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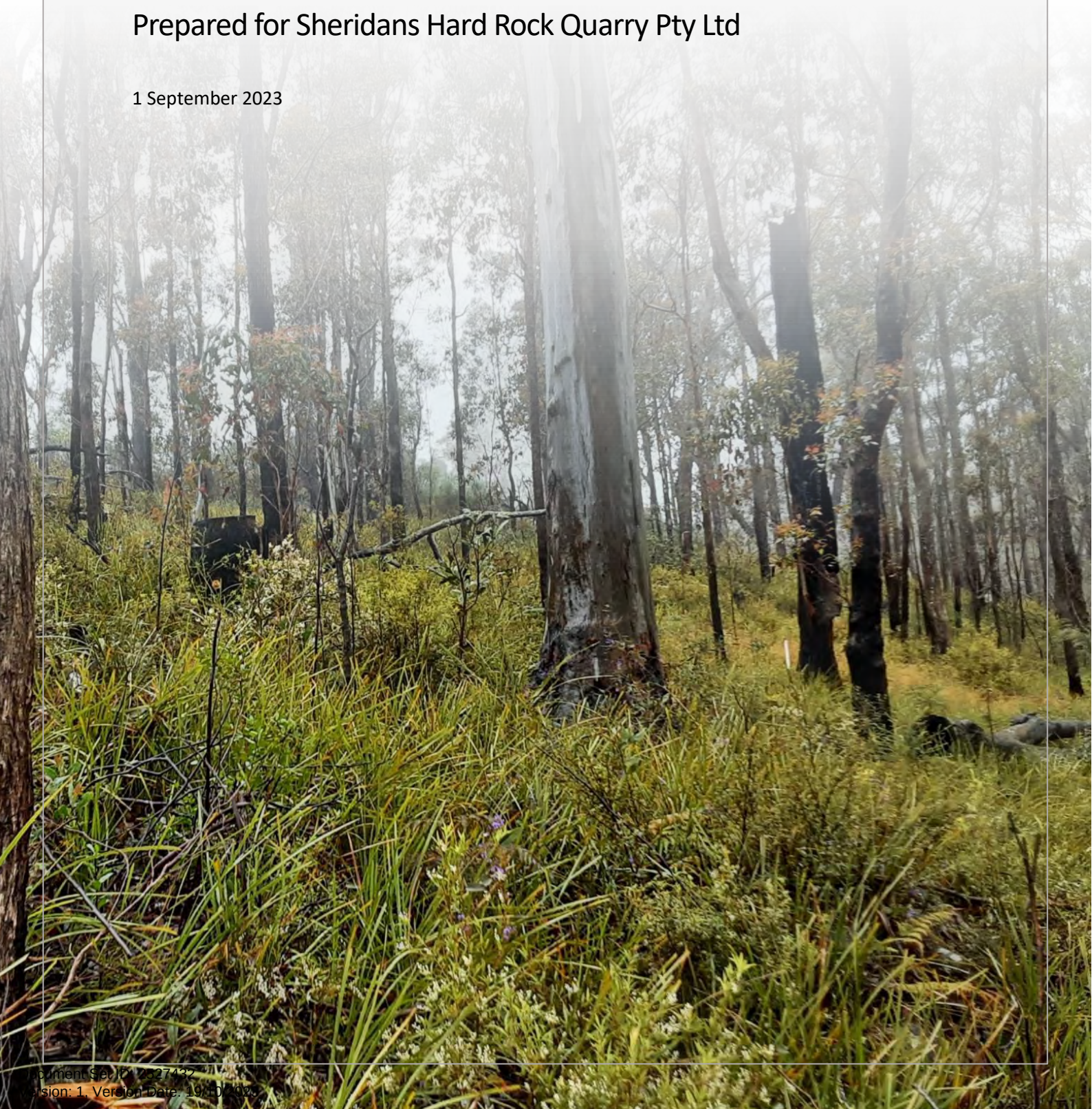
Ecological Assessment Report

Fahey's Pit Continued Operations Project

Prepared for Sheridans Hard Rock Quarry Pty Ltd

1 September 2023



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Front cover photograph: Vegetation adjacent to existing quarry operations at Fahey's Pit.

Table of Abbreviations

APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
DBH	Diameter at Breast Height over bark
DCP	Development Control Plan
EC	Ecological Community listed under the EPBC Act
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	Endangered Ecological Community
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
TBPDC	Threatened Biodiversity Profile Data Collection
TEC	Threatened Ecological Community listed under the BC Act
Vegetation SEPP	*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (NSW)

Executive Summary

Bower Ecology was engaged by Sheridans Hard Rock Quarry Pty Ltd to prepare an Ecological Assessment Report for the Fahey's Pit Continued Operations Project (the Project). The quarry is located at 9720 Armidale Road, Tyringham, New South Wales (NSW), on Lot 31 DP 1203488 within the Clarence Valley Council LGA. The Project involves a proposed expansion to enable an increase in the quarry's output to approximately 150,000 tonnes per annum of quarry material. The proposed expansion would result in an enlarged quarry footprint (total 4.1 ha) and deepen the existing quarry.

This report has been prepared to assess potential impacts of the Project on biodiversity values in the area. The assessment also meets the requirements of the Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEARs) from 30 August 2022.

Native vegetation surveys within the proposed expansion area identified one Plant Community Type (PCT): 3288 "*Northern Escarpment Messmate Moist Grassy Forest*". PCT 3288 is not associated with a Threatened Ecological Community (TEC). The total area of PCT 3288 proposed to be cleared is 0.83 ha. The remainder of the quarry footprint consists of the existing quarry.

If a Biodiversity Development Assessment Report (BDAR) was required, the project would be assessed under the small areas methodology. Hence surveys targeting species at risk of a Serious and Irreversible Impact (SAII) were undertaken by Bower Ecology in September 2022, and January, March, and April 2023. The methods were considered suitable for potential detection of several other threatened species.

Five threatened species were recorded, namely:

- *Dasyurus maculatus* (Spotted-tail Quoll),
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle),
- *Scoteanax rueppellii* (Greater Broad-nosed Bat),
- *Tyto novaehollandiae* (Masked Owl), and
- one target SAII species – *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

No breeding habitat for either the Large Bent-winged Bat or Masked Owl was found to occur within the subject land. No Serious and Irreversible Impacts are predicted to occur due to the proposed quarry expansion.

No TECs are present and vegetation disturbance has been minimised. The Fahey's Pit quarry expansion has been designed to avoid and minimise impacts wherever possible through various design iterations. Further, a range of mitigation and management measures are proposed to reduce biodiversity impacts during vegetation clearing and operations. Revegetation of the existing quarry and proposed expansion area will be undertaken progressively over the life of the Project.

The strategy to offset the clearance of 0.83 ha of PCT 3288 for the proposed quarry expansion is to be resolved following discussion with Council.

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Details and experience of authors and contributors

Table 1: Details and experience of authors and contributors

Name	Position/Role	Tasks performed	Relevant qualifications
S. Jarman	BAM Accredited Assessor (BAAS 18018), Principal Ecologist Field Ecologist	Client liaison, survey planning, site inspections and surveys, BAM calculations, document review	B. Env Mgmt (Hons 1); Masters of Conservation Biology.
N. Fraser	Co-author	Report preparation, BAM calculations	B.Sc. (Hons1)
L. Drummond	Field Ecologist	Setting up camera traps and Anabat detectors	B.Sc. (Hons, Ecology)
H. England	Field Ecologist	Targeted threatened fauna surveys	B.Sc. (Ecology and Zoology)
G. Ford	Ecologist	Anabat data analysis	B.A.Sc. GDRM
G. McGregor	Ecologist	Targeted threatened fauna surveys, document review	B. Env Sc. (Hons1)
J. Fraser	GIS	Figure preparation	B.Sc. (Hons)

1 Introduction

Bower Ecology was engaged by Sheridans Hard Rock Quarry Pty Ltd (the Client) to prepare an Ecological Assessment Report for the Fahey's Pit Continued Operations Project (the Project). The quarry is located at 9720 Armidale Road, Tyringham, New South Wales (NSW), within the Clarence Valley Council LGA.

