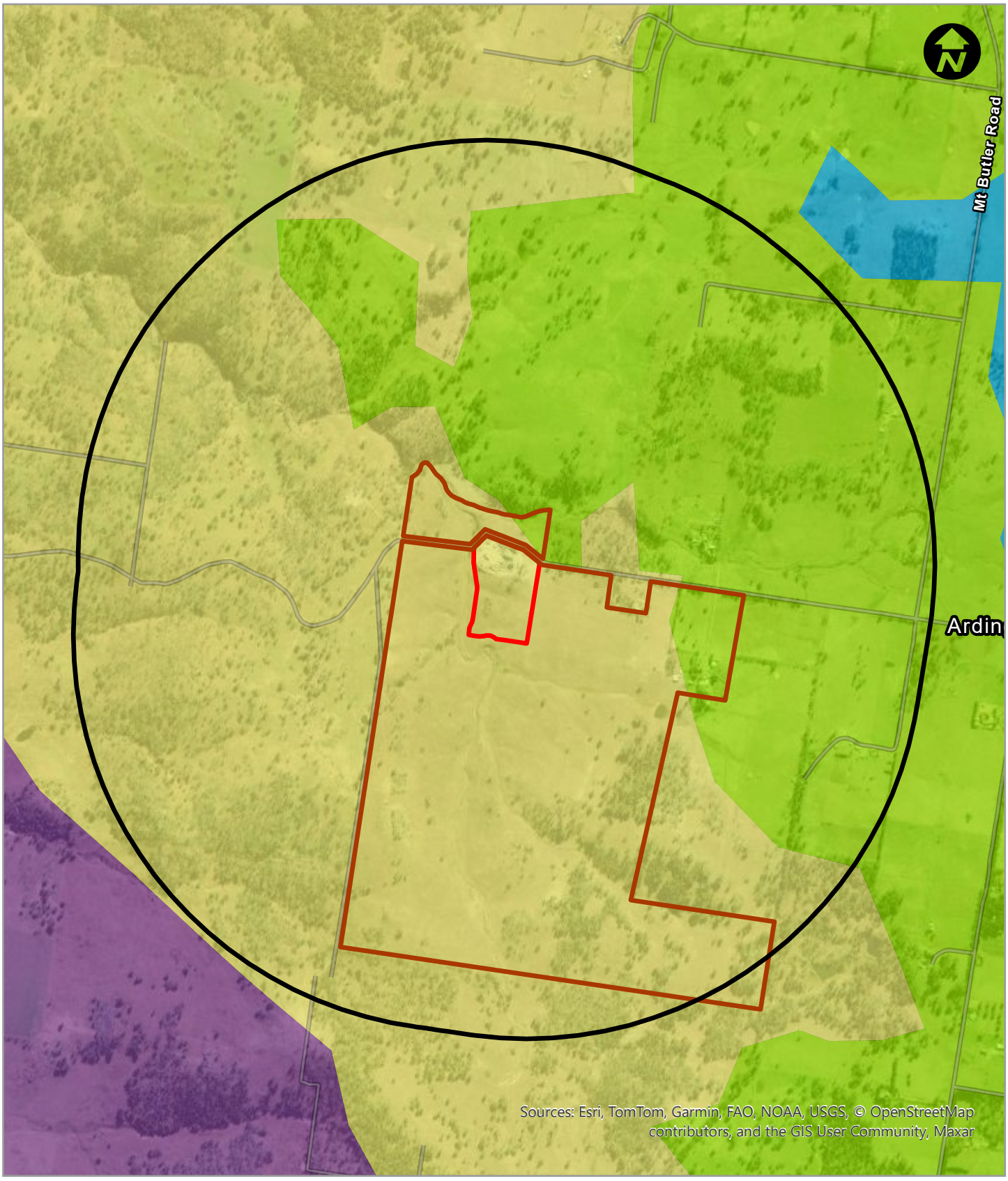
LEGEND

- The site
- 1500m site buffer
- Lot boundary
- Armidale Plateau, New England Tablelands Region
- Bundarra Downs, New England Tablelands Region
- Moredun Volcanics, New England Tablelands Region
- Yarrowyck-Kentucky Downs, New England Tablelands Region

0 3 km

IBRA Landscape - Illustration 3.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, Auricht Projects
Date: 27/02/2025



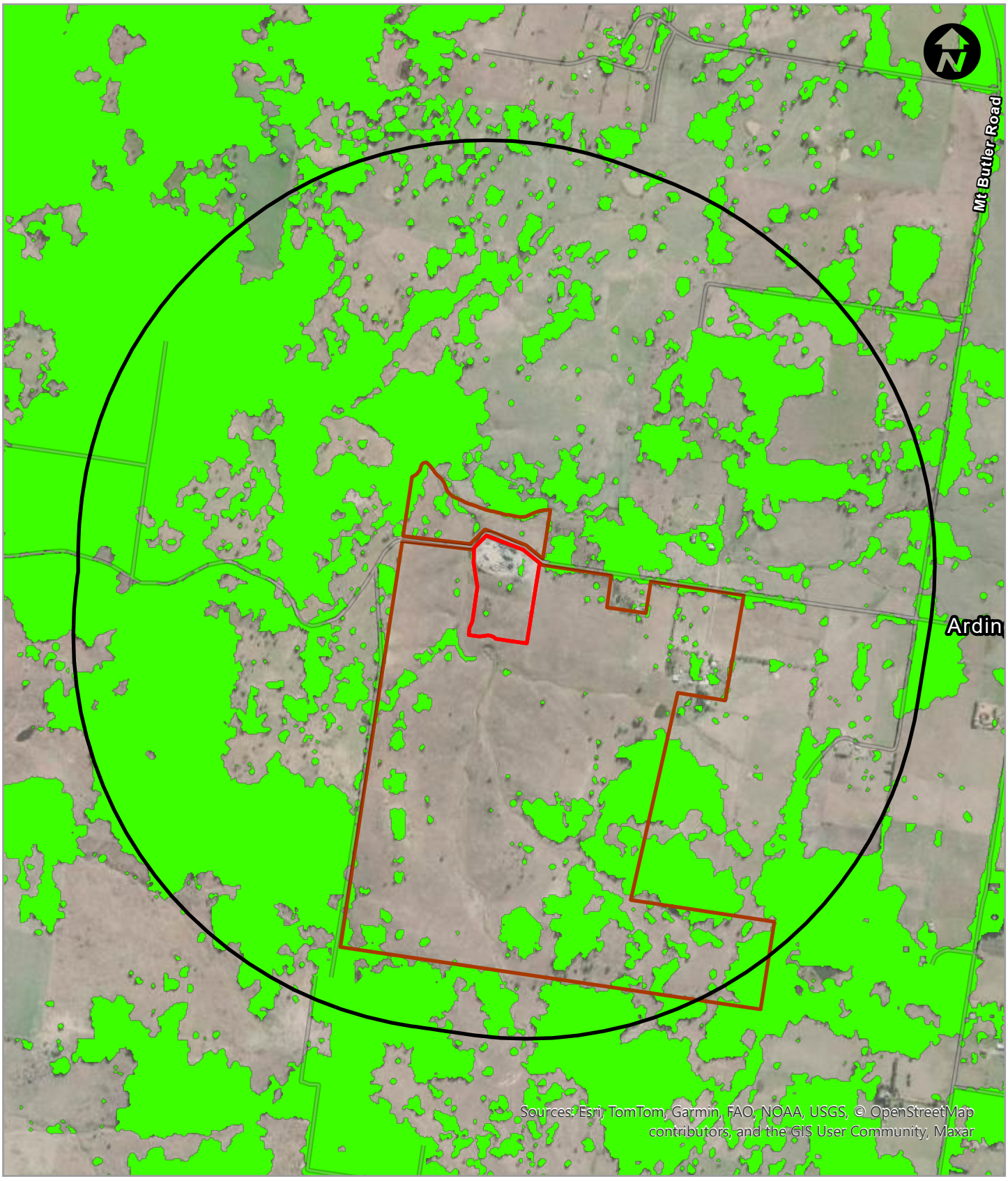
LEGEND

- Development footprint
- 1500m site buffer
- Lot boundary
- Dingo Spur Meta-sediments
- Moonbi - Walcha Granites
- Niangala Plateau and Slopes
- Uralla Basalts and Sands

0 400 Metres

Mitchell Landscapes - Illustration 3.2

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, OEH
Date: 27/02/2025
Revision: A



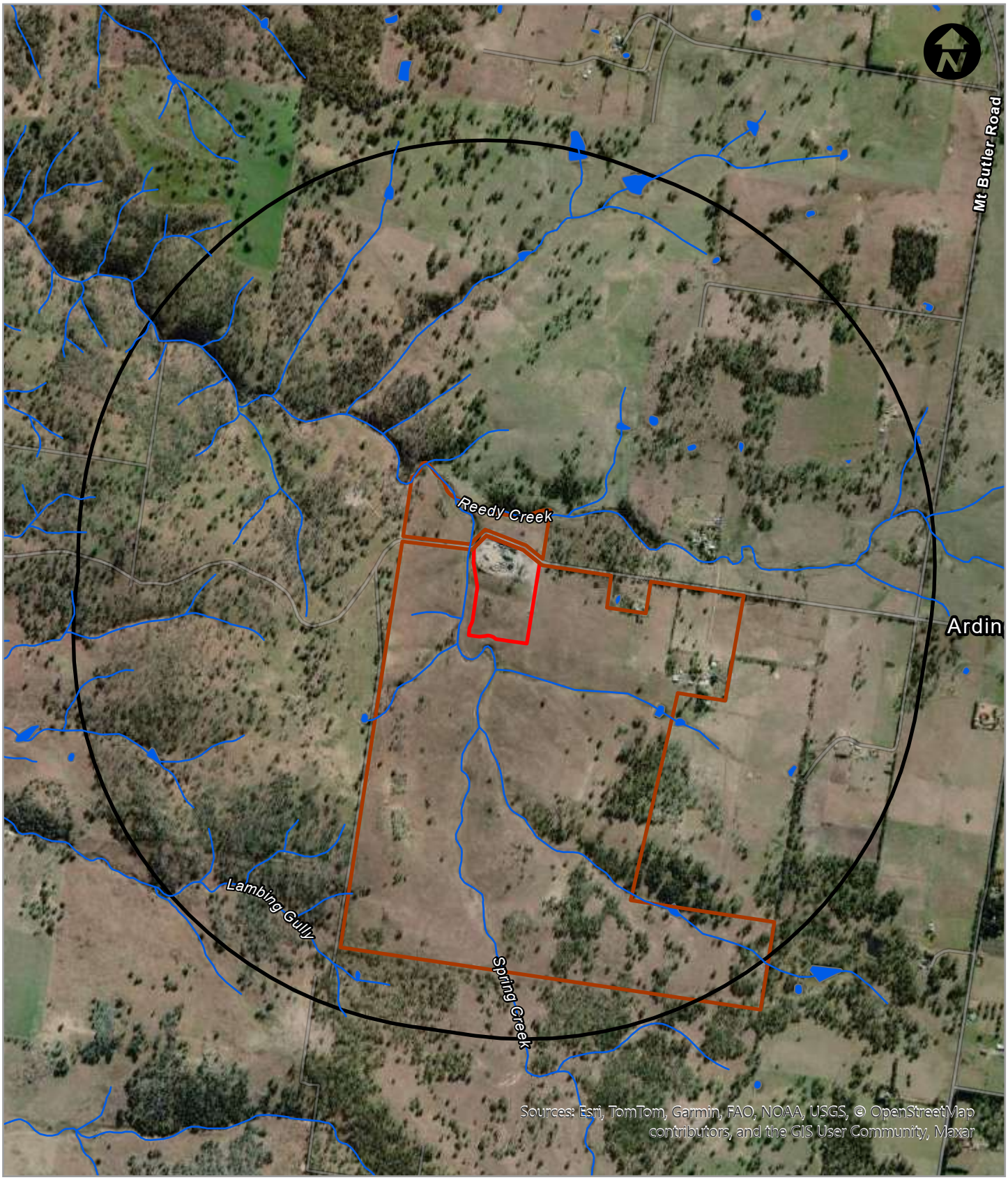
LEGEND

- Development footprint
- 1500m site buffer
- Lot boundary
- Native vegetation extent

0 400 Metres

Native Vegetation Extent - Illustration 3.3

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, OEH
Date: 27/02/2025
Revision: A



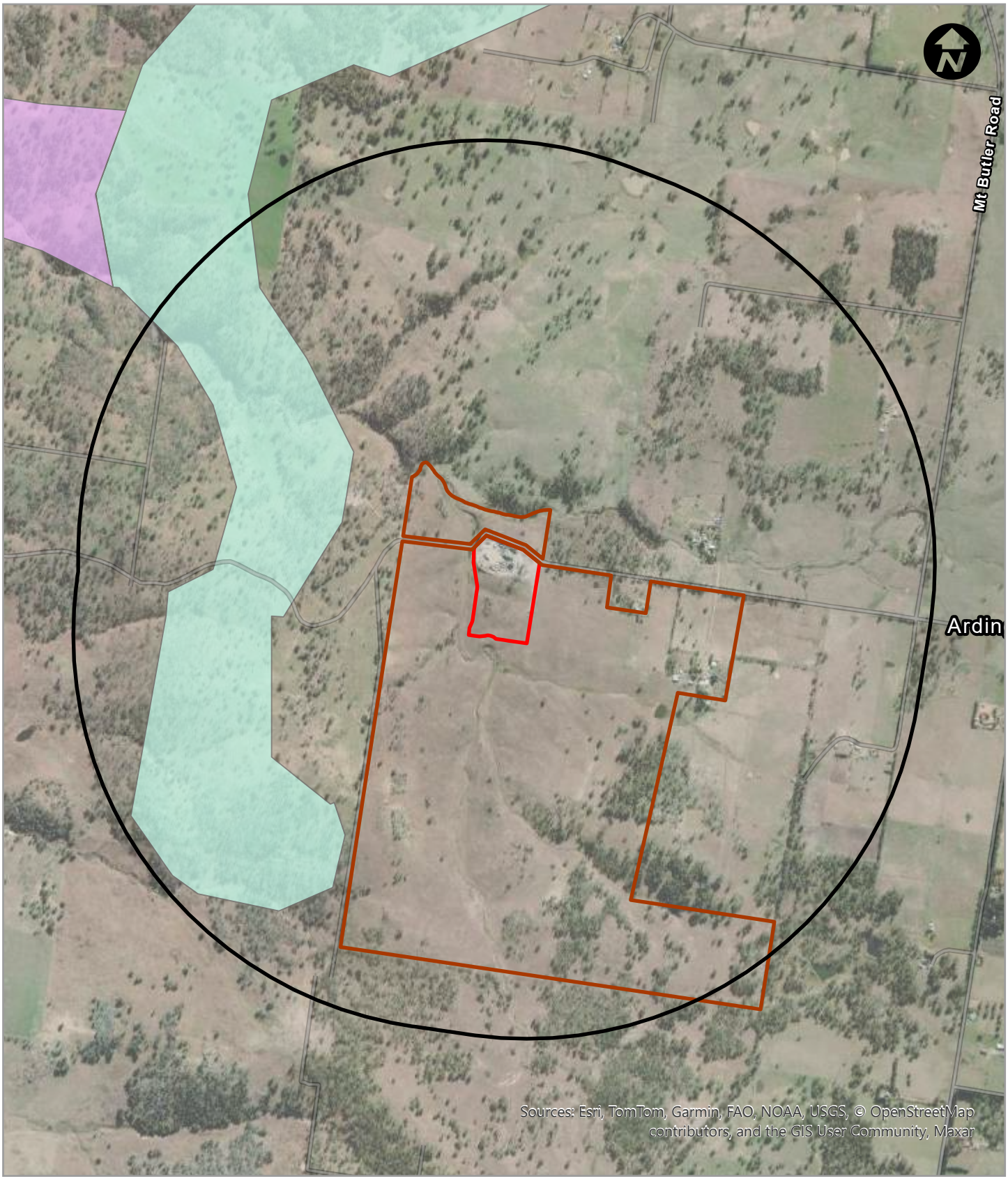
LEGEND

- Development footprint
- 1500m site buffer
- Lot boundary
- Waterbody

0 420 Metres

Water Features - Illustration 3.4

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, Spatial Services
Date: 27/02/2025
Revision: A



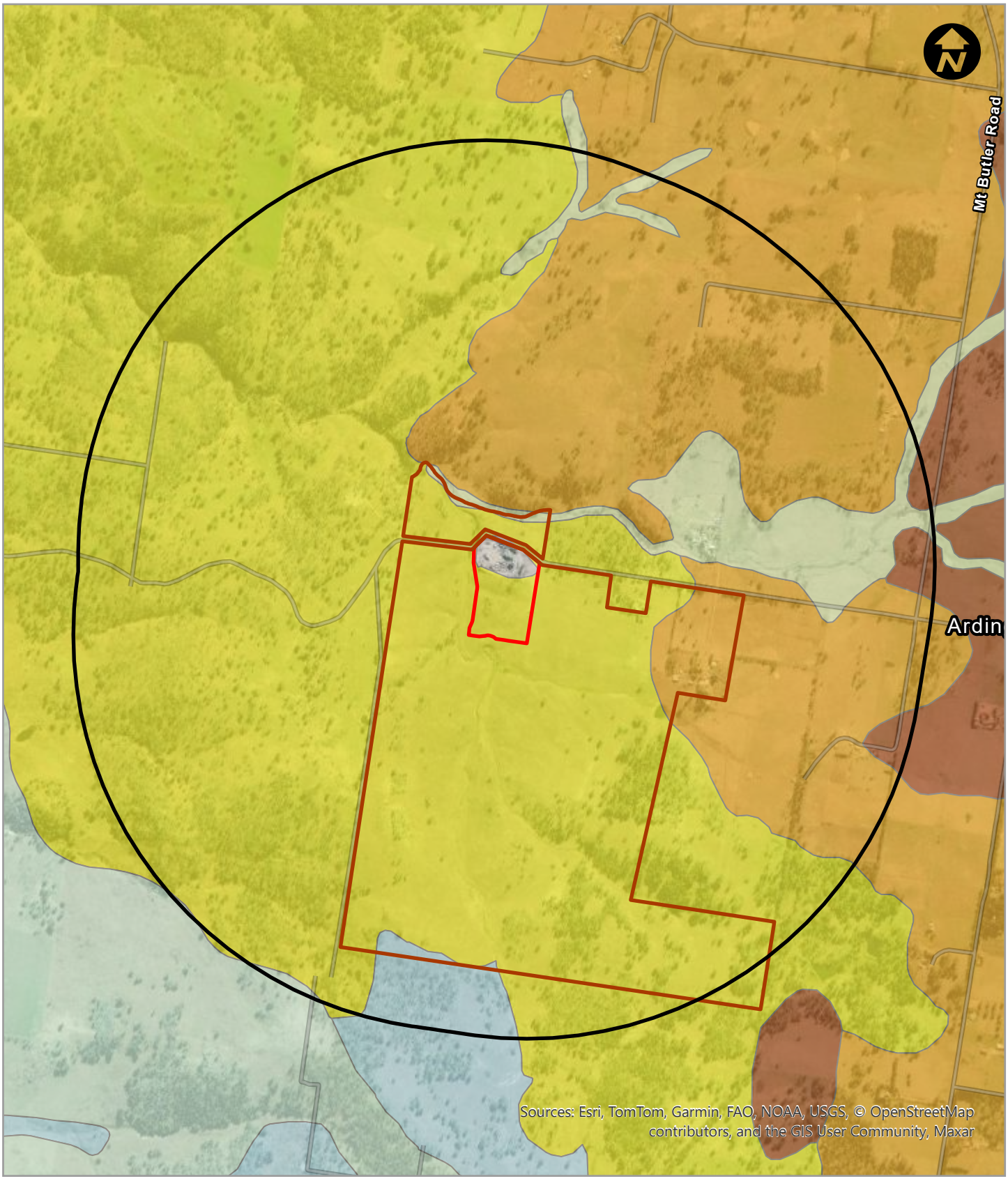
LEGEND

- Development footprint
- 1500m site buffer
- Lot boundary
- Mooneys-Gully, subregional fauna corridor, habitat for DGT assemblage
- Rocky River, subregional fauna corridor, habitat for DGT/DWT assemblages

0 400 Metres

Connectivity - Illustration 3.5

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, OEH
Date: 27/02/2025
Revision: A



LEGEND

- Development footprint
- Lot boundary
- Dermosols
- Ferrosols
- Kurosols
- Kurosols (natric)
- Tenosols
- Vertosols

0 400 Metres

Geology and Soils - Illustration 3.6

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery, OEH
Date: 27/02/2025
Revision: A

4. Native vegetation

This chapter address native vegetation in accordance with Chapter 4 of the BAM (2020) and matters relating to the BC Act. Specifically, this section maps and identifies all native and non-native vegetation types within the site and provides an assessment of vegetation integrity and whether any recorded vegetation types correspond to threatened ecological communities listed under the BC Act.

4.1 Overview of Vegetation Recorded on Site

Native vegetation has been recorded by vegetation formation, class and associated PCT in accordance with the NSW BioNet Vegetation Classification System (NSW Department of Planning and Environment 2022a). The mapping of vegetation zones was based on the sampling of native vegetation broad conditions states as described in **Section 2.7.1**.

Vegetation assessment was completed over multiple days between the periods of October 2022 - April 2023 with 12 integrity plots completed (refer to **Illustration 5.1**)

All plot data relevant to native vegetation being removed for the Project was entered into the BAM-C (Case 40230) in accordance with the BAM methodology. Native vegetation not affected by the Project was not entered into the BAM-C.

A total of two native PCT were recorded within the site and along access road (**Table 4.1**). A detailed description of PCTs recorded including PCT justification, floristic and structural composition along with representative photos are provided in **Section 4.1**. The extent of each PCT and zone is shown in **Illustration 4.1** with plot data provided in **Appendix B.**

Table 4.1 Vegetation Communities and Vegetation Zones

Plant Community Type	Vegetation Class	Vegetation Zone	PCT % Cleared	Associated TEC	Patch Size	Composition Score	Structure Condition Score	Function Score	Vegetation Integrity Score	Investigation area (ha)	Impact area (ha)
PCT 3352 - Armidale Quartz Hills Stringybark Forest	New England Grassy Woodlands	**3352_Derived**	74.61%	Not associated	≥100 ha	39.5	51.2	1.3	**14**	**18.13**	**5.72**
		3352_Moderate				30.1	72.9	53.6	**49**	**1.26**	**0.56**
PCT 3359 - New England Hills Stringybark-Box Woodland	New England Grassy Woodlands	**3359_Derived**	82.44%	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	≥100 ha	38.2	51.3	12.7	**29.2**	**4.45**	**0**
		3359_Moderate				53.9	57.7	63.3	**58.2**	**3.98**	**0**
									Total	**27.82**	**6.28**

356900 357200 357500 357800

6619000 6618800 6618600

Reedy Creek

Spring Creek

Rose Hill Rd

Lot 1
DP1302364

Lot 2
DP1302364

1 2 3 4 5 6 7 8 9 10 11 12

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA 1994 MGA Zone 56

LEGEND

- Development footprint
- Investigation area
- Cadastre
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Derived condition
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Moderate condition
- PCT 3359 - New England Hills Stringybark-Box Woodland - Derived condition
- PCT 3359 - New England Hills Stringybark-Box Woodland - Moderate condition
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland - Critically Endangered (BC Act & EPBC Act)
- Watercourse
- BAM plot

0 60 Metres

Vegetation Within the Site - Illustration 4.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

4.1.1 PCT 3352 - Armidale Quartz Hills Stringybark Forest

Field surveys confirmed the presence of PCT 3352 occurring within the site. A summary of PCT 3352 is provided in **Table 4.2** and shown in **Plate 4.1** to **Plate 4.4**. The extent of PCT 3352 within the site is shown in **Illustration 4.1**.

Table 4.2 Summary of PCT 3352 Armidale Quartz Hills Stringybark Forest

Description	
PCT justification	PCT 3352 occurred as grassy woodland in small patches within the site and also as a cleared state of this PCT. PCT 3352 occurs predominately within and around the existing quarry. Historical clearing within the site has resulted in this PCT occurring in derived condition state with the lack of remnant canopy species. Patches where remnant canopy still persist were considered moderate condition due to presence of upper canopy. In general, the canopy was dominated by *Eucalyptus caliginosa* (New England Stringybark). The midstorey was sparse and dominated with *Lissanthe strigosa* (Peach Heath) and *Pimelea linifolia* (Slender Rice Flower). The understorey was predominately grassy with a variety of herbs and forbs. Dominant species included *Sporobolus creber* (Slender Rat's Tail Grass), *Eragrostis leptostachya* (Paddock Lovegrass) and *Themeda triandra* (Kangaroo Grass), *Eragrostis alveiformis* (Granite Lovegrass) and *Chrysocephalum apiculatum* (Yellow Buttons). In areas near Spring Creek, the presence of more wet tolerant ground species were observed including *Paspalum distichum* (Water Couch), *Juncus usitatus* (Common Rush) and *Cenchrus purpurascens* (Swamp Foxtail). PCT 3352 is described as an open forest to woodland with tall, mid-dense to sparse canopy almost always includes *Eucalyptus caliginosa*, above a sparse to very sparse stratum of scattered low to tall shrubs that commonly includes *Lissanthe strigose.* The ground layer is typically low, dense and commonly has high cover of tussocks and forbs. Based on floristic, geographic and geological characteristics, this vegetation type is considered consistent with the description and distribution information outlined for PCT 3352 within the BioNet Vegetation Classification, and based on this was deemed 'best fit' PCT.
Vegetation class	New England Grassy Woodlands
Vegetation formation	Grassy Woodlands
Conservation status	Not associated with a TEC
SAII entity	N/A
% cleared	74.61%
Dominant canopy species	*Eucalyptus caliginosa*
Dominant midstorey species	*Lissanthe strigosa, Pimelea linifolia* and *Leptospermum polygalifolium,*
Dominant ground cover species	*Sporobolus creber, Eragrostis leptostachya, Rumex brownii, Themeda triandra, Chrysocephalum apiculatum, Bothriochloa spp., Cenchrus purpurascens, Juncus usitatus, Paspalum distichum, Eragrostis alveiformis* and *Microlaena stipoides*.
Vegetation zone & condition	**3352_Moderate** – The vegetation displayed all structural growth forms related to grassy woodland formation, however, components of these layers have been reduced and disturbed due to agricultural practices. Despite this, presence of native species diversity was relatively moderate and weed diversity and cover was relatively low. **3352_Derived** – Over-storey structural components have either entirely been removed or are severely reduced with some regrowth of tree species. Presence of shrubs was present but sparse. These zones were predominately grassy areas with native species diversity was relatively low to moderate and weed diversity and cover was high in some areas.

Description	
Extent	**3352_Moderate =** 0.56 ha within development footprint & 1.26 ha within the investigation area **3352_Derived =** 5.72 ha within development footprint & 18.13 ha within the investigation area

Plate 4.1 PCT 3352 – Moderate condition (Plot 1)

Plate 4.2 PCT 3352 – Derived condition (Plot 4)

Plate 4.3 PCT 3352 – Derived condition (Plot 2)

Plate 4.4 PCT 3352 – Derived condition (Plot 6)

4.1.2 PCT 3359 New England Hills Stringybark-Box Woodland

Field surveys confirmed the presence of PCT 3359 occurring within the site. A summary of PCT 3359 is provided in **Table 4.3** and shown in **Plate 4.5** to **Plate 4.8**. The extent of PCT 3359 within the site is shown in **Illustration 4.1**. PCT 3359 was not observed to occur within the development footprint, its extent occurred along Rose Hill Road and to the north-east of the proposed development footprint.

Table 4.3 Summary of PCT 3359 New England Hills Stringybark-Box Woodland

Description	
PCT justification	PCT 3359 occurred as grassy woodland in the north-eastern portion of the site and along Rose Hill Road. Historical clearing within the site has resulted in this PCT occurring in derived condition state with the lack of remnant canopy species. Patches where remnant canopy still persist were considered moderate condition due to presence of upper and mid-storey layers. In general, the canopy was dominated by *Eucalyptus caliginosa* (New England Stringybark), *Eucalyptus melliodora* (Yellow Box) and *Eucalyptus blakelyi* (Blakely's Red Gum). The midstorey was sparse and dominated with *Lissanthe strigosa* (Peach Heath), *Pultenaea microphylla* (Spreading Bush-pea) and *Rubus parvifolius* (Native Raspberry). The understorey was predominately grassy with a variety of herbs and forbs. Dominant species included *Sporobolus creber* (Slender Rat's Tail Grass), *Poa labillardierei var. labillardierei* (Tussock), *Themeda triandra* (Kangaroo Grass), *Microlaena stipoides* (Weeping Grass) and *Bothriochloa spp*. PCT 3352 is described as an open forest with a mid-stratum of dry and soft-leaved species and a mid-dense grassy ground layer that is widespread on slopes and rises of the low hills of the New England Tableland. The canopy always includes box eucalypts (*Eucalyptus melliodora* or *Eucalyptus bridgesiana*) and stringybarks (usually *Eucalyptus caliginosa*), commonly associated with *Eucalyptus blakelyi*. The mid-dense ground layer is mainly comprised of graminoids and forbs with some twiners and hardy ferns. Notable understorey species includes *Microlaena stipoides*, *Geranium solanderi* and *Poa spp*. Based on floristic, geographic and geological characteristics, this vegetation type is considered consistent with the description and distribution information outlined for PCT 3359 within the BioNet Vegetation Classification, and based on this was deemed 'best fit' PCT.
Vegetation class	New England Grassy Woodlands
Vegetation formation	Grassy Woodlands
Conservation status	Associated with *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* – Critically Endangered (BC Act) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – Critically Endangered (EPBC Act)
SAII entity	Yes
% cleared	82.44%
Dominant canopy species	*Eucalyptus caliginosa*, *Eucalyptus melliodora* and *Eucalyptus blakelyi*
Dominant midstorey species	*Lissanthe strigosa*, *Pultenaea microphylla* and *Rubus parvifolius*
Dominant ground cover species	*Sporobolus creber*, *Poa labillardierei var. labillardierei*, *Themeda triandra*, *Microlaena stipoides* and *Bothriochloa spp*.
Vegetation zone & condition	**3359_Moderate** – The vegetation displayed all structural growth forms related to grassy woodland formation, however, components of these layers have been reduced and disturbed due to agricultural practices. Despite this,

Description	
	presence of native species diversity was relatively moderate and weed diversity and cover was relatively low. **3359_Derived** – Over-storey structural components have either entirely been removed or are severely reduced with some regrowth of tree species. Presence of shrubs was present but sparse. These zones were predominately grassy areas with native species diversity was relatively low to moderate and weed diversity and cover was high in some areas.
Extent	**3359_Moderate =** does not occur within development footprint & 3.98 ha within the investigation area **3359_Derived =** does not occur within development footprint & 4.45 ha within the investigation area

Plate 4.5 (Plot 3) PCT 3359 – Moderate condition

Plate 4.6 (Plot 8) PCT 3359 – Moderate condition

Plate 4.7 (Plot 10) PCT 3359 – Derived condition

Plate 4.8 (Plot 11) PCT 3359 – Derived condition

4.2 Threatened Ecological Communities

Native vegetation recorded within the site is considered to meet the final determination of one threatened ecological community listed under the BC Act being: *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – Critically Endangered (BC Act).

A comparison of the final determination for this threatened ecological community and candidate PCT is provided in **Table 4.4**. Each element of the final determination including locality, species composition, characteristic species and resilience is compared to each condition class for candidate PCTs to determine if vegetation recorded within the investigation area is consistent with the criterion.

4.2.1 White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed as Critically Endangered under the BC Act.

The following recorded PCT was considered a candidate to form part of the BC Act listed *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*: PCT 3359 New England Hills Stringybark-Box Woodland.

To be considered consistent with the Critically Endangered listing under the BC Act, the vegetation must be consistent with the final determination for *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020).

Vegetation recorded in derived condition and as native plantings were not considered to retain a diverse and functional understorey due to historic and ongoing disturbances. These patches were mostly fragmented, isolated from larger connected patches of native vegetation and considered unlikely respond to assisted natural regeneration. It is assumed in these conditions that the natural soil seed bank is not intact and is therefore, not considered further in meeting the final determination for the Critically Endangered listing for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

A comparison of PCT 3359 recorded in all condition states and assessed against the final determination for the threatened *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC is provided in **Table 4.4**.

The assessment concluded that the following vegetation types and zones meet the BC Act listing for Grassy Woodland and Derived Native Grassland:

- PCT 3359 New England Hills Stringybark-Box Woodland – Moderate condition.
- PCT 3359 New England Hills Stringybark-Box Woodland – Derived condition.

A summary of the extent of *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC within the site is provided in **Table 4.5**. It is important to note, that whilst this community was recorded within the site, it does not occur within the proposed development footprint and unlikely to be impacted by the Project.

Table 4.4 Correlation of PCT 3359 against scientific determination criteria for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland threatened ecological community

Final Determination Listing Criteria	PCT 3359 – Moderate condition	PCT 3359 – Derived condition
Location: occurs within the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, North Coast, South Eastern Highlands, South East Corner, South Western Slopes and Riverina IBRA Bioregions in NSW.	**Yes** – the site occurs within the New England Tableland Bioregion.	
Altitude: generally occurs below 600–700m ASL however can occur at elevations to 1200m in northern tableland region.	**Yes** – the site occurs at approximately 900m ASL within the elevation range for this community (600-1200m).	
Topography and geology: known to occur on hilly to undulating landscapes in areas with soils of moderate fertility derived from a range of lithologies, including alkaline and acid volcanics, granites, sediments, serpentinites and metamorphics.	**Yes** – occurs on flats and hilly undulating landscapes on soils of moderate fertility derived from a range of lithologies listed in the scientific determination for this TEC.	
Structure: occurs as either a grassy open woodland or as derived native grasslands.	**Yes –** occurs as open grassy woodlands.	**Yes –** occurs as derived native grasslands.
Floristic canopy composition: typically dominated by *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum) in the eastern parts of its range (generally the tablelands above 600m ASL). In the north-east, species include *Angophora floribunda* (Rough-Barked Apple), *E. bridgesiana* (Apple Box) and occasionally *E. caliginosa* (Broad-Leaved Stringybark) or *E. youmanii* (Youman's Stringybark)	**Yes –** is dominated by *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum). Occurrence of *E. caliginosa* (New England Stringybark) also.	**Partly** – canopy predominately removed from this zone, however, regenerative canopy species of *Eucalyptus melliodora & Eucalyptus blakelyi* were recorded.
Floristic composition as detailed in Part 1 of the Scientific Determination.	**Yes –** several of the characteristic species identified in the scientific determination were recorded from Q3, Q8 & Q9.	**Yes**, several of the characteristic species identified in the scientific determination were recorded from Q10, Q11 & Q12
Meet TEC criteria?	**Yes, meets TEC**	**Yes, meets TEC**

Table 4.5 Summary of White Box – Yellow Box – Blakely's Red Gum grassy woodlands within the investigation area and impact area

TEC	PCT and Zone	BC Act	Investigation area (ha)	Impact area (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	PCT 3359 - Derived	CE	4.45	0
	PCT 3359 - Moderate		3.98	0
Total extent of TEC			**8.43**	**0**

5. Threatened Species

5.1 Identification of Threatened Species

This chapter addresses threatened species in accordance with Chapter 5 of the BAM (2020) and matters relating to the BC Act.

Following input of all plot data into the BAM-C, a list of threatened species with potential to occur at the site was generated. The BAM-C sorts threatened species into two biodiversity credit classes as follows:

1. **Ecosystem credit species**: are threatened species whose occurrence can generally be predicted by vegetation surrogates and/ or landscape features, or that have a low probability of detection using targeted surveys. These are identified in the Threatened Biodiversity Data Collection (TBDC) as ecosystem credit species. Targeted survey is not required for these species.
2. **Species credit species**: are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Threatened species or specific components of species habitat are identified in the TBDC and BAM-C.

5.2 Recorded Threatened Species

A total of 52 fauna species and 117 flora species were identified during field surveys. Of these, five threatened species listed under the BC and/ or EPBC Act were recorded within the site (**Table 5.1**).

Table 5.1 Recorded Threatened Species Within The Site

Scientific Name	Common Name	BC Act	EPBC Act	Credit Type
Fauna				
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Ecosystem
Miniopterus australis	Little Bentwing-bat	V	-	Dual (considered only as Ecosystem)
Miniopterus orianae oceanensis	Large Bentwing-bat	V	-	Dual (considered only as Ecosystem)
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Ecosystem
Vespadelus troughtoni	Eastern Cave Bat	V	-	Species

V = Vulnerable

5.3 Ecosystem Credit Species

Ecosystem credit threatened species were assessed using information about site context, PCTs and vegetation integrity attributes collected during the field surveys, and data from the TBDC as required by subsections 5.3.1 and 5.3.2 of the BAM.

An overview of the process for determining predicted ecosystem credit species is as follows:

- **Step 1**: All PCTs, associated vegetation zones and plot data being impacted are loaded into the calculator (refer to **Section 4** of this report).
- **Step 2**: A list of predicted ecosystem credit species is generated from the BAM Calculator (refer to **Section 5.3.1** and **Table 5.2**).
- **Step 3**: Justification for inclusion of any additional predicted ecosystem credit species based on the outcome from other database searches, local data sources and likelihood of occurrence assessments (refer to **Section 5.3.2**, and **Appendix C** and **Appendix D**).
- **Step 4**: Justification for exclusion of any predicted ecosystem credit species based on the specific geographic and/ or habitat constraints listed in the BAM-C (refer to **Section 5.3.3**, and **Appendix C** and **Appendix D**).
- **Step 5**: Finalise predicted ecosystem credit species associated with each vegetation zone within the site (refer to **Sections 9.1.3** and **12.2**, and **Appendix F**).

5.3.1 Predicted Ecosystem Credit Species Generated from BAM Calculator

A list of predicted ecosystem credit species was generated from the BAM-C based on associated plant community types within the site (refer to **Table 5.2**).

Table 5.2 List of BAM-C Predicted Ecosystem Species

Scientific Name	Common Name	BC Act	Dual Credit Species?	Associated PCTs
Birds (16)				
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	No	PCT 3352
Chthonicola sagittata	Speckled Warbler	V	No	PCT 3352
Circus assimilis	Spotted Harrier	V	No	PCT 3352
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	No	PCT 3352
Daphoenositta chrysoptera	Varied Sittella	V	No	PCT 3352
Falco subniger	Black Falcon	V	No	PCT 3352
Glossopsitta pusilla	Little Lorikeet	V	No	PCT 3352
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	Yes	PCT 3352
Hieraaetus morphnoides	Little Eagle	V	Yes	PCT 3352
Hirundapus caudacutus	White-throated Needletail	V	No	PCT 3352
Lathamus discolor	Swift Parrot	E	Yes	PCT 3352
Lophoictinia isura	Square-tailed Kite	V	Yes	PCT 3352
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	No	PCT 3352
Petroica boodang	Scarlet Robin	V	No	PCT 3352
Petroica phoenicea	Flame Robin	V	No	PCT 3352
Stagonopleura guttata	Diamond Firetail	V	No	PCT 3352
Mammals (3)				
Dasyurus maculatus	Spotted-tailed Quoll	V	No	PCT 3352

Scientific Name	Common Name	BC Act	Dual Credit Species?	Associated PCTs
Pseudomys oralis	Hastings River Mouse	E	No	PCT 3352
Pteropus poliocephalus	Grey-headed Flying-fox	V	Yes	PCT 3352

V = Vulnerable; E = Endangered; CE = Critically Endangered

5.3.2 Justification for Inclusion of Any Additional Predicted Ecosystem Credit Species

Four additional predicted ecosystem credit species were included into the BAM-C predicted list (refer to **Table 5.3**).

Table 5.3 Justification for Inclusion of Any Additional Predicted Ecosystem Credit Species

Scientific Name	Common Name	BC Act	Justification for Inclusion	Associated PCTs
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	**Recorded** – during targeted surveys (Anabat)	PCT 3352
Scoteanax rueppellii	Greater Broad-nose Bat	V	**Recorded** – during targeted surveys (Anabat)	PCT 3352
Miniopterus orianae oceanensis	Large Bentwing-bat	V	**Recorded** – during targeted surveys (Anabat)	PCT 3352
Miniopterus australis	Little Bentwing-bat	V	**Recorded** – during targeted surveys (Anabat)	PCT 3352

V = Vulnerable

5.3.3 Justification for Exclusion of Any Predicted Ecosystem Credit Species

No predicted ecosystem credit species were excluded from BAM-C predicted list.

Table 5.4 Justification for Exclusion of Any Predicted Ecosystem Credit Species

Scientific Name	Common Name	BC Act	Justification for Exclusion
Calyptorhynchus lathami	Glossy Black-Cockatoo	E	**Habitat constraint –** *Presence of Allocasuarina and casuarina species* The field investigations and habitat assessments did not identify the presence of *Allocasuarina* and *Casuarina* species and therefore the site is unlikely to provide foraging habitat for this species and as a result was excluded as an ecosystem credit species.
Ephippiorhynchus asiaticus	Black-necked Stork	V	**Habitat constraint –** *Swamps or Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these swamps/ waterbodies* The field investigations and habitat assessments did not identify the presence of suitable habitat in the form wetlands or large waterbodies therefore the site is unlikely to provide foraging habitat for this species and as a result was excluded as an ecosystem credit species.

V = Vulnerable; E = Endangered

5.4 Species Credit Species

Species credit species were assessed using information about site context, PCTs and vegetation integrity attributes collected during the field surveys, and data from the TBDC as required by Section 5.2.3 of the BAM (2020) in conjunction with a habitat assessment.

An overview of the process for determining candidate species credit species is presented below:

- **Step 1:** All PCTs, associated vegetation zones and plot data are loaded into the BAM-C (refer to **Section 4.1**).
- **Step 2:** A list of candidate species credit species is generated from the BAM-C (refer to **Section 5.4.1** and **5.4.2**).
- **Step 3:** Justification for inclusion of any additional species credit species based on the outcome from other database searches, local data sources and habitat suitability assessments (refer to **Sections 5.4.1.1** and **5.4.2.1**, **Appendix C** and **Appendix D**).
- **Step 4**: Justification for exclusion of any species credit species identified in the steps above (refer to **Sections 5.4.1.2** and **5.4.2.2**, **Appendix C** and **Appendix D**).
- **Step 5:** Finalise candidate species credit species associated with each vegetation zone for site.
- **Step 6:** Undertake target surveys for candidate threatened species or prepare an expert report or assume presence (refer to **Section 5.4.1.3** and **5.4.2.3**).
- **Step 7:** Assessment of candidate threatened species to determine the proposed affected species list (refer to **Section 5.4.1.3** and **5.4.2.3**).
- **Step 8**: Define threatened species impact (individual count or species polygon area count) (refer to Section 9.1.4).
- **Step 9:** Calculate threatened species impact using BAM-C (see **Chapter 12.2.2** and **Appendix F**).

5.4.1 Threatened Flora Species Credit Species

A list of candidate threatened flora species credit species was generated from the BAM-C based on associated vegetation types recorded within the site. Candidate threatened flora species are presented in **Table 5.5**.

Table 5.5 List of BAM-C Threatened Flora Species Credit Species

Scientific Name	Common Name	BC Act	SAII	Associated PCTs
Dichanthium setosum	Bluegrass	V	No	PCT 3352
Eucalyptus magnificata	Northern Blue Box	E	No	PCT 3352
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	No	PCT 3352

V = Vulnerable; E = Endangered

5.4.1.1 Justification for Inclusion of Any Additional Threatened Flora Species Credit Species

In identifying the candidate threatened flora species list for further assessment, no additional threatened flora species credit species are required to be included.

5.4.1.2 Justification for Exclusion of Any Additional Threatened Flora Species Credit Species

In refining the candidate threatened flora species list for further assessment, the following exclusions to the BAM-C preliminary candidate list have been considered (refer to **Table 5.6**). Species exclusions were based on database searches, likelihood of occurrence assessments (**Appendix C**) or habitat constraints as outlined in the BAM-C.

Table 5.6 Justification for Exclusion of Any Additional Threatened Flora Species Credit Species

Scientific Name	Common Name	BC Act	SAII	Associated PCTs or Habitat Features	Justification for Exclusion
Chiloglottis platyptera	Barrington Tops Ant Orchid	V	No	PCT 3352	**Habitat degraded** – the species grows in moist areas in tall open eucalypt forest with a grassy understorey, and also around rainforest edges. It generally occurs in rich brown loam soils. Its distribution occurs predominately along the eastern edge of the New England Tablelands, from Ben Halls Gap to east of Tenterfield, and also in the Barrington Tops area. In regard to the site, majority of the site has been heavily disturbed due to agricultural practices and previous quarry activities, specifically within and around the existing quarry and proposed development footprint. It is unlikely due to the disturbed state of the site that the species would occur. Additionally, the species is more predominately known on the eastern portions of the New England Tablelands region associated with moist eucalypt forest and rainforest, the site does not provide this type of vegetation.
Grevillea beadleana	Beadle's Grevillea	E	No	PCT 3352	**Geographical constraints** – *Oxley Wild Rivers National Park or within a 10 km buffer around the Park.* The site does not occur within Oxley Wild Rivers National Park or within a 10 km buffer around the National Park. The site occurs approximately 42 km north-west of Oxley Wild Rivers National Park. As a result, the species was excluded from being further considered as a species credit species.

V = Vulnerable; E = Endangered

5.4.1.3 Assessment of Candidate Threatened Flora to Determine Affected Species

A total of three candidate threatened flora species were considered to have potential associated habitat within the site and were the subject of targeted surveys.

A summary of survey results for all candidate threatened flora species, to determine those species that are considered affected by the Project, are presented in **Table 5.7**. No threatened flora were recorded within the site during targeted surveys.

Table 5.7 Assessment of Candidate Threatened Flora to Determine Affected Species

Scientific Name	Common Name	BC Act	SAII	Associated PCTs	Optimal Survey period	Species Presence	Survey Effort	Affected?
Dichanthium setosum	Bluegrass	V	No	PCT 3352	Nov - May	No (surveyed)	27th Oct 2022; 16th, 19th – 20th Dec 2022 & 17th – 19th April 2023: ■ Vegetation integrity plots ■ Parallel transects ■ Random meanders	No. Species was not recorded during targeted surveys.
Eucalyptus magnificata	Northern Blue Box	E	No	PCT 3352	All year	No (surveyed)	27th Oct 2022; 16th, 19th – 20th Dec 2022 & 17th – 19th April 2023: ■ Vegetation integrity plots ■ Parallel transects ■ Random meanders	No. Species was not recorded during targeted surveys.
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	No	PCT 3352	All year	No (surveyed)	27th Oct 2022; 16th, 19th – 20th Dec 2022 & 17th – 19th April 2023: ■ Vegetation integrity plots ■ Parallel transects ■ Random meanders	No. Species was not recorded during targeted surveys.

V = Vulnerable; E = Endangered

356900 357200 357500 357800

6619000 6618800 6618600

Reedy Creek

Spring Creek

Rose Hill Rd

1 2 3 4 5 6 7 8 9 10 11 12

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

LEGEND

- Development footprint
- Investigation area
- Cadastre
- BAM plot
- Threatened flora parallel tracks
- Watercourse

GDA 1994 MGA Zone 56

0 60 Metres

Threatened Flora Survey Effort - Illustration 5.1

GeoLINK environment | engineering | planning | design

Biodiversity Development Assessment Report - William's Quarry
4079-1027

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

5.4.2 Threatened Fauna Species Credit Species

A list of candidate threatened fauna species credit species was generated from the BAM-C based on associated habitat features recorded within the site. Candidate threatened fauna species are presented in **Table 5.8**.

Table 5.8 List of BAM-C Threatened Fauna Species Credit Species

Scientific Name	Common Name	BC Act	SAII	Associated PCTs and/or Habitat Features
Amphibians				
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions		E2	Yes	N/A
Birds				
Burhinus grallarius	Bush Stone-curlew	E	No	■ Fallen/ standing dead timber including logs
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	No	■ Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines
Mammals				
Myotis macropus	Southern Myotis	V	No	■ Waterbodies with permanent pools/ stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site
Phascolarctos cinereus	Koala	E	No	■ Presence of koala use trees (*Eucalyptus caliginosa* – supplementary tree)

V = Vulnerable; E = Endangered; CE = Critically Endangered; E2 = Endangered population

5.4.2.1 Justification for Inclusion of Any Additional Threatened Fauna Species Credit Species

In identifying a candidate threatened fauna species list for further assessment, no additional threatened fauna species credit species are required to be included.

5.4.2.2 Justification for Exclusion of Any Additional Threatened Fauna Species Credit Species

In refining the candidate threatened fauna species list for further assessment, 15 threatened fauna species predicted by the BAM-C were excluded from the BAM-C candidate species credit list. A summary of the justification for this exclusion is provided in **Table 5.9**.

Table 5.9 Justification for Exclusion of Any Threatened Fauna Species Credit Species

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Justification for Exclusion
Amphibians					
Litoria piperata	Peppered Tree Frog	CE	Yes	■ Above 800 m altitude	**Degraded Habitat –** The Peppered Tree Frog is found in streamside vegetation and under rocks and fallen timber along rocky streams flowing eastward from the Tablelands (NSW Department of Planning and Environment 2025b). The species has not been definitively recorded in the wild since the 1990s. It was previously found on the New England Tablelands from south of Armidale to the Gibraltar Range. The species has been recorded from rocky habitats in the headwaters of streams that flow eastwards from the New England Tableland. Little is known about the biology and ecology of the species, however, where it has been recorded, habitat included Lomandra (mat rushes), Leptospermum (tea trees) and Casuarina (sheoaks)(Threatened Species Scientific Committee 2017). Field investigations and habitat assessments undertaken within the site, did not recorded preferred habitat within the development footprint. Due to historical agricultural practices the habitat within the site has been degraded resulting in a lack of preferred habitat along adjacent streams. Additionally, the species has been more associated with rocky streams flowing eastward from the Tablelands within gorge country along the ranges. Based on field investigations and the degraded nature of waterbodies within the site, the species was excluded from being further considered as a species credit species.
Birds					
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	No	■ Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground.	**Habitat constraint** – Field investigations and habitat assessments undertaken within the site did not record any hollow-bearing trees with preferred hollow size class of >15cm and >8m above the ground. A small number hollow-bearing trees were identified within the site, however, these trees only provided small-medium size hollows (5-10cm diameter). Due to the lack of large hollow-bearing trees within the site the species is unlikely to use to the site for breeding purposes and therefore the species was excluded as a species credit species.
Hieraaetus morphnoides	Little Eagle	V	No	■ Nest trees - live (occasionally dead) large old trees within vegetation.	**Habitat constraint** – Field investigations and habitat assessments undertaken within the site did not record any stick nests or nest trees within the site or in close proximity to the site. Due to the lack of nest trees within the site the species was excluded as a species credit species.
Lathamus discolor	Swift Parrot	E	Yes	■ Mapped in 'Important Habitat Map'	**Habitat constraint** – The site does not occur within mapped important areas as defined by DCCEEW. These areas are considered essential to support critical

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Justification for Exclusion
					life stages of the species, e.g. breeding areas or locations important for foraging/ over-wintering for migratory species. As a result, the species was excluded from being further considered as a species credit species.
Lophoictinia isura	Square-tailed Kite	V	No	■ Nest trees	**Habitat constraint** – Field investigations and habitat assessments undertaken within the site did not record any stick nests or nest trees within the site or in close proximity to the site. Due to the lack of nest trees within the site the species was excluded as a species credit species.
Ninox connivens	Barking Owl	V	No	■ Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground	**Habitat constraint** – Field investigations and habitat assessments undertaken within the site did not record any hollow-bearing trees with preferred hollow size class of >20cm and >4m above the ground. A small number hollow-bearing trees were identified within the site, however, these trees only provided small-medium size hollows (5-10cm diameter). Due to the lack of large hollow-bearing trees within the site the species is unlikely to use to the site for breeding purposes and therefore the species was excluded as a species credit species.
Ninox strenua	Powerful Owl	V	No	■ Living or dead trees with hollows greater than 20 cm diameter	**Geographical constraint –** *Within 5 km buffer of Macleay Gorges subregion.* The BAM-C lists Powerful Owl within the New England Tablelands bioregion to have a geographical constraint of the site required to occur within a 5 km buffer Macleay Gorges subregion. The site occurs approximately 22km west of the Macleay Gorges subregion. Due to the site not occurring within a 5 km buffer Macleay Gorges subregion the species was excluded as a species credit species. Additionally, Field investigations and habitat assessments undertaken within the site did not record any hollow-bearing trees with preferred hollow size class of >20cm. Due to the lack of large hollow-bearing trees within the site and the site occurring outside a 5 km buffer of Macleay Gorges subregion the species is unlikely to use to the site for breeding purposes and therefore the species was excluded as a species credit species.
Tyto novaehollandiae	Masked Owl	V	No	■ Living or dead trees with hollows greater than 20cm diameter	**Habitat constraint** – Field investigations and habitat assessments undertaken within the site did not record any hollow-bearing trees with preferred hollow size class of >20cm and >4m above the ground. A small number hollow-bearing trees were identified within the site, however, these trees only provided small-medium size hollows (5-10cm diameter). Due to the lack of large hollow-bearing trees within the site the species is unlikely to use to the site for breeding purposes and therefore the species was excluded as a species credit species.
Mammals					

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Justification for Exclusion
Cercartetus nanus	Eastern Pygmy-possum	V	No	N/A	**Habitat degraded –** The Eastern Pygmy-possum prefers habitat with a rich shrub understory, in which it feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. The species predominately shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation (e.g. grass-tree skirts). Field investigations and habitat assessments undertaken within the site, did not recorded preferred habitat within the development footprint. Due to historical agricultural and quarrying practices the habitat within the proposed development site has been degraded resulting in a lack of substantial amount of eucalyptus canopy and diverse understorey habitat that is preferred by the species. Patches of grassy woodland (moderate condition) within the development site are small and isolated fragments that do not have sufficient connectivity to larger patches of remnant woodland for the species to utilise the few isolated eucalyptus trees. Due to the degraded habitat within the development site and the lack of connectivity to larger remnant vegetation patches within the locality it is unlikely that the species would occur or be reliant on the site for foraging or breeding purposes. As such the species was excluded as a species credit species based on degraded habitat.
Chalinolobus dwyeri	Large-eared Pied Bat	V	Yes	■ Cliffs – within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	**Habitat constraint** – The species is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. The species forages in low to mid-elevation dry open forest and woodland close to these roosting features (i.e. cliffs and caves) (NSW Department of Planning and Environment 2025b). The site does not provide any cliffs or caves, nor does any rocky escarpment habitat occur within 2 km of the site. It is unlikely that the species would readily breed or be reliant on the site for breeding purposes. As a result, the species was excluded from being further considered as a species credit species.
Petauroides volans	Southern Greater Glider	E	No	N/A	**Habitat degraded** – Southern Greater Glider is largely restricted to eucalypt forests and woodlands typically found in taller, montane, moist eucalypt forests on fertile soils, with relatively old trees and abundant hollows. Preferred habitat is large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species (Department of Climate Change Energy the Environment and Water 2025d). Field investigations and habitat assessments undertaken within the site, did not recorded preferred habitat within the development footprint in the form of taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows. Due to historical agricultural and quarrying practices the habitat within the proposed development site has been degraded resulting in a lack of substantial

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Justification for Exclusion
					amount of eucalyptus canopy and hollow-bearing trees that is preferred by the species. Patches of grassy woodland (moderate condition) within the development site are small and isolated fragments that do not have sufficient connectivity to larger patches of remnant woodland for the species to utilise the few isolated eucalyptus trees. Due to the degraded habitat within the development site and the lack of connectivity to larger remnant vegetation patches within the locality it is unlikely that the species would occur or be reliant on the site for foraging or breeding purposes. As such the species was excluded as a species credit species based on degraded habitat.
Petaurus norfolcensis	Squirrel Glider	V	No	N/A	**Habitat degraded –** Squirrel Gliders typically inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range. Preferred habitats consist of mixed species stands with a shrub or Acacia midstorey. The species requires abundant tree hollows for refuge and nest sites (NSW Department of Planning and Environment 2025b). Field investigations and habitat assessments undertaken within the site, did not recorded preferred habitat within the development footprint. Due to historical agricultural and quarrying practices the habitat within the proposed development site has been degraded resulting in a lack of substantial amount of eucalyptus canopy and diverse understorey habitat that is preferred by the species. Patches of grassy woodland (moderate condition) within the development site are small and isolated fragments that do not have sufficient connectivity to larger patches of remnant woodland for the species to utilise the few isolated eucalyptus trees. Due to the degraded habitat within the development site and the lack of connectivity to larger remnant vegetation patches within the locality it is unlikely that the species would occur or be reliant on the site for foraging or breeding purposes. As such the species was excluded as a species credit species based on degraded habitat.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	Yes	■ Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	**Habitat constraint** – Brush-tailed Rock-wallaby occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. As such, rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines are a key habitat feature for the species. Field investigations and habitat assessments undertaken within the site, did not recorded preferred habitat within the development footprint or within the investigation area. Based on field investigations no rocky habitats occur within the site or in close proximity to the site, as such, the species was excluded from being further considered as a species credit species.

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Justification for Exclusion
Pteropus poliocephalus	Grey-headed Flying-fox	V	No	■ Breeding camps	**Habitat constraint** – The species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. A key habitat feature for the species to be considered as a species credit is the presence of a breeding camp within the site. Based on field investigations no breeding camps occur within the site or in close proximity to the site, as such, the species was excluded from being further considered as a species credit species
Vespadelus troughtoni	Eastern Cave Bat	V	Yes	■ Caves - within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.	**Habitat constraint** – The species is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The species is a cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings (NSW Department of Planning and Environment 2025b). The site does not provide any cliffs or caves, nor does any rocky escarpment habitat occur within 2 km of the site. It is unlikely that the species would readily breed or be reliant on the site for breeding purposes. As a result, the species was excluded from being further considered as a species credit species.

V = Vulnerable; E = Endangered; CE = Critically Endangered

5.4.2.3 Assessment of Candidate Threatened Fauna to Determine Affected Species

The BAM-C identified six candidate threatened fauna species that may occur on site. Targeted threatened fauna surveys have been undertaken in accordance with methods outlined in **Section 2.9** to determine presence or absence of candidate threatened fauna species in accordance with Section 5.2.4 of the BAM (2020). A summary of survey effort for all candidate threatened fauna species and those that are considered potentially affected by the development, are presented in **Table 5.10**.