Fahey's Pit is currently used as a source of quarry rock by Sheridans Hard Rock Quarry Pty Ltd, who also operate a quarry at Hernani, located on the Dorrigo Plateau some 8 kilometres (km) away. The quarry material won from Fahey's Pit is used for a range of purposes; primarily as a road base or select fill. The existing quarry footprint is shown in Figure 3.

The Project is 'designated development' under s.4.10 of *the Environmental Planning and Assessment Act 1979* (EP&A Act), requiring the preparation of an Environmental Impact Statement (EIS) as it triggers three (3) of the criteria listed in Schedule 3 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) – item 19 Extractive Industries. Namely, the proposal seeks to extract more than 30,000 cubic metres (equivalent to 69,000 tonnes) per annum of quarry material; is located within 40 metres (m) of a 1st order watercourse; and is within 500 m of another extractive industry.

As the Project does not propose to clear an area of vegetation in excess of the vegetation clearing threshold (i.e., >1 ha for the minimum lot size of 100 ha), does not directly impact biodiversity values mapping, does not contain areas of outstanding biodiversity value, and is not likely to significantly affect threatened species or ecological communities, or their habitats, the Biodiversity Offset Scheme does not apply, and a Biodiversity Development Assessment Report (BDAR) is not required.

The five-part test of significance, in accordance with Section 7.3 of the NSW *Biodiversity Conservation Act 2016* (BC Act), is provided in Appendix A.

This report has been prepared to assess the ecological impacts of the proposed quarry expansion. The Biodiversity Assessment Method (BAM) (Department of Planning, Industry and Environment [DPIE] 2020) was used to guide survey methodology and the structure of this assessment at the Client's request.

The Department of Planning and Environment (DPE) Secretary's Environmental Assessment Requirements (SEARs) were released on 30 August 2022. The requirements are included in Appendix B and discussed in Section 3 of this report.

1.1. Proposed Development

Fahey's Pit is located on Lot 31 DP 1203488 (9720 Armidale Road, Tyringham, NSW) (Figure 6). It is within the:

- Clarence Valley Council LGA,
- NSW North Coast IBRA Region and Chaelundi IBRA Subregion, and
- Dingo Spur Metasediments Mitchell Landscape; however, it is also in close proximity to the Dorrigo Basalts (NSW Government, 2023e).

The lot is already utilised as an operating quarry and has a total area of 11.46 ha. Figure 4 and Figure 5 show the local context, including adjacent land uses.

The land proposed to be used for ongoing quarrying and quarry expansion is not zoned for conservation purposes, nor has it been identified in the LEP as having any terrestrial habitat or riparian values. Rather, it is zoned RU1 Primary Production under the provisions of Clarence Valley Local Environmental Plan (LEP) 2011, which permits "extractive industries" as defined.

The owners propose to continue quarrying the resource from Fahey's Pit at an increased rate of extraction and processing up to 150,000 tonnes per annum. To enable this increase in the quarry's output, the proposed development would involve an upgrade of a section of the internal access road, expansion of the quarry footprint and deepening the existing quarry. The area subject to the modification (Figure 3) totals approximately 4.09 ha. In addition. There is 0.14 ha of land with vegetation to be retained.

Two stages of the development are proposed as per Figure 1 and Figure 2, both having the same subject land area.

Site-based run-off will be collected within onsite sediment basins for reuse for product moisture, dust control and rehabilitation works, or eventual discharge offsite within pH, suspended solids and oil and grease criteria under an existing Environment Protection Licence (EPL). With regard to the two proposed development stages, the following will apply to the sediment basins:

- Stage 1: Upper and lower sediment basins provided (Figure 1).
- Final Stage: Upper sediment basin only to be retained (Figure 2).

No fixed infrastructure would be retained on site upon closure, except for the upper sediment basin and erosion controls.

The existing quarry haul route which provides access to Armidale Road would continue to be used. The proposed expansion would extend the operational life of the quarry by up to 20 years. Rehabilitation of the existing quarry and the proposed expansion area would be undertaken progressively as extraction of each bench is completed.

Other key components of the project are provided in Table 2, whilst the ultimate plan of the project is provided in Figure 2.

Table 2: Key project components

Quarry component	Summary description
Extraction Method	Bulldozer used to remove weathered rock, with drill and blast used for unweathered rock.
Resource	Weathered and unweathered siltstone, rare lithofeldspathic wacke and conglomerate, comprising Moombil Siltstone geology.
Disturbance area	A lateral expansion of existing quarry to include all cleared areas, with extraction of up to about 42 metres in depth. Total quarry area approximately 4.1ha ie. 35.7% of the total Project Site area.
Processing	Crushing and screening of quarry resource on a campaign basis. Mobile plant and equipment to be brought to the site when required.
Annual extraction rate	Up to 150,000 tonnes per annum.
Transport	Access to the quarry from Armidale Road, the existing quarry haul route. A mix of truck and dog combination, with larger and smaller trucks used where road weight limits allow. It is anticipated that the quarry may generate up to 60 loaded quarry trucks per day.
Waste management	Minimal waste materials are anticipated to be generated.
Hours of operation	Limited to 7.00am to 6.00pm Monday to Friday (ie. 11 hours operation per day) and 7.00am to 1.00pm on Saturdays (ie. 6 hours operation). Hours of blasting are to be restricted to 9.00am to 3.00pm Monday to Friday.
Total recoverable resource and project life	Preliminary estimates indicate that the total quarry resource is estimated to be approximately 730,000 cubic metres-equivalent to about 1.8 million tonnes (Mt).
Workforce	Up to 4 employees working on site + contractors (eg. blasting contractor, machinery servicing contractors, refuelers).
Key environmental issues	Impacts relating to noise, blasting impacts, rehabilitation and traffic. Rehabilitation of existing quarry workings will also be involved.