Table 5.10 Assessment of Candidate Threatened Fauna Species Credit Species to Determine Affected Species

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Optimal survey period	Species Presence	Survey Effort	Affected?
Amphibians								
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions		E2	Yes	N/A	Oct - Feb	No (surveyed)	14th, 19th, 21st – 23rd Dec 2022 & 1st Feb 2023: ■ 26.5 person hours active searches ■ 5 x nights call playback	No. Not recorded during targeted surveys. Not considered an affected species.
Birds								
Burhinus grallarius	Bush Stone-curlew	E	No	Fallen/ standing dead timber including logs	All year	No (surveyed)	27th Oct 2022, 14th – 23rd Dec 2022, 2nd Feb 2023, 30th Mar 2023 & 4th – 6th Apr 2023: ■ 18 x diurnal bird surveys ■ 4 dusk call playbacks ■ Opportunistic surveys over 18 days	No. Not recorded during targeted surveys. Not considered an affected species.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	No	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Jul - Dec	No (surveyed)	27th Oct 2022, 14th – 23rd Dec 2022, 2nd Feb 2023, 30th Mar 2023 & 4th – 6th Apr 2023: ■ 18 x diurnal bird surveys ■ Nest tree surveys – **no nest trees identified** ■ Opportunistic surveys over 18 days	No. Not recorded during targeted surveys, no nest trees identified (required habitat feature). Not considered an affected species.
Mammals								
Myotis macropus	Southern Myotis	V	No	Waterbodies with permanent pools/ stretches 3 m or wider, including rivers, large creeks, billabongs,	Oct - Mar	No (surveyed)	8th – 23rd Feb 2023: ■ 2 x Anabat acoustic detection – 17 trap nights	No. Not recorded during targeted surveys. Not considered an affected species.

Scientific Name	Common Name	BC Act	SAII	Habitat Features	Optimal survey period	Species Presence	Survey Effort	Affected?
				lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site				
Phascolarctos cinereus	Koala	V	No	Presence of koala use trees (*Eucalyptus caliginosa*)	All year	No (surveyed)	19th Dec 2022; 30th Mar 2023 & 4th and 6th April 2023: ■ 4 x nights spotlighting (16.5 person hours) ■ 7 x SATs ■ Opportunistic surveys over 18 days	No. Not recorded during targeted surveys. Not considered an affected species.

V = Vulnerable; E = Endangered; CE = Critically Endangered; E2 = Endangered population

356900 357200 357500 357800 358100 358400 358700

6619200 6619000 6618800 6618600 6618400

Reedy Creek
Spring Creek
Rose Hill Rd
Mount Butler Rd
Arding Rd
Lot 1
DP1302364
Lot 2
DP1302364

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

LEGEND

- Development footprint
- Investigation area
- Cadastre
- Watercourse
- Amphibian searches / transect
- Fauna spotlight transect
- Hollow-bearing tree (greater than 15cm hollow)
- Hollow-bearing tree (less than 15cm hollow)
- Koala SAT
- Anabat location
- Call playback

GDA 1994 MGA Zone 56

0 100 Metres

Threatened Fauna Survey Effort - Illustration 5.2

GeoLINK environment | engineering | planning | design

Biodiversity Development Assessment Report - William's Quarry
4079-1027

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

356900 357200 357500 357800

6619000 6618800 6618600

Reedy Creek

Spring Creek

Rose Hill Rd

Lot 1
DP1302364

Lot 2
DP1302364

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

LEGEND

- Development footprint
- Investigation area
- Cadastre
- Eastern Cave Bat *(Vespadelus troughtoni)*
- Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*
- Greater Broad-nosed Bat *(Scoteanax rueppellii)*
- Large Bent-winged Bat *(Miniopterus orianae oceanensis)*
- Little Bent-wing Bat *(Miniopterus australis)*
- Watercourse

GDA 1994 MGA Zone 56

0 60 Metres

Recorded Threatened Fauna and Species Polygons - Illustration 5.3

GeoLINK environment | engineering | planning | design

Biodiversity Development Assessment Report - William's Quarry
4079-1027

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

6. Prescribed Impacts

This section identifies prescribed biodiversity impacts which may be difficult to quantify, replace or offset, making avoiding and minimising impacts important in accordance with Chapter 6 of BAM (2020). Prescribed biodiversity impacts relevant to the Project have been identified in **Table 6.1**.

Further consideration and assessment of the identified potential prescribed impacts is provided in Stage 2 of this BDAR.

Table 6.1 Prescribed Biodiversity Impacts Relevant to the Project

Prescribed Biodiversity Impact	Present	Relevance to the Project	Threatened Species or Community Dependant on Feature	Section of BDAR Where Prescribed Impact is Addressed
a) Habitat of threatened entities including: **i. karst, caves, crevices, cliffs, rocks and other geological features of significance, or** **ii. human made structures, or** **iii. non-native vegetation**	No	i) No karst, caves, crevices, cliffs, rocks and other geological features of significance are present ii) No human made structures relevant to prescribed impacts are present iii) No non-native vegetation considered to be relevant to prescribed impacts is present	N/A	N/A
b) Areas connecting threatened species habitat, such as movement corridors	Yes	No mapped corridors occur within the site; however, one mapped corridor (Eastern Tablelands Complex) occurs to the west of the site (approx. 500 m). Eastern Tablelands Complex corridor broadly links patches of vegetation from east to west. In regard to the site, due to historical clearing, limited connectivity is present in the form of intact patches of vegetation and the site does not provide any significant corridor links within the locality. Most of the development footprint occurs within disturbed/ partially cleared areas. The Project would not significantly fragment remnant vegetation within the site, nor would it significantly fragment or isolate habitat patches within the Eastern Tablelands Complex corridor. It is likely that both highly mobile and less mobile fauna species would still have the ability to move through the landscape and would not be significantly impeded due to the Project.	N/A	N/A
c) Affect water quality, water bodies and hydrological processes that sustain threatened entities	Yes	The Project will not result in the direct impact of any mapped drainage lines (i.e. Spring Creek) within the site or change any current hydrological processes. Spring Creek occurs west the development footprint and runs in a south to north direction and links with Reedy Creek in northern part of the site which runs in a westerly direction. Any surface runoff that comes into contact with the site would be diverted into the proposed sediment basin. The sediment basins would facilitate settlement of suspended sediment prior to reuse or discharge of the collected water.	Aquatic dependant fauna	Implementation of mitigation measures are addressed in **Section 9.3** and **11**.

Prescribed Biodiversity Impact	Present	Relevance to the Project	Threatened Species or Community Dependant on Feature	Section of BDAR Where Prescribed Impact is Addressed
d) Threatened and protected animals from turbine strikes from a wind farm	No	N/A	N/A	N/A
e) Threatened species or fauna that are part of a TEC from vehicle strikes	Yes	The Project is likely to generate additional vehicular movements within the site, during construction and operation. However, due to the nature of the Project it is unlikely that vehicle movements would be of significant scale in comparison to other known developments which cause significant levels of vehicle strikes (i.e. larger arterial roads/ highways). Vehicle movements are likely to be small in scale and be in association with onsite quarry operations. It is likely that speed limits would be relatively slow (i.e. <50 km) due to the local road speeds. Despite this, the Project would increase vehicle movements within the site and have an incremental increase in the potential of vehicle strike to fauna than what is currently experienced on site.	Koala and other native terrestrial fauna	Implementation of mitigation measures are addressed in **Section 9.3** and **11.**

7. Matters of National Significance

This chapter describes Matters of National Environmental Significance (MNES) relating to Commonwealth legislation under the EPBC Act. The following biodiversity MNES protected under the EPBC Act were considered for their relevance to the Project:

- Listed threatened species and communities.
- Listed migratory species.
- Critical habitat.
- Wetlands of national and international importance.

This BDAR provides an assessment of all EPBC Act listed threatened species and communities that may be impacted. This list of species and communities for assessment has also been supplemented and refined with database searches (i.e. BioNet, BAM-C, PMST, and NSW Fisheries databases) to provide a thorough assessment.

7.1 EPBC Act Listed Threatened Species and Communities

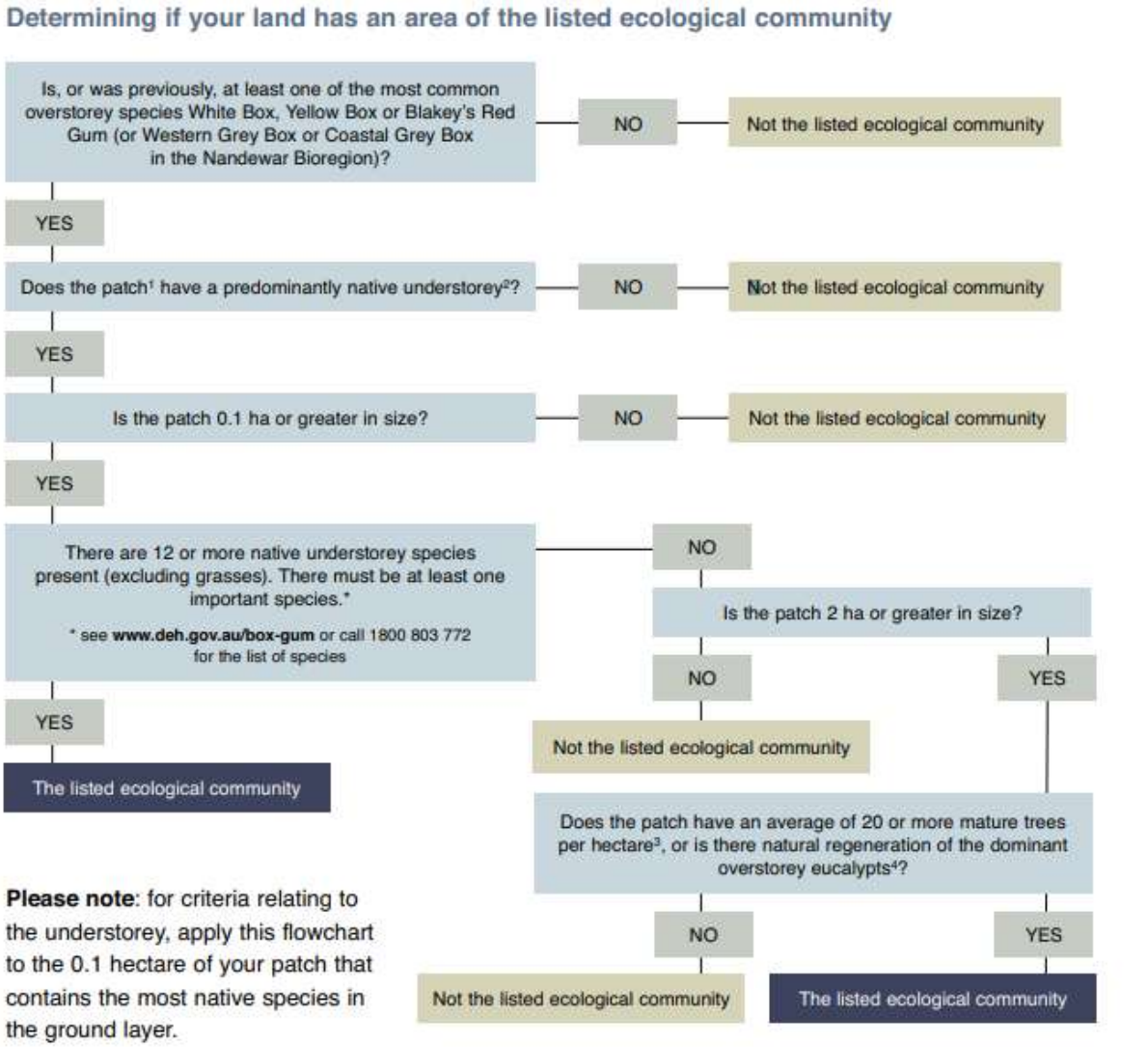
7.1.1 Nationally Threatened Ecological Communities

One PCT recorded in the Project site was considered a candidate to form part of the '*White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands'* threatened ecological community listed as Critically Endangered under the EPBC Act; being: PCT 3359 New England Hills Stringybark-Box Woodland.

To be considered consistent with the Critically Endangered listing under the EPBC Act, the vegetation must be consistent with the criteria outlined in the *EPBC Act policy statement 3.5 – White box – Yellow box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* (Department of the Environment and Heritage 2006) and as summarised in **Figure 7.1**. An assessment of PCT 3359 against these criteria is provided in **Table 7.1**.

The assessment concluded that all zones associated with PCT 3359 meet the criteria of the EPBC Act listing for *White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* (refer to **Table 7.1**) and the extent of this TEC within the site is provided in **Table 7.2**.

The Project will not directly impact this TEC, as a precaution, assessment of significance has been completed for the community in accordance with the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013). This assessment is provided in **Appendix H.**



[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
- an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
- the area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha (1000m²) or greater.

[2] A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily.)

[3] Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.

[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Figure 7.1 Criteria of Commonwealth White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands

Table 7.1 Assessment against White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands EPBC Act determining criteria

Criteria	PCT 3359 – Moderate (Q3, Q8 & Q9)	PCT 3359 – Derived (Q10, Q11 & Q12)
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	Yes, canopy is dominated by Yellow Box or Blakely's Red Gum.	Yes, canopy largely removed, however, some regenerating species include Yellow Box or Blakely's Red Gum
Does the patch have a predominantly native understorey?	Yes, native groundcover is greater than 50% cover.	Yes, native groundcover is greater than 50% cover.
Is the patch 0.1 ha or greater in size?	Yes, patches are greater than 0.1 ha in size.	Yes, patches are greater than 0.1 ha in size
There are 12 or more native understorey species present (excluding grasses). There must be at least one important species.	Yes, patches contain >12 native understory species and at least one important species.	No, patches do not contain >12 native understory species.
Is the patch 2 ha or greater in size?	N/A	Yes, derived grassland > 2 ha
Does the patch have an average of 20 or more mature trees per ha, or is there natural regeneration of dominant overstorey eucalypts?	N/A	Yes, there is natural regeneration of dominant overstorey eucalypts - Yellow Box and Blakely's Red Gum
Meet EPBC Act listing criteria?	**Yes, meets EPBC Act criteria**	**Yes, meets EPBC Act criteria**

Table 7.2 Summary of EPBC Act listed threatened ecological communities within the site and development footprint

TEC	PCT and Zone	EPBC Act	Investigation area (ha)	Impact area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	PCT 3359 – Moderate	CE	3.98	0
	PCT 3359 – Derived	CE	4.45	0
		Total	**8.43**	**0**

CE = Critically Endangered

7.1.2 Nationally Threatened Flora

Fifteen (15) EPBC Act listed threatened flora species are known to occur or are predicted to occur within the locality of the site. Based on habitat assessments and targeted flora searches, no threatened flora listed under the EPBC Act were recorded within the site. As such no threatened flora listed under the EPBC Act are likely to be affected.

7.1.3 Nationally Threatened Fauna

Twenty-nine (29) EPBC Act listed threatened fauna species are known to occur or are predicted to occur within the locality of the site. Of these, three were identified to have a moderate or higher likelihood of occurrence based on previous records and availability of potential habitat (**Appendix D**).

Assessments of significance have been completed for these species in accordance with the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013). This assessment is provided in **Appendix H.**

Table 7.3 EPBC Act Threatened Fauna Species Considered for Assessment

Scientific Name	Common Name	EPBC Act	Likelihood Occurrence	Affected?
Birds (2)				
Hirundapus caudacutus	White-throated Needletail	V; M	**Moderate.** Potential aerial foraging habitat above wooded areas at the site.	**Yes** - assessment of significance undertaken
Stagonopleura guttata	Diamond Firetail	V	**Moderate.** Potential habitat associated with eucalypt woodland.	**Yes** - assessment of significance undertaken
Mammals (1)				
Phascolarctos cinereus	Koala	E	**Moderate.** Marginal habitat within the site, development footprint lacks any preferred feed tree. Some presence of *Eucalyptus blakelyi* outside the site may result in interment occurrences of individuals within proximity to the site**.**	**Yes** - assessment of significance undertaken as precaution

V = Vulnerable; E = Endangered; M = Migratory

7.2 Migratory Species

Migratory species are protected under international agreements, to which Australia is a signatory, including JAMBA, CAMBA, RoKAMBA and the Bonn Convention on the Conservation of Migratory species of Wild Animals. Migratory species are considered MNES and are protected under the EPBC Act.

A total of nine EPBC Act listed migratory species are known or predicted to occur within the locality of the site based on the results of database searches. One migratory species was assessed as having a moderate likelihood of occurring within the site as the site provides a potential foraging habitat for the species (refer to **Table 7.5**).

Table 7.4 Migratory Species with Suitable Habitat Within the Site

Scientific Name	Common Name	EPBC Act	Likelihood Occurrence
Hirundapus caudacutus	White-throated Needletail	V; M	**Moderate.** Potential aerial foraging habitat above wooded areas at the site.

M = Migratory; V = Vulnerable

While terrestrial migratory species of bird may potentially use the site, the site would not be classed as 'important habitat' as defined by the '*Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*' (Department of the Environment 2013) as the site does not contain habitat:

- Utilised by a migratory species occasionally or periodically within a region that supports an ecological significant proportion of the population of the species.
- Utilised by a migratory species which is at the limit of the species range.
- Within an area where the species is declining.

As such, it is not likely that the Project would significantly affect migratory species and therefore migratory species have not been considered further. The White-throated Needletail, is however listed as Vulnerable, and as such, the site could be considered to contain potential habitat where this species is declining. As the White-throated Needletail is listed as migratory and threatened under the EPBC Act, an assessment of significance has been carried out (**Appendix H**)**.**

7.3 Critical Habitat

No EPBC Act listed critical habitat has been recorded or is considered likely to occur within the site.

7.4 Wetlands of National and International Importance

Wetlands are valuable for the environment, food production, our culture and recreation. A healthy wetland has a rich natural diversity of plants and animals. Wetlands may support threatened species and migratory species. Wetlands are important provide strategic refuge during drought and frequently support threatened species. Most of the migratory bird species listed under international convention agreements with Australia may be found in these wetlands.

7.4.1 Nationally Important Wetlands

No nationally important wetlands were identified by the PMST as occurring within or in proximity to the site. As such, the Project is unlikely to impact nationally important wetlands.

7.4.2 Wetlands of International Importance

No wetlands of international importance were identified by database searches within the locality.

BAM STAGE 2 – IMPACT ASSESSMENT

8. Avoid and Minimise

The following provides information on avoiding and minimising impacts on biodiversity values through the planning and design phase of the Project. This information is provided to directly address Chapter 7 of the BAM (2020).

8.1 Avoiding and Minimise Biodiversity Impacts

8.1.1 Location

In accordance with Section 7.1.1 of the BAM (2020), efforts to avoid and minimise direct impacts on native vegetation and habitat through the location of the Project are addressed in **Table 8.1**.

Table 8.1 Efforts to Avoid and Minimise Direct Impacts on Native Vegetation and Habitat During Project Location

Principles to Avoid and Minimise Impact Through Location	Project's Consistency
Locating the Project to avoid minimise impacts	
a) Locating the Project in areas lacking biodiversity values	Areas of biodiversity value could not be entirely avoided; however, the development footprint has been designed to largely avoid impact to high value vegetation as far as practicable. The development footprint (6.28 ha) has been mapped containing native vegetation in different condition states. The Project design has expanded the original quarry to predominately incorporate areas with poorest condition state and limited habitat values. Of the 6.28 ha of mapped native vegetation in the development footprint, 5.72 ha is in 'derived' condition and 0.56 ha is in 'moderate' condition.
b) Locating where native vegetation or threatened species habitat is in the poorest condition	The development footprint has been designed to impact the minimal amount of native vegetation or threatened species habitat. As a result, impact to moderate vegetation is limited to 0.56 ha (8.9% of the development site). The majority of vegetation being impacted predominately occurs in previously disturbed areas associated with derived condition vegetation – 5.72 ha (91.1% of the site).
c) Avoid habitat for species with high biodiversity risk weighting or native vegetation that is a TEC or a highly cleared PCT	The development footprint has been designed to minimise impact to areas of high biodiversity risk and higher vegetation condition classes. The majority of the development occurs within previous disturbed areas and poorest condition vegetation. Areas of TEC (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) have been avoided from impact and do not occur within the development footprint.
d) Outside of the buffer area around breeding habitat features such as nest trees or caves	The development footprint will not impact any breeding habitat or important threatened species habitat/ features. No identified breeding habitat in the form of large hollow-bearing trees are anticipated to be impacted. Some small hollow-bearing trees (5-10cm hollow size class) were identified within the site, however, these occur outside the development footprint and will not be removed as a result of the Project. These hollow-bearing trees are not within the size class associated with breeding habitat of species credit species (i.e. owls) and associated buffer areas.

Principles to Avoid and Minimise Impact Through Location	Project's Consistency
Considerations of alternatives	
a) Alternative modes or technologies that would avoid or minimise impacts on biodiversity values	Alternative design locations are limited due to the position of the existing quarry. The Project design has focused on expanding the quarry into areas with lowest vegetation condition values and avoids impacting areas of high condition vegetation and high biodiversity risk weighting.
b) Alternative routes that would avoid or minimise impacts on biodiversity values	The development footprint was designed within vegetation patches that had the lowest condition values and impacts to high condition vegetation and important habitat values were minimised or avoided where possible.
c) Alternative locations that would avoid or minimise impacts on biodiversity values	
d) Alternative sites within a property on which the Project is located that would avoid or minimise impacts on biodiversity values.	

8.1.2 Design

In accordance with Section 7.1.2 of the BAM (2020), efforts to avoid and minimise direct impact on native vegetation and habitat through the design of the Project are addressed in **Table 8.2**.

Table 8.2 Efforts to Avoid and Minimise Direct Impacts on Native Vegetation and Habitat During Project Design

Principles to avoid and minimise impact through design	Project's consistency
a) Reducing the Project's clearing footprint by minimising the number and type of facilities	The development footprint and layout of ancillary sites will be positioned within low condition vegetated areas or previously cleared areas. The prioritisation of utilising areas which contain previously disturbed vegetation and avoiding impact to habitat features have reduced the impact to sensitive biodiversity values (i.e. high condition vegetation or habitat features). The following design measures were undertaken: ■ Primary and secondary crushers and supporting plant and equipment would be established on the quarry floor alongside the raw and crushed material stockpiles avoiding further clearing of vegetated areas ■ Raw material stockpiles would be located near the crushing plant for easy loading into the crusher and avoid further clearing of vegetated areas for stockpiling ■ Existing roadways would be utilised to avoid further clearing for access tracks/ roads. No TECs or SAII entities will be directly impacted by the Project. The majority of the development footprint and placement of ancillary areas will be placed in cleared areas or poor condition vegetation types.
b) Locating ancillary facilities in areas that have no biodiversity values	
c) Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition	
d) Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)	

Principles to avoid and minimise impact through design	Project's consistency
e) Actions and activities that provide for rehabilitation, ecological restoration and/ or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	Impacts mostly occur within previously disturbed vegetation. In areas surrounding the development footprint, ongoing maintenance of retained areas of native vegetation will be undertaken to ensure that retained vegetation does not deteriorate due to the Project. A site closure and rehabilitation plan will be prepared for the Project, to be provided in the EIS. The plan will include erosion control, quarrying and revegetation, supplied details of the final landform, the planting regime including species and maintenance requirements Mitigation measures that address rehabilitation and restoration actions are outlined in **Section 11**.

8.2 Avoid or Minimise Prescribed Impacts

8.2.1 Location

In accordance with Section 7.2.1 of the BAM (2020), efforts to avoid and minimise prescribed biodiversity impacts through the location of the Project have been addressed in **Table 8.3**.

Table 8.3 Efforts to Avoid and Minimise Impacts on Prescribed Biodiversity During Project Location

Principles to Avoid and Minimise Prescribed Impacts	Project's Consistency
Locating the Project to avoid and minimise on prescribed impacts	
a) Locate surface works to avoid direct impacts on the habitat features	Areas of habitat features could not be entirely avoided; however, the development footprint has been designed to avoid impact to higher condition vegetation as much as practicable. Where habitat features identified during pre-clearing surveys (i.e. large fallen timber) are to be impacted, these will be retained and utilised within adjacent intact vegetation/ habitat, or rehabilitation plans post quarry operation.
b) Locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features	The Project has not been located in an area where subsurface works would impact habitat features. Therefore, the proposed development is unlikely to directly or indirectly interfere with subsurface or groundwater flows associated with any habitat features or vegetation communities.
c) Locate the Project to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways	The development footprint has been largely located in previously disturbed areas and as a result the Project will not significantly increase fragmentation of habitat within the landscape. The Project would not significantly fragment remnant vegetation within the site, nor would it significantly fragment or isolate habitat patches within the Eastern Tablelands Complex corridor. It is likely that both highly mobile and less mobile fauna species would still have the ability to move through the landscape and would not be significantly impeded due to the Project. Fencing will only be placed around the proposed quarry site (i.e. not along access routes) reducing any further hindrance to fauna movement. Overall, the Project would not interfere substantially with corridors or impede flight paths or movement pathways for species.

Principles to Avoid and Minimise Prescribed Impacts	Project's Consistency
d) Optimise the Project layout to minimise interactions with threatened entities	The development footprint has been designed to impact the minimal amount of intact native vegetation or threatened species habitat.
e) Locate the Project to avoid impacts on water bodies or hydrological processes	The Project will not result in the direct impact of any mapped drainage lines (i.e. Spring Creek) within the site or change any current hydrological processes. Spring Creek occurs west the development footprint and runs in a south to north direction and links with Reedy Creek in northern part of the site which runs in a westerly direction. Any surface runoff that comes into contact with the site would be diverted into the proposed sediment basins. The sediment basin would facilitate settlement of suspended sediment prior to reuse or discharge of the collected water Mitigation measures incorporating water sensitive urban design principles will minimise indirect impacts to waterbodies and hydrological processes.
Considerations of alternatives	
a) Alternative modes or technologies that would avoid or minimise prescribed impacts	The development footprint has been largely located within previous disturbed/ cleared areas and as a result largely avoids prescribed impacts. To avoid any direct impacts or use of water from Spring Creek the following measure has been incorporated: Non-potable water would be delivered by water tanks for dust suppression of quarry operations. Some water may be used from sediment and erosion dams associated with the quarry. The implementation of mitigation measures incorporating water sensitive urban design principles will minimise any potential indirect impacts which are considered minor in the context of the site and nature of the prescribed habitat being impacted.
b) Alternative routes that would avoid or minimise prescribed impacts	
c) Alternative locations that would avoid or minimise prescribed impacts	
d) Alternative sites within a property on which the Project is located that would avoid or minimise prescribed impacts	

8.2.2 Design

In accordance with section 7.2.2 of the BAM (2020), efforts to avoid and minimise prescribed biodiversity impacts through the design have been addressed in **Table 8.4**.

Table 8.4 Efforts to Avoid and Minimise Impacts on Prescribed Biodiversity During Project Design

Principles to Avoid and Minimise Prescribed Impacts	Project's Consistency
a) Engineering solutions, such as proven techniques to: **i) minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers** **ii) restore connectivity and movement corridors**	Consideration of alternative locations and sites is generally limited due to the Project being associated with existing quarry footprint and infrastructure. The development footprint has placed and designed within disturbed or low condition vegetated areas. The development footprint has been largely located in previously disturbed areas and as a result the Project will not significantly increase fragmentation of habitat within the landscape. The Project would not significantly fragment remnant vegetation within the site, nor would it significantly fragment or isolate habitat patches within mapped wildlife corridors. Fencing surrounding the Project will be limited to existing stock fencing, no new security fencing is proposed. Mitigation measures which address fencing and rehabilitation/ weed control are outlined in **Section 11**.
b) design elements that minimise interactions with threatened entities, such as: **i) designing turbines to dissuade perching and minimise the diameter of the rotor swept area** **ii) designing fencing to prevent animal entry to transport corridors** **iii) providing vegetated buffers rehabilitated with native species**	
c) maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation	The development footprint has largely been placed and designed within disturbed or low condition vegetated areas, which predominately avoid prescribed habitats. The retention of corridors and hydrological processes will continue to be maintained throughout the site enabling environmental processes (i.e. fauna movement and hydrological flows). Mitigation measures which address prescribed impacts are outlined in **Section 11**.
d) maintaining hydrological processes that sustain threatened entities	The development footprint has been predominately placed within previously disturbed areas and has avoided direct impacts to the main drainage line through the centre of the site. As outlined in Section 1.3, water usage and output requirements will be either be through evaporation methods or offsite disposal. Non-potable water would be delivered by water tanks or utilised from sediment basins for dust suppression of quarry operations. No water usage is required for crushing operations. Mitigation measures incorporating water sensitive urban design principles will minimise impacts to waterbodies and hydrological processes within the site. Mitigation measures incorporating sedimentation and hydrology controls including the development of an Erosion and Sediment Control Plan (ESCP) are outlined in **Section 11**.
e) controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities	

9. Impact Assessment

9.1 Assessment of Direct Impacts

Assessment of direct impacts unable to be avoided is prepared in accordance with Chapter 8 of the BAM (2020).

9.1.1 Impacts on Native Vegetation

The impacts of the development footprint on native vegetation including each PCT, broad condition state, its legislative status and area to be impacted within the development footprint are shown below in **Table 9.1**.

Table 9.1 Direct Impacts on Native Vegetation

Plant Community Type	Vegetation Zone	Current Vegetation Integrity	Change in Vegetation Integrity	Future Vegetation Integrity	Direct Impact (ha)
PCT 3352 Armidale Quartz Hills Stringybark Forest	3352_Derived	14	-14	0	5.72
	3352_Moderate	49	-49	0	0.56
Total direct impact on native vegetation					**6.28**

9.1.2 Direct Impacts on Threatened Ecological Communities

No direct impacts on threatened ecological communities will occur due to the Project.

9.1.3 Direct Impacts on Threatened Species and Habitat

Direct impacts on predicted ecosystem credit species due to the Project are outlined in **Table 9.2**.

Table 9.2 Direct Impacts on Predicted Ecosystem Credit Species

Scientific Name	Common Name	BC Act	Predicted Habitat to be Impacted
Birds (16)			
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	PCT 3352
Chthonicola sagittata	Speckled Warbler	V	PCT 3352
Circus assimilis	Spotted Harrier	V	PCT 3352
Climacteris picumnus victoriae	Brown Treecreeper	V	PCT 3352
Daphoenositta chrysoptera	Varied Sittella	V	PCT 3352
Falco subniger	Black Falcon	V	PCT 3352
Glossopsitta pusilla	Little Lorikeet	V	PCT 3352
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	PCT 3352
Hieraaetus morphnoides	Little Eagle	V	PCT 3352
Hirundapus caudacutus	White-throated Needletail	V	PCT 3352
Lathamus discolor	Swift Parrot	E	PCT 3352
Lophoictinia isura	Square-tailed Kite	V	PCT 3352

Scientific Name	Common Name	BC Act	Predicted Habitat to be Impacted
Melithreptus gularis gularis	Black-chinned Honeyeater	V	PCT 3352
Petroica boodang	Scarlet Robin	V	PCT 3352
Petroica phoenicea	Flame Robin	V	PCT 3352
Stagonopleura guttata	Diamond Firetail	V	PCT 3352
Mammals (7)			
Dasyurus maculatus	Spotted-tailed Quoll	V	PCT 3352
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	PCT 3352
Miniopterus australis	Little Bent-winged Bat	V	PCT 3352
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	PCT 3352
Pseudomys oralis	Hastings River Mouse	E	PCT 3352
Pteropus poliocephalus	Grey-headed Flying-fox	V	PCT 3352
Scoteanax rueppellii	Greater Broad-nosed Bat	V	PCT 3352

V = Vulnerable; E = Endangered; CE = Critically Endangered

9.1.4 Direct Impacts on Threatened Species Credit Species

There are no required species credit obligations, as no species credit species were affected due to the Project.

9.2 Assessment of Indirect Impacts

The assessment of indirect impacts has been prepared in accordance with Section 8.2 of the BAM (2020). Indirect impacts have been considered in terms of the nature, extent and duration of impacts on native vegetation, threatened ecological communities and threatened species habitats likely to be affected. The assessment of indirect impacts is presented in **Table 9.4**.

Table 9.3 Assessment of Indirect Impacts

Indirect Impact	Construction/ Operation	Nature	Extent	Duration	Consequence
Inadvertent impacts on adjacent habitat or vegetation	Construction	Native vegetation Threatened species habitat	All PCTs	Short term	**Low**. Inadvertent impacts on adjacent vegetation can include a range of indirect impacts including soil disturbance, introduction of weeds, erosion, sedimentation, enriched runoff and water quality. Construction of the Project has the potential to result in sedimentation and erosion and mobilisation of contaminants within the development footprint and into adjoining native vegetation and waterways, through soil disturbance and construction activities. Sediment laden runoff and spills affect water quality and adversely affect aquatic life, particularly during construction near creek lines. The mobilisation of sediments would be contained within the disturbance area as sediment containment measures would be implemented as part of mitigation measures.
Inadvertent impacts on hydrology and GDEs	Construction/ operation	Hydrology	Aquatic habitats associated with creeklines	Long term	**Low**. Inadvertent impacts on surface water within proximity to disturbance footprint. Indirect impacts could include enriched run-off, decreased water quality and/ or minor alterations to hydrology as a result of increased water run-off due to hard surfaces. The Project will be carefully designed to minimise impact on these sensitive environmental receivers (i.e. creeklines). The mobilisation of sediments would be contained within the disturbance area as sediment containment measures would be implemented as part of mitigation measures and the implementation of water sensitive design principles including water detention basins will be incorporated into the design to recover and store rain water onsite and reduce sedimentation into adjoining waterways.
Reduced viability of adjacent habitat due to edge effects	Construction/ operation	Native vegetation	All PCTs	Long term	**Low**. Edge effects create vulnerable areas subject to degradation by the establishment and spread of weeds, enriched water run-off from roadways and dumping of rubbish and have the potential to reduce the viability of adjacent habitats long-term. Implementation of mitigation measures including weed & biosecurity management and water runoff controls will reduce the potential impact of edge effects on site both during construction and operation. With the implementation of mitigation measures including a VMP and ESCP, the residual indirect impacts from the Project are considered minor at a local and regional scale. The VMP will focus on measures surrounding the Project development footprint and along access routes where weeds are likely to spread.

Indirect Impact	Construction/ Operation	Nature	Extent	Duration	Consequence
Reduced viability of adjacent habitat due to noise, dust or contaminant pollution	Construction/ operation	Native vegetation Threatened species habitat	All PCTs	Short and long-term	**Low**. Noise, dust and contaminant pollution are potential indirect impacts from activities associated with the development footprint. These impacts are likely to have cumulative effects. Noise, dust and contaminant pollution are likely to occur from both construction and operational phases, although the intensity will be greatest where activities take place near vegetated areas. Increased noise and vibration levels in the site and immediate surrounds are likely during quarry operating hours. Air Quality assessments concluded that dust impacts as a result of construction process is unlikely to be significant given the nature of the activities and dust emissions generated by the construction activities would be less than the emissions produced during the operational stages of the Project (Todoroski Air Sciences Pty Ltd 2023). Significant levels of noise and vibration from human activities (i.e. machinery) are known to potentially disturb fauna and disrupt foraging, reproductive, or movement behaviours especially over continuous and prolonged timeframes (Newport et al. 2014). The safe limit of noise (continuous noise) on humans is understood to be ≤70 dB (Newport et al. 2014). As stated in **Section 1.3**, the most significant operational noise impacts are anticipated from vehicles (i.e. haul trucks & quarry machinery) and blasting operations. Vehicle/ machinery noise impacts during operation are anticipated to be scheduled in nature (mostly occurring during daylight periods) and temporary (i.e. not continuous noise), no works are proposed during evening periods. Noise Impact Assessment for the Project concluded that under a conservative operating scenario and with implementation of noise mitigation measures, that compliance with ANZEC Guidelines will be adhered to and significant impacts due to noise are unlikely (Rodney Stevens Acoustics 2023). In regard to noise impacts to fauna, the majority of fauna likely to be more sensitive to noise impacts and to use adjacent vegetation are likely to be nocturnal species (i.e. arboreal & terrestrial mammals), these species are known to be more active during nocturnal periods during which no works are proposed to be occurring. Additionally, no important habitat features (i.e. hollow-bearing trees) occur within close proximity (50m) reducing any potential impacts to breeding habitat features. Overall, operational noise levels are not anticipated to be at significant levels to result in detrimental impacts to species or their habitats. Residual noise impacts are likely to be localised to the development footprint and are periodic in nature (fixed intervals rather than continuous) and not considered likely to have a significant, long-term impact on wildlife populations outside the area of impact. Elevated levels of dust may be deposited onto the foliage of vegetation adjacent to the development and more specifically along haul roads and access routes. This has the potential to reduce photosynthesis and transpiration and cause abrasion

Indirect Impact	Construction/ Operation	Nature	Extent	Duration	Consequence
					and heating of leaves resulting in reduced growth rates and decreases in overall health of the vegetation. Dust pollution is likely to be greatest during periods of substantial earthworks, vegetation clearing or vehicle movements. However, deposition of dust on foliage is likely to be highly localised (i.e. quarry footprint and roads), intermittent, and temporary and is therefore not considered likely to be a major impact of the Project in the long term. Air Quality Assessment concluded that the proposed operations of the Project would have the greatest potential to generate dust emissions, however it is predicted that all the assessed air pollutants generated by the operation of the Project would comply with the applicable assessment criteria at the assessed receptors and therefore would not lead to any unacceptable level of environmental harm or impact in the surrounding area (Todoroski Air Sciences Pty Ltd 2023). Nevertheless, dust reduction measures will be employed throughout construction and operational phases to reduce any residual impacts due to works, this would include water carts along access roads during both construction and operation phases. Overall, the Air Quality Assessment concluded that the Project is unlikely to cause any significant air quality impacts at sensitive receivers. Given the implementation of dust management measures (i.e. water cater use along access roads) it is unlikely that indirect impacts to adjacent vegetation would result in significant impacts to vegetation integrity and composition. Currently the road experiences some levels of dust impacts from public vehicle movements and quarry activities, with the implementation of dust management measures this would reduce dust impacts compared to what is currently experienced along access routes. Additionally, vegetation adjacent to access roads is grassy woodland, with limited understorey shrubs, the composition of this vegetation type is more resilient to residual dust effects than other sensitive vegetation types (i.e. wet sclerophyll/ rainforest with dense mesic understorey). Overall, with the implementation of dust reduction throughout construction and operational phases it is unlikely that the Project would have significant indirect impacts due to dust to adjacent vegetation. Ecological light pollution is the descriptive term for light pollution that includes direct glare, chronic or periodic increased illumination, and temporary unexpected fluctuations in lighting (including lights from a passing vehicles), that can have potentially adverse effects on wildlife (Longcore & Rich 2004). No lighting work are proposed for the Project. During both construction and operation, no night works would be required, and light pollution as a result of the Project is not anticipated. Due to the Project operating during daylight hours it is unlikely that the Project would have a significant long-term impact on wildlife populations due to light pollution. During the construction and operational phase localised release of contaminants (i.e. hydraulic fluids, oils, fluids, etc.) into the surrounding environment (including

Indirect Impact	Construction/ Operation	Nature	Extent	Duration	Consequence
					drainage lines) could accidentally occur. The most likely result of contaminant discharge would be the localised contamination of soil and potential direct physical trauma to flora and fauna that come into contact with contaminants. Any accidental release of contaminants is likely to be localised and would be unlikely to have a significant effect on the environments of the site, particularly due to the implementation of mitigation measures to immediately address any spills.
Transport of weeds and pathogens from the site to adjacent vegetation	Construction/ operation	Native vegetation	All PCTs	Long term	**Low**. The development footprint has the potential to increase the spread of pathogens that threaten native biodiversity values, such as the soil-borne pathogen *Phytophthora cinnamomi* (Phytophthora) and *Austropuccinia psidii* (Myrtle rust). Phytophthora infects root systems whereas Myrtle Rust deforms leaves and leads to heavy defoliation. Both pathogens are associated with damage and death to native plants and may be dispersed over large distances. Phytophthora can be spread through flowing water, such as storm runoff, or may be spread within a site via mycelial growth from infected roots to roots of healthy plants. Propagules of Phytophthora may also be dispersed by vehicles (e.g. cars and earth moving equipment), animals, walkers and movement of soil. Myrtle rust spores can be spread easily via contaminated clothing, hair, skin and personal items, infected plant material, equipment as well as by insect/ animal movement and wind dispersal. The Project's activities are likely to lead to an increased risk of dispersal of Phytophthora and/ or Myrtle Rust through works involving soil disturbance. However, the biosecurity measures outlined in this BDAR are likely to mitigate these risks.
Increased risk of starvation, exposure and loss of shade or shelter	Construction	All fauna species	All PCTs	Short term	**Negligible**. Displacement of resident fauna species during native vegetation clearing is considered relatively low due to the majority of vegetation requiring clearing being in a poor/ derived vegetation condition. Given the small extent of moderate condition vegetation being removed and the retention of intact vegetation adjacent to the development footprint most resident fauna species are unlikely to have a significant increased risk of starvation, exposure and loss of shade or shelter due to the Project.
Loss of breeding habitats	Construction	All fauna species	All PCTs	Long term	**Negligible**. The loss of breeding habitat such as hollow-bearing trees has the potential to affect native animals such as hollow-dependent bats, hollow-nesting and canopy-nesting birds, arboreal mammals and arboreal mammals. No hollow-bearing trees occur within the development footprint and no nest trees were identified during surveys. Overall no significant breeding habitat was identified within the impact area and as a result it is unlikely any significant impact to

Indirect Impact	Construction/ Operation	Nature	Extent	Duration	Consequence
					breeding habitat would occur. Mitigation and management measures including clearing procedures will be implemented to reduce any residual impacts due to vegetation clearing.
Trampling of threatened flora species	Construction/ operation	Native vegetation Threatened flora species	All PCTs	Short and long term	**Low**. No threatened flora species were identified within the site or development footprint, as such it is unlikely that the Project would result in the trampling of threatened flora species. However, there is always the potential for threatened species to occur within the site (due to seed dispersal) in the future and trampling of threatened flora species has the potential to occur through unauthorised storage of materials, vehicles and general access to retained native vegetation. Mitigation measures will be recommended to minimise and reduce the risk of this potential indirect impact on these species.
Wood collection	Construction	Terrestrial fauna species	All PCTs	Short term	**Negligible**. Removal of dead wood is listed as a key threatening process under the BC Act and will occur during the construction phase within remnant vegetation associated with the development footprint. Wood collection in adjacent habitat is unlikely to occur and it is unlikely that a decrease in the integrity of available habitat for species of animal, such as reptiles and small ground-dwelling mammals and woodland birds, which depend on these resources for shelter and foraging substrates would occur. Any significant dead wood to be removed during construction would be retained and reused in adjacent habitat or within rehabilitated areas.
Bush rock removal and disturbance	Construction	Terrestrial fauna species	All PCTs	Short term	**Negligible.** Removal of bush rock is listed as a key threatening process under the BC Act. Large areas of bush rock and rocky outcropping was not observed in the site during field surveys. However, if bush rock is encountered during construction of the Project it will be retained and reused in adjacent habitat.
Increase in predatory species populations	Construction/ operation	All fauna species	All PCTs	Long term	**Low**. Predation by feral cats and foxes are listed as key threatening processes under the BC Act and have potential to impact local fauna populations in adjacent habitat. It is unlikely that the Project would further exacerbate the impact predator species populations have than what currently exists within the locality.
Increased risk of fire	Construction/ operation	Native vegetation	All PCTs	Long term	**Low**. Bushfire risk is unlikely to be exacerbated from what already exists within the site. Bushfire risk will be managed in accordance with bushfire and fire safety guidelines.

9.3 Assessment of Prescribed Impacts

Assessment of prescribed impacts is prepared in accordance with Section 8.3 of the BAM (2020) and outlined in **Table 9.5**.

Table 9.4 Assessment of Prescribed Impacts

Prescribed impacts	Nature	Extent	Duration	Consequence
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No karst, caves, crevices, cliffs or other features of geological significance will be impacted by the development footprint.			
Human-made structures or non-native vegetation	No human made structures (i.e. culverts) or non-native vegetation associated with threatened entities occur within the site nor will any be impacted due to the development footprint.			
Habitat connectivity	Terrestrial fauna and threatened species (i.e. Koala)	No mapped corridors occur within the site; however, one mapped corridor (Eastern Tablelands Complex) occurs to the west of the site (approx. 500 m). Eastern Tablelands Complex corridor broadly links patches of vegetation from east to west. In regard to the site, due to historical clearing, limited connectivity is present in the form of intact patches of vegetation and the site does not provide any significant corridor links within the locality. As such, there is a likely low impact on habitat connectivity for threatened species that may facilitate movement across the species' range. Most of the development footprint occurs within disturbed/ partially cleared areas. The Project would not significantly fragment remnant vegetation within the site, nor would it significantly fragment or isolate habitat patches within the Eastern Tablelands Complex corridor. It is likely that both highly mobile and less mobile fauna species would still have the ability to move through the landscape and would not be significantly impeded due to the Project.	Long term	**Low** – The development footprint will not result in new fragmentation of habitat patches within the locality. The majority of the development footprint occurs within previously disturbed areas. Overall, the consequences of the impacts would be minor and non-significant.
Waterbodies, water quality and hydrological processes	Aquatic dependant fauna and associated PCTs	The Project will not result in the direct impact of any mapped drainage lines (i.e. Spring Creek) within the site or change any current hydrological processes. Spring Creek occurs west the development footprint and runs in a South to North direction and links with Reedy Creek in northern part of the site which runs in a westerly direction. Any surface runoff that comes into contact with the site would be diverted into the proposed sediment basin. The sediment basins would facilitate the settlement of suspended	Long term	**Low** – Unmanaged construction activities in proximity to watercourses or waterbodies could increase levels of turbidity and sediment deposition, decrease dissolved oxygen, and change pH levels in receiving environments. Mitigation measures incorporating water sensitive urban design principles including development of an erosion and sediment plan will improve water quality and minimise impacts to waterbodies and hydrological processes. With the implementation of mitigation measures it is unlikely

Prescribed impacts	Nature	Extent	Duration	Consequence
		sediment prior to reuse or discharge of the collected water. Unmanaged construction activities in proximity to watercourses or waterbodies could increase levels of turbidity and sediment deposition, decrease dissolved oxygen, and change pH levels in receiving environments. Other potential impacts on water quality could occur due to spills, leakages and disturbance of contaminated land. Mitigation measures will incorporate appropriate sediment and erosion controls during works to reduce any residual impacts.		that the Project would result in significant impacts to water quality and hydrological processes.
Wind turbine strikes	No wind turbines are proposed as part of this development footprint			
Vehicle strikes	Terrestrial fauna and threatened species (i.e. Koala)	The Project is likely to generate additional vehicular movements within the site, during construction and operation. However, due to the nature of the Project, it is unlikely that vehicle movements would be of significant scale in comparison to other known developments which cause significant levels of vehicle strikes (i.e. larger arterial roads/ highways). Vehicle movements are likely to be small in scale and be in association with onsite quarry operations. It is likely that speed limits would be relatively slow (i.e. <50km) due to the local road speeds. Despite this, the Project would increase vehicle movements within the site and have an incremental increase in the potential of vehicle strike to fauna than what is currently experienced on site. Whilst the Project will cause higher levels of vehicle traffic and therefore increase the potential of vehicle strike to native fauna, it is possible to minimise vehicle strike through: ■ Low speeds (≤50 km/ hr). ■ Improved visibility (i.e. clear vegetation along road verge) where applicable. ■ Signage of wildlife within the area.	Long term	**Low** – The Project will increase the potential for vehicle strike on native fauna, however, with the implementation of mitigation measures, the potential for vehicle strike is reduced and likely consequence of significant impacts due to vehicle strike is minimal.

9.4 Serious and Irreversible Impacts (SAII)

This section identifies potential serious and irreversible impact (SAII) entities that are listed in the Guidance to assist a decision-maker to determine a serious and irreversible impact that would be impacted by the disturbance footprint.

One listed SAII entities was recorded within the investigation area being:

- *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* associated with PCT 3359 New England Hills Stringybark-Box Woodland.

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland does not occur within the development footprint. Areas of this TEC have been avoided from impact and as such no listed SAII entities will be impacted as a result of the Project.

356900 357200 357500 357800

6619000 6618800 6618600

Spring Creek

Reedy Creek

Rose Hill Rd

Lot 1
DP1302364

Lot 2
DP1302364

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA2020 MGA Zone 56

LEGEND

- Development footprint
- Investigation area
- Lot 4/DP1096564 boundary
- Cadastre
- Quarry design

0 60 Metres

Proposal Footprint - Illustration 9.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

10. Other Statutory Considerations

10.1 SEPP (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020

The site resides in Uralla Shire LGA and the land zoning is RU2 – Rural Landscape, as such Chapter 3 Koala Habitat Protection 2020 applies to the site.

The aim of the Chapter 3 is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline—

(a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and

(b) by encouraging the identification of areas of core koala habitat, and

(c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.

Is the Land 'potential Koala habitat'?

Chapter 3 Koala Habitat Protection 2020 defines 'potential koala habitat' as "*areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component*".

Within the site the following *Eucalyptus* species dominated the canopy of remnant vegetation:

- *Eucalyptus caliginosa* (New England Stringybark)
- *Eucalyptus melliodora* (Yellow Box); and
- *Eucalyptus blakelyi* (Blakely's Red Gum)

None of the above *Eucalyptus* species are listed in Schedule 1 tree species under Chapter 3 Koala Habitat Protection 2020. On this basis, potential Koala habitat does not occur within the site as defined by *SEPP (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020*.

Overall, it is not considered that the development site provides important koala habitat for the species in the locality. It is likely that the proposed development would have a low impact on koalas and koala habitat in the locality.

11. Mitigation and Compensation

11.1 Mitigation and Compensation Measures Required

Mitigation measures have been prepared in accordance with Section 8.1 of the BAM (2020). Mitigation and management measures have been prepared to address and minimise the biodiversity impacts associated with the Project. **Table 11.1** outlines the proposed mitigation measures for the Project.

Table 11.1 Biodiversity Mitigation Measures

Reference ID	Mitigation Measure	Reason	Responsibility
Design			
B1	Ensure detailed designs are in keeping with impact areas assessed under this BDAR.	To ensure additional impacts do not occur which have not been properly assessed and accounted for within credit calculations/ mitigation measures.	Developer
B2	Internal speed limits and speeds along Rose Hill Rd would be ≤50 km/ hr which would reduce the risk of fauna mortality from vehicle strike.	To reduce impacts to native fauna.	Developer
Construction			
B3	An Erosion and Sediment Control Plan (ESCP) will be prepared for the site and incorporate erosion and sediment control measures in accordance with the Landcom/ Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book) with specific controls installed around watercourses.(Department of Environment and Climate Change 2008, Landcom 2004).	To prevent sediment entering drainage lines, moving off-site and sediment laden water entering adjacent land.	Project Contractor
B4	Erosion and sedimentation controls outlined in the ESCP are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	To ensure sediment controls are functional and appropriate.	Project Contractor
B5	Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised.	To ensure sediment controls are functional and appropriate.	Project Contractor
B6	Work areas are to be stabilised progressively during the works.	To minimise opportunities for soil transport during rainfall events.	Project Contractor
B7	Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (e.g. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines)(Department of the Environment 2015).	To minimise biodiversity risks from weed degradation.	Project Contractor
B8	Biosecurity risk weeds are to be managed according to requirements under the *Biosecurity Act 2015* and/ or Council management measures.	To minimise biodiversity risks from weed degradation and meet statutory requirements.	Project Contractor

Reference ID	Mitigation Measure	Reason	Responsibility
B9	The extent of the development footprint must be clearly (i.e. hi-visibility fencing or similar) pegged/ marked on site by a registered surveyor, consistent with final approved plans/ designs.	To minimise risks to fauna and vegetation not assessed under this BDAR.	Project Contractor
B10	Vegetation clearing must be undertaken via a staged approach so any resident fauna have opportunities for dispersal into retained vegetation outside the construction zone.	Protection of fauna likely to utilise the development footprint.	Project Contractor/ Ecologist
B11	Pre-clearing surveys must be undertaken by an ecologist or spotter-catcher to ensure nesting or roosting fauna are not present within vegetation to be removed. Surveys would ensure no Koalas are present within any vegetation to be removed. In the event that a Koala is identified on the site, clearing would be delayed until the animal moves off the site of its own volition, as determined by an ecologist.	Protection of fauna likely to utilise the development footprint.	Project Contractor/ Ecologist
B12	Any hollow-bearing trees (identified during pre-clearing surveys not previously identified as part of this BDAR) are to be removed in accordance with a two-stage clearing process with surrounding trees to be cleared initially with the habitat tree to be cleared at least 48 hrs after this. The felling of hollow-bearing trees would be supervised by an ecologist. A hollow-bearing tree inventory will be undertaken during the clearing process – data will be used to identify nest box replacement requirements (if required).	Protection of fauna likely to utilise the development footprint.	Project Contractor/ Ecologist
B13	Any hollow-bearing trees identified to be removed during pre-clearing surveys will be replaced and offset within retained vegetation at a 2 (nest box) :1 (hollow tree) ratio. If required, nest boxes will be provided, installed and monitored as prescribed in the Vegetation Management Plan (outlined below). Nest boxes will be installed in accordance with advice from a suitably experienced and qualified ecologist.	To enhance habitat values at the site for hollow obligate fauna.	Project Contractor/ Ecologist
B14	Vegetation to be cleared will not be pushed into adjacent vegetation.	Protection of fauna likely to utilise the development footprint and adjacent vegetation.	Project Contractor
B15	Relocation of habitat features (fallen timber, hollow logs) from the development footprint are to be retained and placed into areas identified for revegetation or within adjacent vegetation without causing significant damage (i.e. placing on the edge of retained vegetation).	Enhancement of habitat in adjacent vegetation.	Project Contractor

Reference ID	Mitigation Measure	Reason	Responsibility
B16	Vegetation removed will not be burnt. Vegetation removed will be chipped and mulch retained for reuse onsite.	To reduce air pollution/ carbon emissions.	Project Contractor
B17	A Vegetation Management Plan (VMP) will be prepared and focus management actions surrounding the proposed development (including other facilities on the lot) and along Spring Creek riparian zones and other areas previously cleared and not associated with development. The plan will include (but not limited to): ■ Re-establishment/ restoration of native vegetation along Spring Creek and offset planting areas (including previously cleared areas unused). ■ Weed control surrounding the development area and along Rose Hill Rd. ■ Nest box replacement and monitoring (if required).	To offset impact of vegetation clearing, hollow-bearing tree removal, weed dispersal and habitat enhancement.	Project Contractor/ Ecologist
Operation			
B18	Implementation of a Vegetation Management Plan in accordance with the measures outlined above.	To address offsets and enhance retained native vegetation on site which comprises intact native forest and good quality biodiversity values.	Project Contractor/ Ecologist
B19	Signage must be installed along access routes displaying road speed limits (<50km/ hr) to reduce the potential of vehicle strike to fauna and dust impacts.	To minimise impacts relating to vehicle strike and dust impacts to biodiversity within the site.	Developer
B20	Stormwater swale and outlet works must be completed to minimise disturbance to native vegetation and appropriate erosion and sediment controls are installed and maintained these will be in accordance with an Erosion and Sediment Control Plan (ESCP).	To minimise impacts to biodiversity and water quality.	Developer

12. Biodiversity Offset Credit Obligation

Biodiversity offsetting for residual impacts on BC Act biodiversity values is mandatory for Part 4 being assessed under Part 7 of the BC Act and subject to a BDAR. Biodiversity offset obligations have been determined using the BAM credit calculator. The required ecosystem and species credit obligations are outlined below.

12.1 Impacts Not Requiring Offset

In accordance with section 9.2.1 of the BAM, an offset is required for all impacts of Projects on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥15, where the PCT is representative of an EEC or a CEEC.
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

The following PCTs and vegetation zones do not require biodiversity offsets as they recorded a vegetation integrity score of ≤15:

- PCT 3352 Armidale Quartz Hills Stringybark Forest – Derived condition.

All biodiversity values that do not require offsets are shown in **Illustration 12.1**.

LEGEND

- Development footprint
- Investigation area
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Derived condition
- Cadastre
- Watercourse

0 60 Metres

Impacts Not Requiring Offset - Illustration 12.1

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

12.2 Impacts Requiring Offset

The vegetation zones recorded within the development footprint that generated a score of ≥17 require biodiversity offsets.

Biodiversity offset obligations have been determined using the BAM credit calculator. Biodiversity values which generated ecosystem and species credits require offset, which are detailed below.

Impacts requiring offset are shown in **Illustration 12.2**.

12.2.1 Ecosystem Credits

The required ecosystem credit obligation, as determined using the BAM calculator for the Project is detailed in **Table 12.1**.

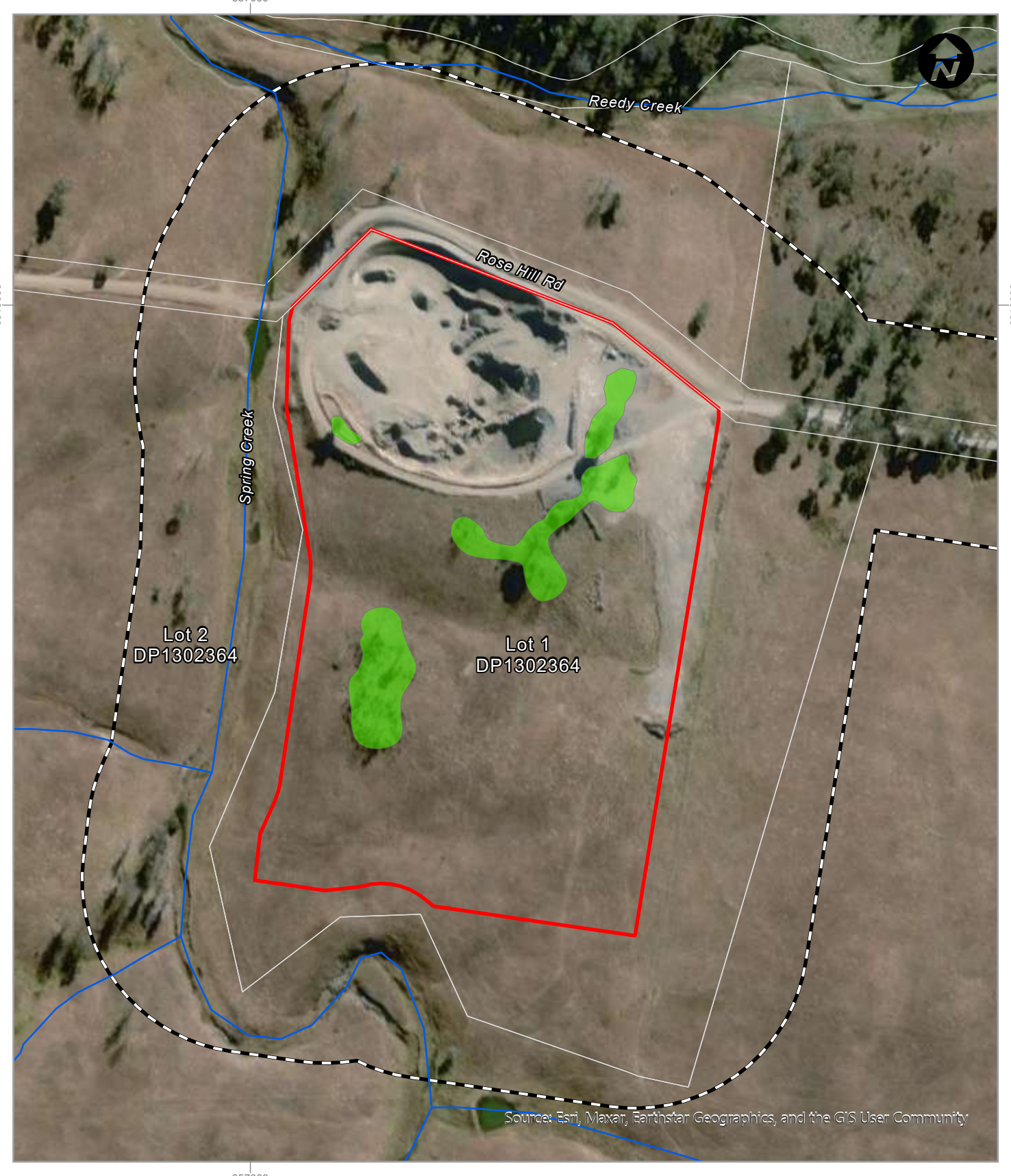
Table 12.1 Ecosystem Credits Required to Offset Development Impacts

PCT	Vegetation Zone	TEC	BRW	Area of Impact (ha)	Ecosystem Credit Obligation
PCT 3352	3352_Moderate	Not listed	2	0.56	14
				Total ecosystem credit obligation	**14**

BRW – Biodiversity Risk Weighting

12.2.2 Species Credits

There are no required species credit obligations, as determined using the BAM-C, for the development.



LEGEND

- Development footprint
- Investigation area
- PCT 3352 - Armidale Quartz Hills Stringybark Forest - Moderate condition
- Cadastre
- Watercourse

0 60 Metres

Impacts Requiring Offset - Illustration 12.2

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: TLJ
Source of base data: ESRI World Imagery
Date: 27/02/2025
Revision: A

12.3 Offsetting Strategy

The biodiversity offset strategy for this Project, that will enable the credit obligations to be met, comprises three options. These options are:

- Establishment of Biodiversity Stewardship Agreements.
- The purchase and retirement of existing biodiversity credits currently available on the biodiversity credit register.
- Making a payment into the Biodiversity Conservation Fund (BCF).

Biodiversity offset obligations will be met by either; purchase and retirement of existing biodiversity credits available on the biodiversity credit register or making a payment into the BCF.

Glossary of Terms and Acronyms

Term or acronym	Meaning
BAM	Biodiversity Assessment Method 2020
BAM-C	BAM Calculator
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	Biodiversity Conservation Regulation 2017
BCD	Biodiversity Conservation Division (now Biodiversity, Conservation and Science (BSC))
BCS	Biodiversity, Conservation and Science
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
BSC	Biodiversity, Conservation and Science
CMA	Catchment Management Area
CST	Credit Supply Taskforce
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	Department of Planning and Environment (now DCCEEW)
EES	Environment, Energy and Science (now BCS)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environmental Plan
LGA	Local Government Area
OEH	Office of Environment and Heritage
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community listed in the BC Act and/or EPBC Act
VI	Vegetation Integrity
VIS	Vegetation Information System
VMP	Vegetation Management Plan

References

Bureau of Meteorology 2025, *Latest Weather Observations for New South Wales - Bureau of Meteorology*, *http://www.bom.gov.au/nsw/observations/nswall.shtml?ref=hdr*.

Cropper, S 1993, *Management of endangered plants*, CSIRO Publishing,.

Department of Climate Change Energy the Environment and Water 2025a, *Directory of Important Wetlands in Australia*, *http://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands*.

Department of Climate Change Energy the Environment and Water 2025b, *Australian Faunal Directory*, *https://biodiversity.org.au/afd/home*, viewed 21 September 2021, <https://biodiversity.org.au/afd/home>.

Department of Climate Change Energy the Environment and Water 2025c, *Protected Matters Search Tool*, *https://www.environment.gov.au/epbc/protected-matters-search-tool*.

Department of Climate Change Energy the Environment and Water 2025d, *Species Profile and Threats Database - SPRAT*, *http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl*.

Department of Environment and Climate Change 2008, *Managing Urban Stormwater: Soils and construction - Volume 2A*.

Department of Environment and Climate Change 2009, *Threatened species survey and assessment guidelines: field survey methods for fauna - Amphibians.*, viewed 21 September 2021, <http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf>.

Department of Environment and Conservation 2004, *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)*.

Department of Environment Water Heritage and the Arts 2010, *Survey guidelines for Australia's threatened birds - Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*, Department of Environment Water Heritage and the Arts.

Department of Planning and Environment 2022, *Koala (Phascolarctos cinereus) - Biodiversity Assessment Method Survey Guide*, Parramatta.

Department of Planning Industry and Environment 2021, *NSW Native Vegetation Extent 5m Raster v1.2*, *https://data.nsw.gov.au/data/dataset/98028b88-e917-4502-91fa-9e571f58385a*.

Department of Primary Industries 2025, *Fisheries Spatial Data Portal*, *https://www.dpi.nsw.gov.au/about-us/science-and-research/spatial-data-portal*.

Department of the Environment 2013, *Matters of National Environmental Significance - Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*.

Department of the Environment 2015, *'Arrive Clean, Leave Clean' - Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems*.

Department of the Environment and Heritage 2006, *EPBC Act policy statement 3.5 – White box – Yellow box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* , Canberra.

Department of the Environment Water Heritage and the Arts 2010, *Survey guidelines for Australia's threatened frogs - guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*.

Landcom 2004, *Managing Urban Stormwater: Soils and construction - Volume 1 (4th Edition)*.

Longcore, T & Rich, C 2004, 'Ecological light pollution', *Frontiers in Ecology and the Environment*, vol. 2, no. 4, pp. 191–198.

Magrath, M et al. 2010, 'Survey guidelines for Australia's threatened birds', *Australian Government Department of the Environment, Water, Heritage and the Arts*.

Newport, J, Shorthouse, DJ, & Manning, AD 2014, 'The effects of light and noise from urban development on biodiversity: Implications for protected areas in Australia', *Ecological Management & Restoration*, vol. 15, no. 3.

NSW Department of Planning and Environment 2020a, *Biodiversity Assessment Method*, Parramatta.

NSW Department of Planning and Environment 2020b, *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method*.

NSW Department of Planning and Environment 2020c, *NSW Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method*, Parramatta, NSW.

NSW Department of Planning and Environment 2022, *Biodiversity Assessment Method 2020 Operational Manual - Stage 1*, Parramatta, NSW.

NSW Department of Planning and Environment 2023, *Biodiversity Assessment Method Operational Manual - Stage 2*, Department of Planning, Industry and Environment.

NSW Department of Planning and Environment 2025a, *BioNet Vegetation Classification*, *https://www.environment.nsw.gov.au/research/Visclassification.htm*.

NSW Department of Planning and Environment 2025b, *NSW BioNet Threatened Biodiversity Data Collection*, *https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet*.

NSW Department of Planning and Environment 2025c, *BioNet Atlas of NSW Wildlife*, *https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx*.

NSW Government 2025, *Biodiversity Assessment Calculator (BAM-C)*, *Office of Environment and Heritage (OEH)*.

NSW Threatened Species Scientific Committee 2020, *Final Determination - White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, Parramatta.

Office of Environment & Heritage 2018, *'Species credit' threatened bats and their habitats - NSW Survey guide for the Biodiversity Assessment Method.*

Phillips, S & Callaghan, J 2011, 'The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus', *Australian Zoologist*, vol. 35, no. 3, pp. 774–780, <https://doi.org/10.7882/AZ.2011.029>.

Planning Industry and Environment 2016, *NSW (Mitchell) Landscapes - version 3.1*, *https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1*.

Rodney Stevens Acoustics 2023, *Noise Impact Assessment Proposed Quarry 75 Rose Hill Road, Arding*, Sydney.

Royal Botanic Gardens 2025, *Plantnet - The Plant Information Network System of Botanic Gardens Trust Version 2.0*, *https://plantnet.rbgsyd.nsw.gov.au/*.

Scotts, D 2003, *Key Habitats and Corridors for Forest Fauna*.

Thackway, R & Cresswell, ID 1995, 'An Interim Biogeographic Regionalisation of Australia (IBRA), Version 7'.

Threatened Species Scientific Committee 2017, *Conservation Advice - Litoria piperata - Peppered Tree Frog*.

Todoroski Air Sciences Pty Ltd 2023, *Air Quality Impact Assessment - Williams Quarry Extension*, Eastwood.

Copyright and Usage

Appendix A

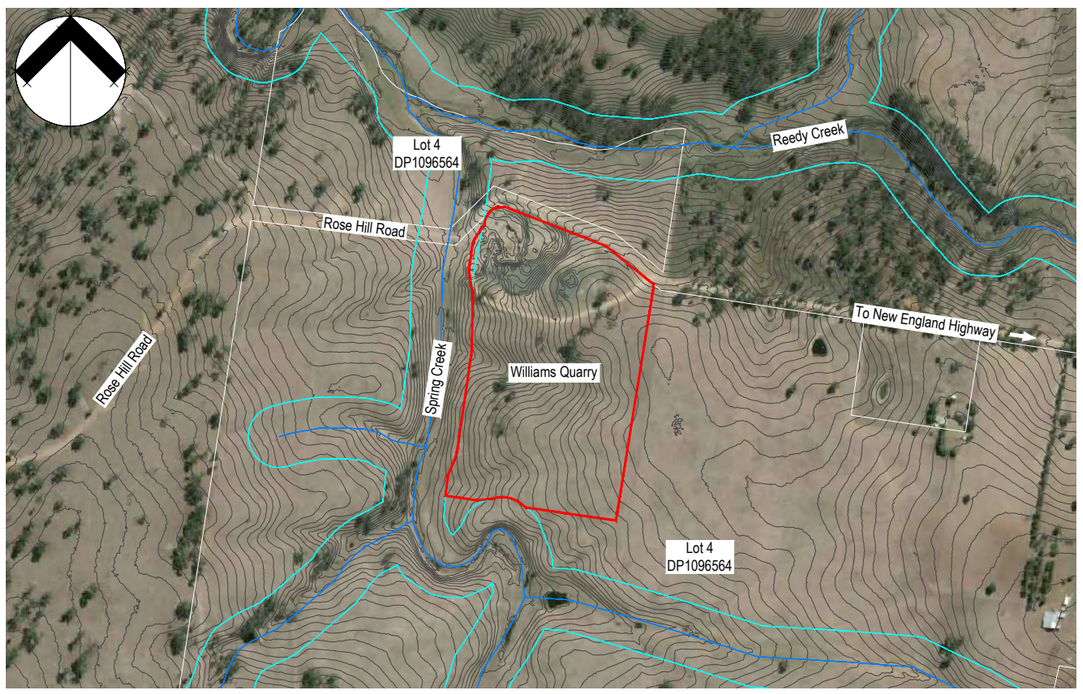
Concept Design

75 ROSE HILL ROAD, ARDING NSW 2358
LOT 4 DP 1096564

WILLIAMS QUARRY

ENGINEERING CONCEPT

Drawing Schedule		
Dwg No.	**Title**	**Revision**
4079/SK001-1	Cover Sheet and Drawing Schedule	-
4079/SK001-2	Concept Overall Staging Plan	-
4079/SK001-3	Concept Catchment Plan	-
4079/SK001-4	Concept Stage 1	-
4079/SK001-5	Concept Stage 2	-
4079/SK001-6	Concept Stage 3	-
4079/SK001-7	Concept Stage 4	-
4079/SK001-8	Concept Stage 5	-
4079/SK001-9	Concept Stage 6	-
4079/SK001-10	Concept Stage 7	-
4079/SK001-11	Concept Stage 8	-
4079/SK001-12	Concept Stage 9	-
4079/SK001-13	Concept Stage 10 (Final)	-
4079/SK001-14	Concept Typical Details	-



Locality Plan

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		

XREFs

Scale

metres — Not To Scale

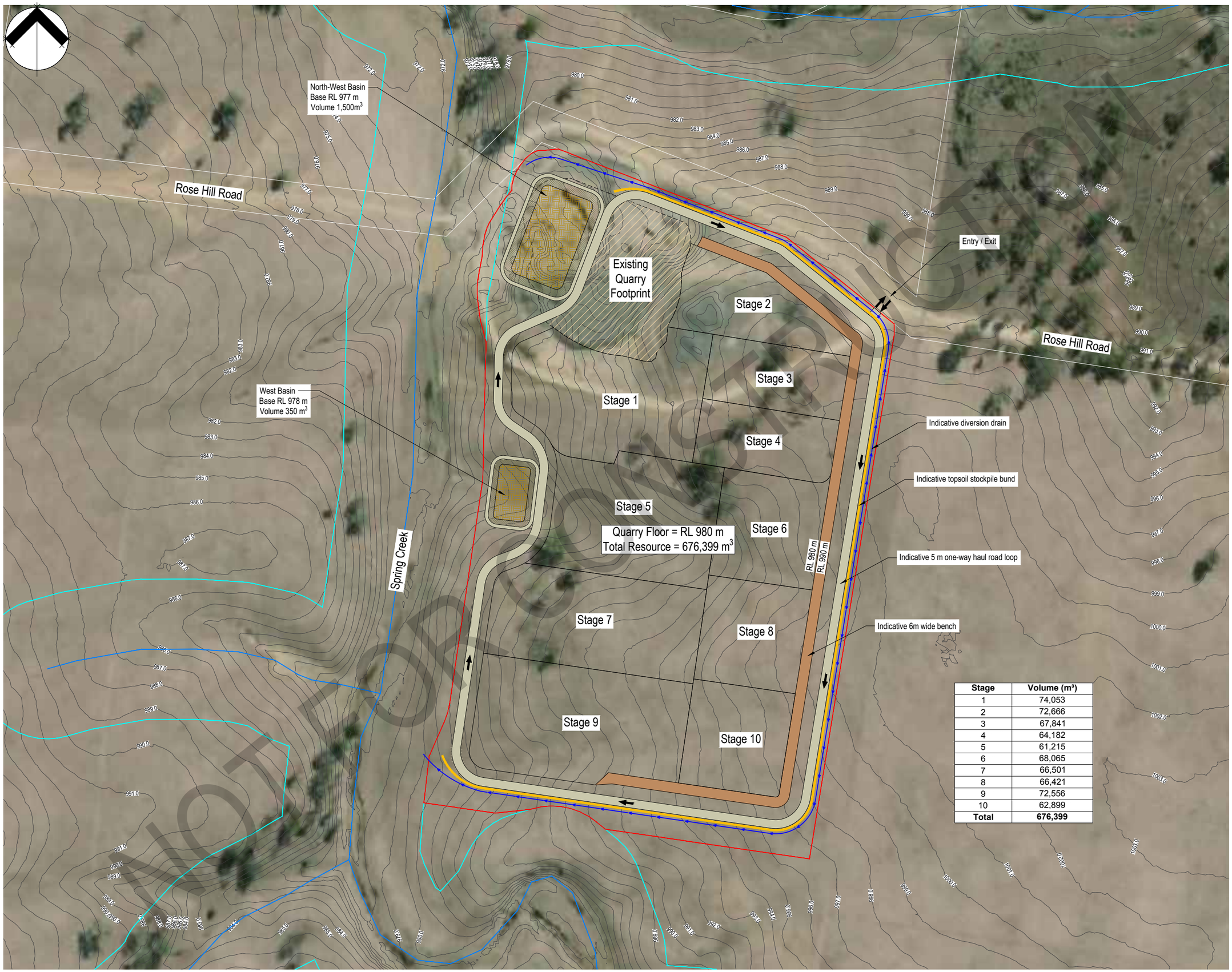
Drawing Title

Cover Sheet and Drawing Schedule

4079-1016

Drawing Number — *Revision*

4079/SK001-1



Stage	Volume (m³)
1	74,053
2	72,666
3	67,841
4	64,182
5	61,215
6	68,065
7	66,501
8	66,421
9	72,556
10	62,899
Total	**676,399**

LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

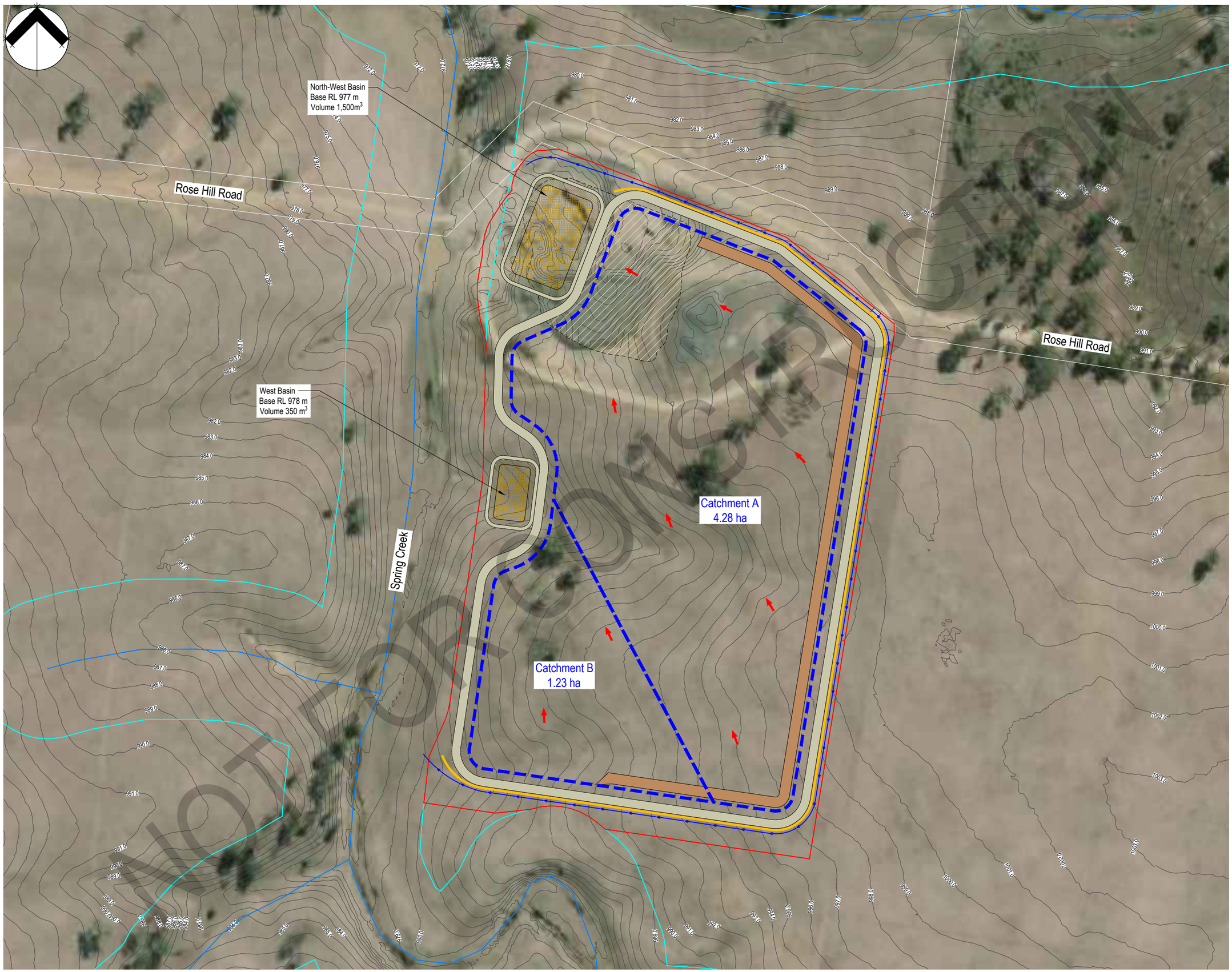
Drawing Title

Concept
Overall Staging Plan

4079-1016

Drawing Number *Revision*

4079/SK001-2



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain
- Catchment boundary
- Site water flow direction

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

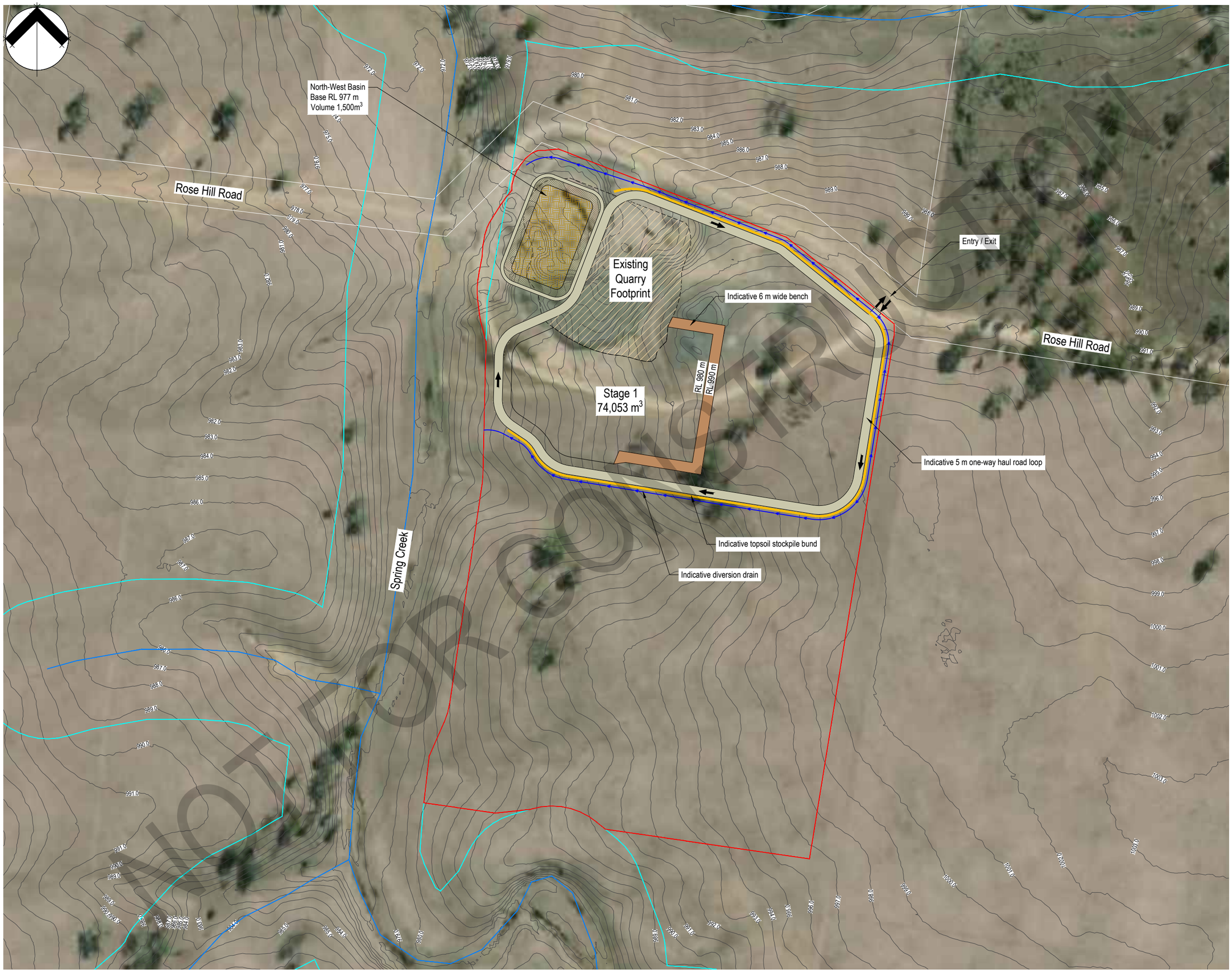
Drawing Title

Concept
Catchment Plan

4079-1016

Drawing Number *Revision*

4079/SK001-3



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

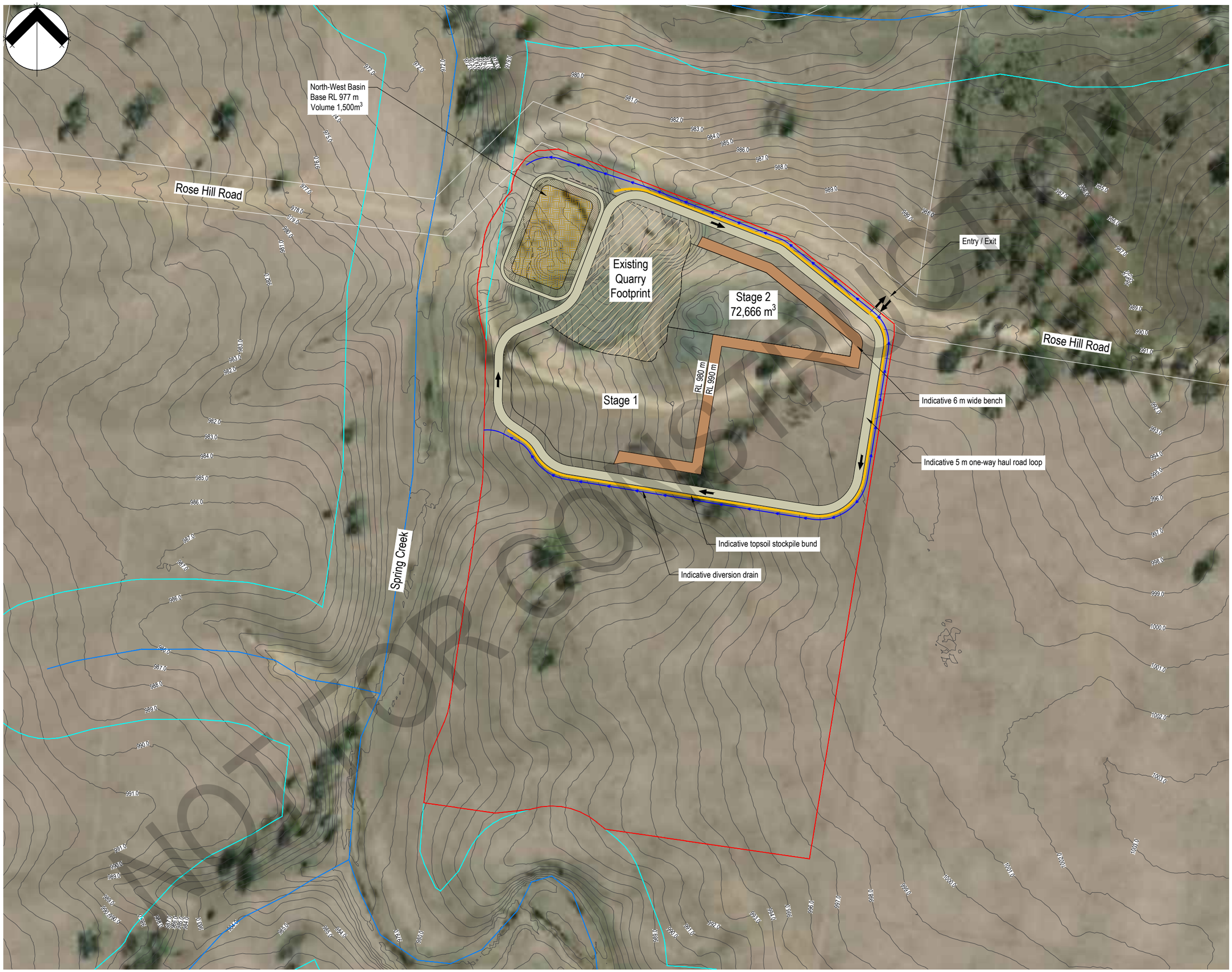
Drawing Title

Concept
Stage 1

4079-1016

Drawing Number *Revision*

4079/SK001-4



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		

XREFs

Scale

metres 0 10 20 30 40 50

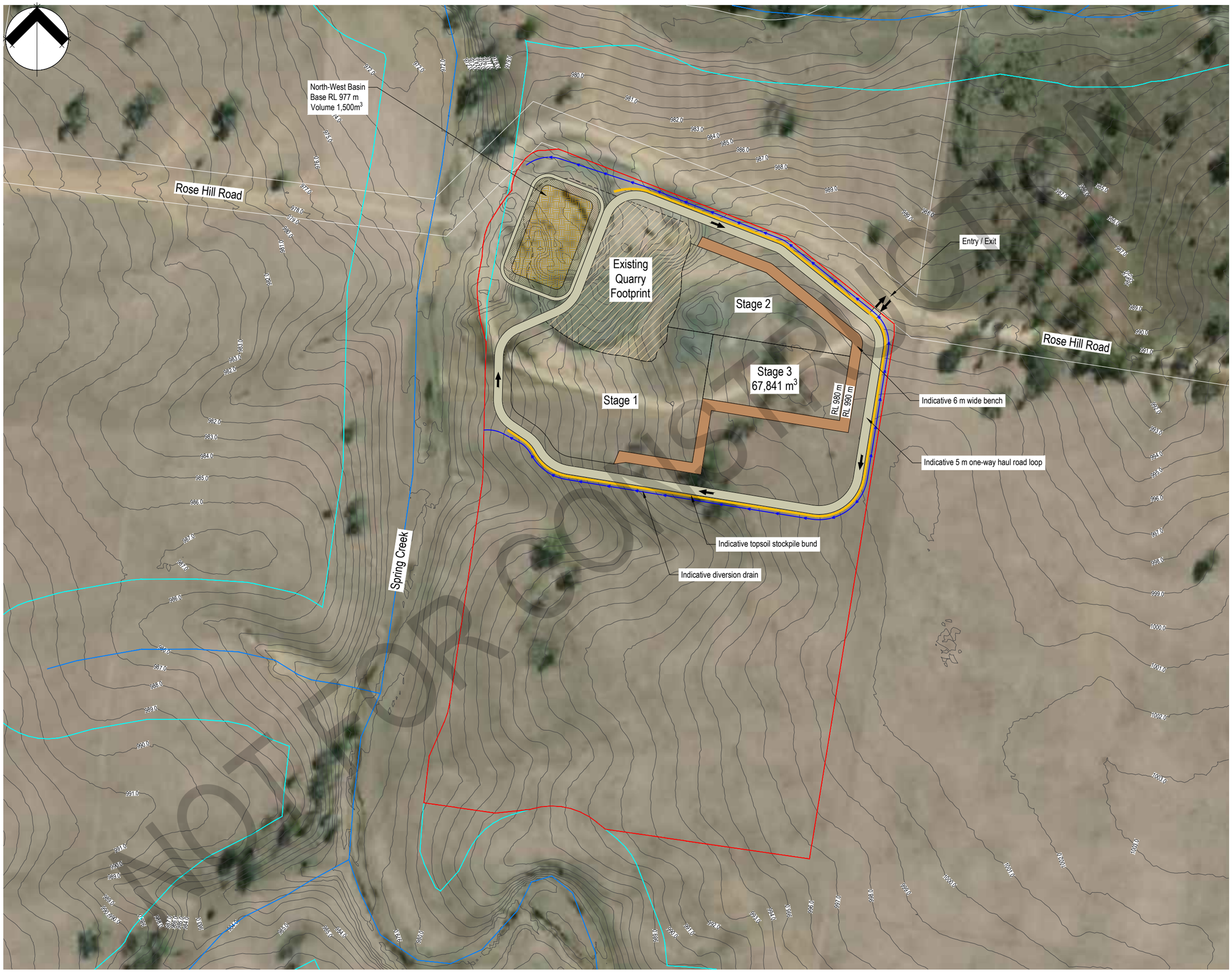
Drawing Title

Concept
Stage 2

4079-1016

Drawing Number *Revision*

4079/SK001-5



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

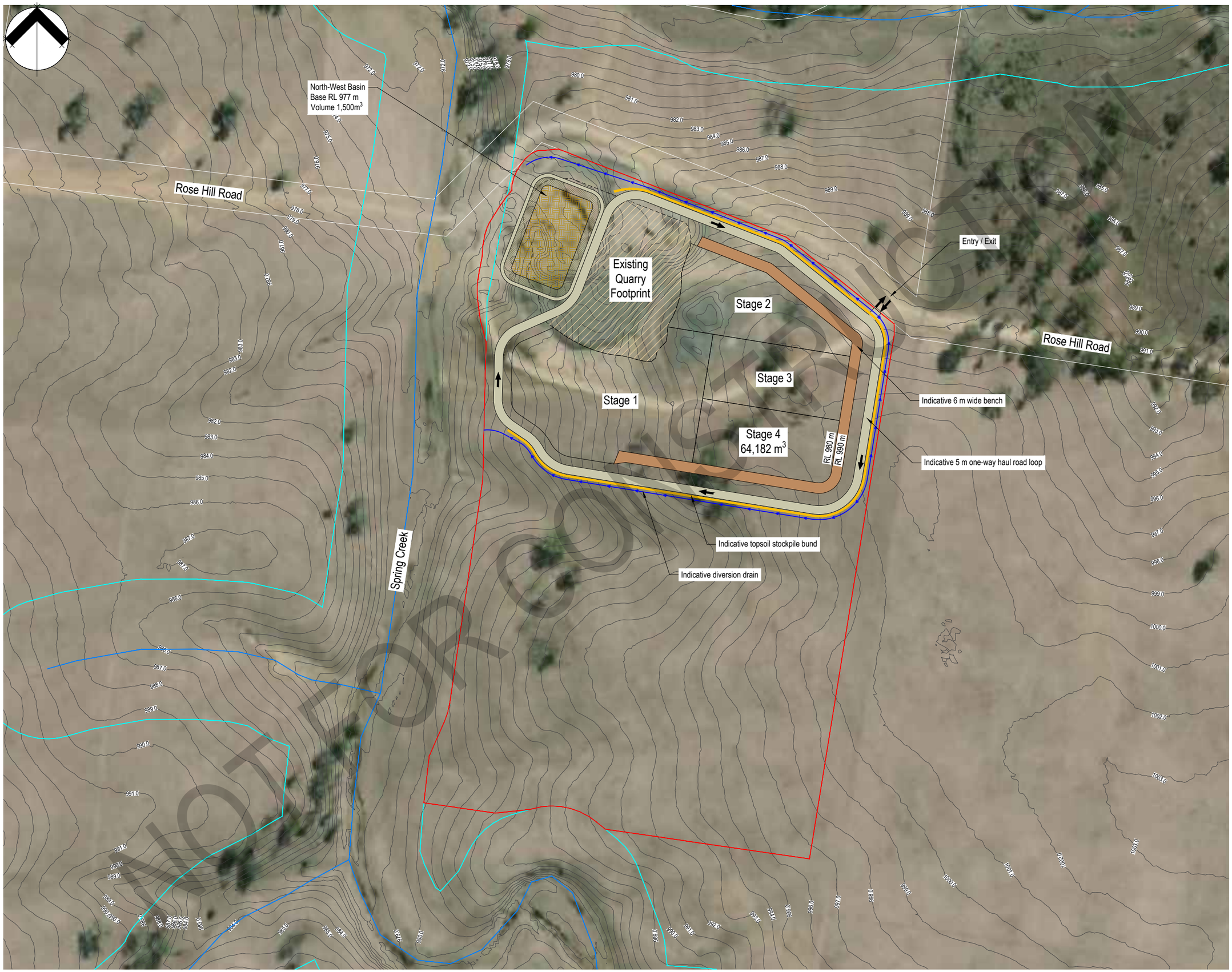
Drawing Title

Concept
Stage 3

4079-1016

Drawing Number *Revision*

4079/SK001-6



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

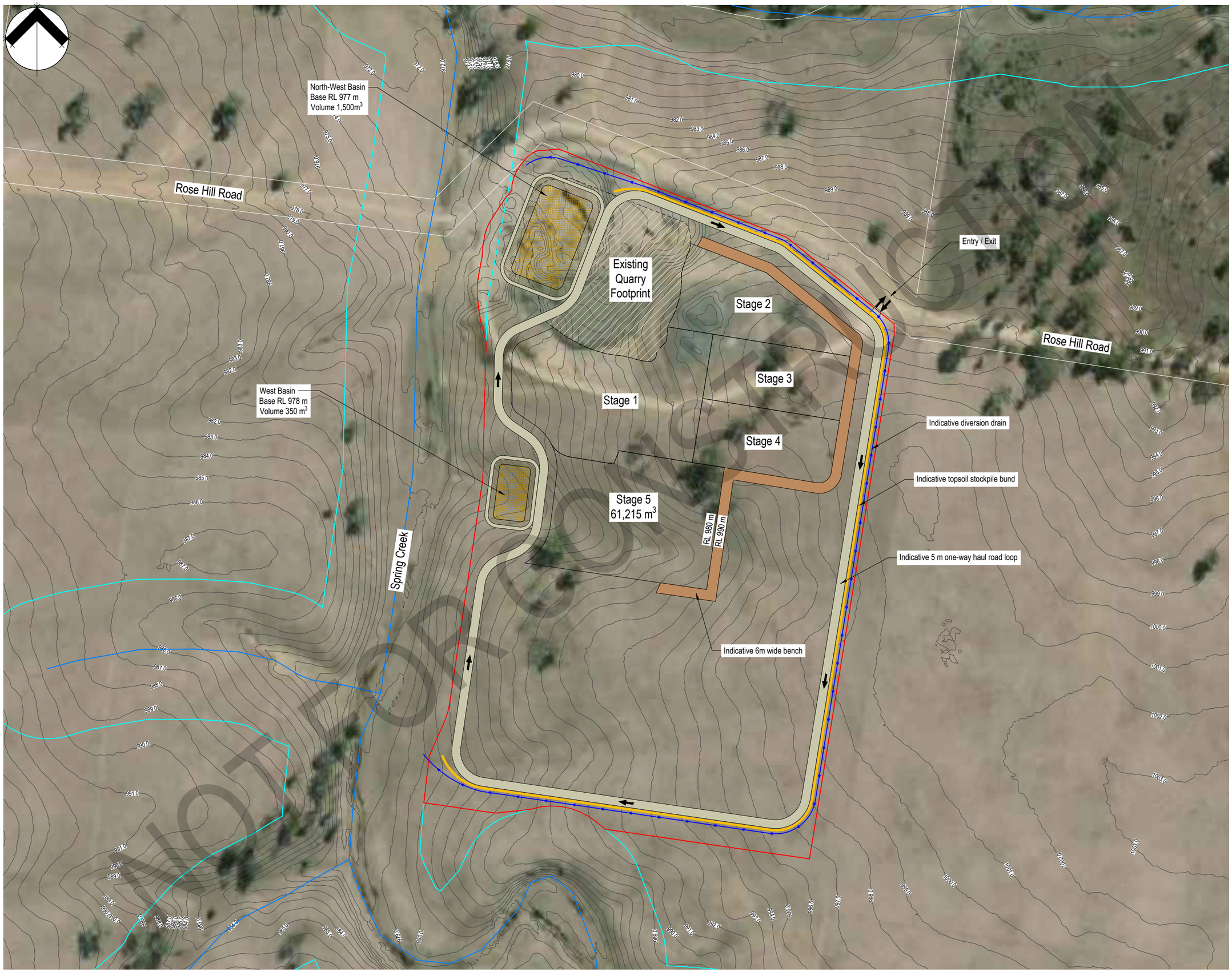
Drawing Title

Concept
Stage 4

4079-1016

Drawing Number *Revision*

4079/SK001-7



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				

Scale

metres 0 10 20 30 40 50

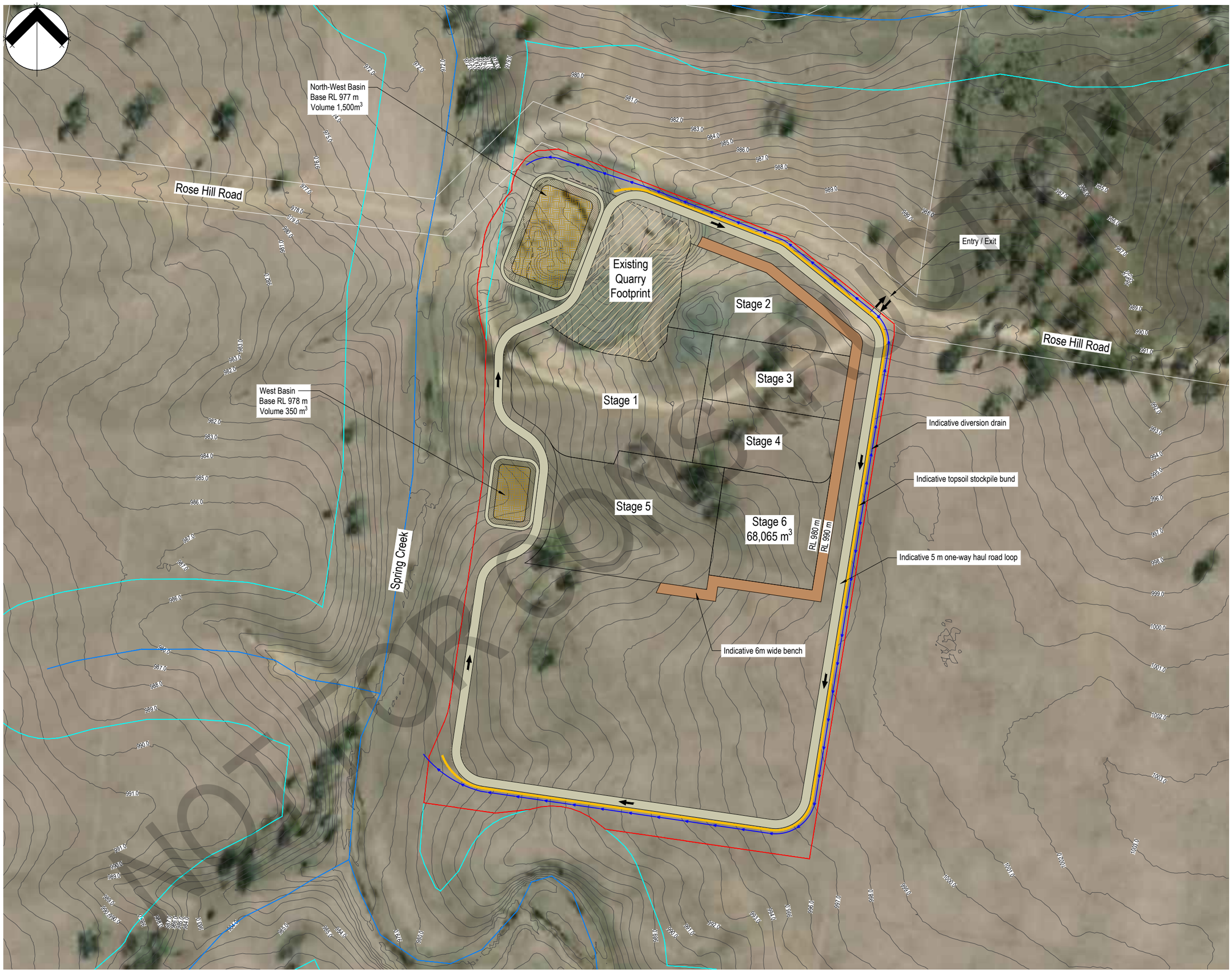
Drawing Title

Concept
Stage 5

4079-1016

Drawing Number *Revision*

4079/SK001-8



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				
Scale				

metres 0 10 20 30 40 50

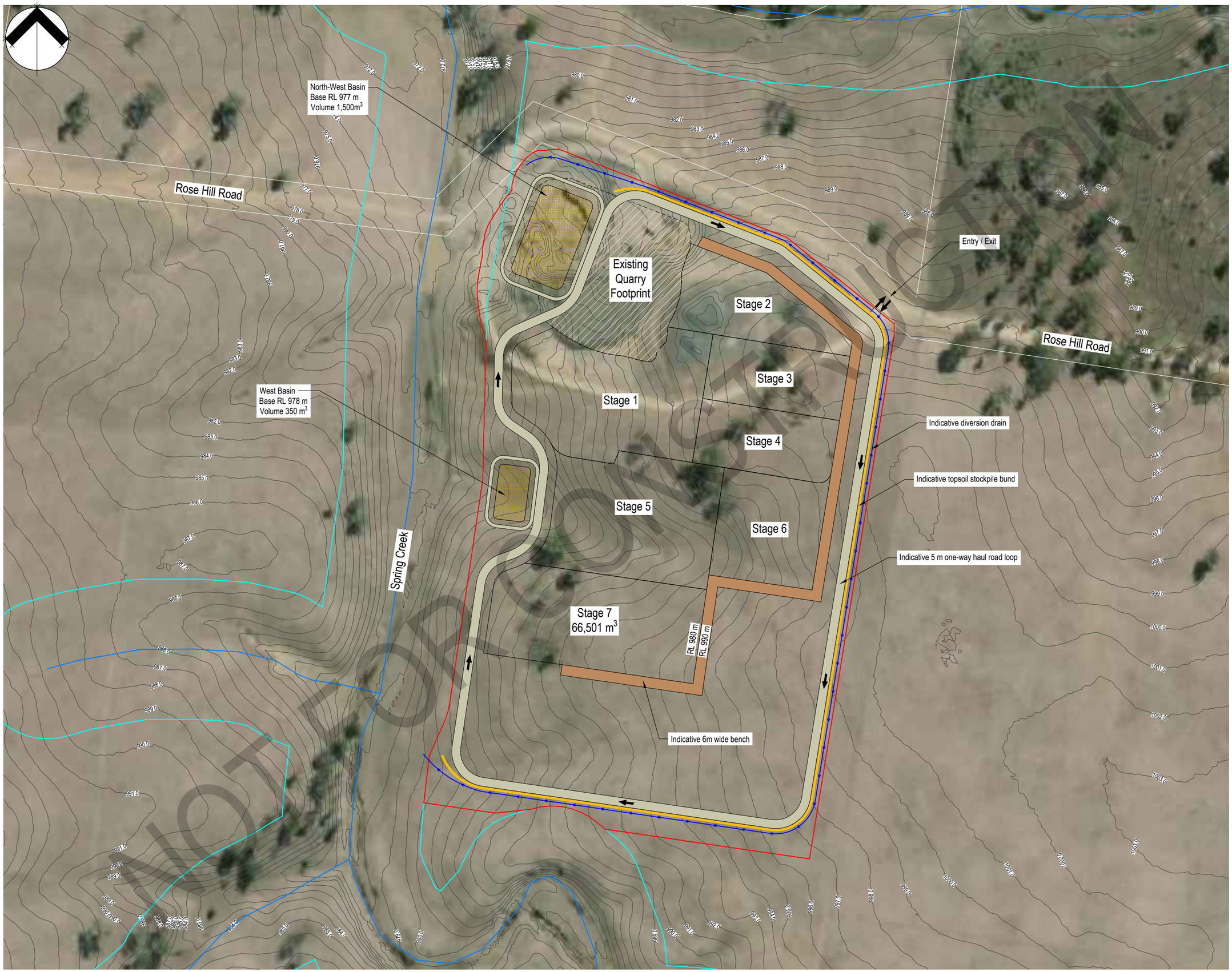
Drawing Title

Concept
Stage 6

4079-1016

Drawing Number *Revision*

4079/SK001-9



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design
www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title
Williams Quarry

Client
Ducats Earthmoving Pty Ltd

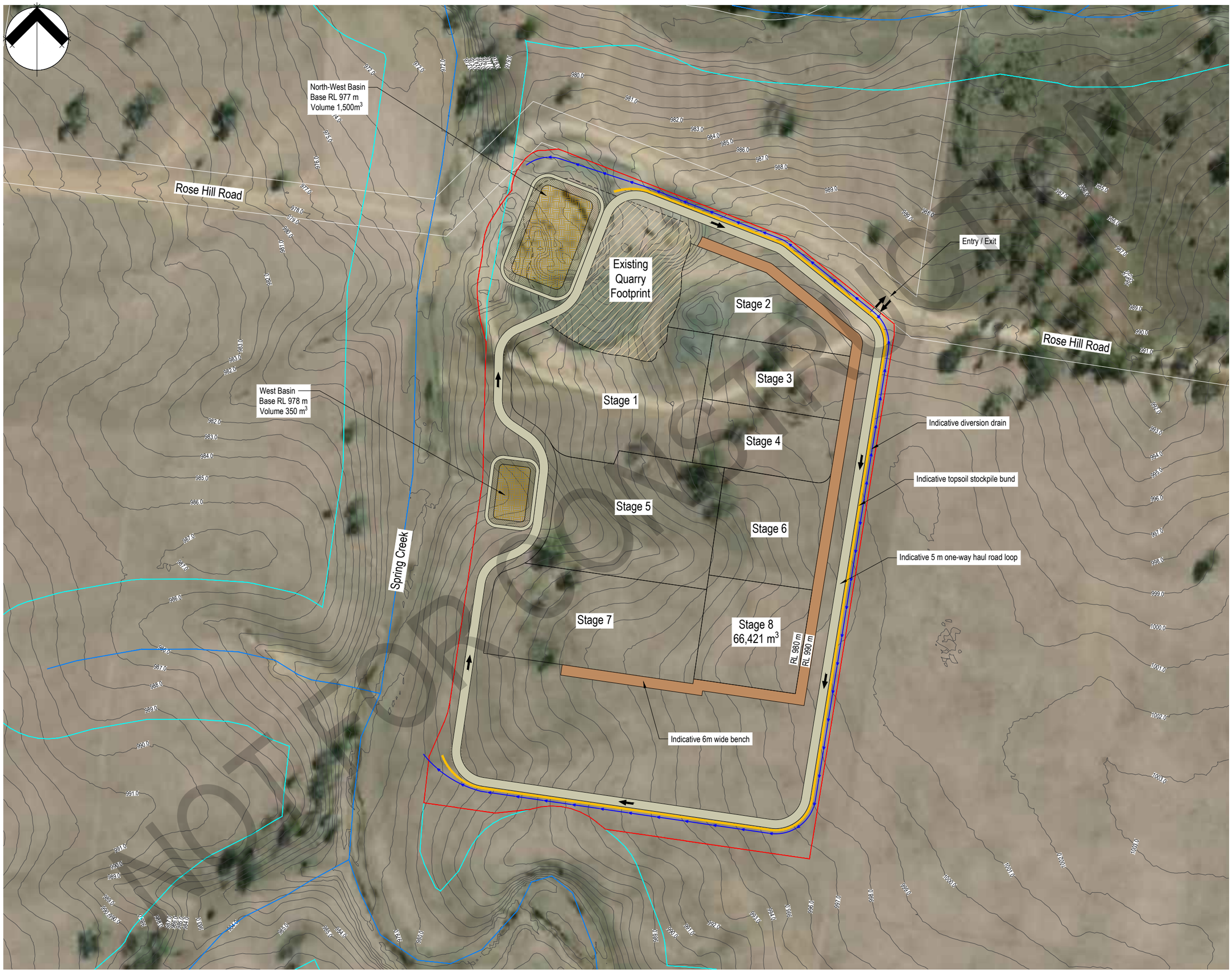
Designed	KWG	Drawn	KWG	Checked PJS
Approved	TJC	Date	1/11/2022	
XREFs				

Scale

metres 0 10 20 30 40 50

Drawing Title
Concept
Stage 7
4079-1016

Drawing Number 4079/SK001-10 *Revision*



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

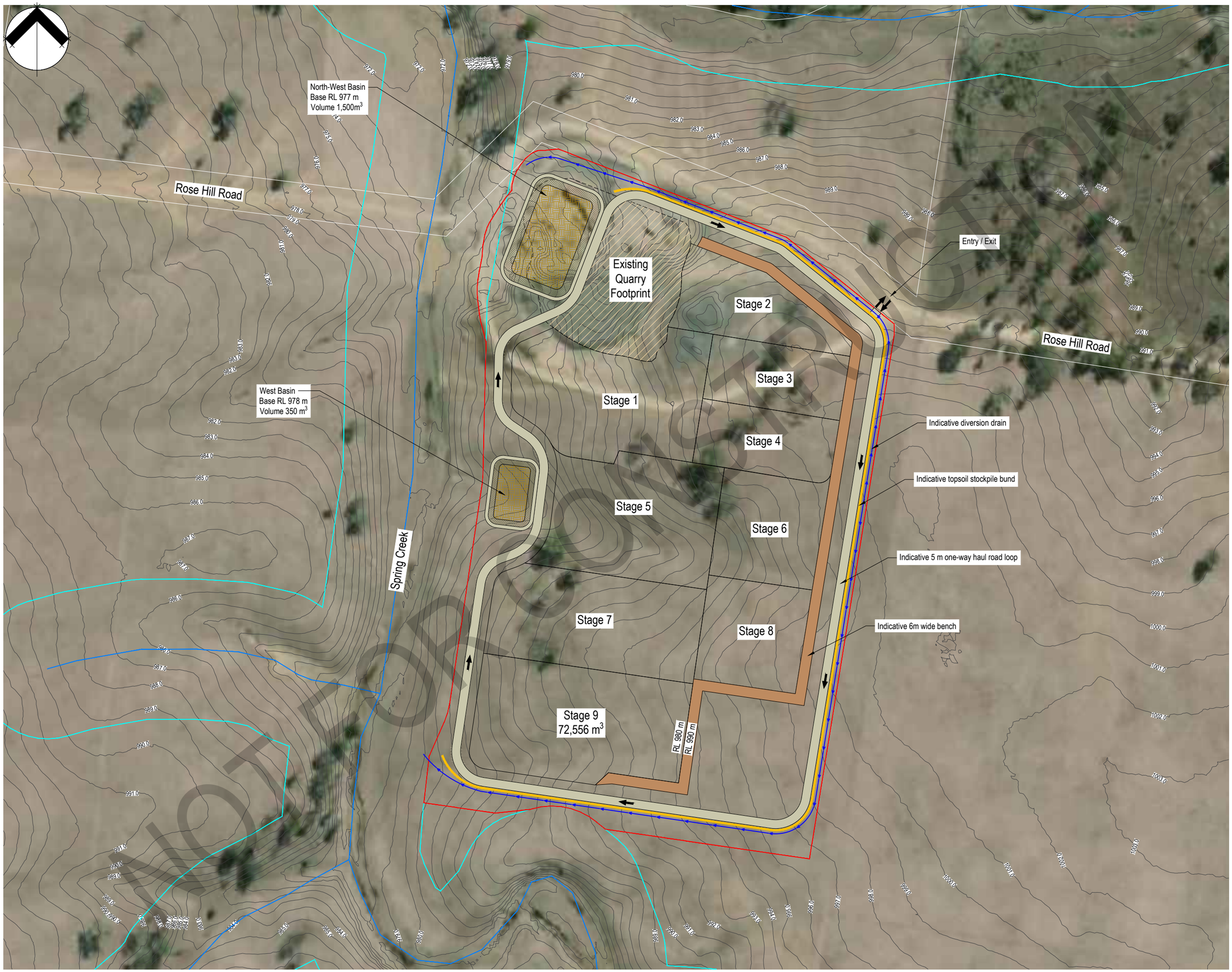
Drawing Title

Concept
Stage 8

4079-1016

Drawing Number *Revision*

4079/SK001-11



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

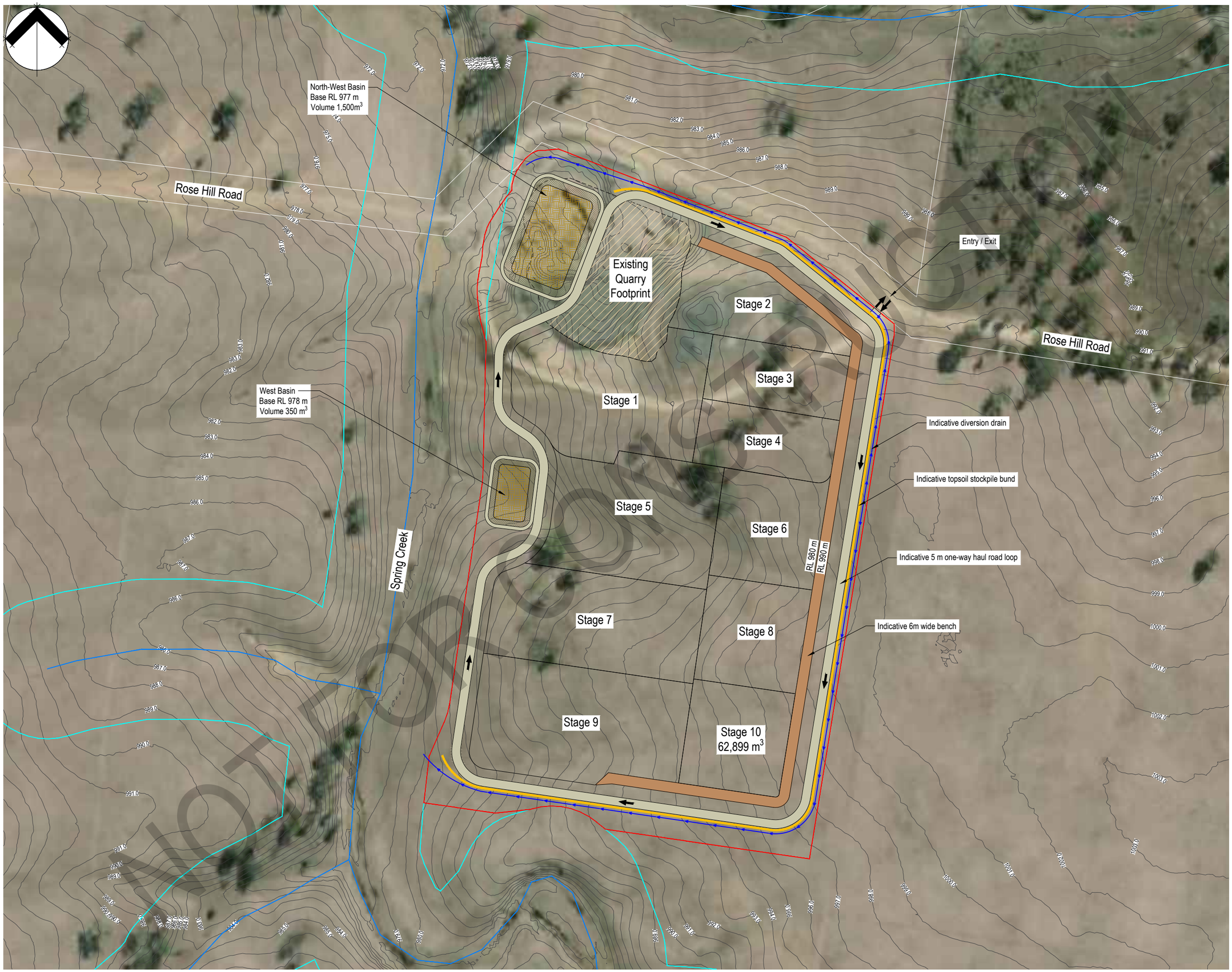
Drawing Title

Concept
Stage 9

4079-1016

Drawing Number *Revision*

4079/SK001-12



LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design
www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		
XREFs					
Scale					

metres 0 10 20 30 40 50

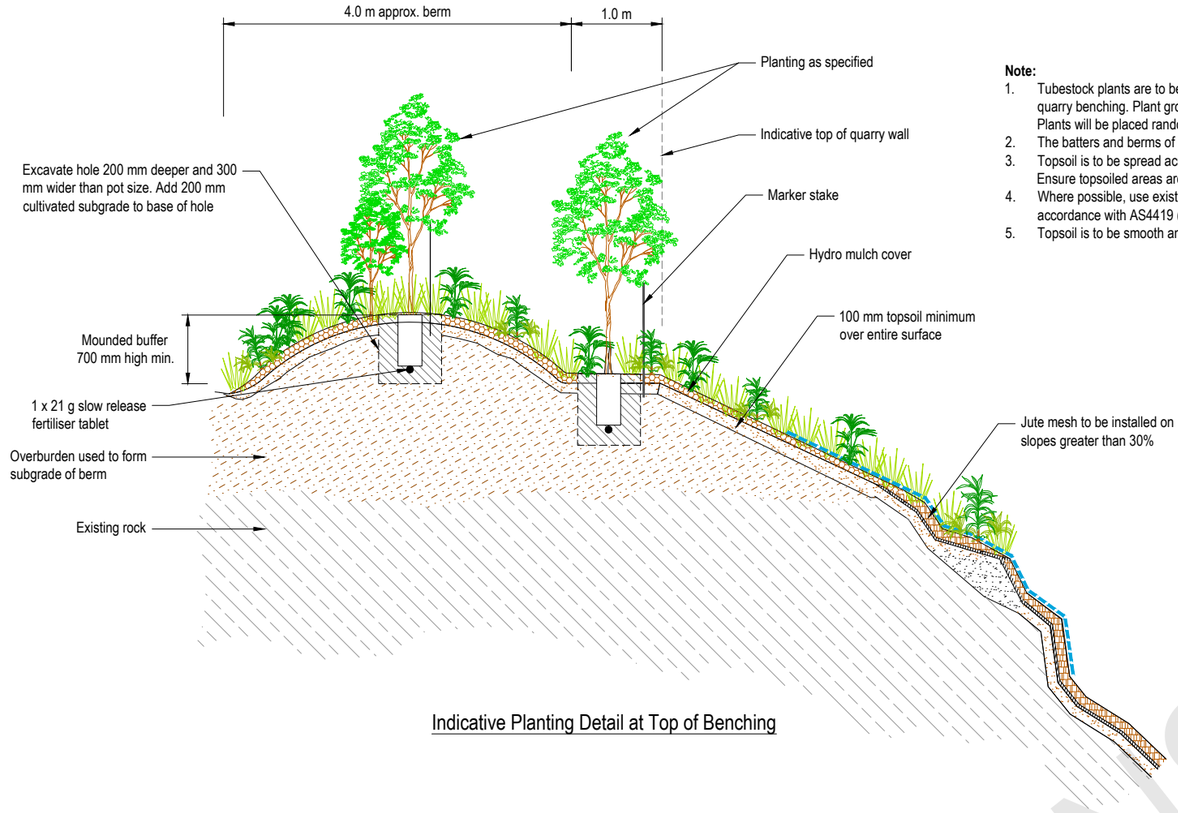
Drawing Title

Concept
Stage 10 (Final)

4079-1016

Drawing Number *Revision*

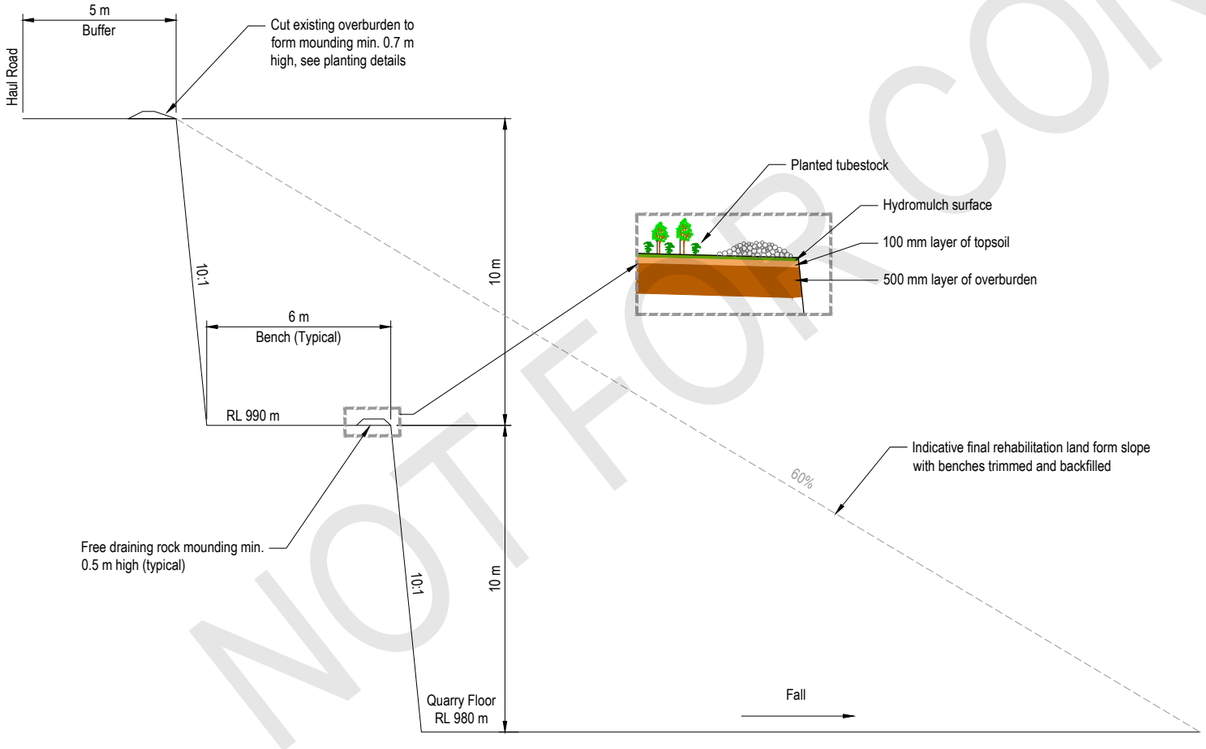
4079/SK001-13



Indicative Planting Detail at Top of Benching

Note:

1. Tubestock plants are to be installed in groups within the berm along the top of the quarry benching. Plant groups will consist of smaller groups of at least three species. Plants will be placed randomly at between 1 - 5 m centres.
2. The batters and berms of the quarry benching are to be hydroseeded.
3. Topsoil is to be spread across the prepared subgrade of the quarry base and berm. Ensure topsoiled areas are graded to enable free drainage without ponding.
4. Where possible, use existing stockpiled site topsoil. Good quality imported topsoil in accordance with AS4419 (1998) is to be used if there is insufficient site topsoil.
5. Topsoil is to be smooth and free of stones, vegetative material or weed seed.