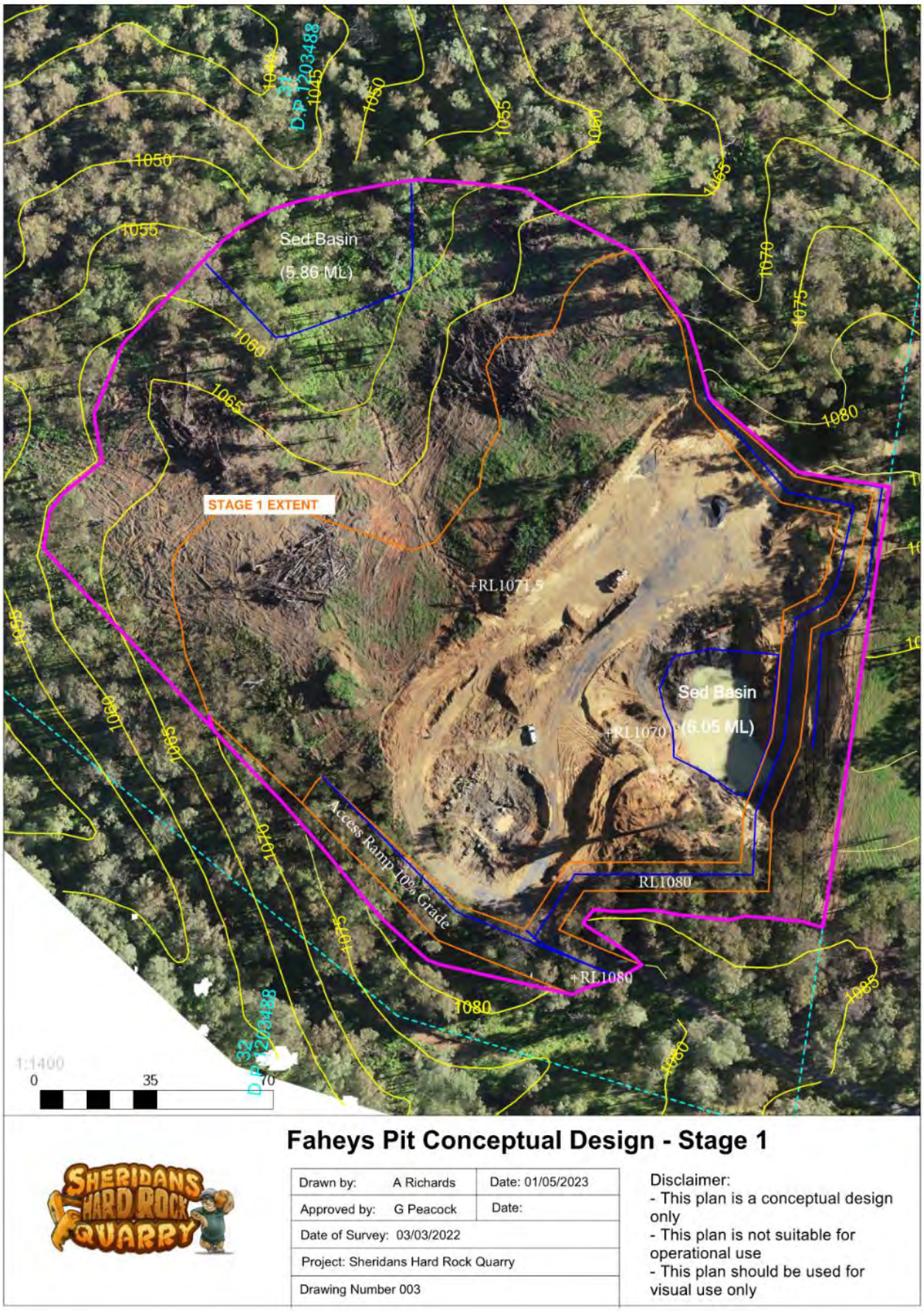

Figure 1: Conceptual Design of Stage 1

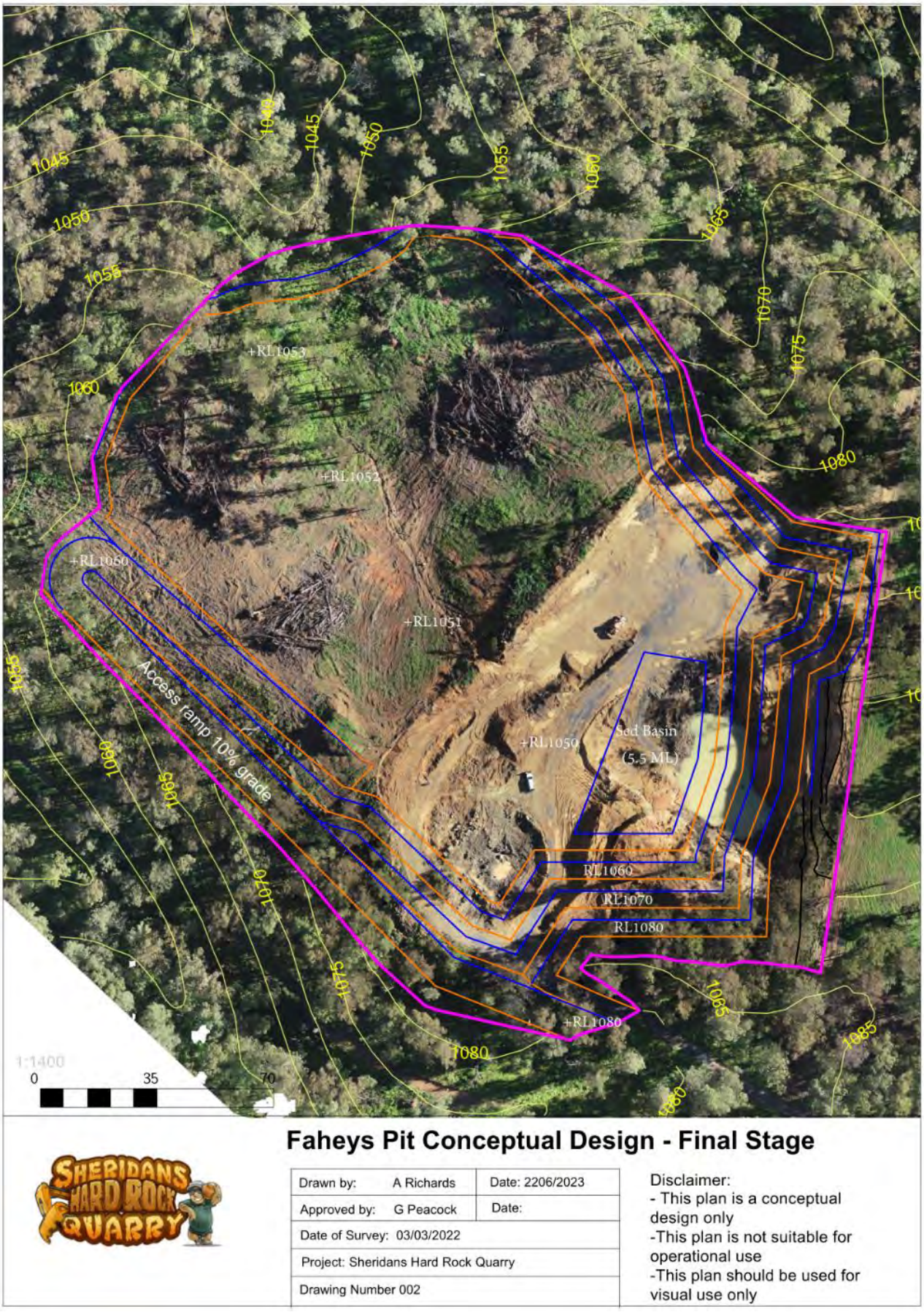

Figure 2: Conceptual Design of the Final Stage

1.2. General Description of the Subject Land

As shown in Figure 3, the subject land for the modification (4.09 ha) includes approximately:

- 1.66 ha of the pre-existing quarry footprint,
- 1.60 ha of previously cleared land, and
- 0.83 ha of vegetation proposed to be cleared.

In addition, there is 0.14 ha of vegetation to be retained within the total quarry footprint.

Only the 0.83 ha of extant vegetation proposed to be cleared is the subject of this ecological assessment report.

The previous vegetation clearing across the site (1.60 ha) was undertaken prior to the ecological surveys being conducted. This clearing was noted in Section 2.2.1 of the Request for SEARs. Bower Ecology has been instructed that lawful land clearing was undertaken on the lands below the existing working quarry area. Further detail is provided in the EIS (Outline Planning Consultants, March 2022), and the local context is shown in Figure 4 and Figure 5.

1.3. Sources of Information

This report relies on information from field surveys completed in January, March and April 2023 (Sections 4.2 and 5.3), as well as the following documents relevant to the proposed expansion:

- The Request for SEARs (Outline Planning Consultants, March 2022) and associated SEARs that were subsequently released by the Department of Planning.
- Environmental Impact Statement – Fahey's Pit Continued Operations Project (Outline Planning Consultants, 2023).
- Fahey's Pit Impact Assessment – Air Quality Assessment (Vipac Engineers and Scientists Limited, 2023)
- Proposed Expansion of Fahey's Pit Quarry Activities – Traffic Impact Assessment (StreetWise Road Safety and Traffic Services Pty Ltd, 2022).
- Fahey's Pit Noise Impact Assessment (Vipac Engineers and Scientists Limited, Spring Hill Australia, 2022).

Published databases used in this assessment include:

- BioNet Atlas (DPE, 2023b),
- Threatened Biodiversity Profile Data Collection (TBPDC) (Department of Planning and Environment [DPE], 2023c), and
- BioNet Vegetation Classification (DPE, 2023d).

All sources of information used during the compilation of this report are included in the list of References.