Indicative Benching Detail

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

www.geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn KWG	Checked PJS
Approved	TJC	Date 1/11/2022	

XREFs

Scale

metres Not To Scale

Drawing Title

Concept
Typical Details

4079-1016

Drawing Number *Revision*

4079/SK001-14

Appendix B

Plot Data

Plot 1

Date							
27/10/2022							
Zone	Datum	Survey Name	Zone ID	*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*			
56	MGA94	4079	1				
Start Easting	Start Northing	Start WP	Recorders	IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
357089	6618802			New England Tablelands	20x50	plot 1 photo start	179
End Easting	End Northing	End WP					

Vegetation Class	New England Grassy Woodlands	**Confidence**	
Plant Community Type	3352	**EEC?**	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	1
	Shrubs	1
	Grasses etc.	4
	Forbs	6
	Ferns	0
	Other	1
Sum of **Cover** of native vascular plants by growth form group	**Trees**	20
	Shrubs	0.3
	Grasses etc.	80.2
	Forbs	7
	Ferns	0
	Other	0.1
High Threat Exotic cover		0

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

*Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.***

*For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	1	1
30 - 49 cm	present	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	present	0
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		28.1

Log length tally	
10.2	
1.3	
1.2	
4.6	
1.6	
1.5	
0.5	
4.9	
2.3	
28.1	

Field Notes
woodland

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	1	1	2	1	1
Average of the 5 subplots	1.2				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m. Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Tree (TG)	*Eucalyptus caliginosa*	Eucalyptus caliginosa	N	20	50		
Shrub (SG)	*Lissanthe strigosa*	Lissanthe strigosa	N	0.3	3		
#N/A			#N/A				
Other (OG)	*Glycine spp.*	glycine	N	0.1	20		
Forb (FG)	*Rumex brownii*	Rumex brownii	N	5	200		
Grass & grasslike (GG)	*Cyperus spp.*	cyperaceae specimen 1,2 Check ID	N	0.1	10		
Forb (FG)	*Chrysocephalum apiculatum*	Chrysocephalum apiculatum	N	0.5	30		
Grass & grasslike (GG)	*Eragrostis leptostachya*	Eragrostis leptostachya	N	10	500		
Grass & grasslike (GG)	*Sporobolus creber*	sporobolus creber specimen 1-10	N	70	4000		
Grass & grasslike (GG)	*Bolboschoenus spp.*	cyperaceae specimen 1,4 try bulboschoenu	N	0.1	10		
Forb (FG)	*Wahlenbergia spp.*	wahlenbergia	N	0.1	1		
Forb (FG)	*Ranunculus spp.*	variable leaf wet herb castledoyle rd Check I	N	1	1000		
Forb (FG)	*Geranium solanderi var. solanderi*	Geranium solanderi var. solanderi	N	0.2	20		
Forb (FG)	*Oxalis exilis*	Oxalis exilis	N	0.2	20		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Plantago lanceolata	Plantago lanceolata	E	0.4	200		
	Holcus lanatus	Holcus lanatus	E	0.3	50		
	Hypochaeris radicata	Hypochaeris radicata	E	0.3	80		
	Acaena agnipila	Acaena agnipila	E	0.1	1		
	Verbena rigida var. rigida	Verbena rigida var. rigida	E	0.1	1		
	Bromus brevis	Bromus brevis	E	0.5	100		
	Petrorhagia nanteuilii	Petrorhagia nanteuilii	E	0.1	1		
	Conyza bonariensis	Conyza bonariensis	E	0.2	20		
	Cirsium vulgare	Cirsium vulgare	E	0.2	10		
	Trifolium dubium	Trifolium dubium	E	0.3	200		
	Trifolium repens	Trifolium repens	E	0.1	2		
	Trifolium subterraneum	Trifolium subterraneum	E	0.1	10		
	Gamochaeta spp.	Gamechaeta	E	0.1	5		
			E				
	Vulpia spp.	grass 1,7	E	0.1	10		
			E				

Plot 2

Date							
27/10/2022							
Zone	Datum	Survey Name	Zone ID				
56	MGA94	4079		*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*			
Start Easting	Start Northing	Start WP	Recorders	IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
357115	6618833			New England Tablelands	20x50		272
End Easting	End Northing	End WP					

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3352	EEC?	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	0
	Shrubs	2
	Grasses etc.	6
	Forbs	4
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0
	Shrubs	10.1
	Grasses etc.	81.9
	Forbs	1.6
	Ferns	0
	Other	0
High Threat Exotic cover		0

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

*Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.** For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	
50 - 79 cm	0	
30 - 49 cm	absent	
20 - 29 cm	absent	
10 - 19 cm	absent	
5 - 9 cm	absent	
< 5 cm	absent	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland - no canopy spp

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each)	0	1	0	0	0
Average of the 5 subplots	0.2				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m. Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Shrub (SG)	*Pimelea linifolia*	Pimelea linifolia	N	10	80		
Forb (FG)	*Wahlenbergia spp.*	wahlenbergia	N	0.1	1		
Shrub (SG)	*Lissanthe strigosa*	Lissanthe strigosa	N	0.1	2		
Forb (FG)	*Chrysocephalum apiculatum*	Chrysocephalum apiculatum	N	1	10		
Forb (FG)	*Ranunculus spp.*	variable leaf wet herb castledoyle rd Ch	N	0.2	100		
Grass & grasslike (GG)	*Cyperus gracilis*	cyperus black common	N	0.5	100		
Grass & grasslike (GG)	*Juncus usitatus*	juncus usitatus	N	0.3	10		
Grass & grasslike (GG)	*Eragrostis leptostachya*	Eragrostis leptostachya	N	10	500		
Forb (FG)	*Rumex brownii*	Rumex brownii	N	0.3	20		
Grass & grasslike (GG)	*Themeda triandra*	themda triandra	N	1	20		
Grass & grasslike (GG)	*Juncus subsecundus*	grass 2-1	N	0.1	3		
Grass & grasslike (GG)	Sporobolus creber	tall grass 1-10	N	70	2000		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Gamochaeta spp.	gamochaeta 2-2	E	1	1000		
	Conyza bonariensis	Conyza bonariensis	E	0.1	40		
	Hypochaeris radicata	Hypochaeris radicata	E	0.4	1200		
	Acaena agnipila	Acaena agnipila	E	0.1	2		
		2-3 purple flower	E	0.1	15		
	Bromus brevis	Bromus brevis	E	1	100		
	Trifolium dubium	Trifolium dubium	E	0.2	20		
	Plantago lanceolata	Plantago lanceolata	E	0.2	30		
	Rumex crispus	rumex cristus	E	0.1	2		
	Festuca elatior	Festuca	E	0.1	1		
	Anthoxanthum odoratum	sweet vernal 2-4	E	2	20		
	Cirsium vulgare	Cirsium vulgare	E	0.1	1		
			E				

Plot 3

Date							
27/10/2022							
Zone	Datum	Survey Name	Zone ID				
56	MGA94	4079		*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*			
Start Easting	Start Northing	Start WP	Recorders	IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
357350	6618972			New England Tablelands	20x50		352
End Easting	End Northing	End WP					

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3359	EEC?	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m² plot)		Sum values	Codes for formulas
Count of **Native Richness**	**Trees**	2	Tree (TG)
	Shrubs	4	Shrub (SG)
	Grasses etc.	3	Grass & grasslike (GG)
	Forbs	6	Forb (FG)
	Ferns	0	Fern (EG)
	Other	1	Other (OG)
Sum of **Cover** of native vascular plants by growth form group	**Trees**	35	N
	Shrubs	0.6	E
	Grasses etc.	61.1	HTE
	Forbs	9	
	Ferns	0	
	Other	0.1	
High Threat Exotic cover		0.3	

*Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.** For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m² plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	
50 - 79 cm	4	2
30 - 49 cm	present	
20 - 29 cm	present	
10 - 19 cm	absent	
5 - 9 cm	present	
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		12.6

Log length tally	
0.9	
7	
1	
1.2	
1.4	
1.1	
12.6	

Field Notes
woodland

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each)	5	30	15	5	50
Average of the 5 subplots	21				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 5, 10, 15, 20, 25, …100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*								
Grass & grasslike (GG)	Poa labillardierei var. labillardierei	poa lab	N	60	1000			
Tree (TG)	Eucalyptus melliodora	Eucalyptus melliodora	N	25	5			
Tree (TG)	Eucalyptus caliginosa	Eucalyptus caliginosa	N	10	3			
Grass & grasslike (GG)	Themeda triandra	themda triandra	N	1	20			Important spp
Shrub (SG)	Lissanthe strigosa	Lissanthe strigosa	N	0.2	3			
Forb (FG)	Hydrocotyle laxiflora	hydrocotyle	N	5	500			
Forb (FG)	Dichondra repens	dichondra	N	2.5	200			
Shrub (SG)	Hibbertia riparia	hibbertia small leaved	N	0.2	1			
Other (OG)	Glycine spp.	glycine	N	0.1	1			
Forb (FG)	Wahlenbergia spp.	wahlenbergia	N	0.1	5			
Forb (FG)	Chrysocephalum apiculatum	Chrysocephalum apiculatum	N	0.3	10			Important spp
Shrub (SG)	Pultenaea microphylla	diwynnia microleafed	N	0.1	1			
Grass & grasslike (GG)	Lomandra filiformis	lomandra filiformis	N	0.1	1			
Shrub (SG)	Pimelea spp.	pimelea 3-2	N	0.1	1			
Forb (FG)	Geranium solanderi var. solanderi	Geranium solanderi var. solanderi	N	1	100			
Forb (FG)	Oxalis exilis	oxalis	N	0.1	50			
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*								
	Plantago lanceolata	Plantago lanceolata	E	3	300			
	Cirsium vulgare	Cirsium vulgare	E	0.3	10			
	Verbascum thapsus subsp. thapsus	Verbascum thapsus subsp. thapsu	E	0.2	20			
	Petrorhagia nanteuilii	Petrorhagia nanteuilii	E	0.1	10			
	Conyza bonariensis	Conyza bonariensis	E	0.3	40			
	Rubus fruticosus sp. agg.	Rubus fruticosus sp. agg.	E	0.1	1			
	Hypochaeris radicata	Hypochaeris radicata	HTE	0.2	20			
	Acaena agnipila	Acaena agnipila	E	0.3	10			
	Trifolium arvense	Trifolium arvense	E	0.1	10			
	Lysimachia arvensis	Lysimachia arvensis	E	0.2	20			
			E					
		galium	E	0.2	5			
	Trifolium repens	Trifolium repens	E	0.5	10			
	Trifolium dubium	Trifolium dubium	E	5	20			
			E					
	Rumex crispus	rumex crispus	E	0.1	5			
	Rosa rubiginosa	sweet briar	HTE	0.1	1			
	Sonchus oleraceus	sonchus	E	0.1	10			
	Cymbonotus lawsonianus	Cymbonotus lawsonianus	E	0.1	5			
	Bromus brevis	Bromus brevis	E	0.2	20			
			E					

Plot 4

Date
17/04/2023

Zone	Datum	Survey Name	Zone ID
56	MGA94	4079	
Start Easting	Start Northing	Start WP	Recorders
357004	6618949		
End Easting	End Northing	End WP	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
New England Tablelands	100x10		132

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3352	EEC?	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m² plot)		Sum values
Count of **Native Richness**	**Trees**	0
	Shrubs	0
	Grasses etc.	7
	Forbs	6
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0
	Shrubs	0
	Grasses etc.	48
	Forbs	1.5
	Ferns	0
	Other	0
High Threat Exotic cover		25

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a ***multi-stemmed tree****, only the largest living stem is included in the count/estimate.* ***Tree stems must be living.*** *For* ***hollows****, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m² plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	0	0
30 - 49 cm	absent	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	absent	0
< 5 cm	absent	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland - no canopy spp

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each)	2	2	5	1	1
Average of the 5 subplots	2.2				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 5, 10, 15, 20, 25, …100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Grass & grasslike (GG)	Sporobolus creber	Slender Rat's Tail Grass	N	20	800		
Forb (FG)	Haloragis heterophylla	Rough Rasp Wort	N	0.1	20		
#N/A			#N/A				
Grass & grasslike (GG)	Bothriochloa spp.	Bothriochloa sp 1	N	5	50		
#N/A			#N/A				
Forb (FG)	Wahlenbergia spp.	Wahlenbergia sp1 hairy leaves	N	0.1	4		
Forb (FG)	Rumex brownii	Swamp Dock	N	0.1	1		
Grass & grasslike (GG)	Juncus usitatus	Common Rush	N	10	200		
#N/A			#N/A				
Grass & grasslike (GG)	Paspalum distichum	Water couch	N	2	50		
Grass & grasslike (GG)	Carex appressa	Tall Sedge	N	0.5	3		
Grass & grasslike (GG)	Cenchrus purpurascens	Swamp Foxtail syn. Pennisetum al	N	10	100		
Grass & grasslike (GG)	Eragrostis leptostachya	Paddock Lovegrass	N	0.5	20		
Forb (FG)	Centella asiatica	Gotu Kola	N	0.1	1		
Forb (FG)	Ranunculus spp.	Ranunculus no flower	N	0.1	20		
Forb (FG)	Alternanthera denticulata	Lesser Joyweed	N	1	20		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Conyza bonariensis	Fleabane	E	0.1	4		
	Paspalum dilatatum	Common paspalum	HTE	25	500		
	Plantain lanceolata	Lamb's tongues	E	5	100		
	Seteria parviflora	Slender Pigeon grass	E	1	25		
	Cirsium vulgare	Spear Thistle	E	0.1	2		
	Hypochaeris radicata	Catsear	E	0.5	20		
	Trifolium repens	White clover	E	5	300		
	Phalris aquatica	Phalaris	E	0.1	3		
	Crepis capillaris	Asteraceae small herb 1	E	2	50		
	Rubus fruticosus sp agg.	Blackberry complex	E	0.5	1		
	Prunella vulgaris	Self-Heal	E	0.1	4		
	Lactuca saligna	Willow Leaf Lettuce	E	0.1	1		
	Cyperus eragrotis	Umbrella Sedge	E	1	25		
	Eragrostis lugens	Red Lovegrass	E	5	80		
			E				

Date							
Zone	Datum	Survey Name	Zone ID				
56	MGA94	4079		*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*			
Start Easting	Start Northing	Start WP	Recorders	IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
357024	6618560			New England Tablelands	20x50		167
End Easting	End Northing	End WP					

Vegetation Class	New England Grassy Woodlands	**Confidence**	
Plant Community Type	3352	**EEC?**	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m² plot)		**Sum values**
Count of **Native Richness**	**Trees**	1
	Shrubs	1
	Grasses etc.	8
	Forbs	8
	Ferns	3
	Other	1
Sum of **Cover** of native vascular plants by growth form group	**Trees**	1
	Shrubs	0.5
	Grasses etc.	53.7
	Forbs	1.7
	Ferns	0.7
	Other	0.1
High Threat Exotic cover		25

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
For a ***multi-stemmed tree****, only the largest living stem is included in the count/estimate.* ***Tree stems must be living.***
For ***hollows****, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m² plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	0	0
30 - 49 cm	absent	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	absent	0
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland - no canopy spp

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	2	2	1	3	2
Average of the 5 subplots	2				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Shrub (SG)	Leptospermum polygalifolium	Jelly Bush	N	0.5	2		
Tree (TG)	Acacia decurrens	Silver Wattle	N	1	3		
Forb (FG)	Chrysocephalum apiculatum	Yellow Buttons	N	0.1	2		
Fern (EG)	Cheilanthes spp.	Cheilanthes	N	0.5	20		
Grass & grasslike (GG)	Sporobolus creber	Slender Rats Tail Grass	N	15	300		
Grass & grasslike (GG)	Bothriochloa spp.	Bothriochloa	N	5	100		
Forb (FG)	Wahlenbergia spp.	Wahlenbergia	N	0.1	30		
#N/A			#N/A				
Grass & grasslike (GG)	Juncus usitatus	Common Rush	N	15	200		
Grass & grasslike (GG)	Eragrostis alveiformis	Eragrostis	N	10	300		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
Fern (EG)	Marsilea spp.	Nardoo	N	0.1	15		
Forb (FG)	Ranunculus spp.	Ranunculus	N	0.1	2		
#N/A			#N/A				
Forb (FG)	Alternanthera denticulata	Lesser Joyweed	N	0.1	1		
Forb (FG)	Persicaria hydropiper	Water Pepper	N	0.1	1		
#N/A		Brassicaceae	#N/A	0.1	10		
#N/A			#N/A				
Forb (FG)	Haloragis heterophylla	Rough Raspwort	N	1	60		
#N/A			#N/A				
Grass & grasslike (GG)	Juncus spp.	Thin rush	N	0.5	5		
Grass & grasslike (GG)	Carex appressa	Tall Sedge	N	0.1	1		
Grass & grasslike (GG)	Microlaena stipoides	Weeping Grass	N	0.1	1		
Other (OG)	Glycine spp.	Trifoliate vine no fruit or flower	N	0.1	1		
Forb (FG)	Dichondra repens	Kidney Weed	N	0.1	1		
Fern (EG)	Adiantum spp.	A Maidenhair	N	0.1	3		
Forb (FG)	Scleranthus spp.	A Knawel sp. Fitz's Hill	N	0.1	1		
Grass & grasslike (GG)	Paspalum distichum	Water Couch	N	8	100		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Conyza bonariensis	Fleabane	E	0.1	6		
	Rumex crispus	Curly Dock	E	0.1	2		
	Seteria parviflora	Slender Pigeon grass	E	10	300		
	Paspalum dilatatum	Paspalum common	HTE	15	200		
	Plantago lanceolata	LambsTongue	E	5	100		
	Verbena bonariensis	Purple Top	E	0.1	1		
	Trifolium repens	White Clover	E	0.1	1		
	Polygonum aviculare	Wireweed	E	0.1	5		
	Prunella vulgaris	Self Heal	E	0.1	1		
	Cyperus eragrostis	Umbrella Sedge	HTE	10	80		
	Crepis capillaris	Asteraceae small herb 1	E	0.1	10		
			E				

Plot 6

Date			
Zone	Datum	Survey Name	Zone ID
56	MGA94	4079	
Start Easting	Start Northing	Start WP	Recorders
357189	6618691		
End Easting	End Northing	End WP	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
New England Tablelands			339

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3352	EEC?	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	0
	Shrubs	2
	Grasses etc.	8
	Forbs	4
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0
	Shrubs	0.2
	Grasses etc.	75.9
	Forbs	5.3
	Ferns	0
	Other	0
High Threat Exotic cover		0.5

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

*Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.** For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	
50 - 79 cm	0	
30 - 49 cm	absent	
20 - 29 cm	absent	
10 - 19 cm	absent	
5 - 9 cm	absent	
< 5 cm	absent	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland - no canopy spp

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	3	2	2	2	1
Average of the 5 subplots	2				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Grass & grasslike (GG)	Sporobolus creber	Slender Rats Tail Grass	N	20	300		
Forb (FG)	Haloragis heterophylla	Rough Raspwort	N	5	200		
Forb (FG)	Hypericum gramineum	Small St John's Wort	N	0.1	5		
Grass & grasslike (GG)	Bothriochloa spp.	Bothriochloa	N	5	80		
Grass & grasslike (GG)	Fimbristylis spp.	Fimbristylis spp. 1	N	0.1	3		
Grass & grasslike (GG)	Rytidosperma spp.	Wallaby grass spp. 1	N	0.1	1		
Grass & grasslike (GG)	Microlaena stipoides	Weeping Grass	N	0.5	30		
Forb (FG)	Phyllanthus virgatus		N	0.1	6		
Shrub (SG)	Lissanthe strigosa	Peach Heath	N	0.1	1		
Grass & grasslike (GG)	Dichelachne spp.	Papery paintbrush (dry head) gras	N	50	500		
Grass & grasslike (GG)	Eragrostis alveiformis	Eragrostis	N	0.1	8		
#N/A			#N/A				
Forb (FG)	Oxalis exilis	Oxalis spp.	N	0.1	1		
Grass & grasslike (GG)	Juncus spp.	Thin rush	N	0.1	1		
#N/A			#N/A				
Shrub (SG)	Pimelea curviflora	Pimelea check as subsp listed V	N	0.1	4		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Gamochaeta spp.	A cudweed	E	0.1	3		
	Conyza bonariensis	Fleabane	E	0.2	6		
	Hypochaeris radicata	Catsear	E	0.1	7		
	Sprobolus africanus	Parramatta Grass	E	0.1	1		
	Paspalum dilatatum	Common paspalum	HTE	0.5	3		
	Setaria parviflora	Slender Pigeon Grass	E	2	20		
	Phalaris aquatica	Phalaris	E	0.1	1		
	Eragrostis lugens	Red Lovegrass	E	15	300		
			E				

Plot 7

Date			
18/04/2023			
Zone	Datum	Survey Name	Zone ID
56	MGA94	4079	
Start Easting	Start Northing	Start WP	Recorders
357115	6619093		
End Easting	End Northing	End WP	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
New England Tablelands			78

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3352	EEC?	
Plant Community Name	Armidale Quartz Hills Stringybark Forest		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	0
	Shrubs	0
	Grasses etc.	7
	Forbs	6
	Ferns	0
	Other	1
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0
	Shrubs	0
	Grasses etc.	25.7
	Forbs	2.6
	Ferns	0
	Other	0.1
High Threat Exotic cover		0.1

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
*For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.***
*For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	
50 - 79 cm	0	
30 - 49 cm	absent	
20 - 29 cm	absent	
10 - 19 cm	absent	
5 - 9 cm	absent	
< 5 cm	absent	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland - no canopy spp

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	1	3	2	1	2
Average of the 5 subplots	1.8				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
#N/A	Rytidosperma spp.	Wallaby grass spp. 1	#N/A	2	40		
Forb (FG)	Wahlenbergia spp.	Wahlenbergia spp. 2	N	0.2	20		
Forb (FG)	Haloragis heterophylla	Rough Raspwort	N	2	100		
Grass & grasslike (GG)	Fimbristylis dichotoma	Common Fringe Sedge	N	0.1	3		
#N/A			#N/A				
Grass & grasslike (GG)	Eragrostis alveiformis	Eragrostis	N				
Forb (FG)	Oxalis exilis	Oxalis spp. 1	N	0.1	4		
Grass & grasslike (GG)	Sporobolus creber	Slender Rats Tail Grass	N	10	200		
Grass & grasslike (GG)	Carex inversa	Knob Sedge	N	0.5	10		
Grass & grasslike (GG)	Dichelachne spp.	Papery paintbrush (dry head) gras	N	10	200		
Grass & grasslike (GG)	Microlaena stipoides	Weeping Grass	N	5	80		
Forb (FG)	Phyllanthus virgatus		N	0.1	4		
Other (OG)	Glycine spp.	no fruit or flower	N	0.1	2		
#N/A			#N/A				
Grass & grasslike (GG)	Aristida spp.	A Wiregrass, purple	N	0.1	1		
Forb (FG)	Chrysocephalum apiculatum	Yellow Buttons	N	0.1	1		
Forb (FG)	Epilobium billardierianum subsp. cinereu	A Willow -Herb	N	0.1	2		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Solanum chenopodioides	Whitetip Nightshade	E	0.1	1		
	Plantago lanceolatum	Lamb's Tongues	E	1	10		
	Setaria parviflora	Slender Pigeon Grass	E	1	10		
	Cyperus eragrostis	Umbrella Sedge	HTE	0.1	1		
	Hypochaeris radicata	Catsear	E	1	10		
	Bromus catharticus	Rye Grass	E	0.5	5		
	Bromus spp.	Bromus tall.	E	0.1	2		
	Centaurium erythraea	Common Centaury	E	0.1	1		
	Eragrostis lugens	Red Lovegrass	E	30	300		
			E				
			E				

Plot 8

Date						
18/04/2023						
Zone	Datum	Survey Name	Zone ID			
56	MGA94	4079	asting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.			
Start Easting	Start Northing	Start WP	Recorders	IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
357462	6618944			New England Tablelands	50x20		68
End Easting	End Northing	End WP				

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3359	EEC?	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	3
	Shrubs	1
	Grasses etc.	8
	Forbs	7
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	35.1
	Shrubs	0.1
	Grasses etc.	26
	Forbs	2.7
	Ferns	0
	Other	0
High Threat Exotic cover		50.1

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
For a ***multi-stemmed tree****, only the largest living stem is included in the count/estimate.* ***Tree stems must be living.***
For ***hollows****, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	1	0
30 - 49 cm	absent	0
20 - 29 cm	present	0
10 - 19 cm	present	0
5 - 9 cm	present	0
< 5 cm		n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		1.2

Log length tally	
1.2	
1.2	

Field Notes
woodland

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	5	3	3	8	3
Average of the 5 subplots	4.4				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*								
Forb (FG)	*Oxalis exilis*	Oxalis	N	0.1	10			
Grass & grasslike (GG)	*Themeda triandra*	Kangaroo Grass	N	0.1	5			Important spp
Tree (TG)	*Eucalyptus caliginosa*	Broad-leaved Stringybark	N	20	4	Upper, mid, lower		
Tree (TG)	*Eucalyptus blakelyi*	Blakely's Red Gum	N	15	11	Lower, mid, upper		
Grass & grasslike (GG)	*Juncus usitatus*	Common Rush	N	0.1	5			
Forb (FG)	*Haloragis heterophylla*	Rough Raspwprt	N	0.2	20			
#N/A			#N/A					
Forb (FG)	*Hypericum gramineum*	Small St John's Wort	N	0.1	4			
Forb (FG)	*Chrysocephalum apiculatum*	Yellow Buttons	N	2	20			Important spp
Grass & grasslike (GG)	*Sporobolus creber*	Slender Rat's Tail Grass	N	10	80			
#N/A			#N/A					
Grass & grasslike (GG)	*Dichelachne spp.*	Papery paintbrush grass	N	5	20			
Grass & grasslike (GG)	*Bothriochloa spp.*	Bothriochloa	N	10	100			
Grass & grasslike (GG)	*Fimbristylis dichotoma*	Common Fringe-sedge	N	0.2	10			
Tree (TG)	*Eucalyptus bridgesiana*	Apple Box	N	0.1	3			
Forb (FG)	*Asperula conferta*	Common Woodruff	N	0.1	5			Important spp
Forb (FG)	*Geranium solanderi*	Native Geranium	N	0.1	2			
Forb (FG)	*Wahlenbergia spp.*	Wahlenbergia same as plot 7	N	0.1	4			
#N/A			#N/A					
Grass & grasslike (GG)	*Eragrostis alveiformis*	Eragrostis	N	0.5	5			
Grass & grasslike (GG)	*Lomandra filiformis*	Wattle Matt Rush	N	0.1	1			
Shrub (SG)	*Rubus parvifolius*	Small-Leaved Bramble	N	0.1	3			
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*								
	Paspalum dilatatum	Paspalum	HTE	30	250			
	Cirsium vulgare	Spear Thistle	E	0.1	3			
	Eragrostis curvula	African love grass	HTE	20	200			
	Plantago lanceolata	Lamb's tongues	E	5	100			
	hypochaeris radicata	Catsear	E	2	40			
	Rubus floribundus sp agg.	Blackberry	E	0.5	3			
	Rosa rubiginosa	Sweet Briar	HTE	0.1	2			
	G	A cudweed	E	0.5	20			
	Conyza bonariensis	Fleabane	E	0.5	8			
	Setaria parviflora	Slender Pigeon grass	E	10	100			
	Centaurium erythraea	Common Centaury	E	0.1	4			
	Eragrostis lugens	Red Lovegrass	E	10	100			
			E					
			E					

Plot 9

Date 18/04/2023							
Zone 56	Datum MGA94	Survey Name 4079	Zone ID	*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*			
Start Easting 357625	Start Northing 6618924	Start WP	Recorders	IBRA region New England Tablelands	Plot dimensions 20x50	Photo #	Midline bearing (degrees)
End Easting	End Northing	End WP					

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3359	EEC?	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m² plot)		Sum values
Count of **Native Richness**	**Trees**	3
	Shrubs	1
	Grasses etc.	4
	Forbs	11
	Ferns	0
	Other	1
Sum of **Cover** of native vascular plants by growth form group	**Trees**	10.6
	Shrubs	0
	Grasses etc.	12.2
	Forbs	9.1
	Ferns	0
	Other	0.2
High Threat Exotic cover		31

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
*For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.***
*For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m² plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	1	0
30 - 49 cm	present	0
20 - 29 cm	present	0
10 - 19 cm	present	0
5 - 9 cm	present	0
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		4

Log length tally	
2	
2	
4	

Field Notes
woodland

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	3	15	5	1	3
Average of the 5 subplots	5.4				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 5, 10, 15, 20, 25, …100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*								
Forb (FG)	*Acaena ovina*		N	0.1	4			
Forb (FG)	*Chrysocephalum apiculatum*	Yellow Buttons	N	1	5			Important spp
Forb (FG)	*Asperula conferta*	Common Woodruff	N	5	40			Important spp
Forb (FG)	*Geranium solanderi*	Native Geranium	N	1	30			
Forb (FG)	*Oxalis exilis*	Oxalis	N	0.5	20			
Grass & grasslike (GG)	*Bothriochloa spp.*	Bothriochloa	N	5	80			
Grass & grasslike (GG)	*Dichelachne spp.*	papery paintbrush grass (dead hea	N	5	50			
Forb (FG)	*Lagenophora spp.*	tiny white daisy basal rosette	N	0.1	1			
Forb (FG)	*Wahlenbergia spp.*		N	0.1	5			
Grass & grasslike (GG)	*Rytidosperma spp.*	Wallaby Grass	N	0.2	10			
Tree (TG)	*Eucalyptus caliginosa*	Broad-Leaved Stringybark	N	10	20			
Tree (TG)	*Eucalyptus blakelyi*	Blakely's Red Gum	N	0.1	1			
Tree (TG)	*Eucalyptus melliodora*	Yellow Box	N	0.5	5			
Shrub (SG)	*Chenopodium spp.*		N					
Forb (FG)	*Lespedeza juncea subsp. sericea*	Bush clover	N	1	10			
#N/A			#N/A					
Grass & grasslike (GG)	*Microlaena stipoides*	Weeping Grass	N	2	20			
Forb (FG)	*Dichondra repens*	Kidney Weed	N	0.1	3			
Other (OG)	*Hardenbergia violacea*	Purple Coral Pea	N	0.2	4			
Forb (FG)	*Epilobium billardierianum subsp. cinere*	A Willow Herb	N	0.1	1			
Forb (FG)	*Cynoglossum australe*	Australian Hound's Tongue	N	0.1	1			
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*								
	Rumex acetosella	Sheep Sorrel	E	0.1	1			
	Eragrostis curvula	African Lovegrass	HTE	20	200			
	Plantago lanceolata	Lamb's Tongue	E	10	400			
	Hypochaeris radicata	Catsear	E	0.5	20			
	Conyza bonariensis	Fleabane	E	10	200			
	Paspalum dilatatum	Paspalum	HTE	10	200			
	Rosa rubiginosa	Sweet Briar	HTE	1	5			
	Rubus fruticosus sp.agg.	Blackberry	E	1	10			
	Verbascum thapsis	Mullein	E	0.2	5			
	Solanum chenopodioides	Whitetip Nightshade	E	0.1	1			
			E					

Plot 10

Date						
18/04/2023						
Zone 56	Datum MGA94	Survey Name 4079	Zone ID	*Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.*		
Start Easting 357365	Start Northing 6618889	Start WP	Recorders	IBRA region New England Tablelands	Plot dimensions 50x20	Photo #	Midline bearing (degrees)
End Easting	End Northing	End WP				

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3359	EEC?	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	2
	Shrubs	1
	Grasses etc.	7
	Forbs	5
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	2
	Shrubs	0.1
	Grasses etc.	60.4
	Forbs	5.8
	Ferns	0
	Other	0
High Threat Exotic cover		0.1

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
For a ***multi-stemmed tree****, only the largest living stem is included in the count/estimate.* ***Tree stems must be living.***
For ***hollows****, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	0	0
30 - 49 cm	absent	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	absent	0
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Log length tally	
Nil	
0	

Field Notes
derived grassland

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	4	2	3	3	2
Average of the 5 subplots	2.8				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 5, 10, 15, 20, 25, …100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*								
#N/A			#N/A					
Grass & grasslike (GG)	*Bothriochloa spp.*	Bothriochloa	N	20	300			
Forb (FG)	*Wahlenbergia spp.*		N	0.1	1			
Forb (FG)	*Haloragis heterophylla*	Rough Raspwort	N	5	50			
Shrub (SG)	*Pimelea curviflora*		N	0.1	1			Important spp.
Grass & grasslike (GG)	*Sporobolus creber*	Slender Rats Tail Grass	N	30	400			
Grass & grasslike (GG)	*Eragrostis leptostachya*	Paddock Lovegrass	N	5	100			
Forb (FG)	*Oxalis exilis*		N	0.5	10			
Grass & grasslike (GG)	*Juncus usitatus*	Common Rush	N	5	50			
Tree (TG)	*Eucalyptus blakelyi*	Blakely's Red Gum	N	1	3			
Tree (TG)	*Eucalyptus melliodora*	Yellow Box	N	1	2			
Grass & grasslike (GG)	*Rytidosperma spp.*	Wallaby Grass	N	0.1	1			
Grass & grasslike (GG)	*Fimbristylis dichotoma*	Common Fringe Sedge	N	0.2	3			
Forb (FG)	*Hypericum gramineum*	Small St John's Wort	N	0.1	1			
Forb (FG)	*Geranium solanderi*	Native Geranium	N	0.1	1			
Grass & grasslike (GG)	*Microlaena stipoides*	Weeping Grass	N	0.1	5			
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
#N/A			#N/A					
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher	
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*								
	Rumex acetosella	Sheep Sorrel	E	0.1	3			
	Hypochaeris radicata	Catsear	E	0.2	5			
	Conyza bonariensis	Fleabane	E	2	20			
	Plantago lanceolata	Lamb's Tongue	E	5	50			
	Gnaphalium spp.	A Cudweed	E	0.2	10			
	Solanum chenopodioides	Whitetip Nightshade	E	0.1	1			
	Rosa rubiginosa	Sweet Briar	HTE	0.1	1			
	Cirsium vulgare	Thistle	E	0.1	2			
	Trifolium repens	White Clover	E	0.2	10			
	Phalaris aquatica	Phalaris	E	0.1	1			
	Eleusine tristchya	Crab Grass	E	0.1	1			
	Lachnagrostis lugens	Red Lovegrass	E	20	300			
			E					
			E					

Plot 11

Date 19/04/2023			
Zone 56	Datum MGA94	Survey Name 4079	Zone ID
Start Easting 357777	Start Northing 6618842	Start WP	Recorders
End Easting	End Northing	End WP	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
New England Tablelands			338

Vegetation Class	New England Grassy Woodlands	Confidence	
Plant Community Type	3359	EEC?	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	2
	Shrubs	0
	Grasses etc.	10
	Forbs	5
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0.2
	Shrubs	0
	Grasses etc.	58.4
	Forbs	3.7
	Ferns	0
	Other	0
High Threat Exotic cover		0

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a ***multi-stemmed tree****, only the largest living stem is included in the count/estimate.* ***Tree stems must be living.*** *For* ***hollows****, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	0	0
30 - 49 cm	absent	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	absent	0
< 5 cm	present	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each)	3	1	2	1	2
Average of the 5 subplots	1.8				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 5, 10, 15, 20, 25, …100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Forb (FG)	*Epilobium billardierianum subsp. cinerei*	Epilobium	N	1	20		
Grass & grasslike (GG)	*Bothriochloa spp.*	Bothriochloa	N	2	20		
Forb (FG)	*Haloragis heterophylla*	Haloragis	N	2	50		
Grass & grasslike (GG)	*Eragrostis leptostachya*	Paddock Lovegrass	N	15	300		
Grass & grasslike (GG)	*Lachnagrostis aemula*	Blown Grass	N	0.5	10		
Tree (TG)	*Acacia dealbata*	Acacia dealbata	N	0.1	1		
Grass & grasslike (GG)	*Lachnagrostis spp.*	Lachnagrostis	N	20	350		
Forb (FG)	*Hypericum gramineum*	Hypericum	N	0.5	20		
Grass & grasslike (GG)	*Sporobolus creber*	Slender Rat's Tail Grass	N	0.5	10		
Tree (TG)	*Eucalyptus melliodora*	Yellow Box	N	0.1	1		
Grass & grasslike (GG)	*Aristida spp.*	A Wiregrass	N	0.2	8		
#N/A			#N/A				
Forb (FG)	*Dichondra repens*	Kidney Weed	N	0.1	1		
Forb (FG)	*Geranium solanderi*	Native Geranium	N	0.1	1		
Grass & grasslike (GG)	*Carex inversa*	Knob Sedge	N	0.1	1		
Grass & grasslike (GG)	*Microlaena stipoides*	Weeping Grass	N	0.1	1		
Grass & grasslike (GG)	*Chloris truncata*	Windmill Grass	N	10	200		
Grass & grasslike (GG)	*Cynodon dactylon*	Common Couch	N	10	100		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Hypochaeris radicata	Catsear	E	20	300		
		A cudweed	E	2	50		
			E				
	Trifolium repens	White clover	E	4	20		
	Cirsium vulgare	Thistle	E	2	20		
		Tiny rumex	E	1	50		
	Conyza bonariensis	Fleabane	E	0.2	8		
	Plantago leanceolata	Lamb's Ear	E	10	100		
	Anagallis arvensis	Scarlet Pimpernel	E	0.1	1		
	Eleusine tristachya	Crab grass	E	0.1	2		
			E				
			E				
	Setaria parviflora	Slender Pigeon Grass	E	0.1	5		
		Other pigeon grass awns broader	E	0.1	3		
	Bromus catharticus	Bromus	E	0.1	1		
	Eragrostis lugens	Red Lovegrass	E	0.1	5		
			E				

Plot 12

Date			
19/04/2023			
Zone	Datum	Survey Name	Zone ID
56	MGA94	4079	
Start Easting	Start Northing	Start WP	Recorders
358003	6618787		
End Easting	End Northing	End WP	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

IBRA region	Plot dimensions	Photo #	Midline bearing (degrees)
New England Tablelands			65

Vegetation Class	New England Grassy Woodlands	**Confidence**	
Plant Community Type	3359	**EEC?**	
Plant Community Name	New England Hills Stringybark-Box Woodland		

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	0
	Shrubs	0
	Grasses etc.	8
	Forbs	5
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	**Trees**	0
	Shrubs	0
	Grasses etc.	42.4
	Forbs	5.5
	Ferns	0
	Other	0
High Threat Exotic cover		25.1

Codes for formulas
Tree (TG)
Shrub (SG)
Grass & grasslike (GG)
Forb (FG)
Fern (EG)
Other (OG)
N
E
HTE

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…).
*For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.***
*For **hollows**, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.*

BAM Attribute (1000 m^2 plot)		
DBH	**# Tree Stems Count**	**# Stems with Hollows**
80 + cm	0	0
50 - 79 cm	0	0
30 - 49 cm	absent	0
20 - 29 cm	absent	0
10 - 19 cm	absent	0
5 - 9 cm	absent	0
< 5 cm	absent	n/a
Length of logs (m) (≥ 10 cm in diameter, >50cm in length)		0

Field Notes
derived grassland

Log length tally	
0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each)	1	3	1	2	1
Average of the 5 subplots	1.6				

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, ..., 5, 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.
Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Natives below this line (see orange row for exotics). *Note: search for species in "Native Species by Growth Form" sheet and copy/paste exact spelling. If unsure when in the field use the 'common name/ field notes' column only.*							
Grass & grasslike (GG)	*Sporobolus creber*	Slender Rat's Tail Grass	N	20	300		
Grass & grasslike (GG)	*Fimbristylis dichotoma*	Fimbristylis	N	0.1	5		
#N/A			#N/A				
Grass & grasslike (GG)	*Bothriochloa spp.*	Bothriochloa	N	10	100		
Forb (FG)	*Haloragis heterophylla*	Rough Raspwort	N	5	100		
Grass & grasslike (GG)	*Cyperus spp.*	Small Cyperus same	N	0.1	2		
Forb (FG)	*Wahlenbergia spp.*	Wahlenbergia	N	0.1	1		
Grass & grasslike (GG)	*Eragrostis leptostachya*	Paddock Lovegrass	N	10	100		
Forb (FG)	*Asperula conferta*	Common Woodruff	N	0.1	2		
Forb (FG)	*Hypericum gramineum*	Small St John's Wort	N	0.2	15		
#N/A			#N/A				
Grass & grasslike (GG)	*Juncus usitatus*	Common Rush	N	2	20		
Grass & grasslike (GG)	*Rytidosperma spp.*	Wallaby grass	N	0.1	4		
Grass & grasslike (GG)	*Chloris truncata*	Windmill Grass	N	0.1	4		
Forb (FG)	*Oxalis exilis*	Oxalis	N	0.1	1		
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
#N/A			#N/A				
GF Code	Species name	Common name/ field notes	N,E or HTE	Cover	Abund	Stratum	Voucher
Exotics (both E and HTE) below this line. *Note: search for species in "High Threat Weeds" sheet and if a match, copy/paste exact spelling of species name. If unsure when in the field, use 'common name/ field notes' column only.*							
	Plantago lanceolata	Lamb's Tongues	E	0.2	20		
	Hypochaeris radicata	Catsear	E	2	100		
	Cirsium vulgare	Thistle	E	0.2	9		
	Paspalum dilatatum	Paspalum	HTE	25	300		
	Triflium repens	White clover	E	1	30		
	Verbena bonariensis	Purpletop	E	0.1	2		
	Gamochaeta spp.	A cudweed	E	0.1	5		
			E				
	Phalaris aquatica	Phalaris	E	0.2	5		
			E				
	Cyperus eragrostis	Umbrella Sedge	HTE	0.1	1		
	Ereagrostis lugens	Red Lovegrass	E	10	100		
			E				

Appendix C

Assessment of Habitat Suitability – Flora

Potential of Occurrence and Habitat Assessment

A potential of occurrence assessment was completed to assess the likelihood of occurrence of each threatened species or population identified with the in the site. All threatened biodiversity identified in background research were considered. The assessment is based on the habitat profile for the species and other habitat information in the Threatened Species Profile Database (Environment Energy and Science Group). The assessment also takes into consideration the dates and locations of nearby records and information about species populations in the locality.

Threatened Flora Potential Occurrence Assessment

For this proposed activity, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Table C 1**.

Table C 1 Potential of Occurrence Criteria for Threatened Species and Populations of Flora

Potential of occurrence	Criteria
Known	The species was observed in the site either during the current survey or during another survey less than one year prior.
High	A species has a high likelihood of occurrence if: ■ the site contains or forms part of a large area of high-quality suitable habitat that has not been subject to recent disturbance (e.g. fire), the species is known to form a persistent soil seedbank and the species has been recorded recently (within 10 years) in the locality ■ the species is a cryptic flowering species that has been recorded recently (within 10 years) in the locality and has a large area of high-quality potential habitat within the development footprint that was not seasonally targeted by surveys.
Moderate	A species has a moderate likelihood of occurrence if: ■ the species: – has a large area of high-quality suitable habitat in the site that has not been subject to recent disturbance (e.g. fire)., – the species is known to form a persistent soil seedbank, but – the species has not been recorded recently (within 10 years) in the locality. ■ the species: – has a small area of high-quality suitable habitat or a large area of marginal habitat in the site That has not been subject to recent disturbance (e.g. fire). – the species is known to form a persistent soil seedbank. – the species has been recorded recently (within 10 years) in the locality. – the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the development footprint, that was not seasonally targeted by surveys.
Low	A species has a low likelihood of occurrence if: ■ it is not a cryptic species, nor a species known to have a persistent soil seedbank species and was not detected despite targeted searches. ■ the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the development footprint, that was not seasonally targeted by surveys as the species has not been recorded within 50 years in the locality.
None	Suitable habitat is absent from the site.

Table C 2 Threatened Flora Potential of Occurrence Assessment

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Acacia pubifolia	Velvet Wattle	E	V	PMST	Rocky granite hillsides, in sandy, stony or loamy soil in eucalypt-scrub woodland or Eucalyptus-Callitris forest, and shrubby woodland on granite.	Low. No records within locality. Unsuitable habitat within the site.
Arthraxon hispidus	Hairy Jointgrass	V	V	PMST	Moist shady places in or on the edges of rainforest and wet eucalypt forest, often near creeks or swamps.	Low. No records within locality. Unsuitable habitat within the site.
Bertya ingramii	Narrow-leaved Bertya	E	E	PlantNet	Grows among rocks or in thin soils close to cliff-edges in dry woodland with she-oaks, wattles and tea-trees.	Low. No records within locality. Unsuitable habitat within the site.
Bertya sp. (Clouds Creek, M. Fatemi 4)	-	E	-	PMST	Grows on steep, rocky slopes in shallow soil. The parent material is either granitic (at least three populations) or metasedimentary (most of the southern-most populations). It typically occurs within heath or low shrubland vegetation surrounded by stunted eucalypts. Altitudes range from 300-1000 m above sea level.	Low. No records within locality. Unsuitable habitat within the site.
Cadellia pentastylis	Ooline	V	V	PMST	Forms a closed or open canopy mixing with eucalypt and cypress pine species. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth.	Low. No records within locality. Unsuitable habitat within the site.
Caladenia amnicola	Bundarra Spider Orchid	E	–	PMST	Rocky habitat supporting shallow soils is prone to prolonged dry periods, and some dieback of *Leptospermum brevipes*, which *Caladenia amnicola* occurs beneath, and eucalypt species was observed within *Caladenia amnicola* habitat following the 2018-19 drought (Copeland 2021). Only one location, bisected by road. In TSR 20 km west of Armidale towards Bundarra, Tea Tree Creek.	Low. No records within locality. Unsuitable habitat within the site.
Callistemon pungens	-	-	V	PlantNet PMST	Habitats range from riparian areas dominated by *Casuarina cunninghamiana* subsp. *cunninghamiana* to woodland and rocky shrubland. In or near rocky	Low. No records within locality. Unsuitable habitat within the site.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
					watercourses, usually in sandy creek beds on granite or sometimes on basalt.	
Chiloglottis platyptera	Barrington Tops Ant Orchid	V	-	BAM-C	Found along the eastern edge of the New England Tablelands, from Ben Halls Gap to east of Tenterfield, and also in the Barrington Tops area. Grows in moist areas in tall open eucalypt forest with a grassy understorey, and also around rainforest edges.	Low. No records within locality. Unsuitable habitat within the site. **Candidate Species Credit Species**
Dichanthium setosum	Bluegrass	V	V	PMST BAM-C	In NSW, occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	Low. No records within locality. Unsuitable habitat within the site. **Candidate Species Credit Species**
Diuris pedunculata	Small Snake Orchid	E	E	PlantNet PMST	Grassy sclerophyll forests, dry sclerophyll woodlands, grassy sclerophyll woodlands, grasslands, riparian areas, and swampy forests.	Low. No records within locality. Unsuitable habitat within the site.
Eucalyptus caleyi subsp. Ovendenii	Ovenden's Ironbark	V	V	PMST	Grows in grassy woodland on dry, shallow soils of moderate fertility.	Low. No records within locality. Unsuitable habitat within the site.
Eucalyptus magnificata	Northern Blue Box	E	-	PlantNet BAM-C	Known in NSW from only a few widely separate populations on the New England Tablelands, around Hillgrove east of Armidale and in the Glen Innes and Tenterfield region, where they occur individually or in small populations. Occurs on moderately hilly sites and at the edge of gorges, usually at altitudes from 900 - 1050 m. Associated with grassy open forest or woodland on shallow, sandy or loamy soils.	Low. No records within locality. Unsuitable habitat within the site. **Candidate Species Credit Species**
Eucalyptus mckieana	McKie's Stringybark	V	V	PlantNet PMST	Confined to the drier western side of the New England Tablelands of NSW, from Torrington to Bendemeer. Most populations occur on private property, but it does occur in Kings Plain National Park, Torrington State Conservation Area and Severn River Nature Reserve. Found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites.	Low. No records within locality. Unsuitable habitat within the site.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Eucalyptus nicholii	Narrow-leaved Peppermint	V	V	PlantNet PMST BAM-C	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors. Grassy or sclerophyllous woodland on shallow relatively infertile soils on shales and slates.	Low. Marginal habitat within the site. No records within locality. **Candidate Species Credit Species**
Euphrasia arguta	-	CE	CE	PMST	Known from three sites in/ near Nundle State Forest in eucalypt forest with a mixed grass and shrub understorey. Habitat includes open forest country around Bathurst in subhumid places, grassy country near Bathurst and in meadows near rivers.	Low. No records within locality. Unsuitable habitat within the site.
Grevillea beadleana	Beadle's Grevillea	E	E	BAM-C	Known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Chambigne Nature Reserve south-west of Grafton. Associated with open eucalypt forest and woodland with a shrubby understorey on granite.	Low. No records within locality. Unsuitable habitat within the site. **Candidate Species Credit Species**
Hakea fraseri	Gorge Hakea	V	V	PlantNet	Found only in the upper Macleay River gorges, and the escarpment country in Oxley Wild Rivers National Park. Mainly occurs on the dry and steep rocky slopes of river gorges.	Low. No records within locality. Unsuitable habitat within the site.
Homoranthus prolixus	Granite Homoranthus	V	V	PlantNet	Occurs in scattered locations between Inverell and Manilla. Grows in heath patches, in skeletal soil among crevices of granite outcrops.	Low. No records within locality. Unsuitable habitat within the site.
Leionema lachnaeoides	-	E	E	PMST	Occurs at 10 sites in the upper Blue Mountains, within a 12 km range between Katoomba and Blackheath. Habitat vegetation is montane heath and commonly includes *Eucalyptus stricta, Allocasuarina nana, Dillwynia retorta, Epacris microphylla and Caustis flexuosa.*	Low. No records within locality. Unsuitable habitat within the site.
Lepidium hyssopifolium	Aromatic Peppercress	CE	E	PMST	In NSW the species was known to have occurred in both woodland with a grassy understorey and in grassland. The species may be a disturbance	Low. No records within locality. Unsuitable habitat within the site.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
					opportunist, as it was discovered at the most recently discovered site (near Bungendore) following soil disturbance. The cryptic and non-descript nature (appearing like several weed species) of the species makes it hard to detect."	
Picris evae	Hawkweed	V	V	PMST	All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora, E. crebra, E. populnea, E. albens*, *Angophora subvelutina, Allocasuarina torulosa*, and/ *or Casuarina cunninghamiana* with a *Dichanthium* grassy understory. Soils are black, dark grey or red-brown (specified as shallow, stony soil over basalt for one collection) and reddish clay-loam or medium clay soils."	Low. Marginal habitat within site. No records within locality.
Pimelea venosa	Bolivia Hill Rice-flower	E	E	-	This rice-flower species occurred primarily in the Bolivia Hill and Bluff Rock Ranges south of Tenterfield. Associated vegetation is dominated by Eucalyptus species, with an open understorey of Xanthorrhoea and Solanum species. Bolivia Hill Rice-flower has been recorded on deep granite soils, black sandy loam and relatively fertile loam soils on granite outcrops in open woodland.	Low. Marginal habitat. No records in locality. Species range recorded between Tenterfield and Glenn Innes, recorded on deep granite soils, black sandy loam and relatively fertile loam soils on granite outcrops, these characteristics are not associated with the site.
Thesium australe	Austral Toadflax	V	V	PMST	Grassland or grassy eucalypt woodland where *Themeda australis* is predominant, on grassy headlands.	Low. Marginal habitat within site. No records within locality.