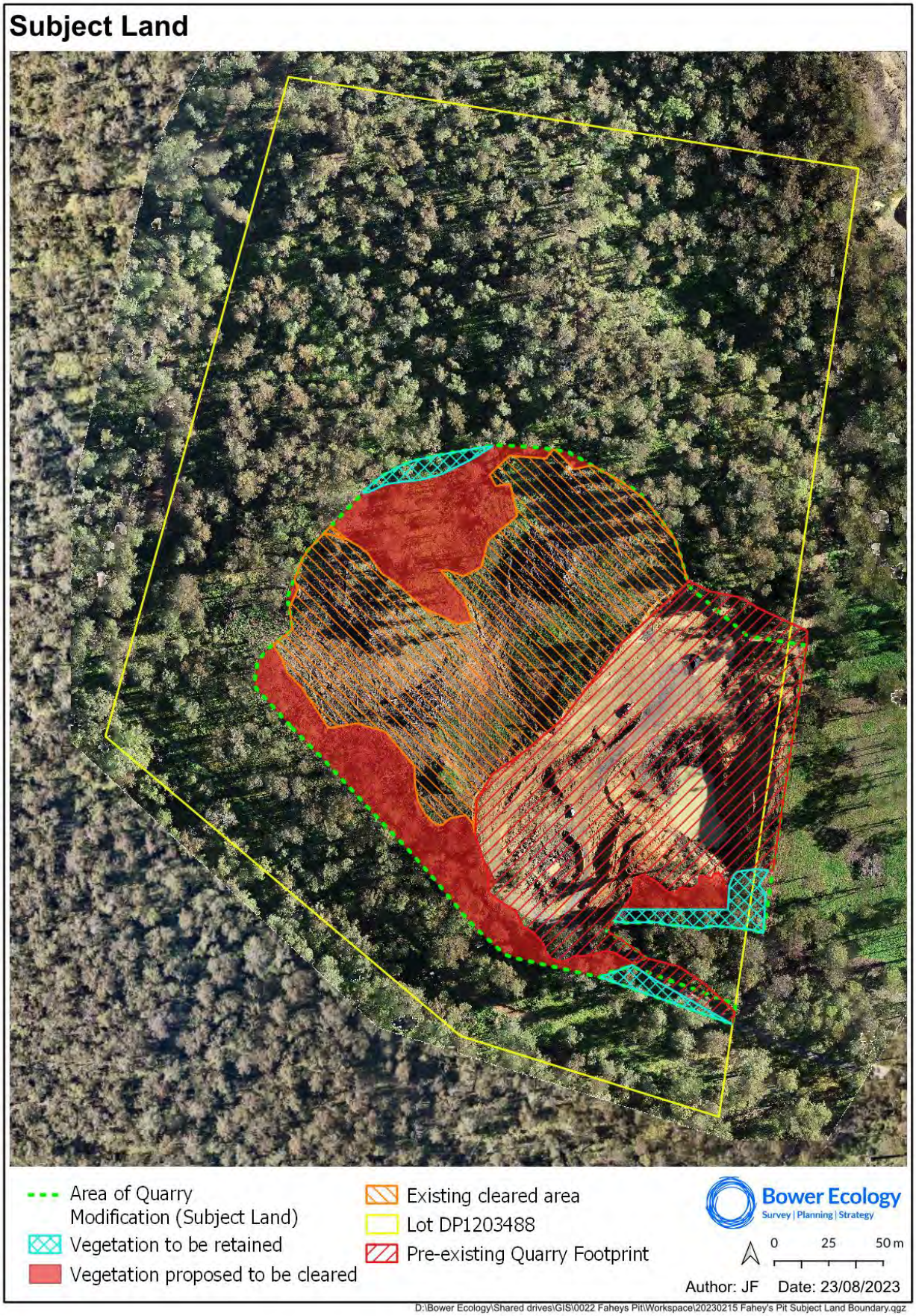

Figure 3: Subject Land and Existing Quarry Footprint

Figure 4: Local Context

Figure 5: Drone footage of the existing pit

2 Landscape Features

2.1. Site Context

2.1.1. General

Fahey's Pit Quarry falls within the NSW North Coast IBRA region and the Chaelundi IBRA sub-region (NSW Government, 2023d) and is located on the western edge of the Dorrigo Plateau, west of the township of Dorrigo (Figure 6).

The site consists of a cleared area immediately adjacent to the existing Pit, with an area of native eucalypt forest to the north-west. The site topography is flat to undulating within the existing quarry, with steeper slopes surrounding (Figure 5). Elevation ranges from 1,095 m Australian Height Datum (AHD) at the top of the quarry, near the southern end of the quarry, to 1,057–1,083 m AHD within the quarry and as low as 1,025 m AHD where a drainage line leaves the site.

The nearest Bureau of Meteorology (BoM) station is at Tyringham (BoM Station 59118), approximately 6 km north of the site. The mean annual rainfall is 1,141 mm (BoM, 2023). Average temperatures range from about 13.1 to 28.2 °C, based on mean monthly temperatures (BoM, 2023, BoM Station 059140 at Dorrigo).

2.1.2. Rivers and Streams

Several ephemeral drainage lines (first-order streams) have been identified within 40 m of the quarry pit, including one within the proposed quarry footprint (Figure 6,Figure 8Figure 9). A first-order drainage line runs across the internal quarry access route south of the existing Pit and flows roughly south-west. Two additional first-order drainage lines, emptying from roughly the site centre, are located north of the existing Pit (Figure 6). A second-order stream drains west from these last two first-order drainage lines. The closest permanent waterway is Merchin Creek, located approximately 250 m north-west of the site.

The drainage line within the quarry footprint has no clearly defined banks, flowing water was only observed during one site survey (April 2023) and the vegetation does not appear to support flora that are adapted to permanently wet areas (such as streams Figure 8).

While the first order streams are not permanent water sources, they direct runoff into Merchin Creek and support the hydrological function of downstream areas within the Clarence River catchment.

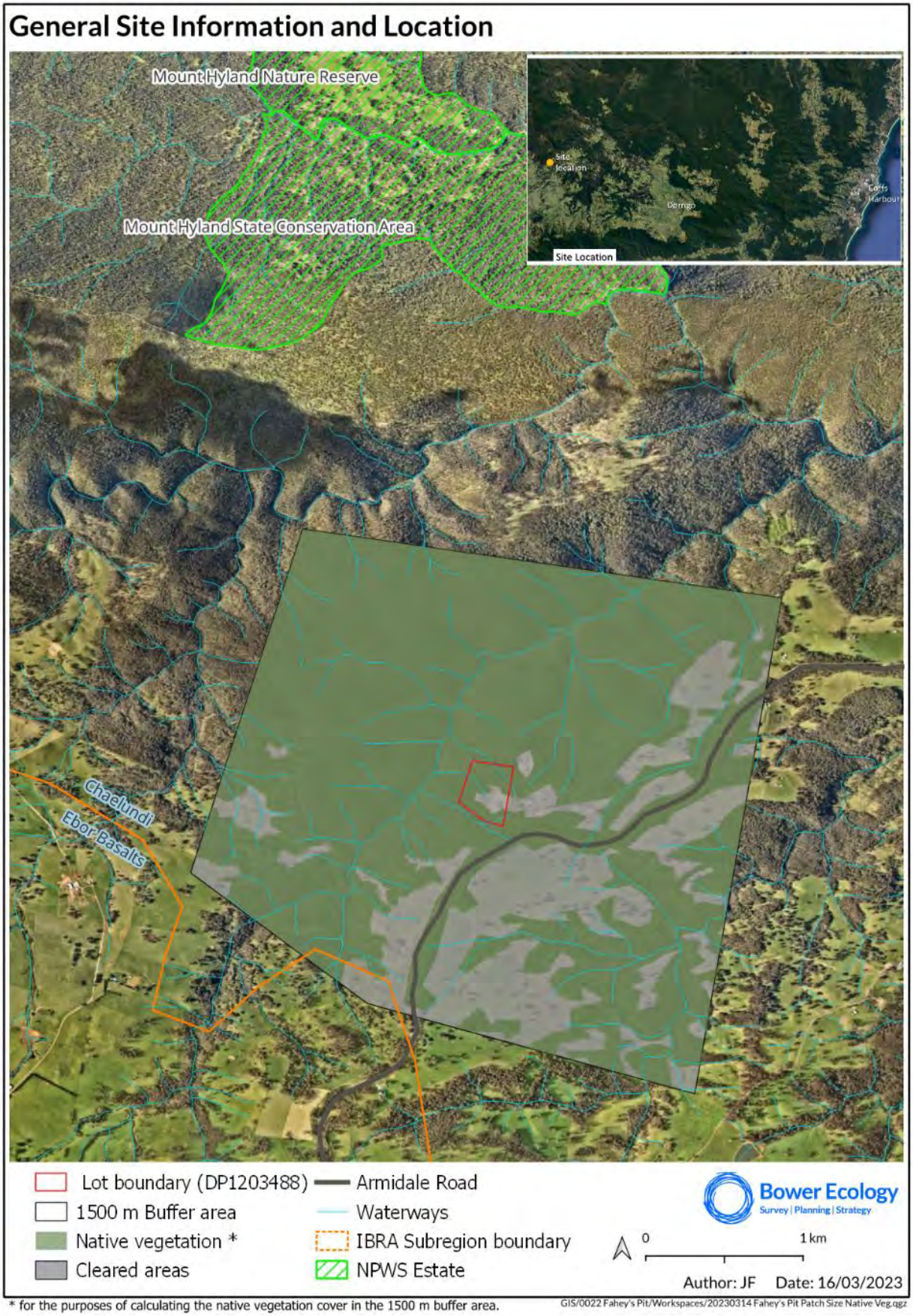

Figure 6: Location map including details of IBRA sub-regions, native vegetation, and lack of areas of outstanding biodiversity value. The quarry falls within the Clarence Valley Council LGA

Figure 7: Mitchell Landscapes

Figure 8: Looking south-west from the quarry edge to the location of the first order stream

Figure 9: Looking uphill, south-east towards the existing quarry from the middle of the first order stream

2.1.3. Native Vegetation Cover

Existing vegetation within the subject land is native and where it exists, is dominated by woody Plant Community Types (PCTs). The 1,500 m buffer established around the proposed expansion area (the Assessment Area) contains approximately 850 ha of native woody vegetation (78% of the Assessment Area).

2.1.4. Habitat Connectivity

Native vegetation extent and composition were determined by field survey and inspection of current aerial imagery. Connectivity of woodland habitat was assessed where gaps between discrete patches were 100 m or less. The site is directly adjacent to large areas of intact vegetation which provide connectivity to the Hyland State Forest (Figure 6Figure 7).

2.1.5. Geology and Soils

There are no areas containing karst, caves, cliffs, rocks, or other geological features of significance, within the project footprint.

The surface geology of the site is classified as Moobil Siltstone (NSW Government, 2022b), consisting of sedimentary weathered and unweathered siltstone. These metasediments are comprised of a thick turbidite sequence dominated by siliceous mudstone, lithofeldspathic wacke and siltstone with minor metabasalt, felsic volcanics, chert, and jasper.

The 'Suicide' Soil Landscape is the most prominent soil profile on the subject land. This consists of well-drained stony Yellow Earths to more than 1 m deep on crests and more stony structured Red Earths to more than 1.5 m deep on mid- and foot-slopes (Outline Planning Consultants Pty Ltd, 2023). The site does not have potential for acid sulphate soils and is not flood-prone.

2.1.6. Outstanding Biodiversity Values

No areas of outstanding biodiversity values (AOBV) overlay the project site.

2.1.7. Biodiversity Values Mapping

No areas of Biodiversity Values Mapping overlay the project site (Figure 10).

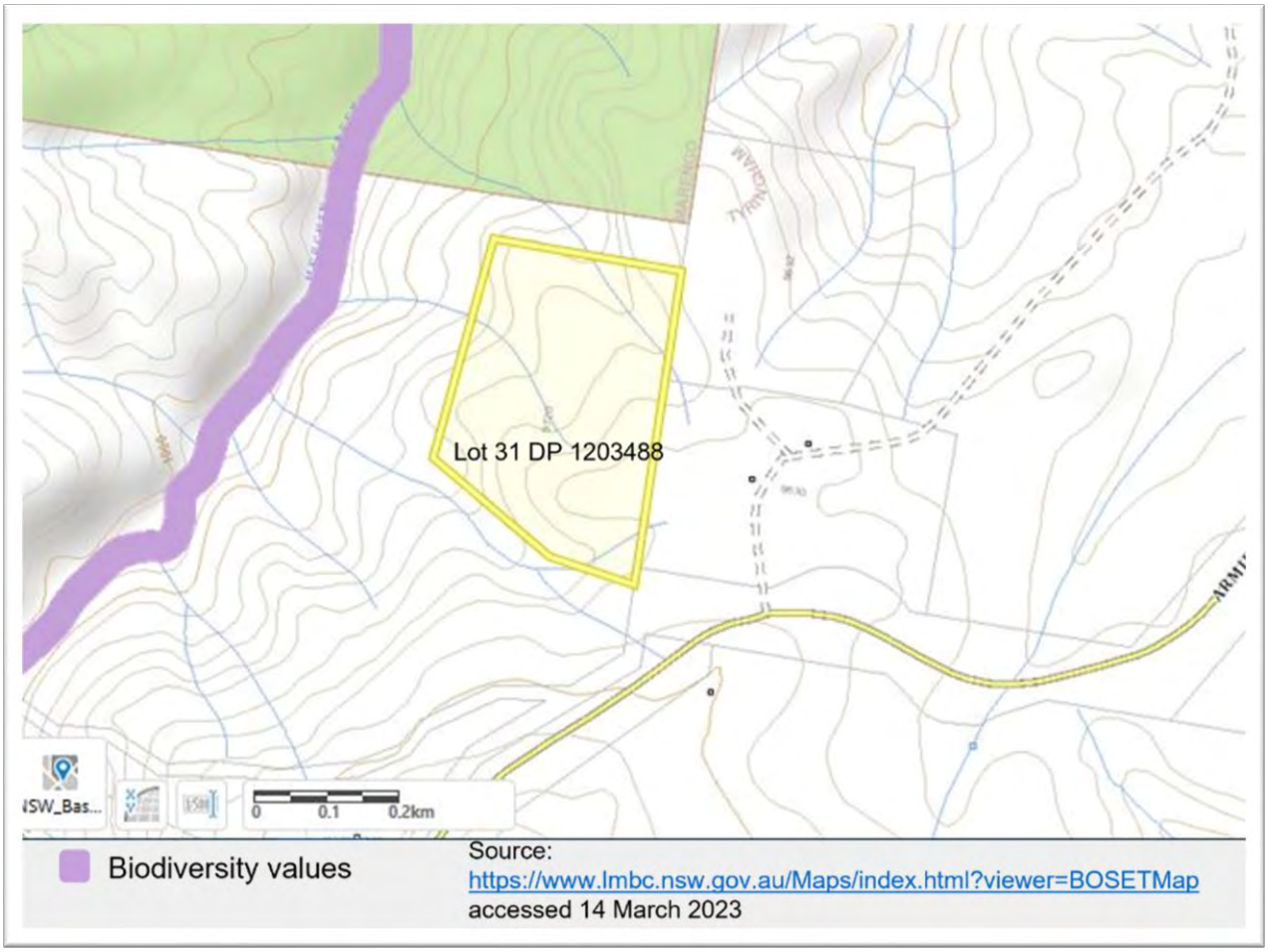

Figure 10: Biodiversity values map of the area surrounding the subject lot

3 SEARs

Table 3 summarises relevant SEARs requirements (related to biodiversity and rehabilitation) and also provides where the requirement is addressed within this report.