V = Vulnerable; E = Endangered; CE = Critically Endangered

Appendix D

Assessment of Habitat Suitability – Fauna

Threatened Fauna Potential Occurrence Assessment

For this proposed activity, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in **Table D 1**.

Table D 1 Potential of Occurrence Criteria for Threatened Species and Populations of Fauna

Potential of occurrence	Criteria
Known	The species was observed in the site either during the current survey or during another survey less than one year prior.
High	A species has a high likelihood of occurrence if: ■ the site contains or forms part of a large area of high-quality suitable habitat. ■ important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are abundant within the site. ■ the species has been recorded recently in similar habitat in the locality. ■ the site is likely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration.
Moderate	A species has a moderate likelihood of occurrence if: ■ the site contains or forms part of a small area of high-quality suitable habitat. ■ the site contains or forms part of a large area of marginal habitat. ■ important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are sparse or absent within the site.
Low	A species has a low likelihood of occurrence if: ■ potentially suitable habitat exists but the species has not been recorded recently (previous 10 years) in the locality despite intensive survey (i.e. the species is considered to be locally extinct). ■ the site is unlikely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration. ■ the species is considered to be a rare vagrant, likely only to visit the site very rarely; e.g. during juvenile dispersal or exceptional climatic conditions (e.g. extreme drought conditions in typical habitat of inland birds).
None	Suitable habitat is absent from the site.

Table D 2 Threatened Fauna Potential of Occurrence Assessment

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Amphibians						
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions		E2	-	BAM-C	Distributed along the eastern coast and adjacent ranges from central Queensland to southern NSW, extending inland to the New England Tableland (New England Bioregion) and North West Slopes (Nandewar Bioregion). Rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks, ditches and ponds, and call while hidden amongst vegetation or debris. The New England Tablelands and Nandewar population of Tusked Frog represents a distinct and disjunct high-elevation population that is at the western limit of the species' range in NSW.	Low. Marginal habitat associated with Spring and Reedy Creek within the site. Species has not been recorded within the locality and unlikely to have any connectivity to source populations. **Candidate Species Credit Species**
Litoria piperata	Peppered Tree Frog	CE	V	BAM-C	Found in streamside vegetation and under rocks and fallen timber along rocky streams flowing eastward from the Tablelands.	Low. Unsuitable habitat within the site. Species has not been recorded within the locality and unlikely to have any connectivity to source populations. **Candidate Species Credit Species**
Litoria castanea	Yellow-spotted Tree Frog	CE	E	PMST	Require large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation.	Low. Unsuitable habitat within the site. Species has not been recorded within the locality and unlikely to have any connectivity to source populations.
Birds						
Actitis hypoleucos	Common Sandpiper	-	M	PMST	Coastal and interior wetlands, - narrow muddy edges of billabongs, river pools, mangroves, among rocks, and snags, reefs or rocky beaches. Avoids wide open mud flats. Perches on branches.	Low. Lack of preferred habitat within the site. No records within the locality.
Anseranas semipalmata	Magpie Goose	V	-	BioNet	Shallow wetlands (<1 m deep), large swamps and dams with dense growth of rushes or sedge.	Low. Unsuitable habitat within the site. May occur in the locality as a vagrant during seasonal movements.
Anthochaera phrygia	Regent Honeyeater	CE	CE	PMST	Dry open forest and woodland with an abundance of nectar-producing eucalypts, particularly box-ironbark woodland, swamp mahogany forests, and riverine sheoak woodlands.	Low. Lack of preferred foraging habitat in the form of high nectar producing eucalypts species. Unlikely to rely on the site for foraging. May

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
						occur as a rare vagrant whilst undertaking seasonal movements.
Aphelocephala leucopsis	Southern Whiteface	V	V	PMST	Open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. Individuals may move into wetter areas outside of their normal range during drought years	Low. Marginal habitat within the site. Unlikely to rely on the site for foraging. May occur as a rare vagrant whilst undertaking seasonal movements. No records within the locality.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	BioNet BAM-C	Woodlands and dry open sclerophyll forests, usually dominated by eucalypts; also recorded in shrublands, heathlands and various modified habitats.	**Moderate**. Potential habitat within the site. Recorded within the locality. **Predicted Ecosystem Credit Species**
Botaurus poiciloptilus	Australasian Bittern	E	E	PMST	Permanent freshwater wetlands with tall dense vegetation, particularly bullrushes and spikerushes.	Low. Lack of preferred habitat within the site. No records within the locality.
Burhinus grallarius	Bush Stone-curlew	E	-	BAM-C	Lightly timbered open forest and woodland, and partly cleared farmland with woodland remnants, preferring areas with dry leaf-litter, fallen timber and sparse ground cover.	Low. Potential habitat within the site, however, the species occurrence has retracted drastically in NSW and predominately occurs on the north coast of NSW and QLD. **Candidate Species Credit Species**
Calidris acuminata	Sharp-tailed Sandpiper	-	M	PMST	When in Australia, around wetlands, preferring freshwater inland wetlands with grassy edges, but also coastal mudflats, salt marsh, brackish lagoons, or even fields, sewerage farms, mangroves.	Low. Lack of preferred habitat within the site. No records within the locality.
Calidris ferruginea	Curlew Sandpiper	E	CE	PMST	Tidal mudflats, sandy ocean shores and occasionally inland freshwater or salt-lakes.	Low. Unsuitable habitat within the site. No records within the locality.
Calidris melanotos	Pectoral Sandpiper	-	M	PMST	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Low. Lack of preferred habitat within the site. No records within the locality.
Calyptorhynchus lathami lathami	Glossy Black-Cockatoo	V	V	BioNet BAM-C	Sheoaks in coastal forests and woodlands, timbered watercourses, and moist and dry eucalypt forests of the coast and the Great Divide up to 1,000 m.	Low. Lack of suitable habitat in the form of stands of She-oaks, unlikely to rely of the site for foraging or breeding habitat. May occur as a fly-over whilst foraging in greater locality.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
						Considered further as both a predicted ecosystem credit and candidate species credit.
Chthonicola sagittata	Speckled Warbler	V	-	BioNet BAM-C	Eucalyptus dominated communities with sparse shrubs and grassy understorey.	**Moderate**. Marginal habitat within the site. Species prefers larger patches of remnant eucalyptus forest/ woodland. **Predicted Ecosystem Credit Species**
Circus assimilis	Spotted Harrier	V	-	BAM-C	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	**Moderate**. Potential habitat within the site. Recorded within the locality. **Predicted Ecosystem Credit Species**
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	BAM-C	Eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range, and less commonly on coastal plains and ranges.	**Moderate**. Marginal habitat within the site associated with eucalypts woodland patches. **Predicted Ecosystem Credit Species**
Daphoenositta chrysoptera	Varied Sittella	V	-	BioNet BAM-C	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	**Moderate**. Marginal habitat within the site associated with eucalypts woodland patches. **Predicted Ecosystem Credit Species**
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	BioNet	Swamps, mangroves, mudflats, dry floodplains.	Low. Unsuitable habitat within the site. May occur in the locality as a vagrant during seasonal movements.
Erythrotriorchis radiatus	Red Goshawk	CE	E	PMST	Open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water. Typically found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian eucalyptus forest of coastal rivers. Population in NSW is naturally small (probably only one pair) and lies at extreme of the natural range of the species in Australia.	Low. Lack of preferred habitat in the form of riparian woodlands and large wetlands. Unlikely to be reliant on site. Species is very rare in NSW, with records limited to northern rivers region.
Falco hypoleucos	Grey Falcon	V	V	PMST	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional	Low. Marginal habitat within the site. Species considered a vagrant and

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
					vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	sparsely distributed in NSW. Majority of records occur within arid areas of NSW. May occur in the locality as a vagrant during seasonal movements.
Falco subniger	Black Falcon	V	-	BAM-C	The Black Falcon is widely, but sparsely, distributed in NSW, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. Favors open environments, where it is an aggressive aerial hunter, frequently observed in rapid pursuit of birds.	Low. Marginal habitat within the site. Species considered a vagrant and sparsely distributed in NSW. May occur in the locality as a vagrant during seasonal movements. **Predicted Ecosystem Credit Species**
Gallinago hardwickii	Latham's Snipe	-	V	PMST	Usually inhabit open, freshwater wetlands with low, dense vegetation. Can also occur in habitat with saline or brackish water, in modified or artificial wetlands, and in areas located close to humans or human activity. Can inhabit drier habitat, including open woodlands and high-altitude grasslands or herblands, usually those being in proximity to surface water.	Low. Unsuitable habitat within the site. May occur in the locality as a vagrant during seasonal movements.
Glossopsitta pusilla	Little Lorikeet	V	-	BAM-C	Forages in open Eucalyptus forest and woodland; also feeds on Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	**Moderate.** Marginal habitat within the site associated with eucalypts woodland patches. **Predicted Ecosystem Credit Species**
Grantiella picta	Painted Honeyeater	V	V	PMST	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low. Lack of high density of mistletoe food sources within the site. Species prefers Box-Gum Woodlands and Box-Ironbark Forests.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	BAM-C	Coastal habitats and around terrestrial wetlands characterised by the presence of large areas of open water (larger rivers, swamps, lakes, ocean). Habitats may include freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds in addition to bays and inlets, beaches, reefs, lagoons, estuaries and mangroves.	Low. Lack of preferred habitat within the site. May intermittently occur whilst foraging in greater locality. Unlikely to be reliant of the site for breeding or foraging purposes. **Considered further as both a predicted ecosystem credit and candidate species credit.**
Hieraaetus morphnoides	Little Eagle	V	-	BioNet BAM-C	Open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	**Moderate**. Potential habitat within the site. Recorded within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
						Considered further as both a predicted ecosystem credit and candidate species credit.
Hirundapus caudacutus	White-throated Needletail	-	V; M	BioNet BAM-C PMST	Most often recorded aerial foraging above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. Breeding does not occur in Australia.	**Moderate**. Potential aerial foraging habitat above wooded areas at the site. **Predicted Ecosystem Credit Species**
Lathamus discolor	Swift Parrot	E	CE	PMST BAM-C	On mainland Australia foraging occurs where eucalypts are flowering profusely or where abundant lerp infestations occur. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Forest Red Gum (*E. tereticornis*), Mugga Ironbark *(E. sideroxylon*), and White Box (*E. albens*). Commonly used lerp infested trees include Inland Grey Box (*E. microcarpa*), Grey Box (*E. moluccana*), Blackbutt (*E. pilularis*) and Yellow Box (*E. melliodora*).	Low. Lack of preferred foraging habitat in the form of high nectar producing eucalypts species. Unlikely to rely on the site for foraging. May occur as a rare vagrant whilst undertaking seasonal movements. **Considered further as both a predicted ecosystem credit and candidate species credit.**
Lophochroa leadbeateri leadbeateri	Major Mitchell's Cockatoo (eastern)	V	E	PMST	Lives in arid and semi-arid woodlands dominated by mulga (*Acacia aneura*), mallee and box eucalypts, slender cypress pine (*Callitris gracilis*) or belah (*Casuarina cristata*). Within these vegetation types, the main requirements are fresh surface water and trees with suitable nesting hollows.	Low. Unsuitable habitat within the site. May occur in the locality as a vagrant during seasonal movements.
Lophoictinia isura	Square-tailed Kite	V	-	BAM-C	Dry woodland and open forest, particularly along major rivers and belts of trees in urban or semi-urban areas. Home ranges can extend over at least 100 km^2.	Low. Lack of preferred habitat within the site. May intermittently occur whilst foraging in greater locality. Unlikely to be reliant of the site for breeding or foraging purposes. **Considered further as both a predicted ecosystem credit and candidate species credit.**
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	E	PMST	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Low. Unsuitable habitat within the site. Prefers structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	BioNet BAM-C	Drier open forests or woodlands dominated by box and ironbark eucalypts, and open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.	Low. Marginal habitat, lack of large patches of eucalypt woodland within the site. Unlikely to be reliant on the site for foraging. However, due to the nomadic nature of the species rare occurrences may occur. **Predicted Ecosystem Credit Species**
Neophema chrysostoma	Blue-winged Parrot	V	V	PMST	Blue-winged parrots breed on mainland Australia south of the Great Dividing Range in southern Victoria, and sometimes in the far south-east of South Australia, and the north-western, central and eastern parts of Tasmania. During the non-breeding period, from autumn to early spring, birds are recorded from northern Victoria, eastern South Australia, south-western Queensland and western New South Wales with some birds reaching south-eastern New South Wales and eastern Victoria. Favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones	Low. Marginal habitat in form of grassy woodland areas, species more known to occur in south-west NSW. Rare occurrences within the locality during seasonal movements may occur.
Ninox connivens	Barking Owl	V	-	BAM-C	Eucalypt woodland, open forest, swamp woodlands and timber along watercourses. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests.	Low**.** Marginal habitat within the site, may occur intermittently whilst foraging in the greater locality. No records within the locality. **Candidate Species Credit Species.**
Ninox strenua	Powerful Owl	V	-	BAM-C	Woodland and open forest to tall moist forest and rainforest. Requires large tracts of forest or woodland habitat but may also occur in fragmented landscapes.	Low**.** Marginal habitat within the site, may occur intermittently whilst foraging in the greater locality. No records within the locality. Species more known on the coastal side of the Great Dividing Range. **Candidate Species Credit Species.**
Petroica boodang	Scarlet Robin	V	-	BioNet BAM-C	Dry eucalypt forests and woodlands with an open and grassy understorey with few scattered shrubs. Both mature and regrowth vegetation are utilised; habitat usually contains abundant logs and fallen timber.	**Moderate**. Potential habitat associated with eucalypt woodland. **Predicted Ecosystem Credit Species**
Petroica phoenicea	Flame Robin	V	-	BAM-C	In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern	**Moderate**. Potential habitat associated with eucalypt woodland.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
					Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees.	**Predicted Ecosystem Credit Species**
Polytelis swainsonii	Superb Parrot	V	V	PMST	Found in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems; vagrants have also been recorded in southern Queensland. Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Low. Marginal habitat within site, species mainly inhabits the Riverina, the South-west Slope and Southern Tableland Regions. Rare occurrences during seasonal movements may occur.
Rostratula australis	Australian Painted Snipe	E	E	PMST	Well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, and open timber.	Low. Lack of preferred habitat within the site. No records in locality.
Stagonopleura guttata	Diamond Firetail	V	V	BAM-C	Widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.	**Moderate**. Potential habitat associated with eucalypt woodland. **Predicted Ecosystem Credit Species**
Tringa nebularia	Common Greenshank	-	E, M	PMST	Sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons. This species also occurs in a wide variety of inland wetlands.	Low. Unsuitable habitat within the site.
Tyto novaehollandiae	Masked Owl	V	-	BAM-C	Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	Low**.** Marginal habitat within the site, may occur intermittently whilst foraging in the greater locality. No records within the locality. **Candidate Species Credit Species.**
Fish						
Maccullochella peelii	Murray Cod	-	V	PMST	Warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs.	Low. No suitable habitat within the site or in close proximity.

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Invertebrates						
Euastacus simplex	Simple Crayfish	-	E	PMST	Endemic to the headwater reaches (typically between approximately 1100 and 1400 m above sea level) of the New England region of New South Wales. The species occurs within the Cathedral Rock and New England National Parks, Styx River State Forest and Guy Fawkes River Nature Reserve. The species has been collected from a range of streams (small and medium sized), both in vegetated (dry sclerophyll forest and heath) and areas cleared for pasture.	Low. Unsuitable habitat within the site.
Mammals						
Cercartetus nanus	Eastern Pygmy-possum	V	-	BAM-C	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities.	Low. Lack of suitable habitat within the site in the form of shrub understorey and sufficient stands of eucalyptus trees. **Candidate Species Credit Species**
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	PMST BAM-C	Near cave entrances and crevices in cliffs. Found in well-timbered areas containing gullies.	Low. Lack of breeding habitat within the locality of the site and therefore unlikely to occur or be reliant on the site for foraging purposes. **Considered further as both a predicted ecosystem credit and candidate species credit.**
Dasyurus maculatus	Spotted-tailed Quoll	V	E	PMST BAM-C	Dry and moist eucalypt forests and rainforests, fallen hollow logs, large rocky outcrops.	Low. Lack of preferred habitat within the site, due to historical clearing, unlikely to occur within the site. **Predicted Ecosystem Credit Species**
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	BioNet	Moist and dry eucalypt forest and rainforest, particularly at high elevations.	**Recorded during Anabat surveys.** **Predicted Ecosystem Credit Species**

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Miniopterus australis	Little Bent-winged Bat	V	-	BioNet BAM-C	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day. Often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.	**Recorded during Anabat surveys.** **Predicted Ecosystem Credit Species**
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	BioNet BAM-C	Forest or woodland, caves are primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer	**Recorded during Anabat surveys.** **Predicted Ecosystem Credit Species**
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	PMST	Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box /ironbark/ cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	Low. Marginal habitat associated with eucalypt woodland, unlikely to be reliant of habitat within the site due to its degraded state.
Petauroides volans	Southern Greater Glider	E	V	BAM-C	The Southern Greater Glider occurs in eastern Australia, in eucalypt forests and woodlands, where it has a broad distribution from around Proserpine in Queensland, south through NSW and the Australian Capital Territory into Victoria. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. It is typically found in highest abundance in taller, montane, moist eucalypt forests on fertile soils, with relatively old trees and abundant hollows. Individuals shelter during the day in tree hollows and will use up to 18 hollows in their home range.	Low. Marginal habitat associated with eucalypt woodland, unlikely to be reliant of habitat within the site due to its degraded state. Species prefers taller, montane, moist eucalypt forests with old growth trees and abundant hollows. **Candidate Species Credit Species.**
Petaurus australis australis	Yellow-bellied Glider (south-eastern)	V	V	PMST	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Dens in tree hollows of large trees, often in family groups. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Low. Marginal habitat associated with eucalypt woodland, unlikely to be reliant of habitat within the site due to its degraded state. Species prefers tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.
Petaurus norfolcensis	Squirrel Glider	V	-	BAM-C	Blackbutt, bloodwood and ironbark eucalypt forest with heath understorey in coastal areas, and box-ironbark woodlands and River Red Gum Forest inland.	Low. Marginal habitat associated with eucalypt woodland, unlikely to be reliant of habitat within the site due to its degraded state. May occur in

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
						greater locality, however, due to limited connectivity and degraded patches within the site, unlikely to occur. **Candidate Species Credit Species**
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	PMST BAM-C	North-facing cliffs and dry eucalypt forest and woodland, inhabiting rock crevices, caves, overhangs during the day, and foraging in grassy areas nearby at night.	Low. Not suitable habitat within the site. No records in locality. **Candidate Species Credit Species**
Phascolarctos cinereus	Koala	E	E	BioNet PMST BAM-C	Appropriate food trees in forests and woodlands, and treed urban areas.	**Moderate.** Marginal habitat within the site, development footprint lacks any preferred feed tree. Some presence of *Eucalyptus blakelyi* outside the site may result in interment occurrences of individuals within proximity to the site. **Candidate Species Credit Species**
Pseudomys novaehollandiae	New Holland Mouse	-	V	PMST	Occurs in open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low. Marginal habitat within the site, lack of preferred heathland characteristics or areas of dense understorey. No records in locality.
Pseudomys oralis	Hastings River Mouse	E	E	BAM-C	A patchy distribution spanning the Great Dividing Range from the Hunter Valley, south of Mt Royal, north to the Bunya Mountains near Kingaroy in south-east Queensland, at elevations between 300 m and 1100 m. A variety of dry open forest types with dense, low ground cover and a diverse mixture of ferns, grass, sedges and herbs.	Low. Lack of preferred habitat within the site (i.e. dense ground cover). No records within the locality. **Predicted Ecosystem Credit Species**
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	PMST BAM-C	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Low. Marginal habitat within the site in associated with Eucalyptus. Species may intermittently occur whilst foraging within the greater locality, however, unlikely to reliant on the site for foraging or breeding habitat. **Considered further as both a predicted ecosystem credit and candidate species credit.**

Scientific Name	Common Name	BC Act	EPBC Act	Source	Habitat	Potential Occurrence and Outcome
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	BioNet BAM-C	Woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Roosts most commonly in hollows but has been known to utilise building and strcutures (bridges and culverts).	**Recorded during Anabat surveys.** **Predicted Ecosystem Credit Species.**
Vespadelus troughtoni	Eastern Cave Bat	V	-	BioNet	Cave roosting species found in dry open forest and woodland near cliffs and rocky overhangs.	**Recorded during Anabat surveys.** **Candidate species credit.**
Reptiles						
Anomalopus mackayi	Five-clawed Worm-skink	E	V	PMST	Close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees.	Low. No suitable habitat within the site. Species more endemic to QLD with some occurrences along NSW border. No records in locality.
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	PMST	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	Low. No suitable habitat within the site. Site lacks preferred habitat in the form of dominated native grassland with microhabitat of rocky outcrops or scattered, partially-buried rocks. No records in locality.
Myuchelys belli	Western Saw-shelled Turtle	E	E	PMST	Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. Occupied pools are most commonly less than 3 m deep with rocky or sandy bottoms and patches of vegetation. Most typically uses narrow stretches of rivers 30 - 40 m wide. Most surrounding habitat has been converted to grazing land.	Low. No suitable habitat within the site. No records in locality.
Uvidicolus sphyrurus	Border Thick-tailed Gecko	V	V	PMST	Dry sclerophyll open forest and woodland associated with outcrops of granite, basalt, sandstone and metamorphic rocks.	Low. No suitable habitat within the site. No records in locality.

V = Vulnerable; E = Endangered; E2 = Endangered population; CE = Critically Endangered

Appendix E

Fauna Inventory

Table E1 Fauna Inventory

Scientific Name	Common Name	BC Act	EPBC Act	Native (N) or Introduced (I)
Amphibians (6)				
Crinia parinsignifera	Eastern Sign-bearing Froglet			N
Limnodynastes tasmaniensis	Spotted Marsh Frog			N
Litoria fallax	Eastern Dwarf Tree Frog			N
Litoria nasuta	Striped Rocket Frog			N
Litoria peronii	Emerald-spotted Tree Frog			N
Uperoleia fusca	Dusky Toadlet			N
Birds (30)				
Acanthiza nana	Yellow Thornbill			N
Acanthiza reguloides	Buff-rumped Thornbill			N
Alisterus scapularis	Australian King-Parrot			N
Anthochaera carunculata	Red Wattle Bird			N
Cacatua galerita	Sulphur-crested Cockatoo			N
Chenonetta jubata	Australian Wood Duck			N
Colluricincla harmonica	Grey Shrike-thrush			N
Coracina novaehollandiae	Black-faced Cuckoo-shrike			N
Corvus coronoides	Australian Raven			N
Cracticus tibicen	Australian Magpie			N
Cracticus torquatus	Grey Butcherbird			N
Dacelo novaeguineae	Laughing Kookaburra			N
Eolophus roseicapilla	Galah			N
Eopsaltria australis	Eastern Yellow Robin			N
Haliastur sphenurus	Whistling Kite			N
Hirundo neoxena	Welcome Swallow			N
Lichenostomus chrysops	Yellow-faced Honeyeater			N
Malurus cyaneus	Superb Fairy-wren			N
Manorina melanocephala	Noisy Miner			N
Ocyphaps lophotes	Crested Pigeon			N
Pachycephala rufiventris	Rufous Whistler			N
Pardalotus striatus	Striated Pardalote			N
Philemon corniculatus	Noisy Friarbird			N
Platycercus elegans	Crimson Rosella			N
Platycercus eximius	Eastern Rosella			N
Psephotus haematonotus	Red-rumped Parrot			N
Rhipidura leucophrys	Willie Wagtail			N
Sturnus vulgaris	Common Starling			I
Trichoglossus moluccanus	Rainbow Lorikeet			N
Vanellus miles	Masked Lapwing			N
Mammals (16)				
Austronomus australis	White-striped Freetail Bat			N
Chalinolobus gouldii	Gould's Wattled Bat			N
Chalinolobus morio	Chocolate Wattled Bat			N
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		N
Macropus giganteus	Eastern Grey Kangaroo			N
Miniopterus australis	Little Bent-winged Bat	V		N
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		N
Nyctophilus sp.	-			N
Ozimops planiceps	South-eastern Freetail Bat			N
Ozimops ridei	Ride's Freetail Bat			N
Scoteanax rueppellii	Greater Broad-nosed Bat	V		N
Scotorepens greyii	Little Broad-nosed Bat			N
Scotorepens orion	Eastern Broad-nosed Bat			N
Vespadelus darlingtoni	Large Forest Bat			N
Vespadelus regulus	Southern Forest Bat			N
Vespadelus troughtoni	Eastern Cave Bat	V		N
Vulpes vulpes	Red Fox			I

V = Vulnerable

Appendix F

BAM Calculator Outputs

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00040230/BAAS18172/23/00040231

Assessment name
Williams Quarry

BAM data last updated *
28/10/2024

Assessor Name
Troy Jennings

Report Created
03/03/2025

BAM Data version *
Current classification (live - default) (80)

Assessor Number
BAAS18172

Assessment Type
Part 4 Developments (General)

BAM Case Status
Finalised

Assessment Revision
4

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

Date Finalised
03/03/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3352_Moderate	3352-Armidale Quartz Hills Stringybark Forest	Moderate	0.56	1	

2	3352_Derived	3352-Armidale Quartz Hills Stringybark Forest	Derived	5.72	3	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00040230/BAAS18172/23/00040231	Williams Quarry	28/10/2024
Assessor Name	Report Created	BAM Data version *
Troy Jennings	03/03/2025	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18172	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
4	BOS Threshold: Biodiversity Values Map and area clearing threshold	03/03/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	3352-Armidale Quartz Hills Stringybark Forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3352-Armidale Quartz Hills Stringybark Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3352-Armidale Quartz Hills Stringybark Forest
Diamond Firetail	Stagonopleura guttata	3352-Armidale Quartz Hills Stringybark Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3352-Armidale Quartz Hills Stringybark Forest
Eastern False Pipistrelle	Falsistrellus tasmaniensis	3352-Armidale Quartz Hills Stringybark Forest
Flame Robin	Petroica phoenicea	3352-Armidale Quartz Hills Stringybark Forest
Greater Broad-nosed Bat	Scoteanax rueppellii	3352-Armidale Quartz Hills Stringybark Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3352-Armidale Quartz Hills Stringybark Forest

Hastings River Mouse	Pseudomys oralis	3352-Armidale Quartz Hills Stringybark Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3352-Armidale Quartz Hills Stringybark Forest
Little Bent-winged Bat	Miniopterus australis	3352-Armidale Quartz Hills Stringybark Forest
Little Eagle	Hieraaetus morphnoides	3352-Armidale Quartz Hills Stringybark Forest
Little Lorikeet	Glossopsitta pusilla	3352-Armidale Quartz Hills Stringybark Forest
Speckled Warbler	Chthonicola sagittata	3352-Armidale Quartz Hills Stringybark Forest
Spotted Harrier	Circus assimilis	3352-Armidale Quartz Hills Stringybark Forest
Spotted-tailed Quoll	Dasyurus maculatus	3352-Armidale Quartz Hills Stringybark Forest
Square-tailed Kite	Lophoictinia isura	3352-Armidale Quartz Hills Stringybark Forest
Swift Parrot	Lathamus discolor	3352-Armidale Quartz Hills Stringybark Forest
Varied Sittella	Daphoenositta chrysoptera	3352-Armidale Quartz Hills Stringybark Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3352-Armidale Quartz Hills Stringybark Forest
White-throated Needletail	Hirundapus caudacutus	3352-Armidale Quartz Hills Stringybark Forest

Threatened species Manually Added

Common Name	Scientific Name
Greater Broad-nosed Bat	Scoteanax rueppellii
Large Bent-winged Bat	Miniopterus orianae oceanensis
Little Bent-winged Bat	Miniopterus australis
Eastern False Pipistrelle	Falsistrellus tasmaniensis

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black-necked Stork	Ephippiorhynchus asiaticus	3352-Armidale Quartz Hills Stringybark Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3352-Armidale Quartz Hills Stringybark Forest

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

BAM Predicted Species Report

Common Name	Scientific Name	Justification in the BAM-C
Black-necked Stork	Ephippiorhynchus asiaticus	Refer to BAR
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints

BAM Candidate Species Report

Proposal Details

Assessment Id 00040230/BAAS18172/23/00040231	Proposal Name Williams Quarry	BAM data last updated * 28/10/2024
Assessor Name Troy Jennings	Report Created 03/03/2025	BAM Data version * Current classification (live - default) (80)
Assessor Number BAAS18172	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 4	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold	Date Finalised 03/03/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions	No (surveyed)	☐ Jan ☑ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☑ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?

Dichanthium setosum Bluegrass	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Eucalyptus magnificata Northern Blue Box	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Eucalyptus nicholii Narrow-leaved Black Peppermint	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Myotis macropus Southern Myotis	No (surveyed)	☐ Jan ☑ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species Manually Added

Common Name	Scientific Name
Eastern Cave Bat	Vespadelus troughtoni

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Beadle's Grevillea	Grevillea beadleana	Habitat constraints
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat degraded Habitat constraints
Eastern Cave Bat	Vespadelus troughtoni	Habitat constraints
Eastern Pygmy-possum	Cercartetus nanus	Habitat degraded
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
Peppered Tree Frog	Litoria piperata	Habitat degraded Geographic limitations
Powerful Owl	Ninox strenua	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints
Southern Greater Glider	Petauroides volans	Habitat degraded
Square-tailed Kite	Lophoictinia isura	Habitat constraints
Squirrel Glider	Petaurus norfolcensis	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00040230/BAAS18172/23/00040231

Proposal Name
Williams Quarry

BAM data last updated *
28/10/2024

Assessor Name
Troy Jennings

Assessor Number
BAAS18172

BAM Data version *
Current classification (live - default) (80)

Proponent Names
Tom Ducat

Report Created
03/03/2025

BAM Case Status
Finalised

Assessment Revision
4

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

Assessment Type
Part 4 Developments (General)

Date Finalised
03/03/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ephippiorhynchus asiaticus / Black-necked Stork
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3352-Armidale Quartz Hills Stringybark Forest	Not a TEC	6.3	14	0	14

3352-Armidale Quartz Hills Stringybark Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	3352_Moderate	Yes	14	Armidale Plateau, Bundarra Downs, Coffs Coast and Escarpment, Eastern Nandewars, Ebor Basalts, Glenn Innes-Guyra Basalts, Macleay Gorges, Moredun Volcanics, Round Mountain, Walcha Plateau, Wongwibinda Plateau and Yarrowyck-Kentucky Downs. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	3352_Derived	No	0	Armidale Plateau, Bundarra Downs, Coffs Coast and Escarpment, Eastern Nandewars, Ebor Basalts, Glenn Innes-Guyra Basalts, Macleay Gorges, Moredun Volcanics, Round Mountain, Walcha Plateau, Wongwibinda Plateau and Yarrowyck-Kentucky Downs. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Credit Summary Report

Proposal Details

Assessment Id
00040230/BAAS18172/23/00040231

Proposal Name
Williams Quarry

BAM data last updated *
28/10/2024

Assessor Name
Troy Jennings

Report Created
03/03/2025

BAM Data version *
Current classification (live - default) (80)

Assessor Number
BAAS18172

BAM Case Status
Finalised

Date Finalised
03/03/2025

Assessment Revision
4

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

Assessment Type
Part 4 Developments (General)

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Armidale Quartz Hills Stringybark Forest												
1	3352_Moderate	Not a TEC	49	49.0	0.56	PCT Cleared - 75%	High Sensitivity to Gain			2.00		14

2	3352_Derived	Not a TEC	14	14.0	5.7	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
											Subtotal	**14**
											Total	**14**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00040230/BAAS18172/23/00040231

Proposal Name

Williams Quarry

BAM data last updated *

28/10/2024

Assessor Name

Troy Jennings

Assessor Number

BAAS18172

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Tom Ducat

Report Created

03/03/2025

BAM Case Status

Finalised

Assessment Revision

4

BOS entry trigger

BOS Threshold: Biodiversity Values Map and area clearing threshold

Assessment Type

Part 4 Developments (General)

Date Finalised

03/03/2025

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ephippiorhynchus asiaticus / Black-necked Stork
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3352-Armidale Quartz Hills Stringybark Forest	Not a TEC	6.3	14	0	14.00

3352-Armidale Quartz Hills Stringybark Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	3352_Moderate	Yes	14	Armidale Plateau,Bundarra Downs, Coffs Coast and Escarpment, Eastern Nandewars, Ebor Basalts, Glenn Innes-Guyra Basalts, Macleay Gorges, Moredun Volcanics, Round Mountain, Walcha Plateau, Wongwibinda Plateau and Yarrowyck-Kentucky Downs. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	New England Grassy Woodlands This includes PCT's: 489, 501, 510, 533, 539, 571, 704, 734, 853, 1118, 1332, 3351, 3352, 3358, 3359, 3363	New England Grassy Woodlands >=70% and <90%	3352_Derived	No	0	Armidale Plateau,Bundarra Downs, Coffs Coast and Escarpment, Eastern Nandewars, Ebor Basalts, Glenn Innes-Guyra Basalts, Macleay Gorges, Moredun Volcanics, Round Mountain, Walcha Plateau, Wongwibinda Plateau and Yarrowyck-Kentucky Downs. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Grassy Woodlands	Tier 2 or higher threat status	3352_Moderate	Yes (including artificial)	14	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3352_Derived	No	0	IBRA Region: New England Tablelands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like options

Appendix G

Anabat Analysis

Microbat Call Identification Report

Prepared for ("Client"):	Geolink
Survey location/project name:	Williams Quarry, Armidale
Survey dates:	8-23 February 2023
Client project reference:	4079
Job no.:	GEO-2303
Report date:	20 March 2023

Methods

Data received

Balance Environmental received 28 raw ZCA files recorded by two Anabat Express detectors (Titley Scientific, Brisbane) over 17 consecutive nights. GPS metadata extracted from the files indicates that each detector sampled a separate site and remained in the same place for the duration of the survey:

- Anabat A1 8th – 23rd February 30.5514°S, 151.5099°E
- Anabat A2 8th – 18th February 30.5570°S, 151.5106°E

Call analysis and species identification

The data were processed in *Anabat Insight* (Version 2.0.6; Titley Scientific, Brisbane). Individual acoustic triggers (ZC sequence files) were extracted from the ZCA files using the "Convert ZCA" function, with a generic noise filter applied to exclude non-bat signals from further analysis. The remaining ZC files were then processed with the Decision Tree Analysis tool to group and label files based on the average characteristic frequency (Fc) of the calls within each file. Species represented within each frequency group were then identified using the Search function to scan on a per-pulse basis for species-specific call metrics, followed by visual validation of the resulting output. Once all potential constituent species within a group were identified and representative calls labelled appropriately, the remaining files in that group were discarded to a "surplus calls" folder.

Species-specific scans and visual validation were based on published call data and spectrograms (*e.g.*, Reinhold *et al.* 2001; Pennay *et al.* 2004) and regionally relevant reference calls held in the *Balance! Environmental* reference call library.

The likelihood of species' occurrence in the study area was confirmed by referring to the Australasian Bat Society's *BatMap* application (https://www.ausbats.org.au/batmap.html) and other published distribution information (*e.g.,* Churchill 2008; van Dyck *et al.* 2013).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at http://www.ausbats.org.au/.

Species nomenclature follows Armstrong *et al.* (2020).

Results & Discussion

The ZCA conversion process yielded 27,300 ZC sequence files, but 24,709 of those were excluded by the noise filter. Call identification for all species present across the two sites was achieved using a subset of 905 ZC files, while the remaining 1686 files contained bat calls that were surplus to species identification requirements.

At least 13 species were detected, with positive identification achieved for 12 individual species plus the undifferentiated *Nyctophilus* genus (see **Table 1**). Two species of *Nyctophilus* – *N. geoffroyi* and *N. gouldi* – potentially occur in the study area.

Up to three additional species were detected, including: *Vespadelus troughtoni; V. vulturnus;* and *Falsistrellus tasmaniensis*.

Eighteen calls with characteristic frequency (Fc) around 49-51 kHz were positively attributed to *Vespadelus* species and represented one or both of *V. troughtoni* and *V. vulturnus*. Another 12 calls in the same frequency range may have been from either of those species or *Chalinolobus morio*, which was positively identified from numerous more definitive calls.

Five calls with Fc~37-38 kHz potentially represented *F. tasmaniensis*, but may have been variants of *Scotorepens greyii* and/or *S. orion*, both of which were reliably identified from other calls. The unresolved calls had mixed pulse characteristics, including some pulses with slightly down-sweeping tails, which can be indicative of *F. tasmaniensis*

Sample spectrograms for each call type identified in the dataset appear in **Appendix 1**.

References

Armstrong, K.N., Reardon, T.B., and Jackson, S.M. (2020). *A current taxonomic list of Australian Chiroptera.* Australasian Bat Society. Version 2020-06-09. URL: http://ausbats.org.au/species-list/4593775065

Australasian Bat Society (2021) *BatMap* - https://www.ausbats.org.au/batmap.html. Accessed 10/3/2023

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Parnaby, H. E. (1992). *An Interim Guide to Identification of Insectivorous Bats of South-eastern Australia.* Technical Reports of the Australian Museum No. 8. Australian Museum, Sydney.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

van Dyck, S., Gynther, I. and Baker, A. (ed.) (2013). *Field Companion to the Mammals of Australia.* New Holland; Sydney.

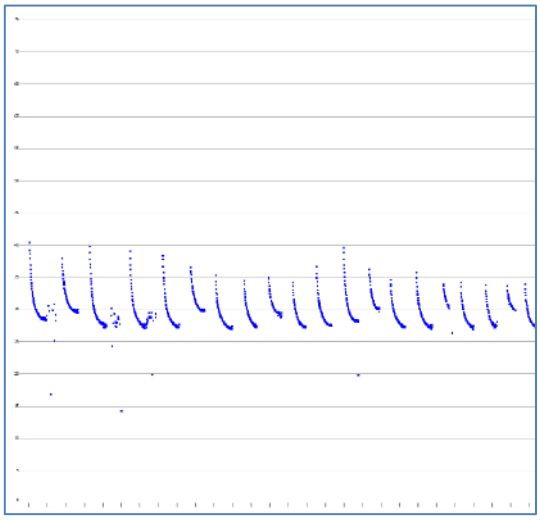
Table 1 Bats recorded during the Williams Quarry survey, 8-23 February 2023.

♦ definitely present; at least one call positively attributable to the species

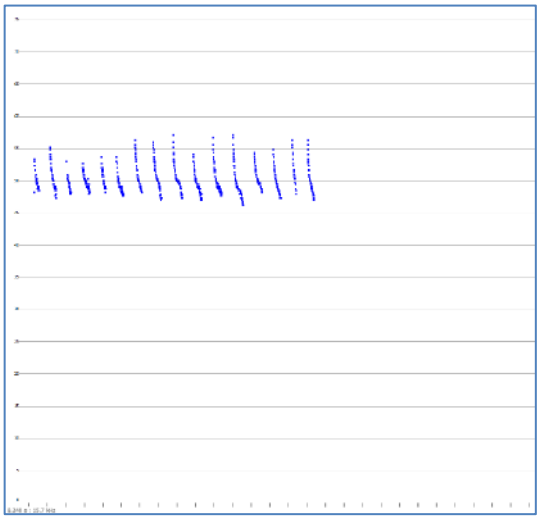
□ possibly present; calls like those of the species were recorded, but could not be reliably identified due to poor call quality and/or similarities with other species

Detector:	Anabat A1_SN628206	Anabat A2_SN628211
Chalinolobus gouldii	♦	♦
Chalinolobus morio	♦	♦
Falsistrellus tasmaniensis	□	□
Nyctophilus sp.	♦	♦
Scoteanax rueppellii	♦	♦
Scotorepens greyii	♦	
Scotorepens orion	♦	♦
Vespadelus darlingtoni	♦	♦
Vespadelus regulus	♦	♦
Vespadelus troughtoni	□	□
Vespadelus vulturnus	□	□
Miniopterus australis	♦	
Miniopterus orianae oceanensis	♦	♦
Austronomus australis	♦	♦
Ozimops planiceps	♦	♦
Ozimops ridei	♦	♦

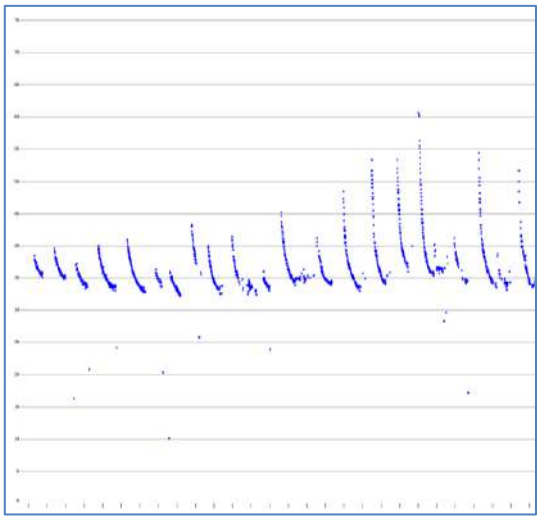
Appendix 1 Representative call sequences from Williams Quarry, 8-23 February 2023.
Scale: 10msec per tick; time between pulses removed (*Anabat Insight* F7 compressed view)



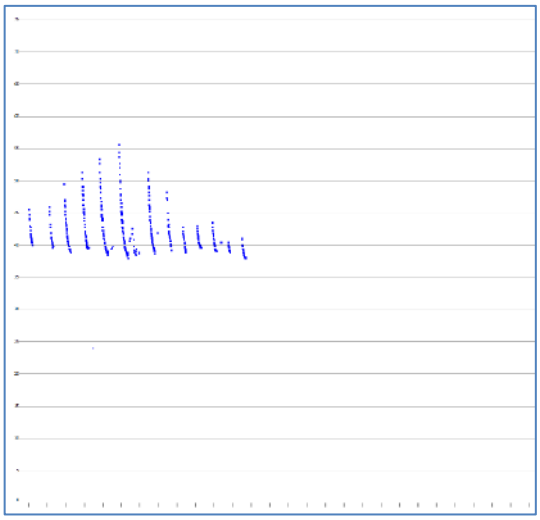
Chalinolobus gouldii



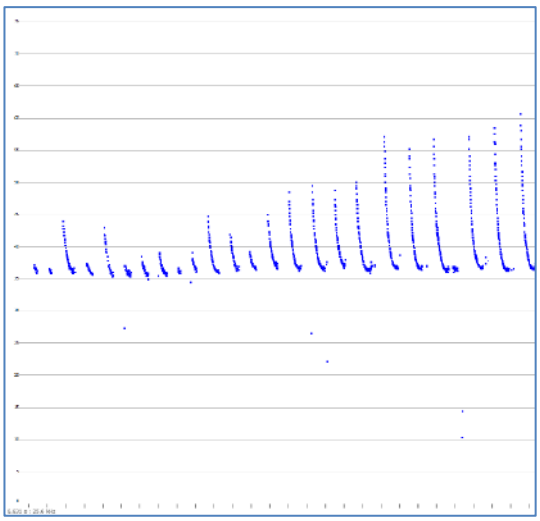
Chalinolobus morio



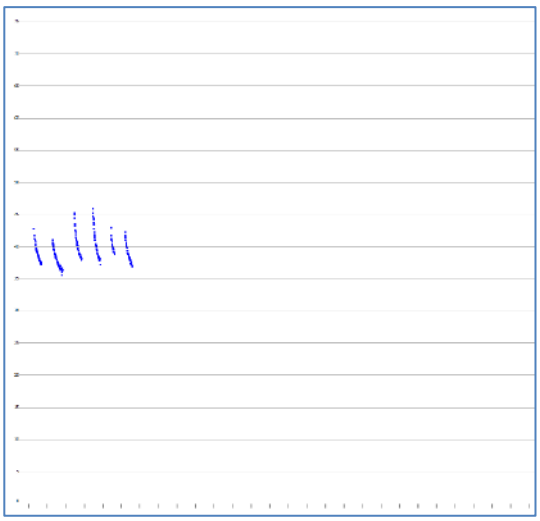
Scoteanax rueppellii



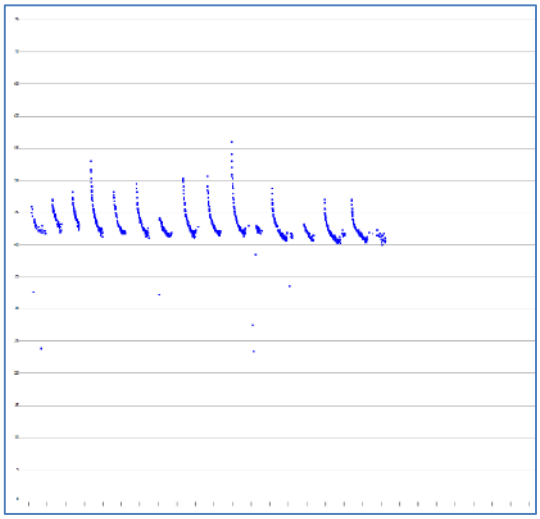
Scotorepens greyii



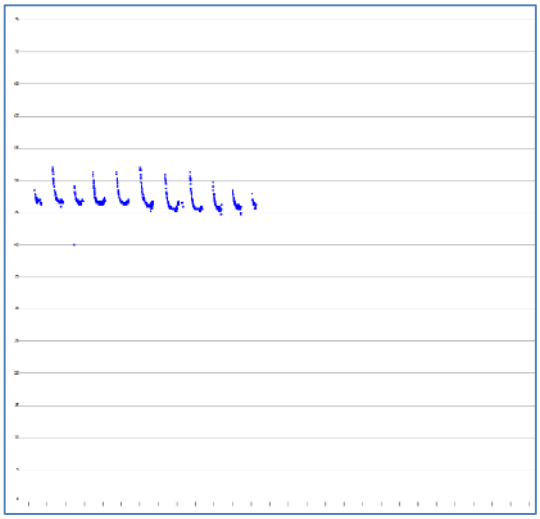
Scotorepens orion



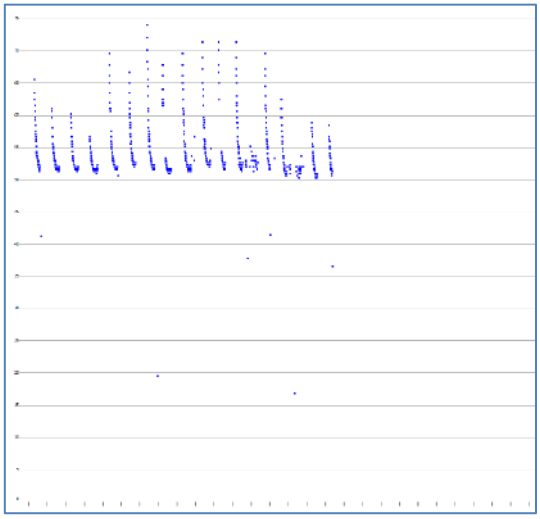
Possible *Falsistrellus tasmaniensis*



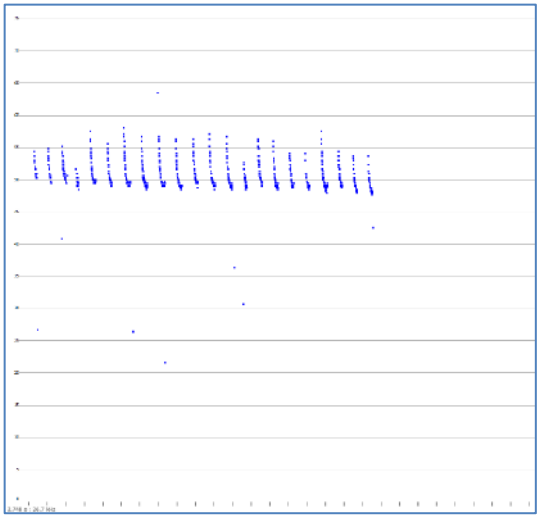
Vespadelus darlingtoni



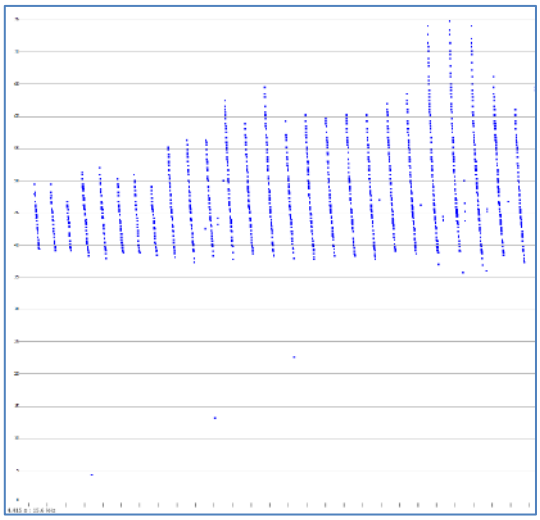
Vespadelus regulus



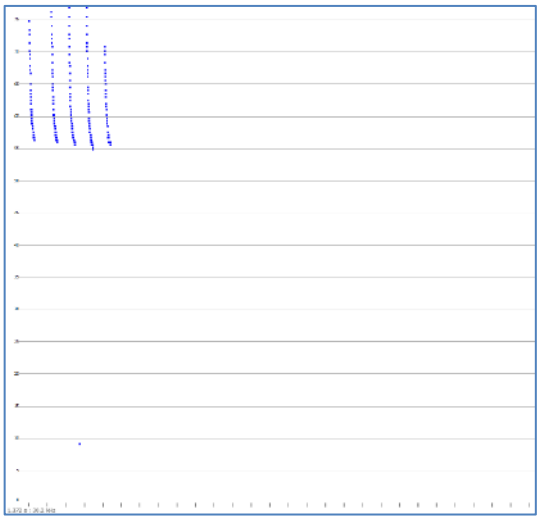
Possible *Vespadelus troughtoni*



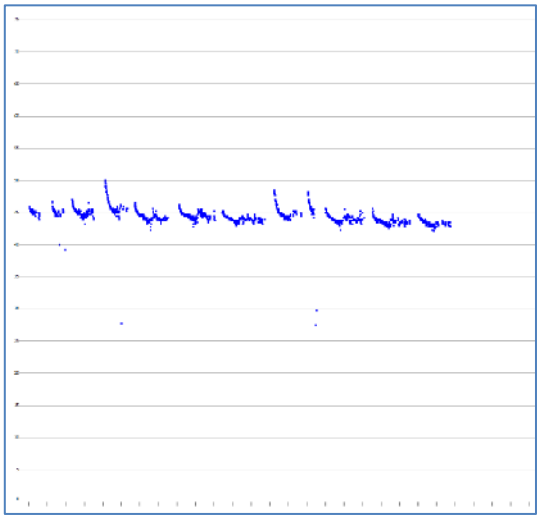
Possible *Vespadelus vulturnus*



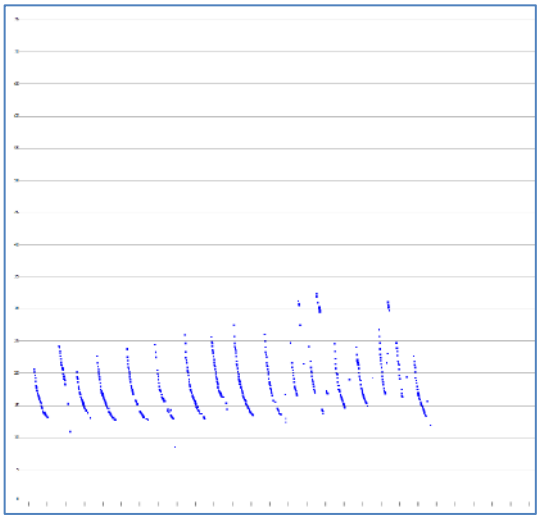
Nyctophilus sp.



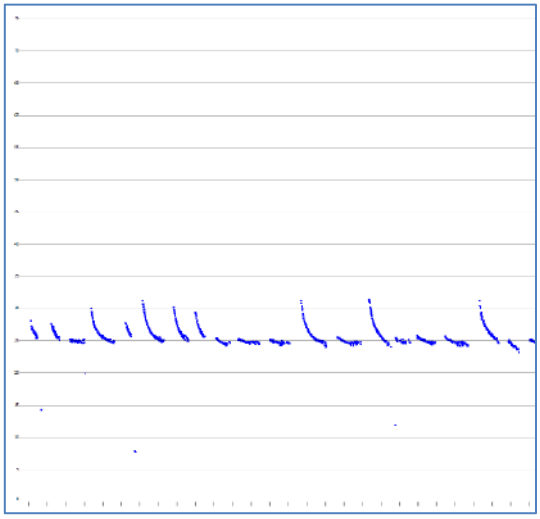
Miniopterus australis



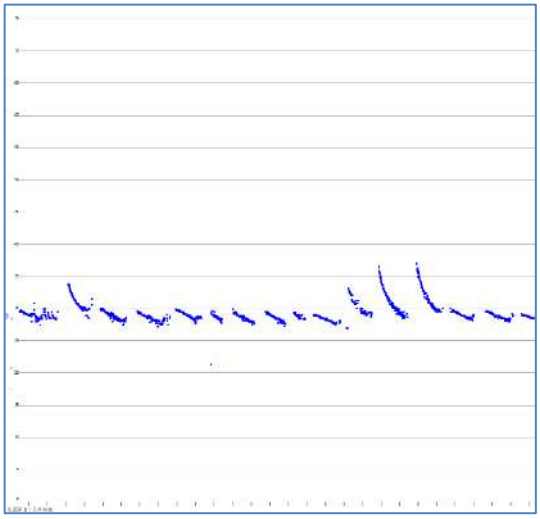
Miniopterus orianae oceanensis



Austronomus australis



Ozimops planiceps



Ozimops ridei

Appendix H

EPBC Assessments of Significance

Assessments of Significance (EPBC Act)

For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Department of the Environment 2013). These significance assessments have been prepared for the following threatened entities:

- **Threatened Ecological Communities**:
  - *White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* listed as Critically Endangered under the EPBC Act
- **Fauna**:
  - White-throated Needletail (*Hirundapus caudacutus*) listed as Vulnerable under the EPBC Act.
  - Diamond Firetail (*Stagonopleura guttata*) listed as Vulnerable under the EPBC Act.
  - Koala (*Phascolarctos cinereus*) listed as Endangered under the EPBC Act.

Significant Impact Assessment - Critically endangered and endangered species listed under the EPBC Act

Significant impact criteria: An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population;*
- *reduce the area of occupancy of the species;*
- *fragment an existing population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of a population;*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

Definitions: *A 'population of a species' is an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:*

- *geographically distinct regional population, or collection of local populations, or*
- *a population, or collection of local populations, that occurs within a particular bioregion*.

Assessments have been completed for two endangered or critically endangered species/ communities including *White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* TEC and Koala.

An assessment of the potential impact of the proposed action on the subject species (as above) with reference to the significant impact criteria as follows. An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- **lead to a long-term decrease in the size of a population?**

Koala: Approximately 0.56 ha of potential habitat is likely to be affected by the proposed action. Although the Project will represent the loss of potential habitat, the development footprint will only be a small component of locally occurring habitat that will be utilised by the species. The proposed impact will predominately impact already disturbed native vegetation associated with small patches surrounding the existing quarry. Any identified population of Koala in the locality will not be restricted to habitat within the development site. Therefore, the Project is not considered likely to significantly contribute to a long-term decline in the size of a population of the species.

- **reduce the area of occupancy of the species?**

Koala: The Koala was not recorded within the site however the species has been recorded in the greater locality. Although the Project will result in the loss of potential foraging habitat, the incremental loss of a small area of potential habitat, only represents a small component of similar locally occurring resources accessible to the species. It is considered that the Project would not reduce the area of occupancy of this species given the amount of accessible habitat in the locality and greater region.

- **fragment an existing population into two or more populations?**

Koala: The Project will not fragment habitat for the Koala; majority of habitat to be impacted occurs as small patches within existing cleared areas. It is likely that likely that the species would still have the ability to move through the landscape and would not be significantly impeded due to the Project. It is unlikely the Project would fragment an existing population into two or more.

- **substantial adversely affect habitat critical to the survival of a species?**

Koala: The habitat within the development site only provides supplementary Koala feed trees. Due to the extensive range occupied by the species, the low scale impacts of the Project, it is unlikely the Project would adversely affect habitat critical to the survival of the Koala.

- **disrupt the breeding cycle of a population?**

Koala: The Project will disturb approximately 0.56 ha of native vegetation considered to be foraging habitat for the species. The Project would not fragment or limit dispersal of adult individuals across the landscape thereby reducing breeding cycle of the species. Large areas of accessible habitat would still be available within greater landscape for the species. It is unlikely that the Project would significantly disrupt the breeding cycle of a population.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**

Koala: The Project will disturb approximately 0.56 ha of native vegetation considered to be foraging habitat for the species, majority of habitat to be impacted occurs as disturbed native vegetation associated with small patches surrounding the existing quarry. It is unlikely that 0.56 ha of foraging habitat along the edge of cleared areas will modify, destroy, remove or isolate habitat for this species to the extent that is likely to cause the species to decline.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

Koala: It is not likely that invasive species (such as introduced predators) that are potentially harmful to the Koala will become further established as a result of the proposed action.

- **introduce disease that may cause the species to decline?**

Koala: the Project would be unlikely to introduce any disease that may cause the species to decline.

- **interfere with the recovery of the species?**

Koala: the Project would be unlikely to interfere with the recovery of the species due to low impacts and the availability of higher-quality habitat within the greater locality.

Conclusion

Overall due to the relatively low impacts associated with the Project and given the nature and scale of impacts it is unlikely that the proposed action would result in a significant impact to Koala.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands TEC:

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- **reduce the extent of an ecological community**

Approximately 8.43 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands was identified within the investigation area. The Project will not directly impact or disturbance any occurrence of this TEC within the site. As such the Project would not reduce the extent of this TEC across its range.

- **fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission line**

The Project will not directly impact or disturbance any occurrence of this TEC within the site. As such the Project would not fragment or increase fragmentation of this TEC.

- **adversely affect habitat critical to the survival of an ecological community**

The Project will not directly impact or disturbance any occurrence of this TEC within the site. As such the Project would not fragment or increase fragmentation of this TEC.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

The Project will not directly impact or disturbance any occurrence of this TEC within the site.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The Project will not directly impact or disturbance any occurrence of this TEC within the site. Any large-scale excavation that occurs in close proximity to the community or to marginal patches will involve mitigation measures to minimise sedimentation and hydrological impacts. Therefore, the Project is considered unlikely to substantially modify or destroy these abiotic factors.