Table 3: Items requested in the SEARs, description, and section(s) of this report or the EIS in which item is addressed

SEARs item	Detail	Relevant section of ecological assessment report
Biodiversity, including	Accurate predictions of any vegetation clearing on site	1.2
	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*	4 to 9
	Detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	10, 11 and 12
	Demonstrate whether the proposed development is to be carried out in a declared area of outstanding biodiversity value	
	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.	2.1
	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	Appendix A

SEARs item	Detail	Relevant section of ecological assessment report
	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.	N/A
	A description of survey methodologies used, including timing, location, and weather conditions.	4.2 and 5.3
	Details, including qualifications and experience, of all staff undertaking the surveys, mapping and assessment of impacts as part of the EIS.	Table 1
	Identification of national and state listed threatened biota known or likely to occur in the study area and their conservation status.	Table 4 and Table 5
	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.	8 and 9
	A description of the residual impacts of the proposed development.	12
	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.	Appendix A
	The anticipated level of performance in meeting required environmental standards	13
Rehabilitation, including	A detailed description of the proposed rehabilitation measures that would be undertaken throughout the development and during quarry closure	11
	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	11
	Potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc)	11

4 Native Vegetation

4.1. Existing Information

A desktop review of the type and condition of vegetation on the site was undertaken using historical aerial photography, topographical mapping and existing vegetation mapping via the State Vegetation Mapping (State Government of NSW and DPE, 2022). As noted in Section 1.2, this report excludes the assessment of an area of vegetation that was recently cleared (Figure 3).

4.2. Vegetation Surveys

Two floristic plots were established in the area proposed to be cleared. Bower Ecology conducted surveys on 23 September 2022 to ground-truth information found during the desktop review. BAM plots were also established for the purpose of calculating the number of hollow bearing trees (HBTs). The location of the plots is shown in Figure 11.

4.3. Plant Community Types

Plant Community Types (PCTs) were mapped on the subject land in accordance with the BAM (DPIE, 2020), and with reference to State Vegetation Mapping (State Government of NSW and DPE, 2022), and the *BioNet Vegetation Classification* (DPE, 2023d).

Site surveys identified that 0.83 ha of 'good' quality PCT 3288 – Northern Escarpment Messmate Moist Grassy Forest is present within the area proposed to be cleared (as at the date of the survey; 23 September 2022). A single vegetation zone was mapped as the condition of PCT 3288 was consistent across the site. Areas within the subject land not mapped as PCT 3288 comprise previously cleared land (Figure 12 and Figure 13). The survey also confirmed that vegetation immediately adjacent to the subject land is PCT 3288 (at least within a 100 m buffer of the subject land).

One vegetation zone is therefore extant within the subject land: PCT 3288 in good condition as shown in Figure 11,Figure 12, andFigure 13.

4.3.1. PCT Justification

Although PCT 3278 is also mapped on site (State Government of NSW and Department of Planning and Environment, 2023d), PCT 3288 was judged the most appropriate PCT considering the vegetation and geology on site. In particular, *Eucalyptus obliqua* is the dominant canopy species across the site, with *Eucalyptus campanulata* also occupying a significant portion of this stratum. The presence of the small shrub *Leucopogon lanceolatus,* the vine *Hibbertia scandens*, and the ground layer species *Pteridium esculentum*, *Lomandra longifolia, Glycine clandestina,* and *Geranium potentilloides* also support the classification of the vegetation as PCT 3288. The surface geology of the site is classified as Moobil Siltstone (NSW Government, 2022b), further supporting the classification of PCT 3288, noted as occurring on soils derived from fine-grained sediments.

4.3.2. Percent Cleared Value

The 'Percent Cleared Value' is the percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification (DPE, 2023d). It is estimated 52.9% of PCT 3288 has been cleared.

4.3.3. Threatened Ecological Communities

PCT 3288 is not associated with a Threatened Ecological Community (TEC) under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

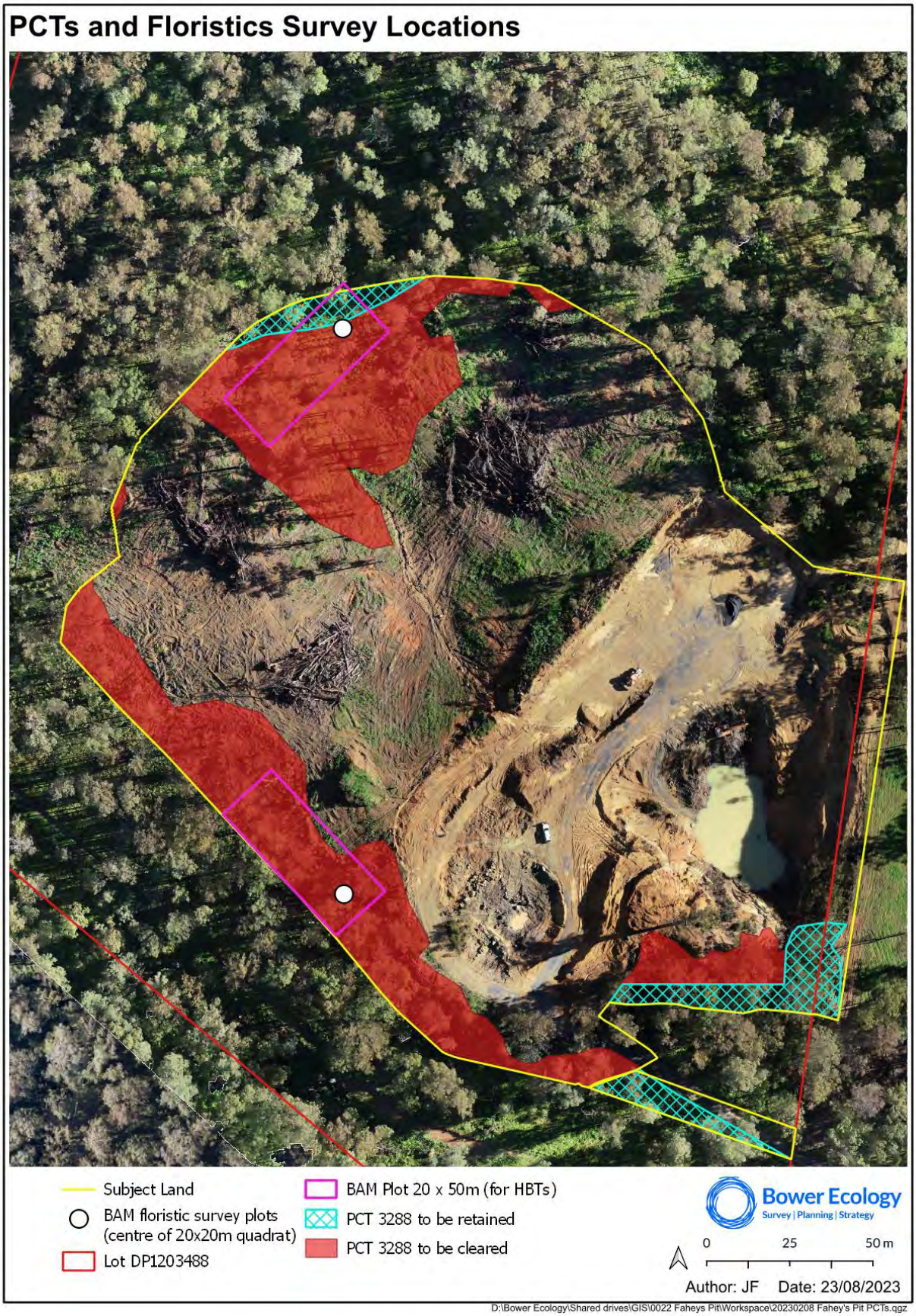

Figure 11: PCTs and BAM Plots

Figure 12: Representative photograph of vegetation within the proposed quarry expansion footprint (at Floristic Plot 1, looking south-east)

Figure 13: Representative photograph of vegetation within the proposed quarry expansion footprint (at Floristic Plot 2, looking north-west along the first order stream)

Figure 14: Representative photograph of Area 1 (cleared prior to ecological survey undertaken 23/9/2022)

Figure 15: Representative photograph of Area 1 (cleared prior to ecological survey undertaken 23/9/2022)

4.4. Vegetation Condition

A single vegetation zone (PCT 3288 in good condition) was mapped on the subject land. Two 20m x 20m floristic plots were surveyed for vegetation assessment. The centres of the 20 x 20 plot locations are shown in Figure 11. Vegetation condition attribute data recorded included species, counts, percent cover, and vegetation type.