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
  - **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
  - **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**

The Project will not directly impact or disturbance any occurrence of this TEC within the site. As result the Project is unlikely to cause a substantial reduction in the quality or integrity of the occurrence of this TEC. Mitigation measures (including weed control) will be enforced to ensure the Project does not substantially change the species composition of an occurrence of this community outside of the impact area.

- **interfere with the recovery of an ecological community**

Box-Gum Woodland within the site currently subject to weed and pest invasion. The majority of the TEC occurs along roadsides and agricultural properties which have all been subjected to historical disturbances. Therefore, it is considered unlikely that the Project would substantially reduce the quality or integrity of the community's occurrence or increase spread of invasive weeds. Mitigation measures included in the vegetation management plan will ensure that further weed incursion is unlikely to occur as a result of the Project. The Project is unlikely to interfere with any of the recovery actions.

Conclusion

The Project will not directly impact or disturbance any occurrence of this TEC within the site. Mitigation measures will be implemented to ensure any potential indirect impacts (i.e. weed incursions) are unlikely to occur. It is considered that the Project is unlikely to have a significant impact on White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands TEC.

Significant Impact Assessment - Vulnerable species listed under the EPBC Act

Significant impact criteria: *An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:*

- *lead to a long-term decrease in the size of an important population;*
- *reduce the area of occupancy of an important population;*
- *fragment an existing population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of an important population;*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

Definitions: *An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/ or that are:*

- *key source populations either for breeding or dispersal;*
- *populations that are necessary for maintaining genetic diversity, and/ or*
- *populations that are near the limit of the species range.*

Assessments have been completed for two vulnerable species including White-throated Needletail and Diamond Firetail.

Is this part of an important population?

Diamond Firetail: Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea. The extent of occurrence (EOO) is estimated at 1,500,000 km^2 and the area of occupancy (AOO) is estimated at 25,000 km^2. Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover. feed predominantly at ground level, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects. This species is not at or near the limit of its range as it occurs over a large portion of southern-eastern Australia (Department of Climate Change Energy the Environment and Water, 2023c)(Department of Climate Change Energy the Environment and Water, 2023c)(Department of Climate Change Energy the Environment and Water, 2023c). As the subject site does not occur at the limit of the species distribution range and is unlikely to be necessary for maintaining genetic diversity populations which may occur are not considered to form part of an 'important population'.

White-throated Needletail: The White-throated Needletail a migratory species and occurs in Australia only between late spring and early autumn but mostly in summer. This species are non-breeding migrants with breeding taking place in Northern Asia (Birdlife Australia, 2020). They have been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows. Probably recorded most often above wooded areas, including open forest and rainforest (Birdlife Australia, 2020). This species is not or near the limit of its range as it occurs over eastern and northern Australia and in Northern Asia (Birdlife Australia, 2020). White-throated Needletail is almost exclusively aerial and although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. As the subject site does not contain key resources for breeding or dispersal, does not occur at the limit of the species distribution range and is unlikely to be necessary for maintaining genetic diversity populations which may occur are not considered to form part of an 'important population'.

An action is likely to have a significant impact on a vulnerable species or ecological community if there is a real chance or possibility that it will:

- **lead to a long-term decrease in the size of an important population**

Diamond Firetail: Not applicable for species not a part of an important population (as mentioned above).

White-throated Needletail: Not applicable. White-throated Needletail occurring in the site is not part of an important population (as mentioned above).

- **reduce the area of occupancy of an important population**

Diamond Firetail: Not applicable for species not a part of an important population (as mentioned above).

White-throated Needletail: Not applicable. White-throated Needletail occurring in the site is not part of an important population (as mentioned above).

- **fragment an existing important population into two or more populations**

Diamond Firetail: Not applicable for species not a part of an important population (as mentioned above).

White-throated Needletail: Not applicable. White-throated Needletail occurring in the Subject site is not part of an important population (as mentioned above).

- **adversely affect habitat critical to the survival of a species**

Diamond Firetail: No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. Habitat critical to the survival of Diamond Firetail as stated in conservation advice may include habitat associated with:

- Activities such as foraging, breeding, roosting or dispersal.
- Long-term maintenance of the species.
- Maintaining genetic diversity.
- Reintroduction of populations or recovery of species.

The site does provide habitat that could be considered as critical habitat due to the presence of a small amount of Eucalypt grassy woodland and presence scattered fallen timber and high grass cover, however, these resources are not limited within the surrounding landscape and the impact of habitat within the site would be considered a negligible amount of potential habitat for the species. Based on the nature and scale of the Project impacts it is unlikely that the Project would adversely impact habitat that it would lead to the species to decline.

White-throated Needletail: No critical habitat is listed for this species under the EPBC Act. The Project will remove a small area 0.56 ha of potential aerial foraging habitat for this species. The White-throated Needletail is a migratory species and breeds in northern Asia. This species forages on the wing and the vegetation within the site is likely to provide aerial foraging habitat for this species. This species occurs widely along the coast of NSW and QLD whilst in Australia suitable foraging resources could be accessed widely throughout the locality and beyond. Therefore, this would not meet the above criteria and the site is not critical to the survival of the White-throated Needletail.

- **disrupt the breeding cycle of an important population**

Diamond Firetail: Not applicable for species not a part of an important population (as mentioned above).

White-throated Needletail: Not applicable. White-throated Needletail occurring in the site is not part of an important population (as mentioned above).

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

Diamond Firetail: The Project will disturb approximately 0.56 ha of grassy woodland vegetation considered to be largely foraging habitat for the species. It is highly unlikely that the species is reliant on the site for regular food or breeding resources. It is unlikely that 0.56 ha of potential habitat would result in a significantly decline to the species.

White-throated Needletail: No, due to the scale and nature of proposed impact, it is not likely to result in species decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The risk of any invasive species (weeds, pests or pathogens) affecting habitat for threatened species is relatively low and would be mitigated by the various biosecurity strategies prescribed and

continuation management procedures. It is unlikely that the Project would result in the exacerbation of invasive species that would already exist within the locality.

- **introduce disease that may cause the species to decline**

Diamond Firetail: No. There are no known diseases that are likely to increase in the area as a result of the Project.

White-throated Needletail: No. There are no known diseases that are likely to increase in the area as a result of the Project.

- **interfere with the recovery of the species**

Diamond Firetail: Due to the scale and nature of the impact it is highly unlikely that the species is reliant on the site for regular food or breeding resources that it would interfere with the recovery of the species across its distribution.

White-throated Needletail: As this species does not breed in Australia and forages on the wing and has the potential to occur intermittently within the locality, the Project is not likely to interfere with the recovery of this species.

Conclusion

Overall due to the relatively low extent and magnitude of impacts associated with the Project, it is unlikely that the Project would result in a significant impact to any listed threatened entities.

Appendix G

Aboriginal Cultural Heritage Assessment Report

Tim Hill
Heritage Management & Planning Pty Ltd
PO BOX 502
Bellingen NSW 2454
timhill.heritage@gmail.com
0473 033 615
ABN: 27 661 743 120

75 ROSE HILL ROAD (WILLIAMS QUARRY), ARDING

ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT

May 2023

Ducats Earthmoving Pty Ltd

DOCUMENT CONTROL	
Report Reference	Hill, T. 2023. *75 Rose Hill Road Arding NSW (Williams Quarry) Aboriginal Cultural Heritage Assessment Report.* Unpublished report for Ducats Earthmoving Pty Ltd.
Project Number	TH031
Author	Tim Hill
Client	Ducats Earthmoving Pty Ltd
Disclaimer *This document may only be used for the purpose for which it was commissioned.* *Heritage Management & Planning Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party.* *Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information.* *Information provided is not intended to be a substitute for legal advice in relation to any matter.* *Unauthorised use of this report in any form is prohibited.*	
Status	Final
Date	13 May 2023
Version	1C

CONTENTS

Figures

Tables

ABBREVIATIONS

ACHA	Aboriginal Cultural Heritage Assessment
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
DA	Development Application
DCP	Development Control Plans
DEECW	Department of Environment, Climate Change and Water (now Heritage NSW)
EARS	Environmental Assessment Requirements
EIS	Environmental Impact Assessment
EPA	Environmental Planning and Assessment
ESD	Ecological Sustainable Design
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
NPW	National Parks and Wildlife
PAD	Potential Archaeological Deposit
PFA	Point of Force Application
Proposed Works	The proposed expansion of the 'Williams Quarry' on part of 75 Rose Hill Road Arding NSW
SU	Survey Unit
Study Area	Part of 75 Rose Hill Road Arding NSW (Lot 4 DP1096564)

1 INTRODUCTION

1.1 Project Background

Heritage Management and Planning Pty Ltd has been commissioned by Ducat Earthmoving Pty Ltd to undertake a Aboriginal Cultural Heritage Assessment Report (ACHAR) to support the Environmental Impact Statement (EIS) for the proposed expansion of Williams Quarry (the Proposed Works) at 75 Rose Hill Road (part of Lot 4 DP1096465), Arding NSW (the Study Area) (**Figure 1** and **Figure 2**). The ACHAR has been commissioned to consider the potential impacts of the proposed quarry expansion on Aboriginal objects and cultural values, including potential impacts to the cultural landscape.

1.2 Project Brief & Methodology

The brief for this project was to undertake an ACHAR in accordance with the Planning Secretary's Environmental Assessment Requirements (EARS) issued on 21 June 2022, being:

> 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.

In accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DEECW 2010A) (CoPAI) and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) the methods employed in this assessment include:

- a description of the proposed quarrying operations
- a search of relevant Aboriginal heritage registers
- a review of environmental information relevant to the assessment
- a review of relevant archaeological and cultural heritage assessments in the local area and region
- development of an archaeological predictive model to inform the assessment methodology and impact assessment
- consultation with the Aboriginal community including documentation of the consultation process and how the consultation informed the assessment
- completion of archaeological investigations and provision of technical information equivalent to a Archaeological Technical Report to inform the impact assessment including:
  i. a summary of the assessment methodology
  ii. a description of results of the assessment including statements on the local and regional significance of archaeological sites identified within the Study Area, and

iii. statements on the adequacy of the assessment and the requirement for additional archaeological investigation

- an assessment of the cultural values (Social, Historic, Scientific, Aesthetic) of the Study Area including a Statement of Significance for Aboriginal cultural values
- an impact assessment to clearly describe the potential Harm to Aboriginal cultural heritage values, including consideration of Ecological Sustainable Development (ESD) considerations (precautionary principle and principle of intergenerational equity)
- an outline of measures to mitigate the impacts of the proposed quarrying operations on cultural values, and
- management recommendations to inform the EIS, including any conditions/ management recommendations to be incorporated into the project and Aboriginal Heritage Impact Permit (AHIP).

1.2 Report Authorship

The study was undertaken by Tim Hill (BA. Hons. Archaeology and Palaeoanthropology, University of New England (1998)).

1.3 Description of the Proposal (GeoLINK 2022)

1.3.1 Resource Description

It is proposed to expand the operation and activities associated with the existing quarry and extract a higher rate of material using blasting. Materials are crushed on site and sold within the local market. The proposal is seeking to obtain approval to extract up to 150,000m3 of material per annum to meet anticipated demands.

1.3.2 Extraction

It is proposed to extract the gravel by blast techniques which will generally involve:

- Blasting the quarry face
- Ripping and removal of the material to the stockpile area
- Crushing and sorting of raw material, and
- Establish stockpiles of gravel material ready for transport.

The quarry already has established areas to access material, facilitate crushing and stockpiling and support transport movements through the site. Blasting would extract rock and gravel material from the source and then quarried material would be crushed, screened and stored on site prior to transport. It would be transported as required for local market use.

1.3.3 Site Rehabilitation

The quarry does not have a definitive lifetime or extraction period; however, a Closure and Rehabilitation Plan would be prepared for the site to accompany the EIS. This Closure and Rehabilitation Plan would demonstrate how the site would be appropriately restored and closed once use of the quarry was no longer required or material had been exhausted.

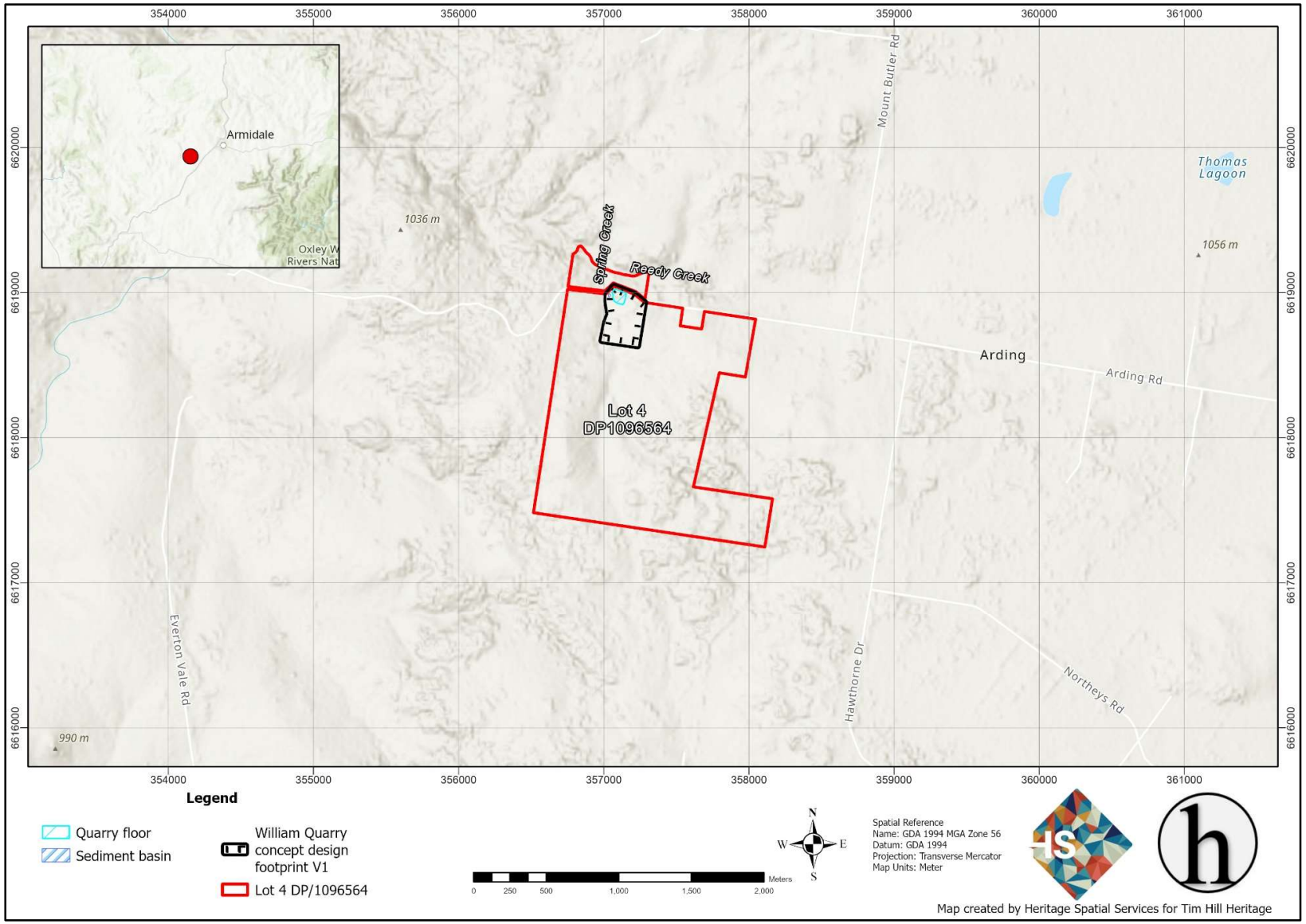


Figure 1: Location of the Study Area and proposed quarry expansion area

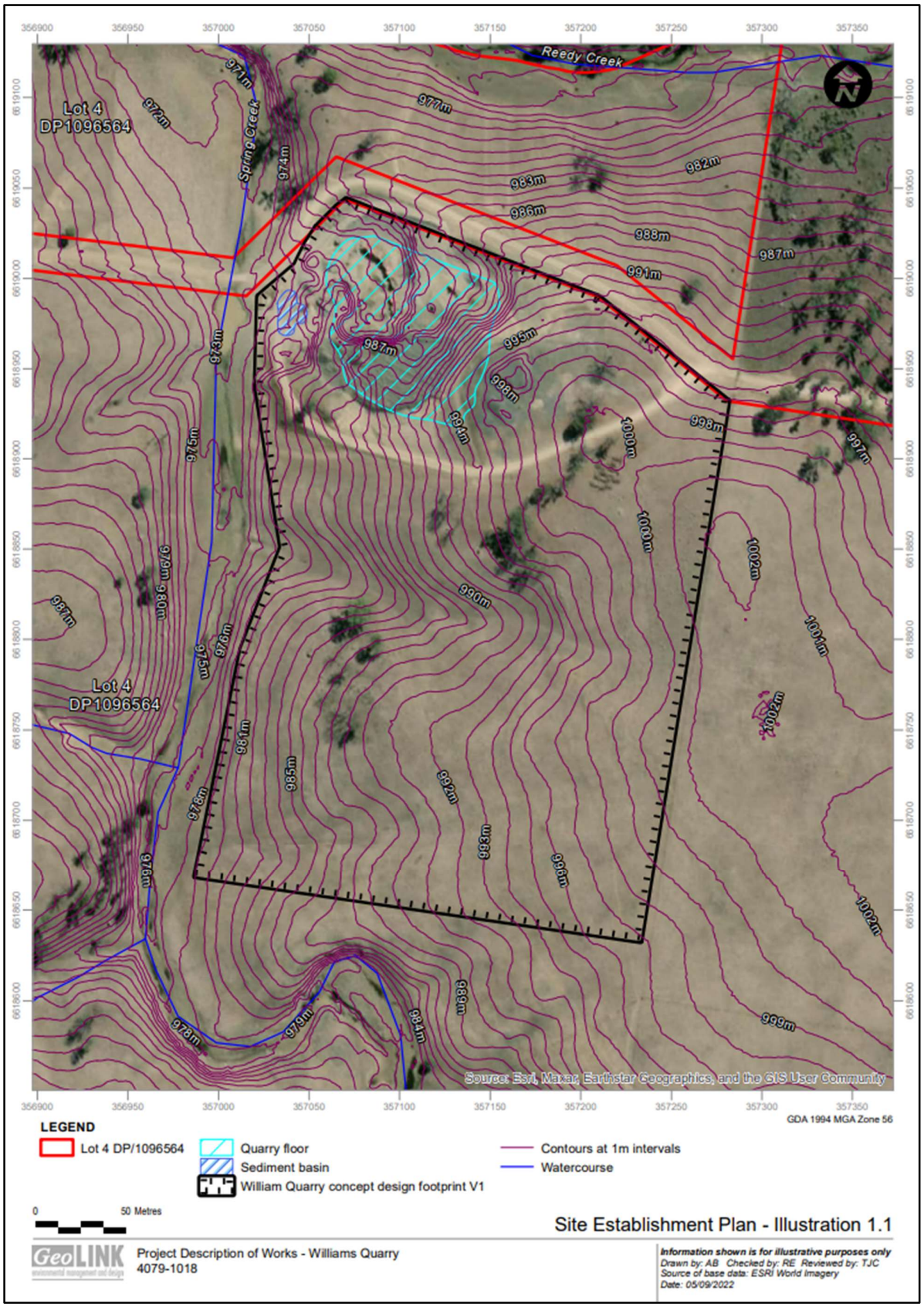


Figure 2: Williams Quarry concept design footprint

2 LEGISLATIVE AND PLANNING CONTEXT

2.1 Environmental Planning and Assessment Act (1979)

The Environmental Planning and Assessment Act (NSW) (1979) (EPA Act) provides a framework to environmental assessment and approvals in NSW. The EPA Act includes three parts relevant to ACHA assessments:

Part 3- Planning instruments which include Local Environment Plans (LEPs), Development Control Plans (DCPs) and other strategic planning controls.

Part 4- Development assessment and consent controls including approvals by local Councils and Regional Planning Panels.

Part 5- Self assessment and approvals by a government agencies, or Determining Authorities, for infrastructure and environmental proposals, and for the approval of State Significant Infrastructure by the Planning Minister.

The Proposal is being determined by the Northern Regional Planning Panel under Part 4 of the EPA Act.

2.2 National Parks and Wildlife Act 1974 (NSW) and Regulations 2019 (NSW)

The National Parks and Wildlife Act 1974 (NSW) (NPW Act) is the primary legislation concerning the identification and protection of Aboriginal cultural heritage in New South Wales. Section 86 of the NPW Act provides offense provisions for Aboriginal objects, Aboriginal skeletal remains and Aboriginal places in NSW (see the definition of 'Harm' above). Three key definitions in the NPW Act which are relevant to this assessment include:

- Aboriginal object means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.
- Aboriginal remains means the body or the remains of the body of a deceased Aboriginal person, but does not include—

  (a) a body or the remains of a body buried in a cemetery in which non-Aboriginal persons are also buried, or

  (b) a body or the remains of a body dealt with or to be dealt with in accordance with a law of the State relating to medical treatment or the examination, for forensic or other purposes, of the bodies of deceased persons.
- Harm an object or place includes any act or omission that—

  (a) destroys, defaces or damages the object or place, or

(b) in relation to an object—moves the object from the land on which it had been situated, or

(c) is specified by the regulations, or

(d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c),

but does not include any act or omission that—

(e) desecrates the object or place, or

(f) is trivial or negligible, or

(g) is excluded from this definition by the regulations.

Section 87 of the NPW Act outlines defences against prosecution relating to Aboriginal objects, skeletal remains and Aboriginal places. These include:

- Acting in accordance with an Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of the NPW Act
- Demonstrating that the "defendant exercised due diligence to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed"
- The activity was prescribed as a "low Impact" activity or an "omission" under the NPW Regulations (2019), and
- Was undertaken in compliance with a Code of Practice adopted or prescribed by the NPW Regulations (2019).

As the quarry exampnsion is being assessed as a under Part 4 of the EPA Act an AHIP is required for any activities which are likely to harm Aboriginal objects.

2.3 Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW

The assessment has been undertaken in substantial accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DEECW 2010A) (CoPAI). The CoPAI provides the following statement on the application of the Code:

> "This Code has been developed to support the process of investigating and assessing Aboriginal cultural heritage by specifying the minimum standards for archaeological investigation undertaken in NSW under the NPW Act. Where an Aboriginal cultural heritage assessment requires an archaeological investigation to be undertaken, this must be done in accordance with the requirements of this Code." (DEECW 2010A:2).

The purpose of this CoPAI is to (DEECW 2010A:1):

1. establish the requirements for undertaking test excavation as a part of archaeological investigation without an AHIP. If you comply with these requirements and you harm an Aboriginal object when undertaking test excavations, your actions will be excluded from the definition of harm and as such you will not be committing an offence of harm to an Aboriginal object.
2. establish the requirements that must be followed when carrying out archaeological investigation in NSW where an application for an AHIP is likely to be made. Under the NPW Act, the Director General can require that certain information accompany an application for an AHIP. This Code explains what that information is in relation to archaeological investigations.

Compliance with the CoPAI is a minimum requirement for archaeological test excavation or archaeological investigation which results in harm to Aboriginal objects. The field survey section (section 6) replaces the requirement for a Archaeological Technical Report. It is the authors experience that the inclusion of the technical information in the ACHAR will assist Registered Aboriginal Parties (RAPs) to consider the outcomes of the assessment if the technical information is contained within a single report.

2.4 Guide to Investigating, Assessing and Reporting on Aboriginal cultural Heritage in NSW (OEH 2011)

The assessment has been undertaken in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) which provides the following statement on the role of an ACHAR in the management of Aboriginal heritage in NSW:

> Anyone proposing to carry out an activity that may harm an Aboriginal object or a declared Aboriginal place must investigate, assess and report on the harm that may be caused by the activity they propose.
>
> The investigation and assessment of Aboriginal cultural heritage is undertaken to explore the harm of a proposed activity on Aboriginal objects and declared Aboriginal places and to clearly set out which impacts are avoidable and which are not. Harm to significant Aboriginal objects and declared Aboriginal places should always be avoided wherever possible. Where harm to Aboriginal objects and declared Aboriginal places cannot be avoided, proposals that reduce the extent and severity of harm to significant Aboriginal objects and declared Aboriginal places should be developed.
>
> An Aboriginal cultural heritage assessment report is a written report detailing the results of the assessment and recommendations for actions to be taken before, during and after an activity to manage and protect Aboriginal objects and declared Aboriginal places identified by the investigation and assessment.

Compliance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) is a minimum requirement for a AHIP application. The ACHAR includes technical information

which would otherwise be included in a stand-alone Archaeological Technical Report (see Sections 1,3, 4, 5 and 6 below) to assist RAPs to comment on the assessment.

2.5 Uralla Local Environmental Plan 2012

The Uralla Local Environment Plan (LEP) (2012) provides a framework to determine activities which require development consent and outlines considerations for the determination process. This includes the following general classes of heritage:

- Items on the NSW State heritage Register
- Items of local heritage significance listed on Schedule 5 of the Uralla LEP, and
- Aboriginal objects and Places as defined by the NPW Act.

The Uralla LEP (2012) sets out provisions to control activities at "Aboriginal Places of heritage significance", which include places which do not meet the definition of an Aboriginal object or Aboriginal places under the NPW Act but are listed under the LEP. Part 5.10.8 of the Uralla LEP (2012) requires that Uralla Shire Council:

> "… must, before granting consent under this clause to the carrying out of development in a place of Aboriginal heritage significance:
>
> a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place, and
>
> b) notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.

The ACHAR will be issued to Uralla Shire Council in accordance with the requirements of Section 5.10 of the Uralla LEP (2012).

3 ENVIRONMENTAL REVIEW

3.1 Environmental Context

The Study Area is located within above the confluence of Spring Creek and Reedy Creek which flow north-west into the Rocky River. The Study Area is very close to the watershed between the Gwydir River (west) and the Macleay River (east). Spring Creek and Rocky Creek comprise small semi-permanent streams and waterholes. The Study Area is at approximately 980-1000 metres above sea level and is located on a low-moderate side slope to the north-west of a relatively large hill/ crest which runs south-east. Mount Brisbane is located to the south and is the highest nearby topographic feature being 1060 metres above sea level (**Error! Reference source not found.**).

The geology of the Study Area is mapped as part of the Sandon Beds which comprise sedimentary rocks dating to the Devonian (419-359 million years) and Carboniferous (359-299 million years) periods. The sedimentary beds contain a number of stone material types suitable for stone tool production including chert, jasper and basalts (**Table 1**). However, it is noted that the adjacent soil landscape, which comprises the hill above the Study Area, forms part of the Bald Knob soil landscape which was formed by basalt flows which would be expected to contain better quality stone material, particularly for stone axe production. Another specific stone material which is known to have qualities for stone tool production is Silcrete which is known to consistently form at the interface of the basalts and sedimentary deposits at approximately 1000-1030 metres above sea level.

The vegetation models for the Study Area include open hardwood forests with a predominately grass understory. Yellow Box is common throughout the New England Tablelands and is known to have been used for the production of wooden implements and tools including bowls, shields and spear throwers.

Table 1: Study Area soil landscapes summary (source: eSpade 2022)

Soil Landscapes	
Invergowrie	**Geology:** Devono-Carboniferous Sandon Beds comprised of sandstone, shale, slate, chert, jasper, rare metabasalt. **Landscape:** Narrow convex crests (<100 m) with gently inclined slope gradients 0–5% and waning sideslopes and footslopes with moderately inclined slopes gradients 5–20%. Elevation is 950–1 060 m. Minor rock outcrop (<2%) and surface strewn rock. **Vegetation:** Mostly partially cleared open-forest. Species include Eucalyptus caliginosa (*broad-leaved stringybark*), *E. dalrympleana* (mountain gum), *E. melliodora* (yellow box), *E. youmanii* (Youman's stringybark), *Angophora floribunda* (rough-barked apple), *Acacia implexa* (hickory wattle), *Acacia filicifolia* (fern-leaved wattle) are among the main tree species. *Jacksonia scoparia* (dogwood), *Daviesia sp.* (bitter pea), *Cassinia quinquefaria* (cassinia), *Hardenbergia violacea* (false sarsaparilla), *Helichrysum apiculatum* (yellow buttons), *Verbascum thapsus* (Aaron's rod), *Brachyloma daphnoides* (daphne heath), *Acacia elongata* (swamp wattle), *Verbena bonariensis* (purpletop), *Bothriochloa macra* (red grass), *Sporobolus creber* (slender rat's tail grass), *Plantago lanceolata* (lamb's tongue), *Wahlenbergia sp.* (bluebell). *Dichelachne sp.* (plumegrass), *Dichondra repens* (kidney weed), and *Acaena ovina* (sheep's burr) are commonly encountered understorey species.

Soil Landscapes	
Bald Knob	**Geology:** Tertiary basalt and associated basalt colluvium. The basalt is both massive and vesicular in places. Some of this unit is also underlain by the Armidale Beds comprised of Tertiary gravels, ferricrete, ferruginous sandstones and silcrete, e.g., Richleigh Hill is on ferricrete, i.e. a ferricrete crest with some basalt influence. Spheroidal weathering of basalt is visible in deep road cuttings and occasionally columnar basalts are observed. **Topography:** Rolling low hills with slopes ranging from 10–30 %. Minor areas have steep slopes >30%, e.g., Arthurs Seat. Angular rock outcrop occurs on some upper slopes as either scattered occurrences or as rockfields with rock outcrop across almost the entire surface, e.g., some slopes such as Mount Hannah and some slopes in the vicinity of Frankfield and Caramaria which are covered in rock outcrop with only minimal soil development. Local relief is 20–90 m. Elevation is 940–1 260 m. Typical landform elements include crests, hillslopes and footslopes. Rock outcrop is 20–50%. Springs are often found in association with the basalt and are often remarkably consistent in terms of their mode of occurrence, e.g., numerous springs are found around the 1 040 m contour near Armidale. **Vegetation:** Mostly extensively cleared open-woodland. Trees in rough order of commonality include *Eucalyptus viminalis* (ribbon gum), *E. melliodora* (yellow box), *Angophora floribunda* (rough-barked apple), *E. laevopinea* (silver top stringybark), *Acacia filicifolia* (fern-leaved wattle), *E. blakelyi* (Blakelys red gum), *E. dalrympleana* (mountain gum), *E. pauciflora* (snow gum), *Exocarpus cupressiformis* (native cherry), *Notelaea microcarpa* (gorge mock olive) and *E. stellulata* (black sally). Some trees of *Banksia integrifolia* (coast banksia) have also been reported on some basalt knobs in the Dangarsleigh area (Greening Australia—unpublished site species lists); however this species is uncommon and more usual on some areas with sandy soils elsewhere on the map sheet, e.g., some rises above Cooney Creek, north of the Grafton-Armidale road, on sandy granite-derived soils. Similarly *E. caliginosa* (broad-leaved stringybark) occurs on some basalt soils, but favours less fertile soils derived from granite and metasediments (trap). Many localised areas have been/are affected by severe dieback, e.g., Big Ridge, east of Uralla.

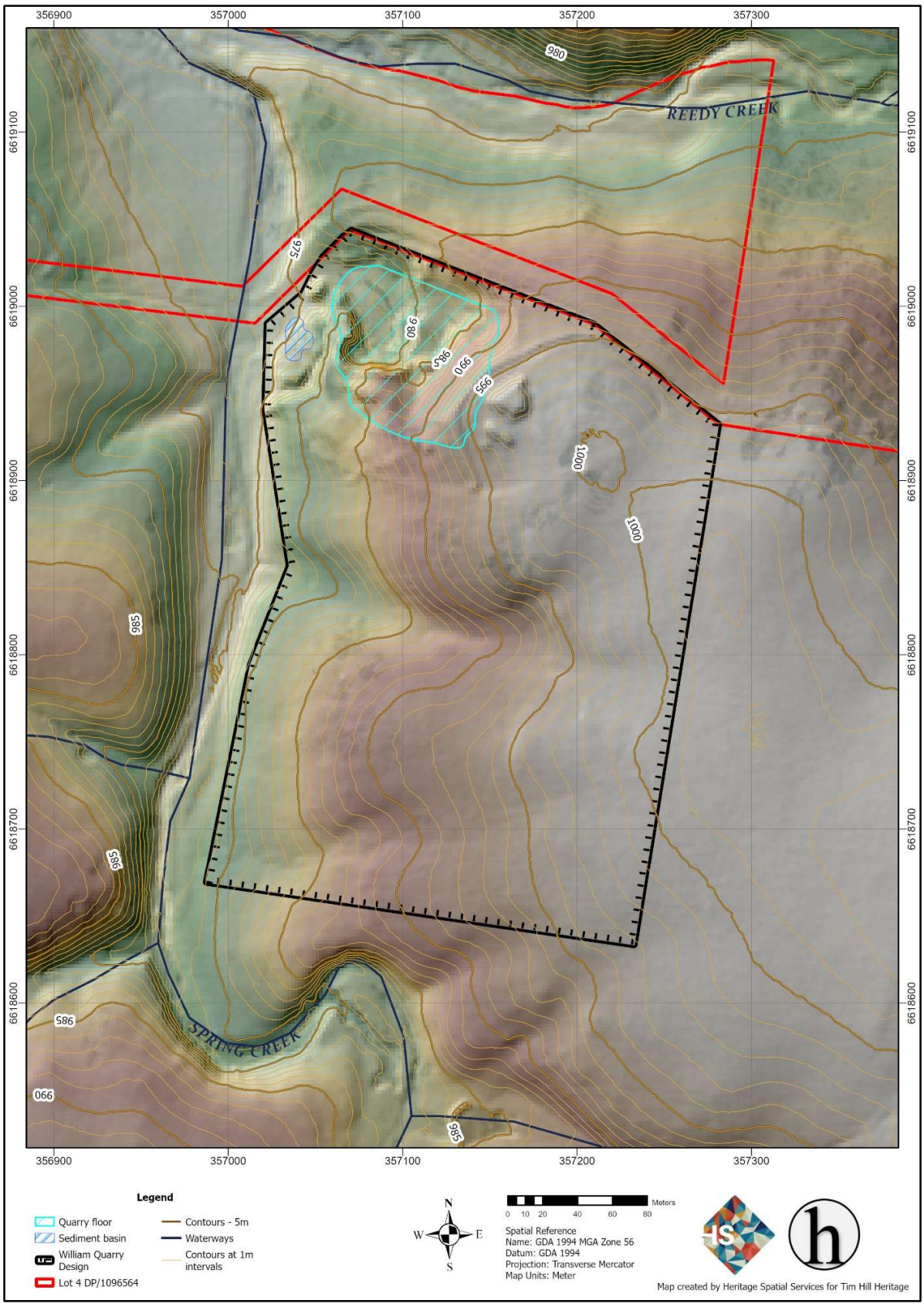


Figure 3: Topography and hydrology (source Six Maps)

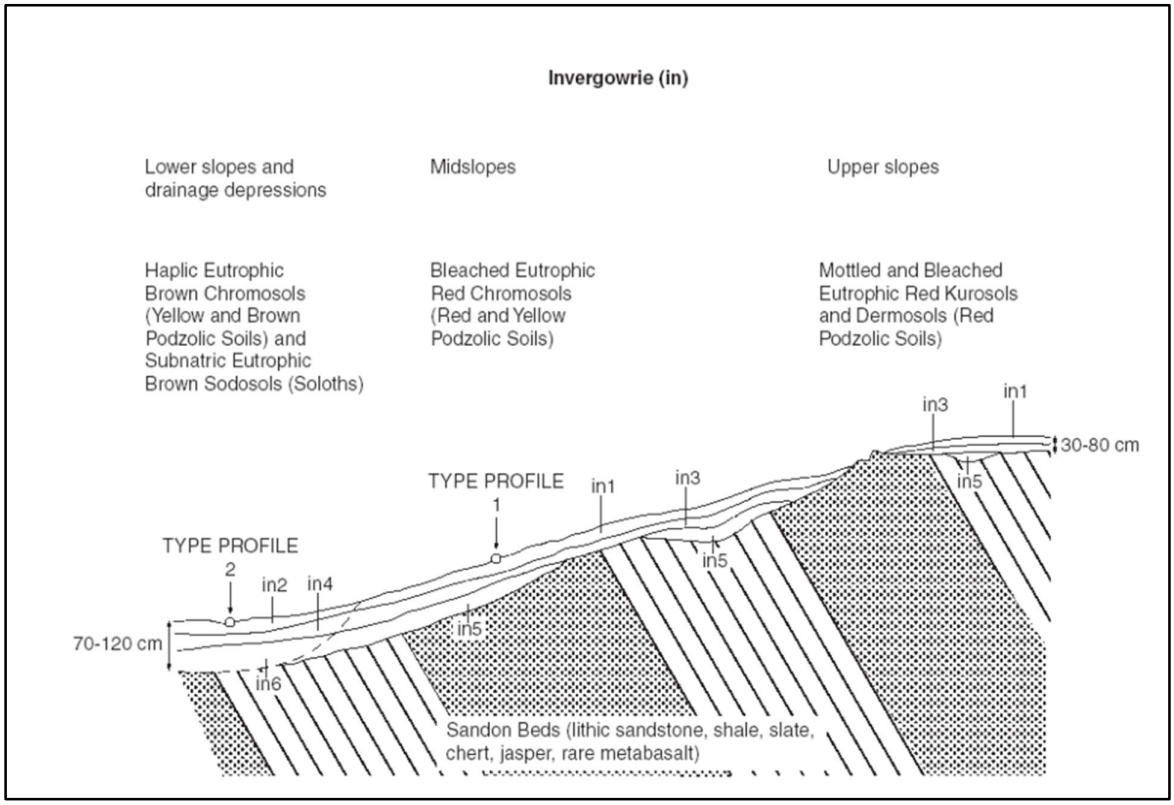


Figure 4: Geological model of the Invergowrie soil landscape (source eSpade.nsw.gov.au)

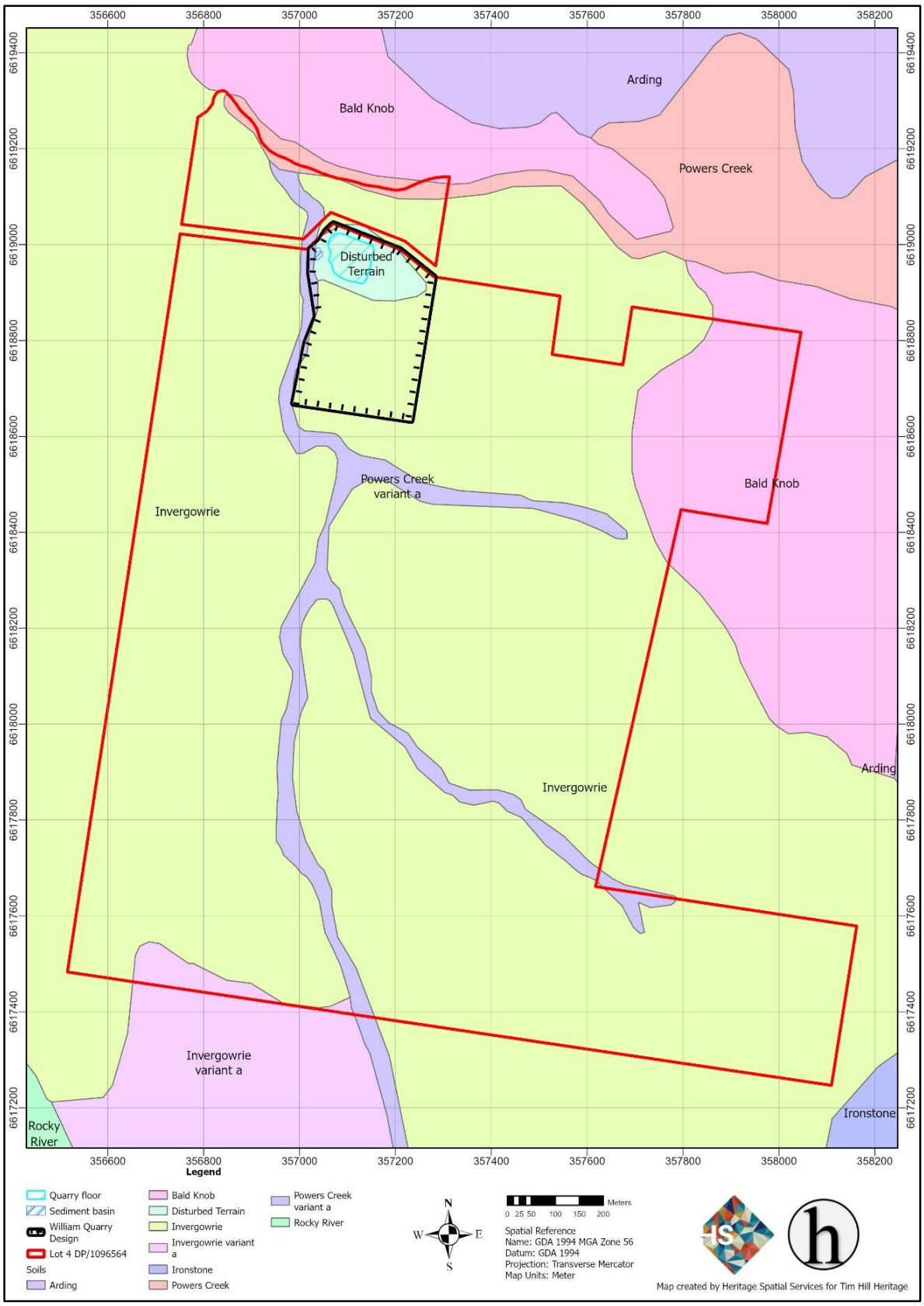


Figure 5: Soil landscape model (source: eSpade.nsw.gov.au)

3.2 Disturbance History

Review of historic aerials was undertaken to understand the potential impact of historic land use on the potential for the Proposal to harm Aboriginal objects, with specific consideration of impacts to topsoils with the potential to contain Aboriginal archaeological sites. Aerial photos from 1978 (**Figure 6**) 1990 (**Figure 7**) and 2020 (**Figure 8**) demonstrate that the proposed quarry has been in use since at least the mid-1970's.

Figure 6: 1978 aerial photo (source NSW Spatial collaboration portal)

Figure 7: 1990 aerial photo (source NSW Spatial collaboration portal)

Figure 8: 2020 aerial image (source Google Earth)

4 ARCHAEOLOGICAL SYNTHESIS AND PREDICTIONS

4.1 Aboriginal Heritage Information Management System (AHIMS)

The Aboriginal Heritage Information Management System (AHIMS) provides a list of previously recorded Aboriginal sites in NSW. A search of the AHIMS database is a condition of compliance with the CoPAI and provides information on the types of sites which will be located within and around the Study Area.

A search was undertaken on 24 October 2022 for the area "Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227." (**Error! Reference source not found.** and **Figure 9**). No Aboriginal sites are recorded in close proximity to the Study Area. The AHIMS search identified 72 previously recorded Aboriginal sites, of which the majority (63%/n=45) were artefacts (**Table 2**). Artefacts were additionally recorded with several other site features including grinding grooves, Potential Archaeological Deposits and a Stone Quarry. The search returned 11 (15%) recordings of scarred trees which is considered to be typical for archaeological landscapes on the New England Tablelands which have been heavily cleared or subject to grazing and wildfires which have removed significant amounts of old growth forests. Although there are qualifications around the recording of ceremonial and sacred sites, there are no recorded stone arrangements or bora rings within the search area. Additionally, there are no previously recorded burials within the search area.

Table 2: Summary of AHIMS search results by site type (AHIMS # 725925)

Site Type	Number	%
Artefact	45	63
Artefact, Grinding Groove	1	1
Artefact, Grinding Groove, Potential Archaeological Deposit (PAD)	2	3
Artefact, Potential Archaeological Deposit (PAD)	3	4
Artefact, Potential Archaeological Deposit (PAD), Stone Quarry	1	1
Grinding Groove	6	8
Grinding Groove, Potential Archaeological Deposit (PAD)	1	1
Modified Tree (Carved or Scarred)	11	15
Potential Archaeological Deposit (PAD)	2	3
	72	**100**

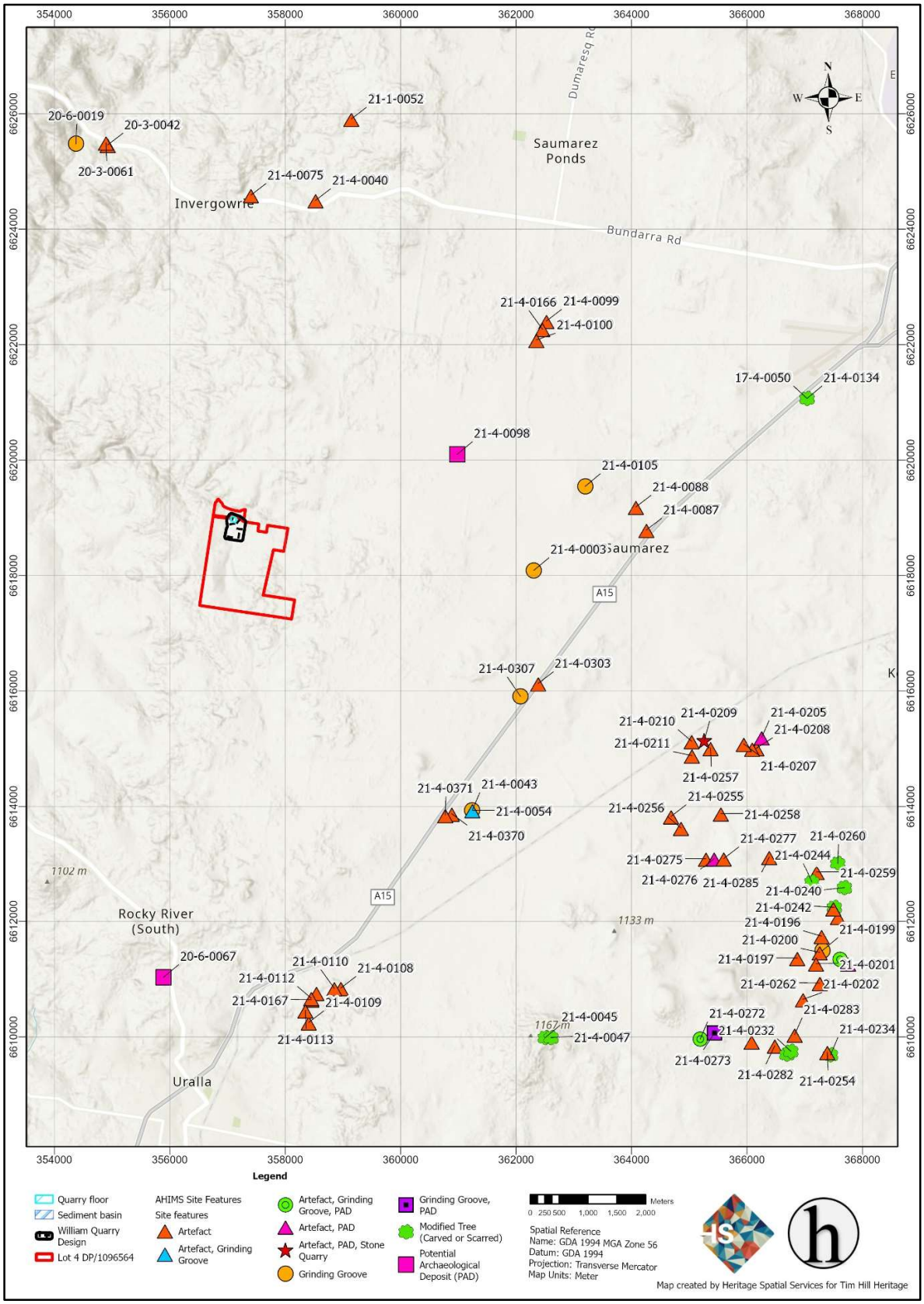


Figure 9: AHIMS search results

4.2 Ethnohistory

4.2.1 Observations of Aboriginal people in New England

The first records of Aboriginal people on the New England Tablelands estimate that the population was in the order of 600 individuals (Macdonald 1845). A significant decrease in the Aboriginal population due to disease and dispossession following the introduction of sheep grazing. In 1851, Commissioner Massie reported that '… a reserve for use by Aborigines of 350 acres had been put aside, which contained good cultivation ground, good water and every essential requisite for the permanent location of the Aborigines, should they feel disposed to forget their migratory habits' (Massie 1851). This reserve was located on the outskirts of Armidale and is not within the Project Area.

Mathews (1898) provides a detailed description of the ceremonies which includes a comment on the role played by the New England people to connect groups from both the coast and the western slopes:

> Lying between the eastern margin of the Tableland of New England and the Pacific Ocean is a large tract of country, extending from about the Hunter River northerly along the coast as far as the Clarence, peopled by a number of tribes differing more or less in their dialects, but having substantially the same class system. The initiation ceremony of these tribes is known as the Keeparra, which is of the same type as the Burbung herein described, all the essential points being almost identical in both, although many of their details differ considerably. It may, therefore, be said that practically the ceremonies described in this paper represent those in force in the whole of the country between New England and the sea coast.

Hoddinott (1977:52-55) classifies the language of the New England Tableland around Armidale and Uralla as Nganyaywana. The language is unique to the area with roots that relate to neighbouring areas populated by Daingatti people. The language is thought to have diverged many thousands of years ago. Hudson (1996:39) and Godwin (1990:381) state that the Aboriginal groups living in the Tablelands had ancestors in common with the eastern Daingatti people, but at some stage they broke with the Daingatti and all other neighbouring groups so totally that their language diverged. At some later time they re-established a close social interrelationship with their western neighbours, the Gamilaroi, sharing aspects of social organisation and during this contact, the language changed to reflect aspects of the Gamilaroi dialect.

4.2.2 Economy and resource-use

Godwin (1983) provides a comprehensive summary of traditional resource use on the elevated areas of the New England Tablelands above 1000 metres above sea level:

> From early historical records it is possible…to define three distinct resource zones on the tablelands with a wide variety of foods.
>
> The most extensive of these were what the early settlers described as 'parklands'. These consisted of large areas of fairly lightly wooded country, with heavy pasture. Oxley wrote of the land near Walcha "we proceeded through the finest of open country, or rather park, imaginable'…this parkland

supported vast numbers of kangaroos, and other native fauna. These were important resources…as the manufacture and maintenance of large standing nets used in communal drives of macropod would seem to indicate…Figs and other fruits, notable the native grape (*Vitus hypoglauca*) which has large bunches of fruit would have been available from the parklands.

A second important resource zone found in many parts of the tablelands was large expanses of marsh and swamp, common before European colonisation. For example, the Enmore District, about 20km north of Walcha, was known as the 'Macquarie Marshes' because of this. These swamps were rich in a variety of foods. Large amounts of crayfish could be obtained from them…Two types of yam as well as the roots and stems of various reeds could be collected there. Waterfowl were abundant. Eels, too, which occupy watercourses and lagoon on many parts of the tablelands would also have been available in quantity. Given the richness of these areas it is not surprising that a number of sites have been found near some of the few remaining vestiges of swamps on the tablelands.

The third major resource zone consisted of numerous grassy clearings found on the tablelands and along the bank of the upper reaches of the rivers flowing east off the tablelands. There were areas devoid of any tree cover, surrounded by parklands…These clearing were recorded with a good deal of surprise by early explorers and settlers who chanced on them after tramping through thick brush…Early observers do record Aboriginal firing on the tablelands, and in some cases this was associated with burning off old grass to encourage new growth, and thereby attract kangaroos…The eastern grey and red-necked wallaby are noted as being the most abundant at the interface of forest and grasslands, and it is likely the clearing would have attracted them, making the clearing attractive hunting areas.

4.2.3 First settlement

The first European exploration of the Armidale New England area was John Oxley in 1818 with later exploration by Cunningham (1825), Sturt (1828) and Thomas (1831). The first of the settlers who arrived in the Armidale area of New England was Henry Dangar in 1833, whilst working for The Australian Agricultural Company to develop wool and coal industries on the New England Tablelands. Following establishment of a post office in 1843 the town of Armidale was surveyed in 1848 and gazetted in 1849. Early industry and agriculture included a small gold rush in the 1850s focussing on the escarpment to the east of Armidale and sheep, particularly fine wool. Hudson et al (2003:23) propose that the remains of buildings from the first European settlement of the area may reflect British layout and style. Housing began with pitching a tent, followed by wattle and daub, pisé, and simple slab, bark and shingle dwellings or log cabins. With the arrival of sheets of iron and glass, more elaborate structures using brick or stone were constructed.

In 1832, Hamilton Sempill settled on the Apsley River and named his holding "Wolka" (now Walcha) and Edward Cory settled east of Uralla in 1833 on Salisbury Waters calling his run "Gostwyck". In 1835 Henry Dangar bought him out, when word of the New England's productivity for wool growing had spread, and

the area was then settled by Henry Dumaresq in 1834, William Dumaresq in 1835 and other settlers who selected land across the New England. These settlers included McDougall, Campbell, Macintyre, Clerk, King, the Everett brothers, Duval, Innes and others who are remembered by present-day places such as Mt Duval, "Clerkness", Macintyre River, Glen Innes, Land of the Beardies (from Duval and Everett), Beardy Street and River (Hudson et al 2003:4).

The township of Uralla grew in the mid-late 1800's in response to the discovery of Gold. A article in the Clarence and Richmond Examiner (1889) provides the following account of the discovery of new gold deposits:

> During the past week (says the Uralla and Walcha Times) the excitement in connection with the recent discovery of gold-bearing reefs at the Enmore Falls has kept Uralla on the tiptoe of expectation, and the find has been the principal topic of conversation among all classes. Many experienced goldminers have visited Postman's Point, where the prospectors (George M'Crossin and party) have pegged out a block on what experts say will develop into a rich gold-bearing reef; and though the opinion is not unanimous that the stone is highly auriferous, it is still thought by a considerable number of visitors that the discoverers have a block that is likely to turn out well. Their lease is considered so valuable that already (so a reliable authority states) a mining speculator has offered £3000 cash, £7000 as soon as the first crushing takes place, and 40,000 paid up shares for the property. Whether this report is an exaggeration or otherwise, it shows that the discovery is thought something of by those who dabble in mining speculations; and, making due allowance for excitement born of the wild reports that get circulated, numbers of residents believe that the rugged Enmore country will shortly develop into a rich quartz-reefing section. Laud is still being pegged out in every direction, sites for hotels, stores, blacksmith's shops, and other businesses have been secured at Melrose (the name of the embryo township now represented by a cluster of tents at Postman's Point), and everyone is earnestly hoping that the place will become a New Eldorado

Arding is located south of Saumarez Homestead and was likely part of the original sheep holding. Saumarez Station, situated about five kilometres south of Armidale, was one of the earliest grazing runs established on the New England tablelands during the 1830s.

Henry Dumaresq, a former army officer and brother-in-law of Governor Ralph Darling, arrived in New South Wales in 1825. Keen to make his fortune from Australia's so-called 'empty' lands, Dumaresq in his official capacity as private secretary to Governor Darling was well placed to achieve this objective. As Commissioner of the Australian Agricultural Company from 1831, Dumaresq developed a close knowledge of the New England tablelands in the hope of furthering his own business interests. In 1835, after first claiming a squatting station for himself on the New England tablelands, Dumaresq, sent a large contingent of men, livestock and machinery to occupy Samaurez, a vast property of about 100,000 acres which he named in memory of his family connections with the Seigneur de Sausmarez in the Channel Isles. Under the control of his superintendant, AS Wightman, a head station, store and stables were set up above

Saumarez Creek. Within a few years Wightman had also built a shearing shed and men's huts. The operation, even in its early years, was a successful one, but in 1838 Dumaresq died, leaving Saumarez to his widow, Elizabeth Sophia (University of New England N.D).

Following the growth of the townships of Armidale and Uralla the station was subdivided into 150 acre holdings:

> CLOSER SETTLEMENT.
>
> FARMS ON SAUMAREZ STATION.
>
> In conversation with representatives of the CHRONICLE yesterday afternoon, Mr. F. J. White stated that it had been decided to offer 25 farms on Saumarez estate, in areas up to 150acres. The land in question is close to the towns of Armidale and Uralla, the major portion being at the Armidale end of the run.
>
> Instructions have been given for survey, and as soon as necessary preliminaries have been adjusted, advertised the land will be for sale by auction locally.
>
> This is very welcome news indeed, and will be hailed with delight by those who are anxious to acquire land in proximity to the town

4.3 Local archaeological studies

A stone axe quarry is known to occur at Salisbury to the south at Uralla (Hudson 1997) which was determined to have been used as part of a localised stone material procurement system. Hudson was able to test a range of theoretical models on the cultural boundaries and affiliations across the Tablelands based on the distribution of stone from the quarry. The study of the Salisbury Quarry indicates that particular stone materials were carried and traded across the landscape and may have been deposited across the Tablelands to the north and west of Uralla.

Remnant Archaeology (Gnuckey 2017) undertook an archaeological survey and consultation with the Aboriginal community for the Metz Solar farm project to the east of Armidale. The survey identified three low density stone artefact scatters, 38 isolated artefacts, two scar trees and a stone arrangement. The results of this survey are considered to provide a typical example of the archaeological record on landscapes with limited soil disturbance.

A cultural heritage assessment was undertaken for the Camerons Dairy site at Kurrawatha Avenue, Armidale (Mehr 2010) which identified a single stone artefact scatter and associated PAD. The ACHA concluded that exclusion of works from the immediate vicinity of the site was the most appropriate management response for the site.

Hill (et al 2020) undertook an assessment for the proposed East Armidale Industrial Area subdivision and recorded an Aboriginal scar (shield) tree on a very old Box tree trunk. The study noted:

> "The tree is facing south which is considered significant given that the area was identified as a place for people from the south to wait as they travelled north. In this sense it may have acted as a visual

marker. It was not possible to age the tree, except as to note that it was senescent. The top half of the tree has fallen and the trees inner wood is in a state of decay. There is a significant crack to the west (left) of the scar and the outer layer of wood has completely separated from the decaying inner wood. As such, the portion of the tree with the shield scar is largely detached from the tree as a result of natural decay".

Hill and Finlayson (2020) completed a archaeological assessment for a rural residential subdivision at Long Swamp Road to the east of Armidale at a location with a similar elevation as the Study Area. The report concluded (Hill and Finlayson 2020:37)

> The TH/JA1 site comprises a spatially extensive scatter of silcrete flakes and cores that that extends across the elevated portions of the Project Area near Mays Road. This site is associated with the silcrete quarry which is known to consistently outcrop above 1000 m ASL in the Armidale area. Two (2) silcrete artefacts were identified during the site inspection that are considered to form part of the TH/JA1 scatter. Based on the site inspection it is reasonable to proceed with the assessment on the basis that the northern section of the Project Area comprises part of a broad stone artefact scatter which is focussed around the silcrete quarry and associated silcrete outcrops …
>
> The TH/JA 1 site forms part of a cultural landscape which extends from the Armidale Plateau and Mt Duval southward to the gorge country and escarpment. The small valley provides a pathway for people travelling from the coast to the tablelands.
>
> Silcrete is an important source of stone material on the New England Tablelands and all local sources of silcrete provide evidence of the use of this resource. The presence of the TH/JA1 site is demonstration of the use of this important resource and forms part of a broader complex of silcrete quarries and scatters around Armidale.

The New England Solar project to the south east of the Study Area is a significant regional infrastructure project which included a Aboriginal heritage assessment as part of the EIS (EMM 2018). The report concluded:

> EMM conducted a targeted archaeological survey over 19 days with the support of RAP representatives. GPS track log data indicates that each survey participant walked approximately 247 km, which represents the total length of the survey transects.
>
> The survey focused on the proposed development footprint (ie where project infrastructure will be constructed) and on areas likely to feature Aboriginal sites, but also extensively sampled areas and landscapes less likely to feature sites to test the survey predictions. The survey coverage results indicate that the ground surface visibility conditions during the survey were generally effective to characterise the distribution of archaeological sites across the survey area.
>
> The survey team identified 96 sites during the 19 days of archaeological field survey. Sites were labelled sequentially, with an NE prefix standing for New England. The 96 sites comprise 95

Aboriginal sites and a historical dry wall site that was originally thought to have potential to be an Aboriginal stone arrangement (NE57)…

Archaeological and socio-cultural significance values were assessed for the project. The Aboriginal community has identified that heritage values in the study area are directly linked with the Aboriginal sites identified during the survey. No specific historical connection has been linked to the identified sites apart from a broader notion that the study area may have formed part of what was known as Oorala – a meeting place for a number of Aboriginal groups which is likely to extend across Uralla and surrounding localities.

EMM ascribed archaeological (scientific) significance to each Aboriginal site. Four sites are of high significance; 31 of moderate significance; and 60 of low significance. Of particular significance was NE09, a grinding groove, artefact scatter and PAD site, which is a rare site complex on a uniquely prominent landscape feature. At NE09, there are many representative examples of grinding grooves unmatched in size and extent by other known grinding grooves in the local area (EMM 2018 E.2, E.3).

The report makes the following notes with which are directly relevant to the current assessment (EMM 2018:88);

No ceremonial sites, Aboriginal stone arrangements, rock art or burials were identified. The identification of such sites are rare generally, primarily because they represent rarer activities, but also because widespread historical disturbance is likely to have destroyed or highly disturbed their archaeological indicators in the landscape.

There is a clear indicator that Aboriginal people were targeting crests with outcropping material, not only for raw materials (eg quarries on silcrete and basalt), but for camping amongst areas of granite and/or silcrete boulders and granite tors. These locations represent relatively flat land in elevated areas with good outlook over the surrounding landscape. This would have provided safety and visibility over the landscape and rocks for sitting or standing. As such, it is likely that these sites exist today not only because they have been less disturbed from historical practices, but also because they were specifically targeted for occupation and used more intensively than the broader landscape. It is probably only by coincidence that these are also the best preserved areas as they are unsuitable for intensive cultivation and livestock grazing.

4.4 Regional archaeological studies

4.4.1 Bowdler (1981)

Sandra Bowdler (1981) completed a major review of archaeological and ethnohistorical sources to complete a settlement model for the New England Tablelands during her tenure with the University of New England, building on the earlier model for north-eastern NSW proposed by Isabel McBryde. The model included the following general predictions to understand the archaeology of the New England tablelands:

- The tablelands were a major ceremonial centre in the region attended by people from the coast, the western slope and the permanent residents of the tablelands
- Land above 1000 metres above sea level were primarily used for ceremony, with most subsistence harvesting and hunting taking place in the lower elevations of the range, and
- The higher parts of the tablelands, above 600 metres above sea level, were substantially abandoned in winter, with people moving into the gorges to the east or the western slopes.

4.4.2 Pearson (1981)

In 1981 Pearson completed an investigation of Aboriginal and early European settlement patterns within the Upper Macquarie River region of NSW. The study area included transitional landforms similar to the New England Tablelands. The majority of the field coverage was directed by information from informants and was thus skewed toward large or obtrusive sites. Pearson excavated three rock shelter sites (Botobolar 5, and Granites 1 and 2) which provided a regional record of Aboriginal occupation dating back to around 7000 years before present. The following can be summarised from this study as a predictive model for the region:

- There is a strong relationship between site location and distance from water sources. Distance to water varied from 10 m to 500 m, but in general the average distance from water decreased as site size increased
- Sites were typically found on hilly or undulating places rather than on river flats or the banks of waterways
- Good drainage and views over watercourses and river flats were important site location criteria
- Most sites were located in contexts that would originally have supported open woodlands, with small numbers in original grassland or forest contexts
- Burial sites and grinding grooves were situated as close to habitation areas as geological constraints would allow
- Ceremonial sites such as earth rings ('bora grounds') were located away from campsites
- Stone arrangements were also located away from campsites in isolated places and tended to be associated with small hills or knolls or were on flat land
- Quarry sites were located where stone outcrops with desirable working qualities were recognised and were reasonably accessible, and
- Aboriginal campsites were seldom used for longer than three nights and that large sites probably represent accumulations of short visits.

4.4.3 Godwin (1990)

Luke Godwin (1990) undertook a regional investigation of Aboriginal ethnohistorical sources across northern NSW, including the New England Tablelands and Western Slopes, in response to the models

proposed by McBryde and Bowdler. Based on primarily ethonhistoric sources, Godwin (1990:171) proposes the following model of movement and settlement relevant to the Study Area:

> The tablelands were occupied throughout the year by bands of people from the three main languages present. These bands were composed of between 15 and 25 individuals, and moved frequently, as would be expected due to the relatively fine-grained nature of resources in this region. Bands ranged widely over the tablelands and upper western slopes, and occasionally into the gorge country. The tablelands, however, were not abandoned at any time of the year.
>
> Both natural and artificial concentrations of resources (e.g. swamps/ lagoons and fired clearings in woodlands) were exploited where and when available. Plant resources, including a number of carbohydrate rich varieties, could be gathered from the forest/ woodland and swamps, and prepared, using a simple toolkit comprising digging stick, bags of plant fibre, and pebbles to pound some substances into a paste. As with the gorge country, meat may have been the major component of the diet during the winter and spring months. Apart from this, possums and macropods were hunted at this time because of the quality of their fur for rug manufacture…
>
> Large gatherings of people occurred at certain locations on the tablelands and the western slope. These were attended by people from the tablelands and the western slopes, and were sometimes held during the winter months. Tablelands groups also travelled to the western slopes during the summer months. However, the seasonal aspect should not be overstressed…Animal drives involving large numbers of people were organised at such times, and nets were often employed in this activity. Tablelands and western slopes people exchanged material goods as well as rituals during such gatherings.

4.4.4 Armidale Dumaresq Aboriginal Heritage Study

The Armidale Dumaresq DCP (Armidale Dumaresq Council 2008) study provides the following model for archaeological site distribution which is relevant to the ACHAR as it covers comparable landforms and environments in the adjacent Local Government Area;

- Sites associated with rock outcrops will be found wherever rock is outcropping, in particular:
    i. engraving sites on ridge tops, on flat rock surfaces above cliffs and scarps and on isolated outcrops and boulders
    ii. rock shelters (with art and/or archaeological deposits) on slopes below ridges, cliffs and scarps, and beneath or part of fallen boulders or isolated boulders
    iii. grinding grooves on fairly level rock surfaces in creeks, swampy areas or isolated areas adjacent to a water source (or former source) or associated with other sites, and
    iv. stone quarries in areas of exposed bedrock, particularly at silcrete deposits.
- Archaeological deposits, including artefact scatters, will be found within rock shelters as well as level areas near to rivers or creek lines, and in level areas throughout Armidale Dumaresq. Artefact

densities will generally be low, but will increase where well-drained, level areas are situated in proximity to diverse environments, larger waterways, sources of raw materials, known cultural sites such as bora grounds and so on. Site and artefact density will be higher on flats, terraces, lower slopes, ridge tops and crests and will be lower on mid-slopes and upper slopes. Site density will increase in flatter country and decrease in steep country. Localised influences that will affect the location of sites include frost hollows or where cold air flows, land subject to inundation and dampness, protection against seasonal winds and weather, outlook over hunting grounds and so on.

- Bora grounds and ceremonial grounds will be more common on the Tablelands and in flatter lands. They are more likely to be found below hills or peaks and above valleys or lowlands subject to inundation. They are likely to be associated with carved or scarred trees or other sites. They will be very rare and difficult to detect if in areas subject to clearance and ploughing.
- Burials will be found in shelter deposits, archaeological deposits and places where the ground is soft, such as sandy banks. They may also be associated with carved or scarred trees or ceremonial sites. It is unlikely that there will be any visible signs of a burial unless there is active and deep erosion to a deposit.
- Scarred trees will be present where there has been less vegetation clearance and less disturbance, such as bushland and travelling stock reserves. Carved trees will be very rare due to their general rarity and their fragility. Other sites, such as fish traps, will be present in areas of minimal previous disturbance and would be very rare. Misidentification of an early colonial or more recent non Aboriginal activity as an Aboriginal site is possible.
- Generally, sites will be relatively common in bushland areas, with the condition of sites improving with distance from roads, walking tracks and more accessible areas. Sites will decrease in frequency in cleared areas and surviving sites will be more disturbed. In built-up areas, sites will be more common where properties adjoin bushland or undeveloped pasture, and less common where the land has been more heavily modified. Artefact scatters will be difficult to detect without sufficient archaeological visibility, which requires erosion or some disturbance to the soil profile to allow stone artefacts to sit on the ground surface above other sediments. Areas where land disturbance has been most intensive will have the lowest frequency of sites (Armidale Dumaresq Development Control Plan 2012:2 & 3).

4.4.5 Beck, Haworth and Appleton (2015)

The study of the interaction of Aboriginal groups and the extensive network of permanent lagoons by Beck, Haworth and Appleton (2015) sought to understand the role of a highly productive aquatic habitats in the economy of Aboriginal people living in the highest elevations of the New England Tablelands. The study makes the following comment on the archaeology of the New England Tablelands:

> The Tableland was cold in winter, but not abandoned …The inhabitation was patterned, not random. Activities in the landscape were focused at places where people lived and worked (quarries, camp sites and ceremonial sites), with a preference for locales with clustered resources, such as lagoons, and also along tracks and pathways, where they moved among sites for both ritual and secular purposes, as perhaps indicated by isolated artefacts and natural routes through the gorge country. Food and material resources were exploited according to their availability, and the movements for other purposes of the social group. Some ceremonial places (such as bora grounds) were visited and revisited by large groups of people (Gardner 1854), being parts of the landscape imbued with meaning. The Tableland has a calculated density of 112 sites per 100 ha (mostly isolated artefacts), compared with figures of 1–35 sites per 100 ha in coastal and coastal hinterland samples. This implies that the Tableland has a surprisingly high site density overall (Beck, Haworth, Appleton 2015:51).

The study makes the following conclusion:

> The lagoons were the only natural resource feature on the Tableland capable of supporting the large numbers of people likely to be involved in ceremonies. Increased ceremonial activity in the later Holocene could have been facilitated by the consumption and exchange of some of the essential foods obtained from the lagoons in locations that made travel most convenient, as well as facilitating the exchange of such food items from distant places that might help to overcome local dietary deficiencies. Ceremonial and exchange activity had reached such an intensity that by historical times the people of the northern part of New England were venturing as far as the Bunya Mountains in southern Queensland, indicating networks among highland people that could be used to mitigate any local resource failure (Beck, Haworth, Appleton 2015:55).

4.4.6 Predictive model for the Study Area

The following landscape features are influential in the distribution of Aboriginal archaeological sites on the New England Tablelands:

- localised landforms and erosion creating broad flat areas above creeks and rivers suitable for campsites
- proximity to the confluence of the creeks and tributaries which have increase resource diversity
- outcrops of stone material suitable for tool production and collection of stone material for trading and exchange
- natural ridges and spurs which connect catchments and valleys and are suitable for use as pathways and travel routes
- aspect and elevation providing views over large areas including views of ceremonial sites, and
- the impacts on archaeological sites from significant historic ground disturbance.

As a general pattern of use spurs and ridgelines above the water line would have formed the main areas of occupation, and therefore archaeological sites on these features would be expected to comprise very high

numbers of artefacts and increased site type diversity. Secondary creeks and adjacent rocky ranges would have been utilized as traditional pathways, however the archaeological signature of this type of use typically comprises isolated artefacts and low-density stone artefact scatters. The archaeological signature of the floodplain is typically associated with hunting and gathering and includes low density artefact scatters, isolated artefacts and scarred trees. Archaeological sites associated with consumption of foods, such as hearths and middens rarely survive in soils subject to flooding and intensive agriculture.

The following specific comments are provided to inform the ACHAR:

- the Study Area is located in an area near the confluence of two smaller creeks but upstream from the confluence with the Rocky River which would have an increased potential for large archaeological sites associated with semi-permanent campsites
- the Study Area is located nearby to the interface of the older sedimentary Sandon Beds and has the potential to contain metamorphosed stone material (silcrete) which is commonly used for stone tool production
- the Study Area is immediately west of the watershed of the Gwydirr and Macleay River which such has an elevated potential to have been used as a traditional pathway, and
- the Study Area is located in an area which has been subject to significant historic ground disturbance which has removed most of the topsoils, including all of the topsoils from the naturally flat north facing ridge spur.

As such it is considered that there is a moderate potential that the Study Area will contain Aboriginal archaeological sites.

5 SUMMARY OF ABORIGINAL COMMUNITY CONSULTATION

The *Aboriginal Cultural Heritage Consultation Requirement for Proponents* (DECCW 2010C) (ACHCRP) provides a guide for appropriate consultation with the Aboriginal community to inform an ACHAR. The overview of the ACHCRP makes the following comment on the role of consultation in the cultural heritage assessment process (DECCW 2010C:iii):

> The NPW Act provides specific protection for Aboriginal objects and Aboriginal places by providing offences for unauthorised harm. The NPW Act establishes the Director General of DECCW as the decision-maker for Aboriginal heritage impact permit (AHIP) applications. DECCW requires the effective consultation with Aboriginal people as a fundamental component of the AHIP assessment process and acknowledges that:
>
> - Aboriginal people should have the right to maintain culture, language, knowledge and identity
> - Aboriginal people should have the right to directly participate in matters that may affect their heritage
> - Aboriginal people are the primary determinants of the cultural significance of their heritage.
>
> This document focuses on the requirements for consultation with Aboriginal people as part of the heritage assessment process:
>
> - to determine potential harm on Aboriginal cultural heritage from proposed activities
> - that informs decision making for any application for an AHIP where it is determined harm cannot be avoided.

Section 60 (9) of the National Parks and Wildlife Regulation (2019) makes the following comment on the application of the ACHCRP in the assessment process:

> An application for an Aboriginal heritage impact permit is not invalid merely because the applicant for the permit failed to comply with any one or more of the requirements set out in this clause. *Note. Under section 90K(1)(g) of the Act, the Chief Executive, in making a decision in relation to an Aboriginal heritage impact permit, must consider whether any consultation by the applicant with Aboriginal people regarding the Aboriginal objects or Aboriginal place that are the subject of the permit substantially complied with any requirements for consultation set out in the regulations*.

A key consideration is that any activity which has the potential to harm Aboriginal objects, whether is authorised an AHIP or a Code of Practice, must include a process of consultation with the Aboriginal community to understand the values of the place and site that cannot be assessed by standard archaeological methods, including the spiritual, cultural and historic significance in the Aboriginal cultural landscape of which the site forms a part. The following summarises the Aboriginal community consultation undertaken prior for the ACHAR to inform the impact assessment (Table 3):

Table 3: Aboriginal community consultation summary

Date	Stakeholder	Method	Comment
27/10/22	Armidale LALC	Email	Introduction of project, methodology for pedestrian survey (see section 6.1 below) and invitation to participate in the ACHA.
27/10/22	Iwatta Aboriginal Corporation	Email	Introduction of project, methodology for pedestrian survey (see section 6.1 below) and invitation to participate in the ACHA.
28/10/22	Iwatta Aboriginal Corporation	Email	Acceptance of proposed methodology and confirmation of the availability of a Aboriginal sites officer.
4 November	Armidale LALC	Text	Text to Alithea to confirm she received the email notification
14 November	Armidale LALC	Phone/ Email	Phone call with Alithea to confirm that she received the email and was aware of the project. The notification email was resent to make sure it got through.
24 November	Armidale LALC Iwatta Aboriginal Corporation	Email	Reminder email re: meeting arrangement and offer of a lift from Armidale
26 November	Iwatta Aboriginal Corporation	In person	Site inspection and discussion of the management of cultural heritage.
6 January 2023	Heritage NSW Uralla Shire Council Northern Tablelands Local Land Services NSW Aboriginal Land Council NTS Corp	Email	Request for advice on potential Aboriginal stakeholders in the local area
6 January 2023	Clive Ahoy (Armidale LALC)	Text	Request for correct email address and to make contact re: assessment.
17 January 2023	Heritage NSW	Email	Provision of list of Aboriginal stakeholders for Armidale Regional Council
18 January 2023	Aaron Broad Aleira French Trading Armidale LALC AT Gomilaroi Cultural Consultancy Edgerton Kwiembal AC Gomeroi People (c/- NTSCORP Ltd) Gomery Cultural Consultants Indigenous Outcomes	Email	Notification of project and request for registration (3 February 2022)

	Iwatta Aboriginal Corporation Jeremy Duncan Larissa Ahoy Nunawanna Aboriginal Corporation Vicky Hannah Gomeroi Duncan RAW Cultural Healing		
18 January 2023	Anaiwan Traditional Owners Aboriginal Corporation Mr Craig Archibald Natasha Rodgers William Bates	Mail	Notification of project and request for registration (3 February 2022)
18 January 2023	Edgerton Kwiembal Aboriginal Corporation	Email	Registration as a Aboriginal party for the ACHAR.
18 January 2023	Jeremy Duncan	Email	Registration as a Aboriginal party for the ACHAR.
18 January 2023	Vicki Hannah Gomeroi Duncan	Email	Registration as a Aboriginal party for the ACHAR.
18 January 2023	Nunnawanna Aboriginal Corporation	Email	Registration as a Aboriginal party for the ACHAR.
18 January 2023	David Horton Gomery Cultural Consultants	Email	Registration as a Aboriginal party for the ACHAR.
20 January 2023	Public Notice		Public notice in the Armidale Express.
20 January 2023	Iwatta Aboriginal Corporation	Email	Registration as a Aboriginal party for the ACHAR.
23 January 2023	AT Gamilaroi Cultural Consultancy	Email	Registration as a Aboriginal party for the ACHAR.
6 February 2023	Heritage NSW	Email	Notification of RAPs for the assessment
6 February 2023	Armidale LALC	Email	Notification of RAPs for the assessment
6 February 2023	Edgerton Kwiembal Aboriginal Corporation Jeremy Duncan Vicki Hannah Gomeroi Duncan Nunnawanna Aboriginal Corporation David Horton Gomery Cultural Consultants Iwatta Aboriginal Corporation AT Gamilaroi Cultural Consultancy	Email	Provision of assessment methodology and excavation proposal. Request for comment by 6 March 2023.
6 February 2023	AT Gamilaroi Cultural Consultancy	Email	Email providing support for the assessment methodology and excavation proposal
7 March 2023	Edgerton Kwiembal Aboriginal Corporation Jeremy Duncan Vicki Hannah Gomeroi Duncan Nunnawanna Aboriginal Corporation	Email	Notification of the date for test-excavation (22 March 2023) and that the Armidale LALC and Iwatta Aboriginal Corporation will be engaged as sub-contractors to support the test excavations.

	David Horton Gomery Cultural Consultants Iwatta Aboriginal Corporation AT Gamilaroi Cultural Consultancy Armidale LALC Heritage NSW		
18 March	Armidale LALC	Text	Question to confirm whether Armidale LACL will attend the site inspections
22 March 2023	Iwatta Aboriginal Corporation	Excavation	Completion of test excavations
5 April 2023	Edgerton Kwiembal Aboriginal Corporation Jeremy Duncan Vicki Hannah Gomeroi Duncan Nunnawanna Aboriginal Corporation David Horton Gomery Cultural Consultants Iwatta Aboriginal Corporation AT Gamilaroi Cultural Consultancy Armidale LALC Heritage NSW	Draft ACHAR	Issue of Draft ACHAR by mail
4 May 2023		Draft ACHAR	No response or comments on the Draft ACHAR were received

5.1 Outcomes of the consultation

5.1.1 Site survey

The below summarises how the site survey informed the ACHA:

- the Williams Quarry Arding Stone Artefact Scatter 01 site was identified and the residual area of the ridge crest was identified as a potential archaeological deposit
- the ridge crest was identified as having cultural landscape values on account of the views to Mt Yarrowyck and proximity to known traditional pathways and song lines to Ooralla, and
- it was identified that test excavation was an appropriate assessment and investigation methodology to inform the quarry expansion proposal.

5.1.2 Assessment methodology

The below summarises the outcomes of consultation on the assessment methodology:

- one written submission was provided which supported the test-excavation methodology (AT Gamilaroi) and Iwatta Aboriginal Corporation confirmed support via a phone call on the day of the assessment methodology meeting.
- no RAPs attended the site inspection/ consultation meeting, however Iwatta Aboriginal Corporation and Armidale LALC sent apologies, and
- no additional comment or advice on intangible/ cultural landscape values were submitted.

Based on the outcomes of the consultation the completion of archaeological test-excavations were determined to be an appropriate management response for the site.

5.1.3 Archaeological excavation

The below summarises how the archaeological excavation informed the ACHA:

- due to the extent of historic ground disturbance the expansion of the quarry was considered to be an appropriate use of the Study Area, conditional on the relocation and permanent storage of the topsoil as a repatriation site
- the use of the wet sieve methodology resulted in the identification of smaller flake pieces and debitage that might otherwise not have been recovered using dry-sieving, and
- the excavations demonstrated that the topsoils must have been subject to some form of chemical or mechanical disturbance as they were highly compacted and hydrophobic which would have affected any organic archaeological remains through the site.

5.2 Draft ACHAR

The Draft ACHAR was issued on 5 April 2023 and responses were received by the close of the consultation period, being 4 May 2023. As such the report was finalised on the basis that there were no objections to the proposed quarry expansion

6 FIELD SURVEY: ABORIGINAL CULTURAL HERITAGE

6.1 Assessment Methodology

The following points summarise the proposed assessment methodology:

- Ducat Earthmoving Pty Ltd are seeking to expand the operation of the Williams Quarry, Arding NSW to provide for an additional extraction of up to 150,000 cubic metres of stone material per year within the 'Concept Design Footprint' as outlined in **Figure 2**, (see section 0) adjacent to Rose Hill Road, Arding.
- the objectives of the assessment include:
    i. to consult with knowledge holders to identify Aboriginal cultural landscape values for the Study Area and surrounds
    ii. to undertake an archaeological survey using pedestrian transects (meandering) focussed on elevated flat ridges or crests and outcrops of stone material within the Study Area that have an elevated potential to contain Aboriginal archaeological sites (**Figure 10**)
    iii. to determine the extent and relative impact of historic quarry operations and pastoral activities on Aboriginal sites
    iv. to discuss and determine the requirement for additional community consultation and archaeological excavation, and
    v. to discuss appropriate Aboriginal heritage impact mitigation measures.
- the following research questions will guide the assessment:
    i. does the Study Area contain Aboriginal cultural values that will be impacted by the proposed expanded quarrying operations
    ii. does the Study Area contain Aboriginal archaeological values that will be impacted by the proposed expanded quarrying operations
    iii. does the Study Area contain topsoils with the potential to retain Aboriginal archaeological deposits
    iv. what is the cultural and scientific significance of any archaeological deposits.

The assessment includes cultural landscape values including values such as:

- consideration of downstream water quality that may impact on fishing
- visual impacts, and
- any resource use and gathering values along Spring Creek or within the Rose Hill Road Reserve.

The outcomes of the assessment will inform the ACHAR, including a significance assessment, impact assessment and approval conditions if required.

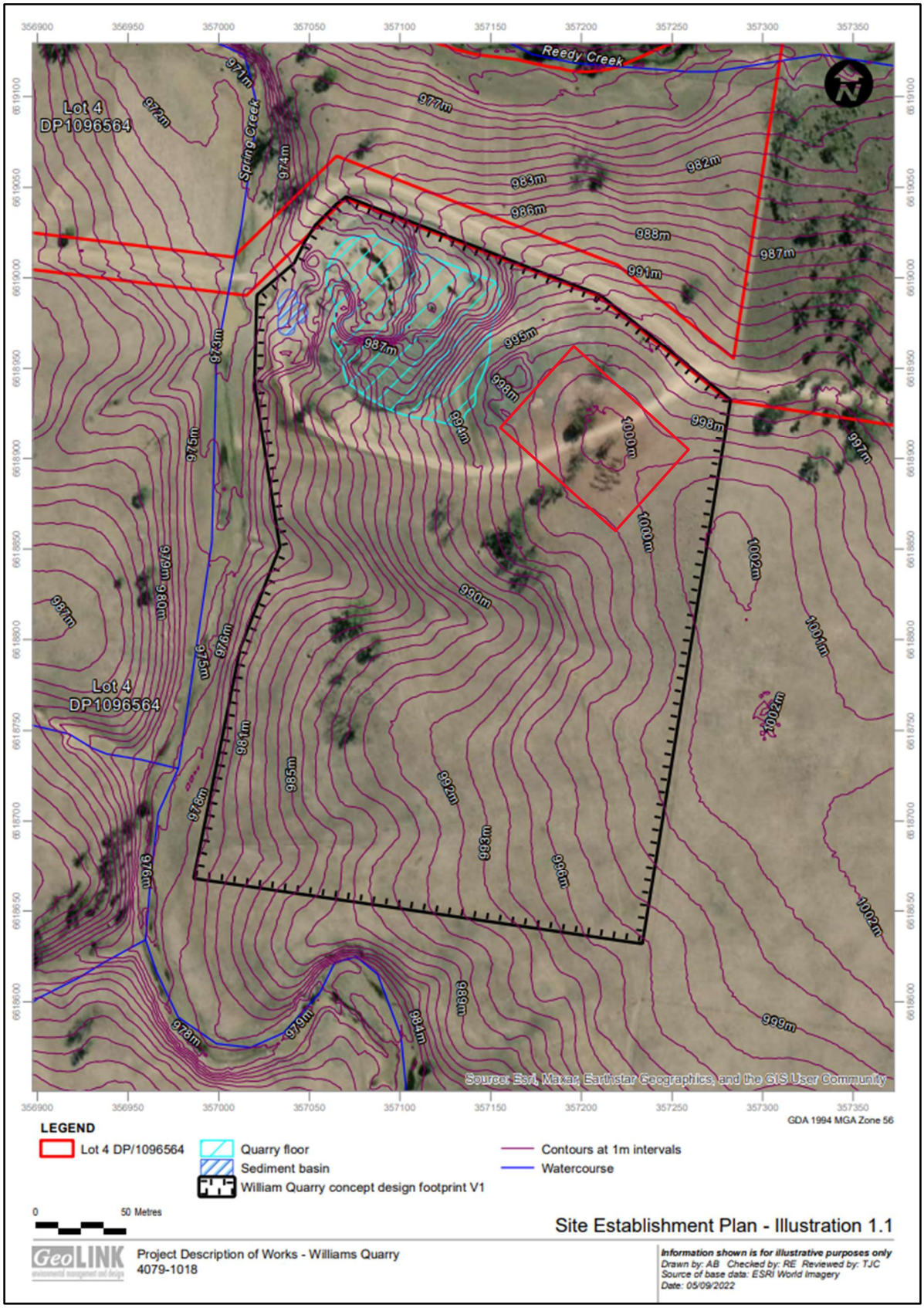


Figure 10: Target area of elevated ridge crest for archaeological investigation

6.2 Pedestrian survey

The archaeological site inspection was undertaken by Tim Hill, Steven Ahoy and Jocelyn Blair (Iwatta Aboriginal Corporation) in accordance with the assessment methodology (see section 6.1 above) and focussed on the elevated saddle and crest to the east of the quarry site where the ground had not been disturbed. The survey utilised a georeferenced plan (see **Figure 10**) and recorded tracks and waypoints as .kml format files (Avenza). The quarry was not operating at the time of the site inspection however given the extent of the stockpiling and disturbance it was not necessary to undertake an inspection across much of the proposed expansion area.

An assessment of the constraints to site detection is made to assist in formulating a view as to the effectiveness of the field inspection to find Aboriginal sites and cultural materials and is a requirement of the CoPAI (DEECW 2010A). For the Study Area this included (**Figure 12**- **Figure 14**):

- native and improved pasture
- gravels to form internal access roads and laydown areas, and
- crushed aggregate stockpiles.

Table 4 presents information on the extent to which survey data provides sufficient evidence for an evaluation of the extent and nature of disturbance across the project area and the potential of identifying archaeological materials should they occur. Based on the calculation of survey coverage it is reasonable to proceed on the basis that the archaeological survey was constrained by grass cover and gravel from access tracks and laydown areas.

Table 4: Calculation of survey coverage/ effectiveness by Survey Unit

Survey Unit (SU)	Landform	Survey Area (m^2)	Visibility	Exposure	Effective coverage area (m^2)	Effective coverage %	No. of sites
1	Ridge (crest & saddle)	3000	40	20	240	8	1
2	Quarry access roads and stockpile areas	3000	0	0	0	0	0
3	Side slopes	5000	20	10	100	2	0

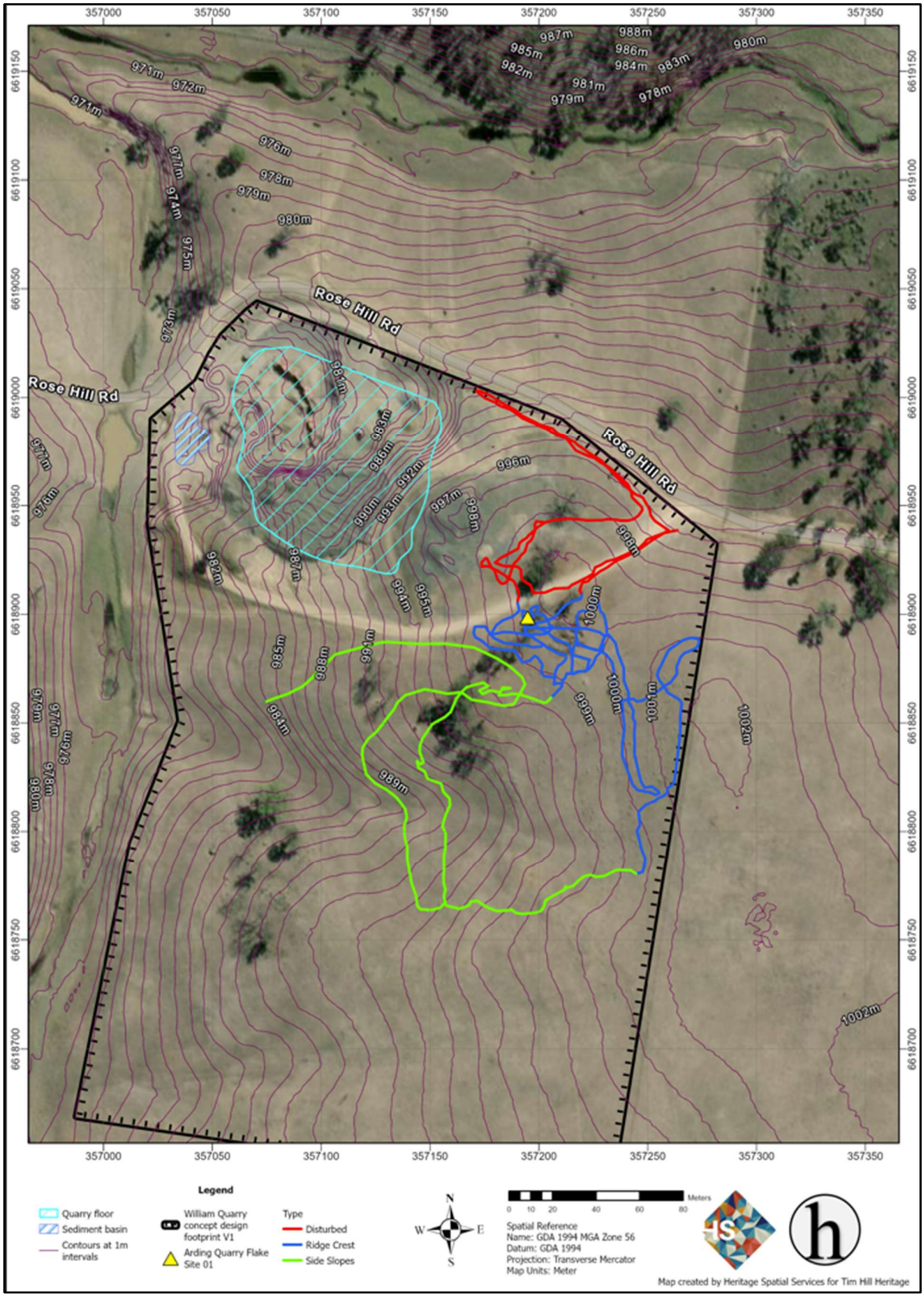


Figure 11: Location of survey transects

Figure 12: Typical hardstand and gravell access east fo the quarry pit

Figure 13: The existing quarry pit looking south

Figure 14: The quarry pit looking north-west

6.3 Archaeological Excavations

Archaeological excavation using test-pits is an appropriate archaeological investigation methodology where it is determined that it is likely that Aboriginal archaeological sites occur throughout the soil profile. The objectives of the test-pits include the following:

- to better understand the nature and extent of the Williams Quarry Arding Artefact Scatter 01 throughout the ridge crest
- to provide RAPs with additional site data to inform their assessment of the cultural significance of the site
- to provide additional site data to inform the scientific assessment of the site, and
- to inform the management response for the site including appropriate avoidance or mitigation measures.

Based on the outcomes of the pedestrian site survey and consultation with RAPs the test excavation strategy for the Williams Quarry Arding Artefact Scatter 01 site focussed on the eastern boundary of the Study Area which had not been subject to significant historical ground disturbance which would have impacted topsoils. The following summarises the excavations

- five 50x50cm (0.25m^2) shovel test pits were excavated along the eastern boundary at 15 metre intervals
- artefacts were retrieved from the soils using a 5mm aperture mesh using a 'wet sieve' method to separate topsoil and artefacts

- analysis of artefacts onsite included the following basic attributes:
    i. artefact type
    ii. raw material
    iii. artefact dimensions (length x width x thickness (mm))
    iv. Point of Force Application (PFA) to ridge relationship
    v. Termination types (Feather, Step or Hinge),
    vi. Percentage and type of cortex, and
    vii. Observations of use wear or resharpening.
- the soils were consistent across the ridge crest and included highly compacted grey sandy soils with gravels and angular rocks throughout and the topsoil with a very compacted rocky sub-soil
- due to the history of ground disturbance and soil loss there was no visible difference within the soil profile and as such the excavation units were recorded based on the amount of soil removed for processing rather than absolute depth or change in soil characteristics, and
- following the analysis the artefacts were reburied within the test pit (north-eastern corner) with each artefact individually bagged and labelled including a metal object to assist with the relocation of the artefact using a metal detector.

The following summarises the archaeological excavation (**Table 5** and **Figure 15**- **Figure 18**)

Figure 15: Excavation of test pit 2

Figure 16: Excavation of test pit 3

Figure 17: Test pit 2 and wet sieve area

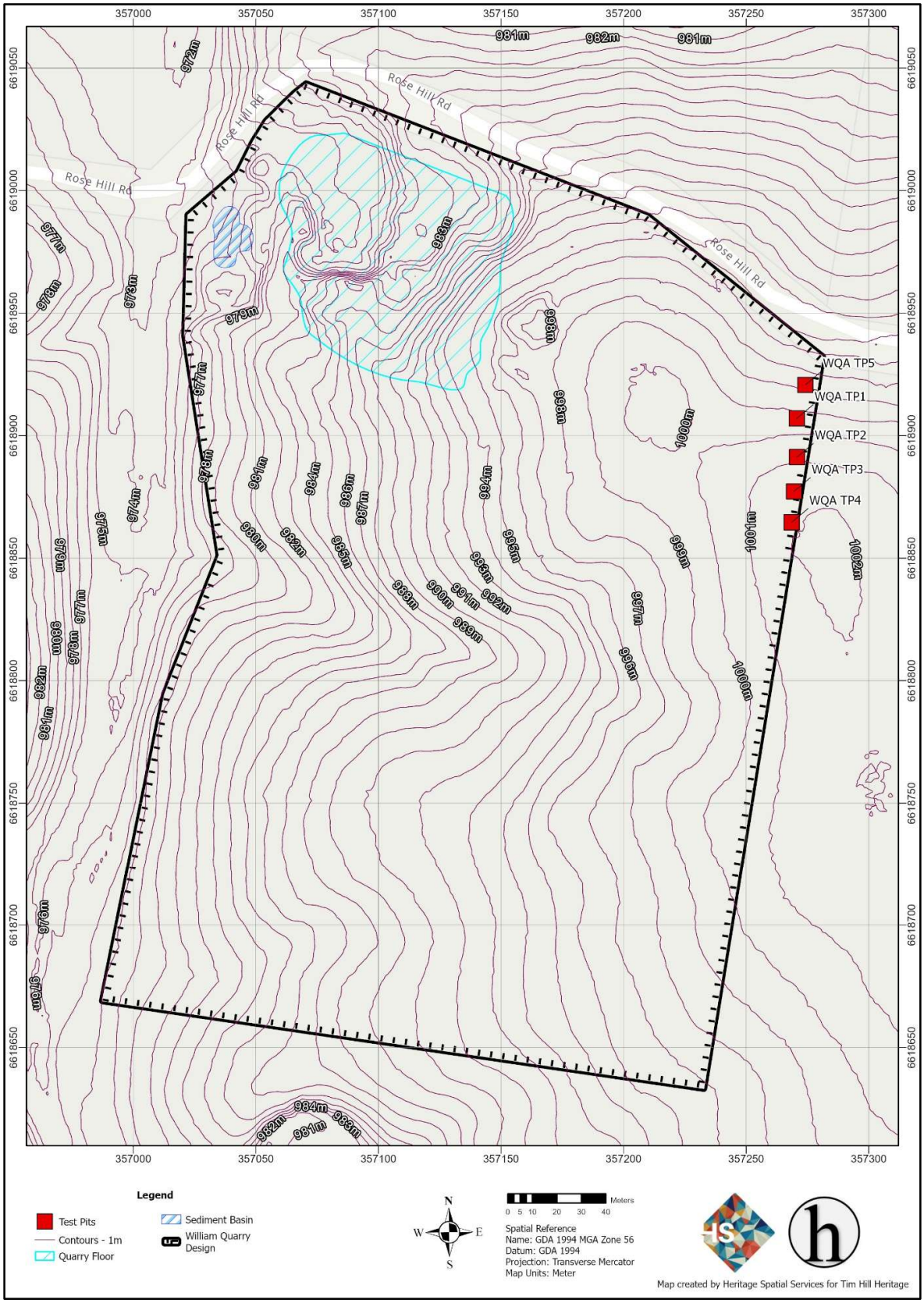
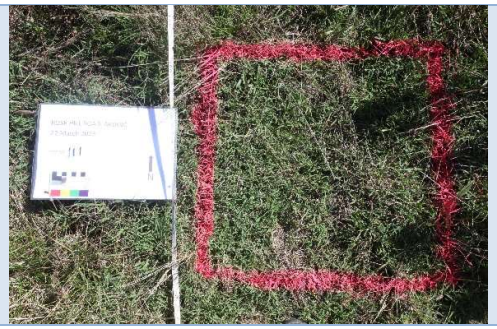


Figure 18: Proposed archaeological test pit locations

Table 5: Summary of proposed archaeological test pit locations

Test Pit	Easting	Northing	XU (mm)	Soil type	Photo (start)	Photo (Termination)	Artefacts
TP1	357270	6618907	1 (20mm)	Dry, shale & small rocks			1
			2 (45mm)	Dry, shale & small rocks. Compacted grey-yellow clays with mixed gravel and rocks throughout			1
TP2	357270	6618891	1 (30mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey Very high organic matter (fine roots) and almost no humic matter			2

Test Pit	Easting	Northing	XU (mm)	Soil type	Photo (start)	Photo (Termination)	Artefacts
			2 (75mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey Basal soils were very compacted grey-yellows mottled clays			4
TP3	357269	6618877	1 (40mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey			1
			2 (70mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey			3

Test Pit	Easting	Northing	XU (mm)	Soil type	Photo (start)	Photo (Termination)	Artefacts
4	357268	6618864	1 (40mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey			0
			2 (70mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey			2
5	357274	6618920	1 (20mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey The soil was very compacted compared to TP2,3 and 4			

Test Pit	Easting	Northing	XU (mm)	Soil type	Photo (start)	Photo (Termination)	Artefacts
			2 (40mm)	Dry, shale & small rocks Soil was hydrophobic and pale grey			1

6.4 Survey Results

For the purposes of the ACHAR the following describe the outcomes of the archaeological investigations of the Study Area to inform the cultural heritage statement and impact assessment:

- the survey identified a low-moderate density scatter of silcrete flakes /flake pieces across the ridge crest of the Study Area approximately above 998 metres above sea level (Williams Quarry Arding Artefact Scatter 01) (Table 6-Table 9, Figure 19-Figure 28)
- the artefacts comprised small to medium primary flakes, flake pieces and debitage produced from locally available silcrete and jasper which appeared to be from very similar silcrete material which is common around 1000 metres above sea level on the New England Tablelands
- the artefact scatter is typical of sites on traditional Aboriginal pathways and hunting camps across the New England Tablelands which include both formed flakes and knapping waste from tool production
- the morphology of the flakes and the overall density of artefacts is not consistent with a silcrete quarry or tool production area
- it is noted that the RAPs who attended the excavations indicated that the use of the wet sieve was a factor in the identification of debitage and small flake pieces which would not likely have been recovered using dry sieving
- the excavations demonstrated that the topsoils must have been subject to some form of chemical or mechanical disturbance as they were highly compacted and hydrophobic which would have affected any organic archaeological remains through the site.
- it is expected that the site would extend across the ridge crest within undisturbed topsoils and areas not significantly disturbed by gravel stockpile areas, tracks and grass and would extend into the adjacent paddock east of the Study Area across the main ridgeline
- the ridge crest provides views toward Mt Yarrowyck which is a known Aboriginal ceremonial site comprising rock art and other spiritual sites
- the site is located on the edge of a valley which runs south-eastward to Uralla/ Salisbury Waters which is known as a significant ceremonial site on the New England Tablelands, and
- the ridge crest is located to the south of Thomas Lagoon and Saumarez Creek which are known to contain a diverse range of site types including grinding stones, stone axes production areas and quarries.

Table 6: Summary of survey results

Site name	Feature	Location (GDA)	Dimension	Landform (SU)	Comments
Williams Quarry Arding Artefact Scatter 01	Artefact scatter	E357199 N6618727	400m^2	Ridge crest	The site is located across the ridge crest east of Williams Quarry pit. The scatter overlooks Spring Hill Creek and looks north-west to Mt. Yarrowyck. The density of artefacts is greatest where soils have eroded and artefacts have been retained on the ground surface.

Table 7: Summary of artefacts (pedestrian survey)

No.	Artefact type	Material	L x W x T (mm)	PFA- Ridge	Retouch/ edge wear	Cortex (%)
1	Flake	Silcrete	30x18x4	Behind	No	10
2	Flake	Silcrete	42x28x9	Behind	Edge wear	0
3	Flake piece	Silcrete	22x11x10	Behind	No	0
4	Flake (broken-distal portion only)	Silcrete	39x18x8	Behind	No	0

Table 8: Summary of artefacts (archaeological excavation)

No.	Artefact type	Material	L x W x T (mm)	PFA- Ridge	Retouch/ edge wear	Cortex (%)
TP1-1	Flake piece	Silcrete	12x7x4	No	No	0
TP1-2	Backed blade	Silcrete	23x8x4	No	No	0
TP2-1	Flake piece	Silcrete	17x16x3	No	No	0
TP2-2	Flake piece	Jasper	32x18x7	No	No	0
TP2-3	Debitage	Jasper	7x5x2	No	No	0
TP2-4	Flake piece	Silcrete	12x5x3	No	No	0
TP2-5	Debitage	Silcrete	7x4x2	No	No	0
TP3-1	Flake piece	Silcrete	15x3x7	No	No	0
TP3-2	Flake piece	Silcrete	13x7x4	No	No	0
TP3-3	Flake piece	Silcrete	12x6x22	No	No	0
TP3-4	Flake piece	Silcrete	17x9x3	No	No	0
TP4-1	Debitage	Silcrete	5x4x1	No	No	0
TP4-2	Debitage	Jasper	8x4x1	No	No	0
TP5-1	Flake piece	Silcrete	11x9x3	No	No	0

Figure 19: Location of Williams Quarry Arding Artefact Scatter 01 site (>998 m.asl.).

Figure 20: Location of Williams Quarry Arding Artefact Scatter 01 (looking north)

Figure 21: Silcrete flake (#1) showing dorsal surface.

Figure 22: Silcrete flake (#2) showing ventral surface.

Figure 23: Silcrete flake piece (#3) showing ventral surface.

Figure 24: Location of silcrete flake (#4) on edge of internal gravel road.

Figure 25: Typical ground disturbance looking west across the upper processing and storage area.

Figure 26: Example of silcrete flake on compacted and eroded sub-soils.

Figure 27: Test pit 1: Artefacts 1 (silcrete flake piece) and 2 (silcrete backed blade)

Figure 28: Test pit 2: Artefact 2 jasper flake piece

6.5 Archaeological survey analysis

Having consideration for the desktop assessment, consultation with representatives of the Aboriginal community and the outcomes of the archaeological investigations it is possible to make the following statements to inform the ACHAR:

- the Williams Quarry Arding Artefact Scatter 01 is a low- moderate density stone artefact scatter that comprises silcrete and jasper flakes and knapping waste which occur along the ridge crest in areas which have not been subject to significant disturbance from the quarrying operations
- the relatively high density of artefacts in test pit 2 and 3 can be attributed to a high proportion of flake pieces and debitage which is consistent with tool maintenance or production but does not necessarily indicate that the ridge crest was a significant occupation site or quarry
- the nature of the known archaeological record includes primary flakes and one backed blade which indicates that the ridge crest was used for the production or maintenance of hunting tools
- silcrete and jasper flakes are common on the New England Tablelands, particularly on ridges and saddles near the confluence of creeks that provide good hunting ground or provided easier terrain for pathways
- the ridge crest has views to Mt Yarrowyck which is a known place of ceremonial and spiritual significance to the Aboriginal community, and has a number of culturally significant rock art sites

- the Study Area is located to the south-west of Thomas Lagoon and to the west of a large grinding groove and stone axe production sites and as such forms part of a broad cultural landscape that connects the ceremonial sites of Uralla/Salisbury Waters and Mt Yarrowyck
- the site provides an opportunity to understand the correlation between the Armidale Batholith geological formation, upland lagoons/ wetlands and Aboriginal archaeological sites, and
- based on the nature and extent of the site it is reasonable to assume that the site extends along the ridge and connects through to the higher ground to the south-east of the quarry on parts of the ridge which not been subject to quarrying operations

The following table is provided to summarise the findings of the ACHA and inform the impact assessment (**Table 9**).

Table 9: Summary of the findings of the archaeological survey

Landform	Known archaeological values	Archaeological potential
Ridge crest (intact topsoils)	Williams Quarry Arding Stone Artefact Scatter 01	**High**- likely artefact density of up to 20 per metre square associated with small forest hunting/ gathering camps and pathways where topsoils have not been significantly disturbed.
Ridge crest (Disturbed areas)	Williams Quarry Arding Stone Artefact Scatter 01	**Moderate -** Artefacts are likely to occur on the ridge crest where they have been moved by machinery or sheet water. Where topsoils from the ridge crests have been relocated and stockpiled, they retain the potential to contain Aboriginal stone artefacts.
Side slopes		**Low-** likely used for hunting and gathering but moderate slopes rarely contain insitu archaeological sites. Artefacts were found in test pits 1 and 5 which were located on the north facing upper slope, but the density of artefacts was lower than the test pits on the ridge crest and this may be in part as the topsoil has eroded to a greater extent than the ridge crest. It is expected that the density of artefacts would decrease with slope and distance from the ridgeline.

6.6 Adequacy of the assessment

The results of the archaeological survey are within the range of 'normal' for archaeological investigations on the New England Tablelands where the ability to identify sites closely correlates with landforms and the extent of disturbance to topsoils. Archaeological test excavation has demonstrated that the residual topsoil areas do contain Aboriginal artefacts which are consistent with the manufacture and maintenance of hunting tools. This is in part because where artefact scatters occur on the New England Tablelands they are typically localised on ridge crests and spurs but form part of a much broader archaeological and cultural landscapes which comprise discontinuous sites along elevated terrain connected by landscape features such as creeks and lagoons. The overall high density of artefacts identified by the test excavations is from the high proportion of knapping waste, being small flake pieces and debitage, that was identified as a result of using a wet sieve to process the soil. However, the proportion of formed and primary flakes is consistent with other archaeological sites in the region that utilised dry sieve methods for soil processing.

7 Aboriginal Cultural Heritage Assessment

7.1 Cultural Values of the Study Area

The following statements summarise the cultural values of the Study Area:

- the Study Area comprises one known archaeological site, being the Williams Quarry Arding Artefact Scatter 01
- the Williams Quarry Arding Artefact Scatter 01 is a low-moderate density (up to 20 artefact per square metre) flake scatter typical of travelling or hunting sites on the New England Tablelands
- it is noted that the RAPs who attended the excavations indicated that the use of the wet sieve was a factor in the identification of debitage and small flake pieces which would not likely have been recovered using dry sieving
- Aboriginal artefacts have an inherent cultural value as they come from the land and provide a direct connection with ancestors and the Dreamtime
- the site forms part of a broader cultural landscape which connects the major ceremonial sites of Mt Yarrowyck and Ooralla and was likely used by Aboriginal groups who occupied permanent or semi-permanent campsites around Thomas Lagoon and Saumarez to the north
- the site is a demonstration of the adaptation of Aboriginal people to the New England Tablelands whereby elevated forests and grasslands were typically used for hunting and travelling
- the site has the potential to contribute to community research around the relationship of stone artefacts and silcrete outcrops, which typically outcrops at similar altitudes and may outcrop nearby to the Study Area, and
- the extent of the site likely extends along the ridge crest to the south-east into the adjacent paddocks which have not been subject to significant ground disturbance.

7.2 Significance Assessment

The following comments are provided to understand the significance of the Study Area and Williams Quarry Arding Artefact Scatter 01 in accordance with the *Australian ICOMOS Burra Charter* (2013) (**Table 10**):

Table 10: Summary of significance assessment (ICOMOS Burra Charter 2013)

Value	Comment
Social/ Cultural	The Williams Quarry Arding Artefact Scatter 01 is considered to be of social and cultural significance to the Aboriginal community as a tangible link to pre-contact use of the New England Tablelands and the demonstration of the connection between the major ceremonial sites and resource rich lagoons and wetlands.
Historic	The Study Area is not considered to be of historic value.
Scientific (Archaeological)	The Williams Quarry Arding Artefact Scatter 01 is considered to have moderate scientific values as it is a very common artefact type and has limited potential to inform regional research around social or economic adaptation or the potential for dating of scientific analysis.

Value	Comment
Aesthetic	The Study Area has limited aesthetic value and is secondary to the higher ridge crests and ranges along the watershed of the catchments.

The following comments are provided to assess whether the Williams Quarry Arding Artefact Scatter 01 meets the criteria of significance as set out in the NSW Heritage Office (2001) *Guidelines for Assessing Heritage Significance* (Table 11).

Table 11: Significance Grading (NSW Heritage Office 2001)

Value	Assessment question	Significance
Social	Does the subject area have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?	Local
Historic	Is the subject area important to the cultural or natural history of the local area and/or region and/or state?	No
Scientific (archaeological)	Does the subject area have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state?	Yes
Aesthetic	Is the subject area important in demonstrating aesthetic characteristics in the local area and/or region and/or state?	No
Research potential	The site, including the adjacent undisturbed ridge crest, has some research potential.	Local
Representativeness	The site is representative of the silcrete flake scatters on the New England Tablelands	No
Rarity	The site is not considered to be rare	No
Education potential	The artefact has limited educational potential and there are already numerous silcrete flakes and flake pieces in museum collections	No

7.3 Statement of Significance

The Williams Quarry Arding Artefact Scatter 01 is considered to form part of an archaeological and cultural landscape that informs our understanding of the adaptation of Aboriginal people to the New England Tablelands, specifically the use of elevated ridges around permanent and semi-permanent lagoons and wetlands. The assessment has concluded that the site likely extends into the adjacent paddocks which have not been subject to significant ground disturbance which has either removed or covered topsoils around the existing quarrying operation. The distribution of artefacts across the ridge crest, of which the Study Area is located, demonstrates that while Aboriginal people may not have been utilising the elevated ridges and spurs ridges to the same extent as the lagoons and wetlands, there was a pattern of use which includes hunting and travelling between campsites or ceremonial sites on the interconnected ridges. In the case of the Study Area this includes the major ceremonial sites of Mt Yarrowyck and Uralla/ Salisbury Waters.

7.4 Assessment of Harm

7.4.1 The Proposed Works

The management response for the site includes the management of the archaeological values of the intact topsoils along the ridge crest. The cultural values and mitigation strategies for each of the stages are summarised below (Table 12).

Table 12: Summary of existing ground disturbance, Cultural heritage values and management response.

Area	Existing land use / disturbance	Aboriginal cultural heritage	Cultural heritage management response
Ridge	The existing land use comprises historical grazing and quarrying operations which have reduced the amount of topsoil along the ridge crest to a narrow band of soil adjacent to the fenceline.	Williams Quarry Arding Artefact Scatter 01. Top soils on the ridge crest have an elevated potential for additional artefacts.	The site has been substantially disturbed as a result of historic quarrying operations. The primary mitigation measure is to relocate and quarantine the stockpiled topsoil and the insitu topsoils from the ridge crest to a permanent repatriation area.
Slopes	Cleared pasture- with increased local erosion around outcrops of rocks and animal tracks.	Soils on the side slopes have limited potential for additional artefacts as these areas were typically not pathways or lookouts during hunting.	An unexpected find procedure is an appropriate mitigation measure for side slopes.
Existing quarry operations	Removal of topsoils around the quarry. Placement of gravel for internal roads and for stockpile areas has partially disturbed the underlying topsoils.	The ridge crest which are under the access roads or stockpile sites have limited research potential when compared to the adjacent farmland which has not been disturbed to the same extent.	An unexpected find procedure is an appropriate mitigation measure for side slopes.

7.4.2 Impact Avoidance and Assessment

The following statements are provided to inform the Impact Assessment and outline measures to avoid or mitigate the consequences of harm.

- the Williams Quarry Arding Artefact Scatter 01 forms part of a broad cultural and archaeological landscape which comprises major ceremonial sites at Mt Yarrowyck and Uralla/ Salisbury Waters and the complex of lagoons and wetlands around the New England Tablelands, particularly Thomas Lagoon to the north-east
- the site has been assessed as being of moderate scientific significance and is not considered to be rare

- the site is not part of a class of sites which are at risk from cumulative impacts associated with agriculture or residential development
- the site is primarily associated with travelling routes and hunting between significant Dreaming sites or ceremonial/ songline places but is not a recognised as a ceremonial site
- the site is inferred to extend across the ridge line into the paddock to the south-east of the Study Area
- the majority of the topsoil from the ridge crest has been stockpiled and is currently stored on the ridge crest
- the assessment acknowledges that artefacts have an inherent cultural value as they come from the land are provide a direct connection with ancestors
- the inclusion of Aboriginal sites officers in an ongoing management of the site will ensure the continued practice of cultural traditions that are designed to care for Country and culture by providing additional opportunities for the development of cultural knowledge and experience in the Aboriginal community
- there are established precedents for the management of isolated finds, low-moderate density stone artefact scatters and PADs using site avoidance and exclusion fencing, and
- the retention of artefacts, and topsoils with the potential to contain Aboriginal artefacts, will ensure that the artefacts are retained 'on-Country' which is respectful to Aboriginal tradition and cultural responsibility.

In accordance with the requirements of the CoPAI the impact assessment is provided to clearly outline the harm that is expected to occur as a result of the Proposed Works (**Table 13**).

Table 13: Summary of Impact assessment

AHIMS	Site	Type of Harm	Degree of Harm	Consequence of Harm
21-1-0565	Williams Quarry Arding Artefact Scatter 01	Direct	Partial	Partial loss of value

7.4.3 Ecologically Sustainable Design principles

The *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) specifically identifies the following principles as part of the impact assessment (OEH 2011:12):

- Precautionary Principle, and
- Principle of inter-generational Equity

The Environmental Defenders Office (2022) factsheet on Ecologically Sustainable Development (ESD) provides the following comments on the Precautionary principle and the Principle of Intergenerational equity

The Precautionary principle

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. If risk to the environment is high, but scientific certainty of the risk eventuating is low, the precautionary principle can fill the gap and essentially requires decision-makers to act as though the risk to the environment is real.

There is an implicit acknowledgment that science and scientific methodologies have limitations. Because of these limitations, it is unlikely that the full consequences a particular act or activity upon the environment can be known in advance. A lack of full scientific certainty is therefore the norm, rather than the exception.

Inter-generational equity

This principle states 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.

When applied to Aboriginal cultural heritage management the application of ESD principles is problematic as the ESD principles are primarily developed to inform decision making around ecological values whereas the cultural heritage process includes Aboriginal knowledge holders and Elders who are the primary stakeholders/ decision makers with respect to Aboriginal cultural values and have different value systems. The EDO (2022) makes the following comment on the practical application of the ESD principles that is relevant to this assessment:

ESD seeks to maximise the combined total of economic, social and environmental values relevant to a decision but to do this, value judgments may need to be made by the decision-maker.

The ACHRCP consultation process has an inherent mechanism to provide opportunities for Aboriginal knowledge holders/ RAPS to inform the investigation process, significance assessment and management response based on their individual or collective values and judgements on the acceptable level of change or impact to their culture.