A survey of HBTs within 100 m of the subject land was undertaken separate to the vegetation plot surveys using a GNSS GPS with maximum on-ground accuracy of +/-10 cm in optimal conditions. It was found that there were two HBTs in the first 20 x 50 m BAM plot, and none in plot 2.

The vegetation was representative of the description of PCT 3288 listed on the *BioNet Vegetation Classification* (DPE, 2023d), as follows:

A very tall moist grassy sclerophyll open forest of high, cool, fertile environments of the lower northern escarpment rim from Mount Royal north to Nowendoc, Mummel Gulf, Ebor and Mount Hyland. This PCT occurs on fertile soils derived from basalts and fine-grained sediments, at elevations of 850-1450 metres asl with mean annual precipitation of 850-1500 mm and may be subject to up to 30 frost days annually and occasional winter snowfall. The canopy very frequently includes *Eucalyptus obliqua*, commonly with *Eucalyptus nobilis* and occasionally *Eucalyptus campanulata*. The mid-stratum is commonly open, with an occasional sparse small tree layer including *Acacia melanoxylon*. A layer of scattered smaller shrubs commonly includes *Leucopogon lanceolatus* and occasionally *Indigofera australis*, *Coprosma quadrifida* or *Cyathea australis*. There is often a component of trailing vines present, commonly including *Smilax australis* with occasional *Hibbertia scandens* or *Clematis aristata*. The ground layer is almost always dominated by *Poa sieberiana, Pteridium esculentum* and *Lomandra longifolia*, with a suite of moist forbs that commonly includes *Glycine clandestina*, *Viola betonicifolia*, *Rubus parvifolius, Hydrocotyle laxiflora*, *Geranium potentilloides* and *Dichondra repens*. This community commonly occurs on broad plateaux and crests, and grades down into PCT 3286 on adjacent steeper slopes or PCT 3285 on warmer sheltered aspects in the south of its range.

5 Habitat Suitability for Threatened Species

The following section describes habitat suitability for threatened species that have been identified in the BAM-C as having potential to occur on site. If the project required a BDAR, Appendix C of the BAM (DPIE, 2020) *Streamlined assessments module – small area* would apply. Hence, this section follows the structure prescribed in Appendix C of the BAM (DPIE, 2020), including identification of 'ecosystem credit species' and 'species credit species' at risk of a Serious and Irreversible Impact (SAII) that require further assessment and/or targeted survey.

5.1. Species for Assessment

A list of 33 ecosystem credit species was generated using the BAM-C (Table 4).

Table 4: Ecosystem credit species from the BAM-C

Common name	Scientific name	Threatened Status		Sensitivity to gain class
		BC Act	EPBC Act	
1. Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	NL	Moderate
2. Glossy Black Cockatoo (Foraging)	*Calyptorhynchus lathami*	V	NL	High
3. Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V	NL	High
4. Speckled Warbler	*Chthonicola sagittata*	V	NL	High
5. Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	NL	High
6. Varied Sitella	*Daphoenositta chrysoptera*	V	NL	Moderate
7. Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	High
8. Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	NL	High
9. Little Lorikeet	*Glossopsitta pusilla*	V	NL	High
10. Little Eagle (Foraging)	*Hieraaetus morphnoides*	V	NL	Moderate
11. White-throated Needletail	*Hirundapus caudacutus*	NL	V	High
12. Square-tailed Kite (Foraging)	*Lophoictinia isura*	V	NL	Moderate
13. Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	V	NL	Moderate
14. Black-chinned Honeyeater	*Melithreptus gularis gularis*	V	NL	Moderate
15. Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	NL	High
16. Little Bent-winged Bat (Foraging)	*Miniopterus australis*	V	NL	High
17. Large Bent-winged Bat (Foraging)	*Miniopterus orianae oceanensis*	V	NL	High
18. Barking Owl (Foraging)	*Ninox connivens*	V	NL	High
19. Powerful Owl (Foraging)	*Ninox strenua*	V	NL	High
20. Olive Whistler	*Pachycephala olivacea*	V	NL	Moderate
21. Yellow-bellied Glider	*Petaurus australis*	V	NL	High
22. Scarlet Robin	*Petroica boodang*	V	NL	Moderate
23. Flame Robin	*Petroica phoenicea*	V	NL	Moderate
24. Golden-tipped Bat	*Phoniscus papuensis*	V	NL	High
25. New Holland Mouse	*Pseudomys novaehollandiae*	V	NL	High
26. Hastings River Mouse	*Pseudomys oralis*	V	NL	High
27. Grey-headed Flying-fox (Foraging)	*Pteropus poliocephalus*	V	V	High
28. Wompoo Fruit-dove	*Ptilinopus magnificus*	V	NL	Moderate
29. Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	NL	High
30. Diamond Firetail	*Stagonopleura guttata*	V	NL	Moderate

Common name	Scientific name	Threatened Status		Sensitivity to gain class
		BC Act	EPBC Act	
31. Thylogale stigmatica	*Red-legged Pademelon*	V	NL	High
32. Masked Owl (Foraging)	*Tyto novaehollandiae*	V	NL	High
33. Sooty Owl (Foraging)	*Tyto tenebricosa*	V	NL	High

* V = Vulnerable, E = Endangered, NL = not listed

5.1.1. Habitat Constraints for Ecosystem Credit Species

Based on habitat constraints, one of the species in Table 4, *Calyptorhynchus lathami* (Glossy Black-cockatoo) was excluded from further assessment because no suitable foraging tree species (i.e., *Allocasuarina* or *Casuarina* spp.) were found on the site, despite intensive search efforts.

5.2. Candidate species credit species at risk of an SAII

In accordance with Appendix C of the BAM (DPIE, 2020), all the species credit (candidate) species identified as having potential to occur that are also at risk of an SAII must be further assessed. Candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject land do not require further assessment. A list of 14 candidate threatened species that are at risk of an SAII was generated using the BAM-C (Table 5).

Table 5: Species credit species from the BAM-C at risk of an SAII

Common name	Scientific name	Threatened Status*		Biodiversity risk weighting
		BC Act	EPBC Act	
1. Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	3
2. Red Goshawk	*Erythrotriorchis radiatus*	CE	V	3
3. *Gingidia rupicola*	*Gingidia rupicola*	E	E	3
4. Glandular Frog	*Litoria subglandulosa*	V	NL	3
5. Little Bent-winged Bat (Breeding)	*Miniopterus australis*	V	NL	3
6. Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	V	NL	3
7. Stuttering Frog	*Mixophyes balbus*	E	V	3
8. Dorrigo Daisy Bush	*Olearia flocktoniae*	E	E	3
9. Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	3
10. Scrub Turpentine	*Rhodamnia rubescens*	CE	CE	3
11. Fragrant Pepperbush	Tas*mannia glaucifolia*	V	V	3
12. Black-breasted Button-quail**	*Turnix melanogaster*	CE	V	3
13. Sooty Owl (Breeding)	*Tyto tenebricosa*	V	NL	3
14. Eastern Cave Bat*	*Vespadelus troughtoni*	V	NL	3

*V = Vulnerable, E = Endangered, CE = Critically Endangered, NL = Not listed

5.2.1. Habitat Constraints for Candidate SAII Species

Habitat constraints for some species credit species are identified in the BioNet Threatened Biodiversity Data Collection (DPE, 2023c) and are listed in Table 6.