The following ESD considerations / statements are provided to inform the assessment (**Table 14**).

Table 14: ESD considerations and statements

ESD Principle	Comment	Management response
Apply Precaution	The impact assessment and management response has been informed by the precautionary principle: • the ACHAR has been informed by a number of larger archaeological studies, being the New England Solar Farm and the University of New England study of adaptation to lagoons and wetlands • relocation of topsoils is an established mitigation measure where the nature, extent and cultural significance of a site is known	The primary management response is to implement an construction methodology which relocates and quarantines the topsoil as a repatriation site within the Study Area. This applies to areas of the ridge crest which have not been subject to quarrying operations and to the stockpiles of topsoil already stored on the ridge crest.

ESD Principle	Comment	Management response
	• the study has included consultation with Aboriginal knowledge holders and stakeholders who have extensive experience managing Aboriginal sites and places in the region, and • the presence of the artefacts on the ridge crest demonstrates that the site extends likely across the undisturbed areas of the ridge crest to the south and east of the Study Area.	
Intergenerational equity	The impact assessment and management response has been informed by the principle of inter-generation equity: • artefacts will be retained on country and can be accessed in the future for community led research, and • the contiguous ridge crest in the adjacent paddock likely contains additional stone artefacts connected to the site.	The ACHAR has included consultation with Knowledge Holders and the management response has been informed by previous experiences managing sites across agricultural landscapes of the New England Tablelands.

7.5 Management Recommendations

The ACHAR has concluded that an AHIP will be required for any future activities that involve disturbance of topsoils within the Study Area. The following management procedures should be put in place as conditions of an AHIP to mitigate the impacts from the proposed quarry expansion on the Aboriginal cultural values of the Williams Quarry Arding Artefact Scatter 01.

7.5.1 Intact topsoils along the ridge crest

The known extent of the Williams Quarry Arding Artefact Scatter 01 (**Figure 29**), being the ridge crest above 998 metres above sea level, has already been subject to significant ground disturbance from historic quarrying operations. Intact topsoils on the ridge crest, being areas that do not comprise gravels and aggregate across the ground surface, should be subject to a topsoil relocation procedure before any additional quarrying activities take place on the ridge crest. The existing topsoil stockpiles should be subject to a quarantine and clearly identified with exclusion fencing and signage. The topsoil repatriation area should be located along the eastern boundary fence and should be recorded as a new repatriation site on AHIMS.

7.5.2 Existing topsoil stockpiles

Additional archaeological salvage excavation will be required to understand the archaeological values of the existing topsoil stockpiles and to inform the long-term management of stockpiles on the ridge crest, including:

- excavation of approximately 0.5 cubic metres of topsoil from a sample of the stockpile sites to determine the presence of artefacts within the existing topsoil piles

- analysis of any archaeological finds to compare the stone artefact assemblage with the site data form the ACHAR to inform the overall understanding of the site, and
- at the completion of the excavations the existing topsoil stockpiles should be relocated to the permanent topsoil repatriation area.

7.5.3 Williams Quarry Arding topsoil repatriation site

The proposed topsoil repatriation site should be constructed in a manner which does not increase downslope erosion or loss of artefacts and should include the following features:

- an appropriate batter so that the dry soils are stable
- sediment controls around the base of the stockpile to retain artefacts should they move downslope
- appropriate revegetation with native grass and shrub species, and
- appropriate exclusion fencing and signage to ensure that the material is not subject to additional use or movement.

7.5.4 Artefact movement and reburial

Any artefacts collected by RAPs during the test excavations or archaeological salvage works on the existing topsoils should be repatriated into the permanent topsoil site so that they are retained on country.

7.5.5 Cultural heritage inductions

Cultural heritage inductions are required for an contractors and staff involved in any works affecting topsoils within the Williams Quarry Arding Artefact Scatter 01, being the area above 998 metres above sea level. Cultural heritage induction should be delivered by either Armidale LALC or Iwatta Aboriginal Corporation and should include the operational and reporting conditions of the AHIP, a guide to identify stone artefacts and a summary of management and mitigation measures around the topsoils relocation and repatriation areas.

7.5.6 Additional finds

The ACHAR has concluded that there is the residual potential that artefacts will have moved down slope as a result of erosion and topsoil relocation. The following additional finds procedure should be applied for all quarrying operations outside the mapped extent of the William Quarry Arding Stone Artefact Scatter 01 site:

a) work in the surrounding area is to stop immediately and records are made of the finds via project incident reporting procedures
b) a temporary exclusion zone is to be erected around the site and appropriate controls put in place to ensure that no additional ground disturbance happens in the vicinity of the find
c) an appropriately qualified archaeological consultant and a representative of the Armidale LALC and/or Iwatta Aboriginal Corporation are to be engaged to identify the material and provide an initial assessment of the significance of the object and the likely nature and extent of any associated archaeological sites

d) if the material is found to be of Aboriginal origin, the find must be reported on the AHIMS database as a update of the Williams Quarry Arding Artefact Scatter 01 (#21-1-0565) site

e) the artefact may be relocated to the topsoil stockpile area by representatives of Armidale LALC and Iwatta Aboriginal Corporation using a method agreed by the quarry operator, the consulting archaeologist and the Aboriginal site officers engaged to respond to the additional find, and

f) works may only recommence after the artefact(s) has been relocated and it is agreed that no additional management or mitigation measures are required.

7.5.7 Aboriginal Human Remains

Although it is unlikely that Human Remains will be located at any stage during earthworks within the Study Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Armidale), Armidale LALC and Iwatta Aboriginal Corporation and the Heritage NSW Regional Office (Armidale) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and the Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all parties, provided it is in accordance with all parties' statutory obligations.

Figure 29: Location of the Williams Quarry Arding Stone Artefact Scatter (>998 m.asl.)

8 REFERENCES

Armidale Chronicle (NSW : 1894 - 1929),
7 Sept. 1907, *Closer Settlement. Farms On Saumarez Station.* <https://trove.nla.gov.au/newspaper/rendition/nla.news-article189532259.3.pdf?followup=05e4aae727a860dae7b34ea79fe5e15a

Armidale Dumaresq Regional Council>
2012 *Development Control Plan Chapter 2.4 Aboriginal Heritage* <file:///C:/Users/lk_th/OneDrive/Documents/REPORT%20database/Armidale%20Regional%20DCP%202.4_Aboriginal_Heritage.pdf>

Australian ICOMOS Incorporated
2013 *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance,* <https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf>

Beck, W. R. Haworth and J. Appleton
2015 Aboriginal resources change through time in New England upland wetlands, south-east Australia. *Archaeology in Oceania*, Vol. 50 Supplement (2015): 47–57

Bowdler, S.
1981 Hunters in the highlands: Aboriginal adaptations in the eastern Australian uplands. *Archaeology in Oceania* 16(2):99-111

Clarence and Richmond Examiner
10 August 1889 *The Uralla Gold Rush* <https://trove.nla.gov.au/newspaper/rendition/nla.news-article61306195.3.pdf?followup=d5c85fbc6f79ca4065d2921234b6f274>

Department of Environment, Climate Change and Water,
2010A *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*
2010B *Aboriginal Cultural Heritage Consultation Requirements for Proponents in NSW*

EMM
2018 *New England Solar Farm Aboriginal Cultural Heritage Assessment Report*. Prepared for New England Solar Farm, Uralla.

Environmental Defenders Office
2022 *Factsheet-What is ecologically sustainable development (ESD)?* < https://www.edo.org.au/wp-content/uploads/2022/02/220214-What-is-ESD.pdf>

eSpade
Invergowrie Soil Landscape <https://www.environment.nsw.gov.au/Salis5app/resources/spade/reports/9236in.pdf>

Gnuckey, G.
2017 *A Cultural Heritage Assessment. Metz Solar Farm on "Bayley Park". Waterfall Way via Armidale.* Prepared for Eco Logical Pty Ltd.

Godwin, L.
1983 Archaeological site surveys on the eastern Margin of the New England Tablelands. *Archaeology in Oceania* (17):38-47

1990 *Inside Information: Settlement and Alliance in the Late Holocene of North-eastern New South Wales.* Unpublished PhD Thesis- University of New England.

Hill, T. & M. Finlayson
2021. 267 *Long Swamp Road Lot Resizing, Armidale NSW: Aboriginal Cultural Heritage Assessment.* unpublished report prepared for Tim Danieli.

Hill, T. P. Fowler and T. Robins.
2020 *Aboriginal Cultural Heritage Assessment Report for proposed Armidale Plateau Shield Tree, Armidale NSW*. unpublished report prepared for Sorenta Pty Ltd and Stevens Holding Pty Ltd.

Hudson, S.
1996. *Salisbury Axe Quarry: the acquisition, distribution and cross-exchange patterns from a local distribution site*. Unpublished Honours thesis, UNE, Armidale
1997. Salisbury axe quarry: The acquisition, distribution and cross-exchange patterns from a local distribution site. Thesis abstract- *Australian Archaeology* No. 44:6-7

Hudson, S., Duncan, L., Kim, M., McKenzie, P., Townsend, L., & Hudson, C.
2003. *An Archaeological Survey of Southern New England Landcare Area.* Unpublished report for SNELCC, Armidale

Macdonald, G.J.
1845. First Report on the New England Aborigines. *Governor's Dispatches*, Vol. 40, 1845 ML.A1229.

Massie, R.G.
1851. Report on New England Aborigines, 1851. *Governor's Despatches* Vol. 71, 1852. ML. A-1260

Mathews, R. H.
1896 *The Burbung of the New England Tribes, New South Wales.* Ford & Son, Melbourne.

McBryde, I.
1978 *Records of Times Past: ethno-historical essays on the culture and ecology of the New England tribes.* Canberra: Australian Institute of Aboriginal Studies.

Mehr, R.
2010 *Aboriginal Heritage Impact Assessment Lots 661-663 and Lots 699-703 DP755808 Kurrawatha Lane, Armidale.* Unpublished report prepared for Regional Land Pty Ltd, Wingham.

NSW Heritage Office
2001 *Assessing heritage significance*, NSW Heritage Office, Sydney, Australia.

NSW Spatial Collaboration Portal
1978 aerial photo
<https://portal.spatial.nsw.gov.au/download/historic/2792/2792_01_134.jp2.jpeg>
1990 aerial photo
<https://portal.spatial.nsw.gov.au/download/historic/3788/3788_02_050.jp2.jpeg>

Office of Environment and Heritage
2011 *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*

Pearson, M.
1981 *Seen Through Different Eyes: Changing Landuse and Settlement Patterns in the Upper Macquarie River Region of NSW from Prehistoric Times to 1860.* Unpublished PhD thesis. Dept of Prehistory and Anthropology, Australian National University.

University of New England
Unlocking Regional Memory-Saumarez Station
<https://www.nswera.net.au/biogs/UNE0413b.htm#:~:text=Saumarez%20Station%2C%20situated%20about%20five%20kilometres%20south%20of,Darling%2C%20arrived%20in%20New%20South%20Wales%20in%201825.>

Uralla Shire Council
2012 *Local Environment Plan*
<https://legislation.nsw.gov.au/view/whole/html/inforce/2021-07-14/epi-2012-0119>

APPENDIX A: AHIMS SEARCH RESULTS

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : TH031 Arding Quarry
Client Service ID : 725925

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-4-0045	SC1	AGD	56	362400	6609800	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	Recorders	Alice Gorman					Permits	1104,1109	
21-4-0047	SC3	AGD	56	362500	6609800	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	Recorders	Alice Gorman					Permits		
21-1-0052	Invergowrie JA3;	AGD	56	359040	6625720	Open site	Valid	Artefact : -	Isolated Find	2628
	Contact	Recorders	Mr.John Appleton					Permits		
20-3-0042	JA/Teat 1	AGD	56	354820	6625270	Open site	Valid	Artefact : -	Open Camp Site	2401
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0003	Mount John;New England Hwy;	AGD	56	362200	6617900	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	W Cook					Permits		
21-4-0040	Invergowrie JA2;	AGD	56	358420	6624310	Open site	Valid	Artefact : -	Isolated Find	2628
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0043	Chiswick Axe Grinding Site;	GDA	56	361241	6613935	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	Mr.John Appleton,S.R Hudson					Permits		
21-4-0054	Chiswick Camp Site	GDA	56	361241	6613935	Open site	Valid	Artefact : -, Grinding Groove : -		
	Contact	Recorders	Mr.John Appleton,Karen Moorhouse					Permits		
20-3-0061	JA/TEAT2	AGD	56	354790	6625310	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0208	NE13	GDA	56	366163	6615009	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
20-6-0019	Pinnacle Cherry Hill	AGD	56	354270	6625290	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	Robert Walford					Permits		
21-4-0075	JA/ Invg 1	AGD	56	357300	6624400	Open site	Valid	Artefact : 27		
	Contact T Russell	Recorders	Mr.John Appleton					Permits		
21-4-0087	Salibury creek 2	GDA	56	364257	6618790	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Malcolm Ridges					Permits		
21-4-0088	Saumarez Open Site 1, (ARM 112)	AGD	56	363970	6619000	Open site	Valid	Artefact : 30		
	Contact	Recorders	Mr.Phil Hunt					Permits		
20-6-0067	Barley Uralla L&H P1	GDA	56	355890	6611030	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Mr.John Appleton					Permits	3893,4108	

Report generated by AHIMS Web Service on 24/10/2022 for Tim Hill for the following area at Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227. Number of Aboriginal sites and Aboriginal objects found is 72

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

Page 1 of 6

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : TH031 Arding Quarry
Client Service ID : 725925

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-4-0098	Thomas L&H P1	GDA	56	360980	6620100	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Mr.John Appleton					Permits	3893,4108	
21-4-0105	ALFOXTON GG	GDA	56	363197	6619546	Open site	Valid	Grinding Groove : 1		
	Contact	Recorders	Mr.John Appleton,University of New England - Armidale					Permits		
21-4-0108	BARLEY M1	GDA	56	358963	6610845	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.John Appleton,University of New England - Armidale					Permits		
21-4-0099	WALLIS ISO 1	AGD	56	362420	6622220	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.John Appleton,University of New England - Armidale					Permits		
21-4-0100	WILLIS OS 2	GDA	56	362350	6622080	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0109	Barley OS 5	GDA	56	358407	6610250	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0110	Barley OS 1	GDA	56	358850	6610840	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits	3893,4108	
21-4-0111	Barley OS 2	GDA	56	358540	6610760	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0112	Barley OS 3	GDA	56	358450	6610670	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0113	Barley OS4	GDA	56	358349	6610456	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0134	Airport Plateau Shield Tree 1	GDA	56	367040	6621068	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	Recorders	Everick Heritage Pty Ltd,Mr.Tim Hill					Permits		
21-4-0199	NE04	GDA	56	367310	6611497	Open site	Valid	Grinding Groove : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0200	NE05	GDA	56	367258	6611463	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0201	NE06	GDA	56	367195	6611269	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0202	NE07	GDA	56	366969	6610650	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0205	NE10	GDA	56	366253	6615198	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		

Report generated by AHIMS Web Service on 24/10/2022 for Tim Hill for the following area at Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227. Number of Aboriginal sites and Aboriginal objects found is 72

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : TH031 Arding Quarry

Client Service ID : 725925

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-4-0206	NE11	GDA	56	366088	6615000	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0166	Willis OS 2.	AGD	56	362350	6622080	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton,University of New England - Armidale					Permits		
21-4-0167	Barley Q 4	AGD	56	358349	6610456	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton,University of New England - Armidale					Permits		
21-4-0259	NE66	GDA	56	367205	6612854	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0260	NE67	GDA	56	367572	6613014	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0261	NE68	GDA	56	367612	6611341	Open site	Valid	Artefact : 1, Grinding Groove : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0262	NE69	GDA	56	367261	6610932	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0272	NE79	GDA	56	365190	6609962	Open site	Valid	Artefact : 1, Grinding Groove : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0273	NE80	GDA	56	365436	6610068	Open site	Valid	Grinding Groove : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0275	NE82	GDA	56	365289	6613096	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0276	NE83	GDA	56	365430	6613098	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0277	NE84	GDA	56	365596	6613099	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0282	NE89	GDA	56	366481	6609848	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		

Report generated by AHIMS Web Service on 24/10/2022 for Tim Hill for the following area at Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227. Number of Aboriginal sites and Aboriginal objects found is 72

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : TH031 Arding Quarry

Client Service ID : 725925

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-4-0283	NE90	GDA	56	366825	6610039	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0285	NE92	GDA	56	366384	6613124	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0293	NE102	GDA	56	366691	6609700	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0196	NE01	GDA	56	367291	6611743	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0197	NE02	GDA	56	366870	6611364	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0232	NE37	GDA	56	366758	6609752	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0234	NE39	GDA	56	367447	6609689	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0237	NE42	GDA	56	366079	6609918	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0240	NE45	GDA	56	367686	6612583	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0241	NE46	GDA	56	367575	6612074	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0242	NE47	GDA	56	367512	6612242	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0243	NE48	GDA	56	367495	6612223	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0244	NE49	GDA	56	367124	6612682	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		

Report generated by AHIMS Web Service on 24/10/2022 for Tim Hill for the following area at Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227. Number of Aboriginal sites and Aboriginal objects found is 72

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : TH031 Arding Quarry

Client Service ID : 725925

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
21-4-0245	NE50	GDA	56	367752	6611268	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0254	NE60	GDA	56	367391	6609737	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0255	NE62	GDA	56	364684	6613830	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0256	NE63	GDA	56	364856	6613629	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0257	NE64	GDA	56	365368	6615010	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0258	NE65	GDA	56	365546	6613878	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0207	NE12	GDA	56	365943	6615084	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0303	gostwyck stream	GDA	56	362382	6616132	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Colin Ahoy,Mr.Colin Ahoy,Mrs.Mikaela Palmer,Mrs.Mikaela Palmer					Permits		
17-4-0050	Armidale Plateau Sheild Tree 1	GDA	56	367040	6621067	Open site	Partially Destroyed	Modified Tree (Carved or Scarred) : -		
	Contact	Recorders	Everick Heritage Pty Ltd,Everick Heritage Pty Ltd,Mr.Tim Hill,Mr.Tim Hill					Permits	4565	
21-4-0209	NE14	GDA	56	365258	6615140	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1, Stone Quarry : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0210	NE15	GDA	56	365041	6615131	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0211	NE16	GDA	56	365045	6614883	Open site	Valid	Artefact : 1		
	Contact	Recorders	Mr.Ryan Desic,EMM Consulting - St Leonards - Individual users					Permits		
21-4-0307	gostwyck 2	GDA	56	362077	6615906	Closed site	Valid	Grinding Groove : -		
	Contact	Recorders	Mr.Colin Ahoy,Mrs.Mikaela Palmer					Permits		
21-4-0370	Chiswick OS 1	GDA	56	360885	6613875	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		
21-4-0371	Chiswick OS 2	GDA	56	360772	6613851	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.John Appleton					Permits		

Report generated by AHIMS Web Service on 24/10/2022 for Tim Hill for the following area at Lat, Long From : -30.6384, 151.3755 - Lat, Long To : -30.4906, 151.6227. Number of Aboriginal sites and Aboriginal objects found is 72

Appendix H

Traffic Impact Assessment

Traffic Impact Assessment

Williams Quarry

Quality solutions. Sustainable future.

GeoLINK
environment | engineering | planning | design

GeoLINK Consulting Pty Ltd

PO Box 119
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

PO Box 1267
Armidale NSW 2350
T 02 6772 0454

PO Box 229
Lismore NSW 2480
T 02 6621 6677

info@geolink.net.au

Prepared for: Ducats Earthmoving Pty Ltd

UPR	Description	Issued By	Date Issued
4079-1015	Version 1	Bradley Herd / Michelle Erwin	26/06/2023

Table of Contents

Figures

Appendices

1. Introduction

1.1 Project Overview

GeoLINK has been engaged by Ducats to prepare a Traffic Impact Assessment (TIA) to accompany a Development Application (DA) under Part 4 of the EP&A Act for expansion of the existing gravel quarry and increased extraction from the land for up to 66,600 m^3 of material per annum.

Williams Quarry is located on the Northern Tablelands of NSW, approximately 10 km north of Uralla and 15 km south-west of Armidale. The land is legally described as Lot 4 DP 1096564. The development is located within the land parcel of 75 Rose Hill Road, Arding NSW. This site is accessible from (and sits adjacent to the southern side of) Rose Hill Road.

The Development Application seeks consent for expansion of the existing quarry site and associated operations. The primary objective of the proposal is to extract and process more gravel material to supply to local markets.

The development proposal generally involves:

- A maximum extraction of up to 150,000 m^3 and expected average extraction of 66,600 m^3 of material per annum
- Estimated quarry life of 10 years
- Removal of existing (deceased) trees to accommodate expansion of quarry to the east and south
- Haulage to be undertaken by truck and trailer with 32 tonne typical payload
- Haulage times to be between 7 am and 5 pm Monday to Friday and 7 am to 1 pm Saturday
- Maximum of 302 haulage days available per annum

Development consent is required as per the requirements under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The proposal is a Schedule 1 development under State Environmental Planning Policy No 11 – Traffic Generating Developments and requires the preparation of a TIA on the basis that the proposal is an extractive industry use under item (m) of Schedule 1.

1.2 Objectives

The objectives of the TIA are to assess the expected traffic impact of the proposed development in accordance with the Austroads Guide to Traffic Management Part 12 – Integrated Transport Assessments for Developments 2020 (AGTM12) and the RTA Guide to Traffic Generating Developments 2002 (RTA GTGD). Issues to be addressed include:

- surrounding road network and any existing proposals for road improvements
- impact of the development on road safety
- impact of the development on traffic volumes including assessment of existing traffic volumes and estimation of development generated traffic
- assessment of generated traffic trip distribution
- peak period traffic impact at key intersections
- impacts on public transport
- impacts on pedestrians, cyclists and alternative modes of transport
- assessment of parking provisions
- safety and efficiency of internal road layout
- safety and efficiency of access between the site and adjacent road network.

1.3 Site Description

Rose Hill Road is a rural road within the north-eastern area of Uralla Shire Council (USC), approximately 10 km due north of the township of Uralla and 14 km south-west of Armidale. At the site frontage, Rose Hill Road is an unsealed road typically 5 m wide with informal roadside table drains. Approximately 1.4 km east of the site, Rose Hill Road intersects Mount Butler Road and Arding Road, with Arding Road being the continuation of Rose Hill Road to the east.

The existing quarry at 75 Rose Hill Road is immediately adjacent to the southern edge of Rose Hill Road and is bordered by Spring Creek to the west. Surrounding land uses are primarily agricultural, with the majority being large areas of open pasture, occasionally interspersed with trees and shrubs. The nearest residential premises are two individual farmhouses approximately 700 m east of the site on Rose Hill Road.

Rose Hill Road provides access to two other rural properties to the west, while the main connection to the wider road network is via Arding Road to the east, which connects to the New England Highway 6.5 km east of the site.

1.4 Proposed Development

Ducats Earthmoving Pty. Ltd. proposes to expand the footprint of the existing quarry to extract gravel and rock from Williams Quarry to supply gravel and rock for use in local construction. This proposal seeks consent for use of the land to extract up to 150,000 m^3 (225,000 tonnes equivalent) per annum. Actual expected extraction is around 66,600 m^3 per annum. The material will be crushed on site and sold locally. Extraction methods would involve blasting and mechanical excavation.

The remaining vegetation within the quarry site would be cleared. Native vegetation would be taken off site to be mulched and stockpiled at designated stockpile sites and non-native vegetation would be disposed of according to the relevant guidelines. Topsoil would be removed and stored at designated stockpile sites. The stored topsoil would be stockpiled in low, domed mounds with sediment and erosion measures installed to prevent sediment runoff.

Extraction of material will be as per existing arrangements, with equipment to include Hitachi ZW150-5B front end loader and Kobelco SK210LC-10 excavator, with crushing plant also required to be established on site. Crushing plant will be delivered by low-loader truck and trailer as per existing arrangements. Once material has been crushed, screened and mixed as required, it will be loaded into haulage trucks at the extraction site and delivered to either directly to construction sites throughout the region or to the Ducat's Armidale depot for stockpiling or further processing. The trucks will leave the site via the existing Rose Hill Road access, continuing onto Arding Road before turning either left to access Armidale and surrounds or right if destined for Uralla and surrounds.

A concept layout of the proposed site staging and access is provided in Error! Reference source not found.. Note that all vehicles will enter and exit the site in a forward motion.

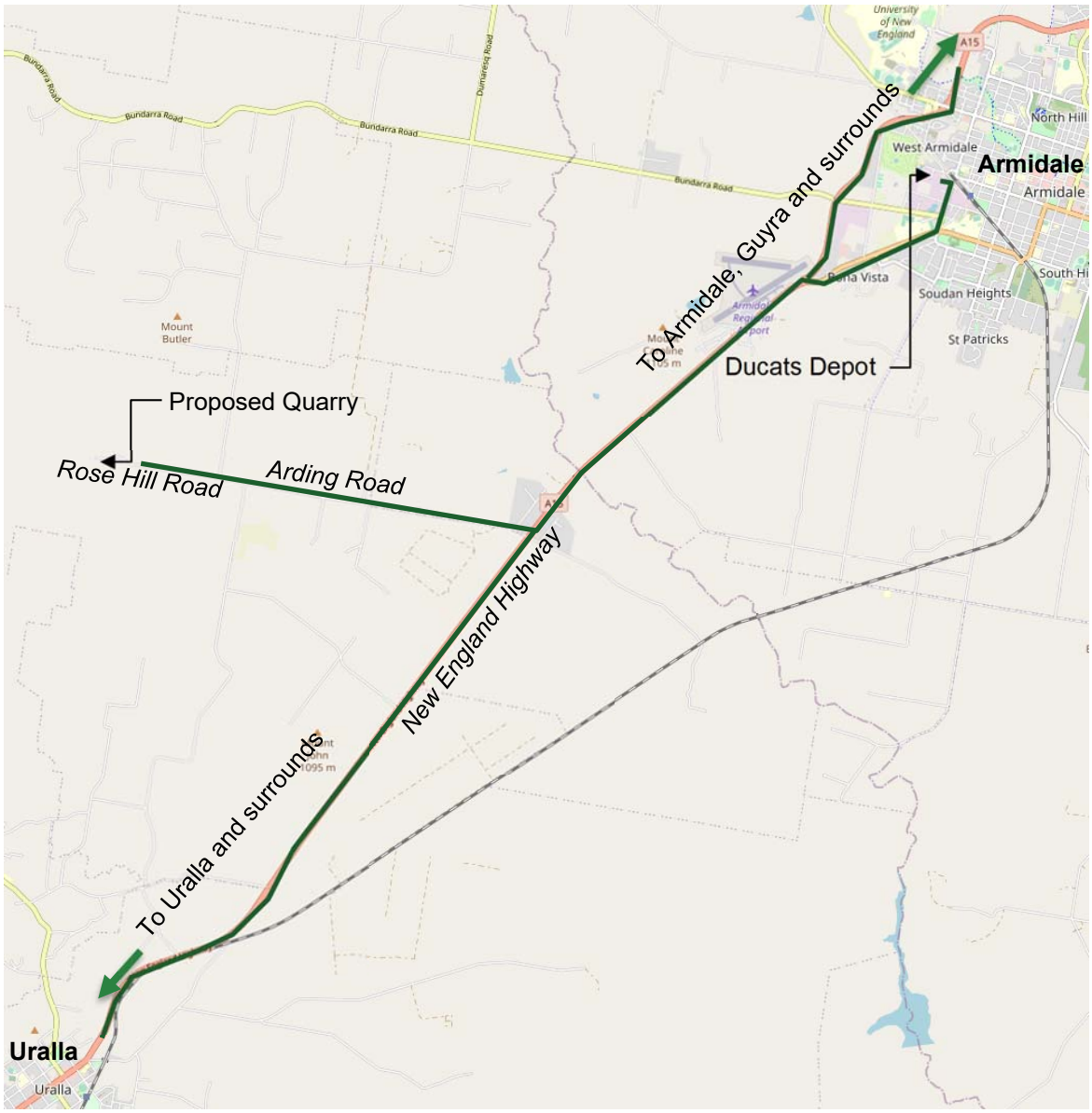


Figure 1.1 Site Locality Plan and Haulage Routes

2. Existing Conditions

2.1 Road Network

Rose Hill Road is a small rural road with very low traffic volumes. The existing quarry at the site currently operates on an approval for 30,000 m^3 of material extraction per annum, which is estimated to generate an average of approximately 10 vehicle trips per day (vpd).

There are only two properties accessed via Rose Hill Road west of the site, so existing AADT traffic at the site frontage is estimated at 15 vpd. East of the site, Rose Hill Road becomes Arding Road, which provides connection to the New England Highway and the wider road network. Traffic counts on Arding Road give AADT of around 250 vpd and peak hour traffic of 26 vehicles per hour (vph).

Existing haul routes for the site are via Rose Hill Road and Arding Road to the New England Highway. Once trucks reach the New England Highway they either turn left to head north to Armidale and surrounds or right to head south to Uralla and surrounds.

2.1.1 Rose Hill Road

Rose Hill Road is an unsealed rural road, typically 5 m wide with informal roadside grassed table drains. There is no sign posted speed limit for this road in the vicinity of the site. The site access is essentially incorporated into the road formation of Rose Hill Road, which deviates around the northern edge of the existing quarry. A 'Trucks Entering' sign is located at the approach to the site approximately 100 m east on Rose Hill Road. Rose Hill Road provides access to just four rural properties apart from the quarry site, which indicates that existing traffic volumes are likely to be generally very low.

Estimated daily traffic volumes for Rose Hill Road at the connection to Arding Road are around 40 vpd, with up to 40% heavy vehicles depending on quarry operations.

Figure 2.1 Rose Hill Road

2.1.2 Arding Road

Ardng road is a sealed rural road, typically 7 m sealed width with 1 m unsealed shoulders. Arding Road has no signposted speed limit in the vicinity of the site and it is expected that the default rural speed limit of 100 km/h would apply. Arding Road acts as a rural collector road, providing direct connection to a number of rural properties, while also connecting a number of smaller rural roads to the wider road network. There is a potential conflict of traffic movement and right-of-way at the intersection of Arding Road, Mount Butler Road and Rose Hill Road. No 'give way' signage or linemarking has been installed and this should be rectified to ensure no new conflicts arise as a result of the increase in vehicle movements expected to be generated by the development.

Arding Road connects with the New England Highway in a 'Give Way' controlled crossroads arrangement, with Saumarez War Service Road forming the opposite leg of the intersection and the New England Highway being the major through road. Sight distance both north and south along the New England Highway from Ardng Road is good with no obstructions and good intersection geometry.

Figure 2.2 Arding Road, at the intersection with Mt Butler Rd

2.1.3 New England Highway

The New England Highway is a TfNSW controlled state road (HW9) which provides connection across the broader New England Region, including between larger population centres in the surrounding region such as Tamworth, Uralla, Armidale and Glen Innes.

It has a typical through lane width of 3.6 m, with 2.5 m wide sealed shoulders and approximately 1 m unsealed shoulders, however there are many areas where the carriageway is widened to provide for overtaking lanes, auxiliary and channelised turning lanes and enhanced dividing barrier lines (BB2).

Figure 2.3 New England Highway, view from Arding Road to the north (left) and south (right)

2.2 Traffic Flows

2.2.1 Arding Road

Traffic data has been supplied by USC and is attached in **Appendix B** and was verified by a short on-site traffic count. Data supplied by USC indicates Annual Average Daily Traffic (AADT) of between 150 vpd (western end) and 250 vpd (eastern end) with 23-35% heavy vehicles from counts carried out in August-September 2020. An on-site traffic count was carried out from 8:00 to 9:00 am on Wednesday the 19th of October 2022 to verify data supplied by USC and provide an indication of typical directional split. For outbound movements, the directional split was 70/30; 70% of the vehicles turning left to head north toward Armidale and 30% of the vehicles turning right to head south toward Uralla. This is consistent with the data supplied by USC.

Peak hour traffic (PHT) according to the USC data was between 10 and 18 vehicles per hour (vph), while the 85th percentile speed was 99.72 km/h. PHT during the on-site traffic count was 35 vehicles, including two school buses, with 75% of traffic outbound to the New England Highway and 25% inbound from the New England Highway.

2.2.2 New England Highway

TfNSW traffic data for the New England Highway, 560 m south of Arding Road, shows typical AADT of 6,128 vpd for the year 2011, up from 5,842 in 2007. This puts traffic growth in this period at approximately 1.2% per annum, indicating likely traffic volumes of around 7,000 vpd for the year 2022. Heavy vehicle volumes were generally around 10% of total volumes.

On-site traffic counts carried out on Wednesday the 19th of October 2022 indicated PHT of 451 vph for northbound traffic and 249 vph for southbound traffic during the am peak between 8 and 9 am. The proportion of heavy vehicles was around 7% of northbound traffic and 14% of southbound traffic.

2.3 Traffic Safety

The Transport for New South Wales (TfNSW) Centre for Road Safety Interactive Crash Statistics service was used to determine whether any crashes have occurred at or near the site or along the proposed haulage routes. Results for the USC and ARC local government areas (LGAs) are shown in **Figure 2.4** and **Figure 2.5** below.

Figure 2.4 Crash Locations Along Haulage Routes Within USC LGA

Figure 2.5 Crash Locations Along Haulage Routes Within ARC LGA

For many of the crash types that are recorded along the haulage routes, the likelihood of the risk increasing for these crash types as a result of the development generated traffic is low. However, there is one crash location that indicates a potential risk that could be exacerbated by development generated traffic and therefore deserves further attention.

At the intersection of Arding Road and the New England Highway crash statistics indicate that a Road User Movement (RUM) code 13 (right-near) crash type occurred at this intersection in 2021, resulting in serious injury. It is unclear from which leg of the crossroad intersection the vehicle was turning, but it is clear that right turn movements across traffic at the intersection should be given appropriate attention. This is addressed further with sight distance and gap acceptance checks in section 3.

2.4 Public Transport

No public transport routes pass the site access location; however, school buses were observed using Arding Road, with two school buses being observed using the intersection with the New England Highway during the on-site traffic count. Public transport routes do use the New England Highway between Uralla and Armidale, with Edwards Coaches route 480 departing Uralla and Armidale three times daily on weekdays and twice daily on Saturdays. Due to existing use of these roads for haulage trucks from various other industries, no new potential conflict points between haulage trucks and public transport vehicles are likely to occur.

2.5 Pedestrians and Cyclists

There are many pedestrian / cyclist generators within Uralla and Armidale, with the primary point of potential conflict between vehicles and pedestrians likely to be near the intersection of Miller Street, Uralla Road and Kentucky Street in Armidale, where two schools are located adjacent to the industrial estate. These potential conflicts already exist due to existing industrial estate traffic and the existing school traffic. At the intersection, pedestrian infrastructure is very poor and could be improved. This is an existing issue that is not likely to be exacerbated by the proposed development but should be given attention by Armidale Regional Council.

Closer to the development site there are minimal pedestrian or cyclist generators or infrastructure and conflicts between development generated traffic and pedestrians or cyclists is highly unlikely.

3. Assessment

3.1 Traffic Generation

Approval is sought for a maximum extraction limit of 150,000 m^3 (225,000 tonnes equivalent) per annum, with actual expected initial extraction of around 66,600 m^3 per annum. Assuming operation is constant year-round with two weeks of shut-down for holidays and/or maintenance, operating on weekdays and on ten Saturdays per year each month, there will be estimated 260 days of operation.

Assuming material is collected and hauled on each day the quarry is in operation, this gives an average of 386 t or 254 m^3 of material transported from the site per day.

It is reasonable to assume that the extracted material will be collected from the quarry site by a standard truck-and-dog with a load carrying capacity of 32 t or 25 m^3. Thus, an average daily trip generation of 20 movements (ten in, ten out) is expected. This estimate provides some room for smaller loads or smaller trucks to be used occasionally.

However, it is likely that some periods of the week or year will be busier than others. To be conservative, it has been assumed that a peak day will be three times the calculated average daily haul, being 346 t and resulting in 60 movements (30 in and 30 out).

In addition to the traffic generated by sale and haulage of the extracted material, the proposed operation will generate one passenger vehicle travelling to and from the site each day (i.e. the quarry operator). As a result, the estimated impact of the proposed development will be an increase in the ADT on Arding Road from around 250 vpd to 272 vpd under normal operating conditions or 312 vpd under peak operating conditions.

Estimated peak hour traffic is generally accepted to be around ten percent of the estimated annual average daily traffic. In this case, the peak hour traffic contribution of the development on a peak day can be assumed to be six truck movements plus one passenger vehicle movement.

Based on the supplied traffic data from USC and assuming 1.2% annual traffic growth (based on New England Highway traffic growth), the 10-year design traffic for Arding Road can be taken to be 312 vehicles per day with 30% heavy vehicles, which is consistent with the calculated traffic generation of the development.

3.2 Traffic Distribution

Traffic generated by the development will have a variety of origins and destinations, with quarried material expected to be delivered to many different locations across both the USC and ARC LGAs. As a result of these considerations, some assumptions about trip generation distribution have been made:

- Traffic generation origin and destination will be weighted towards the larger population centre of Armidale, with an assumed 80% of trips generated by the development having origin or destination north of Arding Road (20% south)
- The development peak hour will coincide with the existing traffic peak hour (conservative)

In order to test the sensitivity of these assumptions, checks were also carried out with a larger proportion of vehicles having origin or destination to the south and also with either a larger proportion of development generated traffic exiting Arding Road during the development peak hour or a larger proportion entering Arding Road during the development peak hour.

3.2.1 Peak periods

In general, quarry operations will require both an inbound and an outbound trip for all trucks carrying out material delivery operations. It is likely that these trips will, on average, be equally distributed throughout normal business hours, typically between 7 am and 5 pm, with a slightly higher number of vehicle movements in the morning peak period. In addition to truck movements, there will typically be a need for a single vehicle inbound trip each morning and a single vehicle outbound trip each afternoon for the quarry operator.

Peak traffic is likely to occur in the morning period, when the first trucks arrive for material collection for the days works. The afternoon peak period is likely to have fewer truck movements as material deliveries for construction works are usually carried out on the day that the material is to be used. As a result, it has been assumed that the morning peak hour will involve the largest number of vehicle movements, including:

- 1 inbound quarry operator car trip
- 3 inbound truck trips for material collection
- 3 outbound truck trips for material delivery

3.3 Roadway Capacity

The Austroads Guide to Road Design Part 3: Geometric Design 2021 (AGRD03) provides recommended minimum geometric characteristics for various types of roads. Section 4.2.6 notes that many roads in Australia have traffic volumes less than 150 vehicles per day and that some of these are arterial roads passing through sparsely settled flat country where the terrain leads to a high operating speed. This description is similar to the existing condition of Rose Hill Road and Arding Road including the estimated traffic generation of the development, though Rose Hill Road is likely to have lower operating speeds due to the existing geometry.

AGRD03 goes on to note that, in these circumstances (rural roads with AADT of 150 vpd or less), single lane carriageways may be used, with a minimum sealed width of 3.7 m. With the conservative estimate of peak traffic generation reaching 60 vpd AADT and the estimated 10-year design traffic being 75 vpd AADT, it is considered unnecessary to upgrade Rose Hill Road, while Arding Road already provides a 7 m sealed width in good condition.

With regard to the New England Highway, the existing condition of the road pavement including the very wide sealed carriageway and sealed shoulders indicates that the road is in a suitable condition to accept the small increase in additional traffic and has the capacity to accept much higher volumes of vehicles.

3.4 Existing Intersections

There are three existing intersections that will be impacted by the proposal, being:

- Site access connection to Rose Hill Road
- Rose Hill Road / Arding Road
- Ardling Road / New England Highway

3.4.1 Site Access and Rose Hill Road

The intersection of the site access with Rose Hill Road is confidently assumed to be suitable to use by all vehicle types and the combined existing and future traffic for a 10-year design horizon, particularly given that it is already used by haulage trucks from the existing quarry. On site assessment of the site access was carried out and existing geometry and sight distance are considered acceptable.

3.4.2 Rose Hill Road and Arding Road

The intersection of Rose Hill Road and Arding Road occurs as a sort of geometric continuation from Rose Hill Road onto Arding Road, however Rose Hill Road is unsealed while Arding Road is sealed. In addition to this, at the intersection, Mt Butler Road also connects from the north in a T-intersection arrangement. There is no existing linemarking or signage at the intersection that indicates right of way. Due to the increase in traffic expected as a result of the development, it is recommended that a 'Give Way' sign and hold line be installed on Mt Butler Rd at the intersection to appropriately indicate right of way and avoid unnecessary vehicle conflicts.

3.4.3 Arding Road and New England Highway

The intersection of Arding Road with the New England Highway is adequate for all movements, with only vehicles exiting Saumarez War Service Road experiencing less than Level of Service (LOS) A during the peak hour. The LOS for each movement is summarised below for the existing intersection as well as for the 10 year design case, with both examples also being checked with and without the development generated traffic. It can be seen that there is not expected to be any reduction in LOS at the intersection across the next 10 years, either with or without the development generated traffic.

Lane	Existing	2032	Existing + Dev	2032+ Dev
Arding Road	A	A	A	A
NEHN R	A	A	A	A
NEHN T	A	A	A	A
NEHN L	A	A	A	A
SWS Road	B	B	B	B
NEHS L+T	A	A	A	A
NEHS R	A	A	A	A

The impact on the intersection is negligible, with the maximum impact being for vehicles exiting Saumarez War Service Road, with delay increasing from an average of 15.7 seconds currently to an average of 18.9 seconds in 2032 with the addition of development generated traffic.

3.4.3.1 Safe Intersection Sight Distance (SISD)

SISD is the minimum standard which should be provided on the major road at any intersection. Values for SISD are defined by the Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2021) (AGRD04A). The SISD depends on the operating speed at the intersection location. For traffic approaching the intersection on the New England Highway, this is 100 km/h.

For a design speed of 100 km/h and a reaction time of 2.0 seconds, the minimum SISD required is 181 m. The available sight distance is in excess of 300 m. Note that even for a slower reaction time of 2.5 seconds and a design speed of 110km/h, the recommended minimum SISD is 300m.

In accordance with AGRD04A, SISD for trucks is calculated using the following formula:

$SISD_{TRUCK} = [(D_T \times V) / 3.6] + [V^2 / (254 \times (d + 0.01a))]$

Where: D_T = Decision time = 3s observation time + 2s reaction time = 5 seconds (AGRD03)
V = operating speed = 100 km/h
d = coefficient of deceleration (Table 5.3 of AGRD03) = 0.29 for trucks
a = longitudinal grade in % = 3% (estimated worst case southbound traffic)
Thus $SISD_{TRUCK} = [(5 \times 100) / 3.6] + [100^2 / (254 \times (0.29 - 0.03))] = 290$ m

Therefore, the available sight distance at the proposed intersection in both directions is ample for design speeds greater than those anticipated.

3.4.3.2 Minimum Gap Sight Distance (MGSD)

The worst case MGSD is for vehicles turning right out of Arding Road onto the New England Highway, where the MGSD according to AGRD04A Table 3.5 and Table 3.6 is 139 m for an approach speed of 100 km/h and critical gap acceptance time of 5 seconds. The required sight distance is easily achieved at the intersection and during peak hour traffic observations on Thursday the 19th of October, the required 5 second critical gap occurred often, indicating that the intersection has the capacity to safely provide for the vehicle turning movements as per the existing condition. Even if they critical gap acceptance time is increased to 8 seconds, the MGSD is 278 m, which is comfortably achieved at the site.

3.5 Proposed Access Road

The proposed access road will connect directly to Rose Hill Road as an unsealed driveway connection similar to the existing arrangement. This access connection and segment of Rose Hill Road will be upgraded and stabilised to enable safe passage of truck and trailer and long-term stability of the road pavement. The internal road design is to include provision for the largest likely design vehicle to turn within the property and thus enter and exit in a forward motion. Provision for parking and circulation should also be considered.

It is noted that some haulage trucks may be a prime mover and semi-trailer. This has been used as the design regular access vehicle for assessment of the site access due to the wider turning path of this vehicle as compared to a truck-and-dog combination. The design vehicle for occasional access is the proposed SRD240X Mobile Wash Plant with prime mover.

3.6 Parking

Parking demand associated with the proposal is very low and all parking supply will be on site. There is expected to be one employee on site and unlikely to be multiple haulage trucks arriving simultaneously. The detailed design will need to specify the number of parking spaces to be provided, including circulation and manoeuvring areas, in accordance with AS 2890.

4. Traffic Impact of Proposal

4.1 Traffic Efficiency

In accordance with the RTA (now TfNSW) *Guide to Traffic Generating Developments* (the RTA Guide, 2002), an important consideration in determining the impact of a development proposal on the road system is to assess the effect on traffic efficiency, the objective of which is to maintain the existing level of service. The level of service (LOS) is used as a performance standard, assessing quantitative effects of factors such as speed, traffic volumes, geometry, delays and freedom of movement. LOS A is the top level, essentially representing free flow conditions where the drive is unaffected by the presence of others in the traffic stream. LOS F is the lowest level, representing forced flow, where the amount of traffic approaching the study area exceeds that which can pass it.

For intersections, traffic modelling using software such as SIDRA Intersection can be used to estimate the delays and LOS likely to be experienced during the peak hour. A model has been prepared for the intersection of Arding Road and the New England Highway based on existing geometry and the worst-case traffic data in **Section 2.2**, applying a 1.2% annual growth rate to achieve a ten year design-horizon and adding in the expected traffic generated by the development.

The results showed that the existing intersection is expected to operate at LOS A for the year 2032 with no decrease in LOS as a result of the development. Further, the additional traffic does not exceed the maximum volumes recommended for the given road types. As such, the proposal is not expected to have any noticeable impact on traffic efficiency.

4.2 Amenity

Rose Hill Road currently only services a handful of residential properties, while Arding Road provides connection to the wider road network for 20-30 additional properties. The nearest dwelling to the proposed quarry is 700 m to the north east, with only one other residential property within a 1 km radius of the operation. The Uralla town centre is about 10 km from the proposed quarry, including the various businesses, residences and other facilities of Uralla.

The small increase in traffic will result in a minimal traffic noise increase. Given the distance of the proposed operation from the nearest residential dwelling, this increase is not expected to be an issue with regard to amenity. The environmental expectations of surrounding residents will not be significantly altered by the additional traffic movements of seven vehicles during the peak hour.

Furthermore, the additional traffic will not impose any major social or physical detriment upon the local residents and road users. The local road network is currently used by heavy vehicles from the existing quarry and other industrial and agricultural businesses nearby and additional heavy vehicles will not have a significant impact.

4.3 Safety

As per **Section** Error! Reference source not found., SISD has been checked for the relevant intersections and considered to be ample. The layout and geometry of the existing intersections have also been assessed and are considered adequate to cater for the existing and proposed traffic volumes and vehicle types.

Additional heavy vehicle traffic averaging twenty vehicle trips per day with an expected maximum of 62 trips per day are unlikely to raise any adverse safety issues for local transport and users of the local and regional road network.

To ensure safety of all road users is maintained, it is recommended that the 'Give Way signage and linemarking be installed on Mt Butler Road at the intersection with Arding Road to clarify right of way and ensure vehicle conflicts do not occur as a result of the increase in traffic at the site.

4.4 Road Pavement

The existing road pavement condition is fair along the principal haulage route. Additional heavy vehicle usage will increase the wear and tear of the existing pavement.

The existing traffic on Arding Road causes approximately 6.4 x 10^5 ESAs of traffic loading on the existing pavement for a 10 year design horizon. With the additional traffic as a result of the proposed development the load will increase to around 8.1 x 10^5 ESAs.

Assuming a subgrade CBR of between 3 and 10, according to Figure 8.4 ofAustroads *'Guide to Pavement Technology: Part 2 – Pavement Structural Design'*, 2017, the additional traffic would only require an increase in pavement thickness of around 20 mm. It is expected that the existing pavement is of suitable thickness and any additional wear and tear as a result of the development generated traffic can be managed through an appropriate increase in the level of road maintenance including road reseals, patching and rehabilitation when necessary.

4.5 Public Transport

The proposed development will not generate any demand for the public transport network and will not impact on the existing public transport system operating in the area.

4.6 Pedestrians and Cyclists

There is no measurable pedestrian traffic in the vicinity of the site and minimal pedestrian activity along the haulage route. The existing and future pedestrian network will not be negatively impacted by the proposal.

5. Summary and Recommendations

Following investigations of the existing conditions and assessment of the proposal in relation to the existing road network from the perspective of all road users for a 10-year design horizon, it is considered that the proposed quarry operation on Rose Hill Road near Uralla will have minimal negative impact. Specifically, the following conclusions have been made:

- On average, the development is expected to generate 20 heavy vehicle trips per day (10 in, 10 out) plus two passenger vehicle trips (one in, one out). A maximum of 62 trips per day has been estimated, assuming that some days will be busier than others. The peak hour trip has been assumed to be 7 vehicles per hour, comprising 85% heavy vehicles.
- Traffic modelling using SIDRA Intersection 9.0 indicates that the expected level of service offered by the intersections along the proposed haulage route will continue to be LOS A for all movements. Calculations were based on traffic data provided by USC and on-site counts carried out by GeoLINK, increased to the year 2032 using a growth rate of 1.2% compounded annually.
- The development will increase the volume of heavy vehicle traffic on Rose Hill Road, Arding Road and the New England Highway. However, assuming regular maintenance of the roads by the local roads authority and TfNSW, these roads are considered to be in suitable condition and geometry to accept the additional traffic and have the capacity to do so. The additional traffic volumes are not expected to noticeably shorten the design life of the road pavements along the proposed haulage routes.
- The small increase in traffic will result in a minimal traffic noise increase. However, it is not anticipated that the environmental expectations of surrounding residents will be significantly altered by the additional traffic movements of an average of two vehicles per hour.
- The existing access road location is considered suitable in terms of sight distance available. There is ample space and suitable topography within the site to provide a compliant and functional internal road design.

  Recommendation: *The access road should be constructed according to the concept design provided in* Error! Reference source not found.*. Internal roads, circulation and parking areas should be designed in accordance with the relevant standards for the largest likely design vehicle. All vehicles should be able to enter and exit the site in a forward movement. The pavement and surface shall be designed for all-weather access.*
- No upgrades to the existing road network are considered warranted by the proposed development. However, some additional signage may be required to maintain road safety.

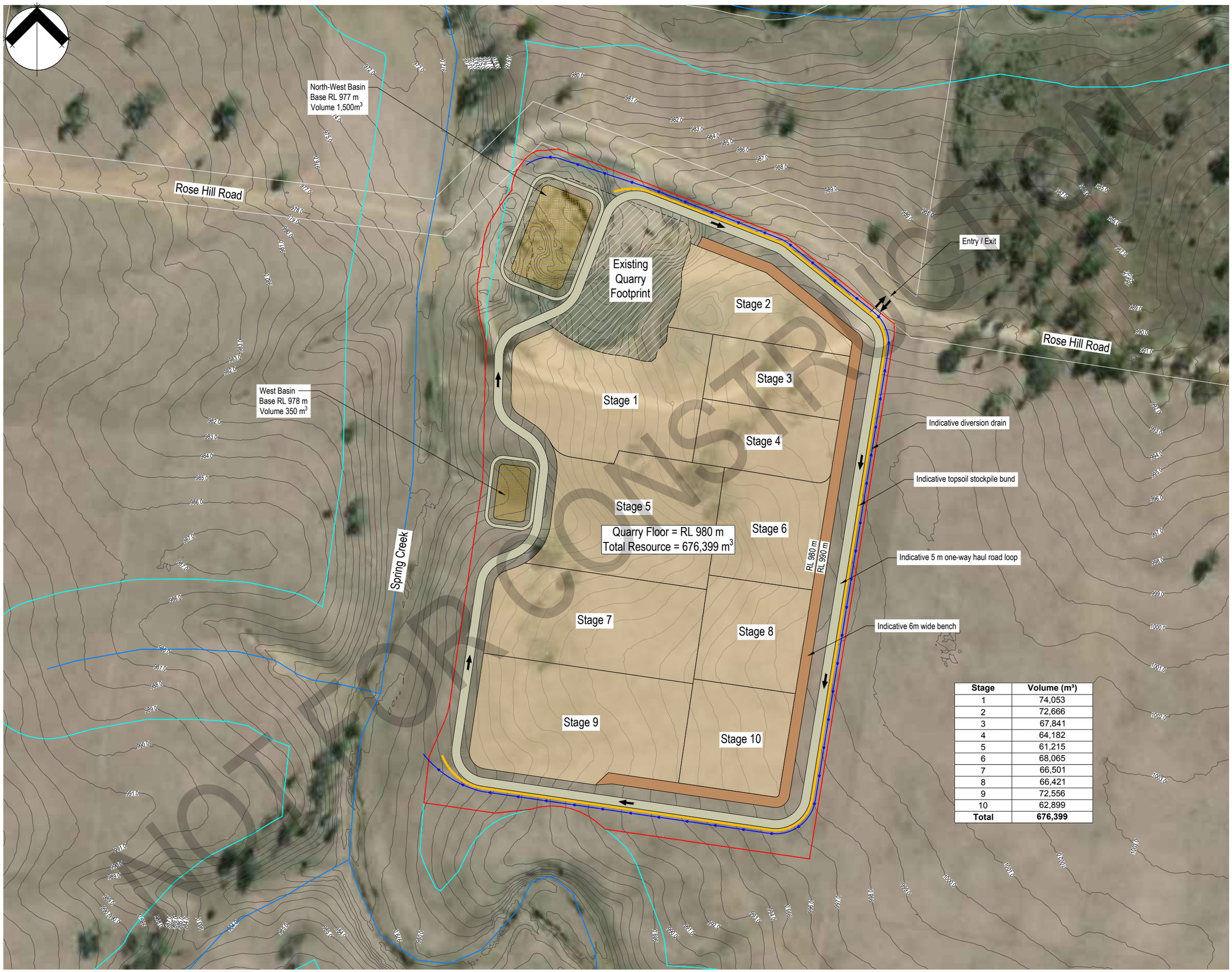
  Recommendation: *Installation of* 'Give Way' signage and linemarking on Mt Butler Road at the intersection with Arding Road.

The proposal is unlikely to generate pedestrian and/or cycle traffic or demand for public transport. It is also unlikely to impact on existing and future non-motorised traffic or public transport.

Copyright and Usage

Appendix A

Proposed Site Staging Plan



Stage	Volume (m³)
1	74,053
2	72,666
3	67,841
4	64,182
5	61,215
6	68,065
7	66,501
8	66,421
9	72,556
10	62,899
Total	**676,399**

LEGEND

- Existing contours at 1 m intervals
- Watercourse
- 40 m buffer from water course
- Quarry concept footprint
- Topsoil stockpile bund
- Diversion drain

Note:
Quarry designs must be checked and finalised at detailed design

NOT FOR CONSTRUCTION

Rev.	Description	Date	Des.	App.	Chk.

Amendments

GeoLINK environment | engineering | planning | design

www.geolink.net.au

Lennox Head Office
PO Box 119
Lennox Head NSW 2478
Tel: 02 6687 7666

Coffs Harbour Office
PO Box 1446
Coffs Harbour NSW 2450
Tel: 02 6651 7666

Armidale Office
PO Box 1267
Armidale NSW 2350
Tel: 02 6772 0454

Lismore Office
PO Box 229
Lismore NSW 2480
Tel: 02 6621 6677

Email: info@geolink.net.au

quality solutions **sustainable** future

Project Title

Williams Quarry

Client

Ducats Earthmoving Pty Ltd

Designed	KWG	Drawn	KWG	Checked	PJS
Approved	TJC	Date	1/11/2022		

XREFs

Scale

metres 0 10 20 30 40 50

Drawing Title

Concept
Overall Staging Plan

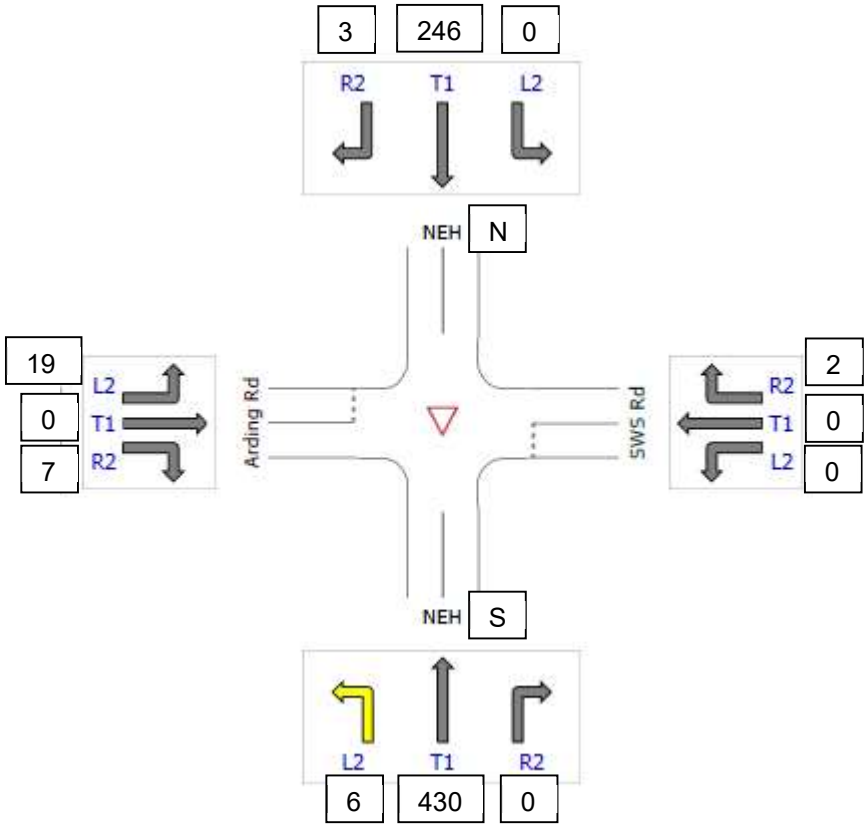
4079-1016

Drawing Number *Revision*

4079/SK001-2

Appendix B

Traffic Count Data



19/10/2022 (Wednesday)

Movement	8:00 AM	8:15 AM	8:30 AM	8:45 AM	Total (veh/h)
Arding L	8	5	2	4	19
Arding T	-	-	-	-	0
Arding R	3	1	3		7
NEHS L	-	1	1	3	6
NEHS T	121	114	119	76	430
NEHS R	-	-	-	-	0
SWS L	-	-	-	-	0
SWS T	-	-	-	-	0
SWS R	-	-	1	1	2
NEHN L	-	-	-	-	0
NEHN T	60	53	66	67	246
NEHN R	1	1	-	1	3