Table 6: Habitat constraints for candidate species

Common name	Scientific name	Credit Class*	Habitat Constraint (DPE, 2023c)	Assessment
Large-eared Pied Bat	*Chalinolobus dwyeri*	S	Cliffs Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	Survey required.
Red Goshawk	*Erythrotriorchis radiatus*	S	None.	Survey required.
Gingidia rupicola	*Gingidia rupicola*	S	Cliffs Mini crevices and soil pockets within rock fissures|Rocky areas Mini crevices and soil pockets within rock fissures	No suitable microhabitat present.
Glandular Frog	*Litoria subglandulosa*	S	None.	No suitable microhabitat present.
Little Bent-winged Bat (Breeding)	*Miniopterus australis*	S/E	Breeding habitat: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	No suitable breeding habitat present.
Large Bent-winged Bat (Breeding)	*Miniopterus orianae oceanensis*	S/E	Breeding habitat: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	No suitable breeding habitat present.
Stuttering Frog	*Mixophyes balbus*	S	None.	No suitable microhabitat present.
Dorrigo Daisy Bush	*Olearia flocktoniae*	S	None.	Survey required.
Brush-tailed Rock-wallaby	*Petrogale penicillata*	S	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	Suitable habitats may occur in Hyland State Forest, within 1 km of subject land. Survey required.
Scrub Turpentine	*Rhodamnia rubescens*	S	None.	Survey required.
Fragrant Pepperbush	*Tasmannia glaucifolia*		None.	Survey required.
Black-breasted Button-quail	*Turnix melanogaster*		N/A|Other Deep leaf litter	Survey required.
Sooty Owl (Breeding)	*Tyto tenebricosa*	S/E	Breeding habitat: Caves or clifflines/ledges; Living or dead trees with hollows greater than 20cm diameter.	Suitable habitat present. Survey required.

Common name	Scientific name	Credit Class*	Habitat Constraint (DPE, 2023c)	Assessment
Eastern Cave Bat	*Vespadelus troughtoni*	S	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.	Survey required.

*S = Species Credit Species, E = Ecosystem Credit Species, S/E = Dual Credit Species

Based on habitat constraints and/or lack of microhabitats, as well the as the known ecological of the species (refer to the TBPDC and BioNet Atlas), four of the species in Table 6 (shaded grey) were excluded, as follows:

- *Gingidia rupicola* was excluded as no suitable microhabitat was present, being cliffs; or mini crevices and soil pockets within rock fissures or rocky areas.
- *Miniopterus australis* (Little Bent-winged Bat) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat) were excluded from further assessment as no habitat constraints were present on the subject land: there is no suitable breeding habitat within the subject land or within 100 m of the subject land. Despite this, use of Anabat detection resulted in incidental survey for this species.
- Although there are drainage lines that trickle after rain, there are no permanent or semi-permanent streams within the subject land. Therefore, there is no suitable microhabitat for *Litoria subglandulosa* (Glandular Frog) or *Mixophyes balbus* (Stuttering Frog), and both were excluded from further assessment.

5.2.2. Further Assessment of Candidate Species

A number of species require further assessment, as set out in the following section. Species' descriptions, listed habitat constraints and/or microhabitats were taken from the Office of Environment and Heritage (OEH) Threatened species profiles and TBPDC / BioNet Atlas (DPE, 2023b).

Chalinolobus dwyeri - Large-eared Pied Bat

The Large-eared Pied Pat is a small to medium-sized bat with long, prominent ears and glossy black fur. The lower body has broad white fringes running under the wings and tail-membrane, meeting in a V-shape in the pubic area. This species is one of the wattled bats, with small lobes of skin between the ears and corner of the mouth.

It is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.

Erythrotriorchis radiatus – Red Goshawk

A large reddish-brown hawk with long and broad wings, deeply 'fingered' wingtips, and heavy yellow legs. The upper parts are primarily grey-brown and heavily scaled with rufous. Underparts are rufous with darker streaks. The head is pale, streaked with black. Females are paler than males, below, with a whitish underbody. When viewed from below (in flight), the underwing and tail appear white with black barring, with a rufous panel on the leading edge of the inner wing, and blackish wingtips. The Goshawk flies fast with strong wingbeats interspersed with glides. The bird also soars, and when perched, sits upright. These birds use large mature trees for nesting.

Red Goshawks are rare but known or predicted to live in the Chaelundi IBRA sub-region, and PCT 3288 is one of their listed habitats.

Olearia flocktoniae – Dorrigo Daisy Bush

This plant is a short-lived shrub that grows to 2.5 m with soft, slender leaves, sometimes with finely toothed margins. It can be single- or multi-stemmed, near the base. Flowers are 19-25 mm wide with a yellow central disc; petals are white and sometimes violet-fringed. The plant produces a mass of these flowers from January to May.

As the name suggests, this species has been recorded only on the northern fall of the Dorrigo Plateau. It is a pioneer species, generally colonising disturbed locations and primarily found on road verges in state forests, often adjacent to wet eucalypt forests or rainforests. Dorrigo Daisy Bush often disappears as plant community succession progresses. This plant is not generally present unless a recent disturbance event has occurred. It is noted that there has been recent disturbance (vegetation clearing in Area 1) adjacent to extant vegetation within the subject land, so attention was paid to surveying this area.

Petrogale penicillata – Brush-tailed Rock Wallaby

This wallaby has a long, bushy, dark rufous-brown tail that is bushier towards its tip. It has long, thick, brown body fur that tends to be rufous on the rump and greyer on the shoulders. Chest and belly fur is paler, and some individuals have a white chest blaze. There is also a white cheek stripe and a black stripe from forehead to the back of the head.

Rhodamnia rubescens – Scrub Turpentine

This plant is a small tree or shrub. It grows to 25 m with reddish-brown, fissured bark. Young stems are densely covered in fine hairs. The leaves are 5-10 cm long, 2-5 cm wide, and the upper surface is green and sparsely hairy. The lower surface of leaves is paler and sparsely to densely hairy. Leaves have three strong veins from the base and moderately dense, translucent oil dots. Petiole 4-9 mm long. Inflorescences 1-3 per axil, generally 3-flowered with white petals 4-6 mm diameter. Fruit is globose, 5-8 mm diameter, red turning black, although individual plants infected with Myrtle Rust (infection is widespread) are no longer flowering or setting seed.

Rhodamnia rubescens is known or predicted to live in the Chaelundi IBRA sub-region, and PCT 3288 is listed as supporting this species.

Tasmannia glaucifolia – Fragrant Pepperbush

Fragrant Pepperbush is a bushy shrub that grows up to 3 m tall. It has glossy deep green leaves 4 - 6 cm long and 4 - 15 mm wide, with fine lumps on the underside, and maroon branches. The small white flowers are followed by shiny, deep purple-black berries which are held in groups of one to three. When crushed, the leaves have a spicy or peppery smell.

It is known from several locations at high altitude in north east NSW, mainly the Barrington Tops National Park, Gloucester Tops National Park, New England National Park (Point Lookout) and potentially Ben Halls Gap Nature Reserve.

Usually grows in or near Antarctic Beech *Nothofagus moorei* rainforest along streams in mountain areas at altitudes of between 1200 and 1500 m altitude. It is noted that the subject land exists around 1080 AHD.

Also occurs in tall scrub, on seepage lines in tall eucalypt forest and in grassy woodland.

Turnix melanogaster - Black-breasted Button-quail

The Black-breasted Button-quail is a fairly large and plump, dark, quail-like ground bird, similar in size to Brown Quail (*Coturnix ypsilophora*), which are quite unrelated. The upperparts are mottled with rufous-brown, black, grey and white, and the foreneck and breast are black with profuse white spotting and barring. In males, the face and throat are white with fine black speckling; in females the head and neck are black with some white speckling. Adults have off-white eyes, grey bill and pale-yellow legs. Juvenile birds resemble males but are duller in colour. The combination of fairly large size, whitish eyes, and black neck and breast boldy spotted and barred with white distinguish Black-breasted Button-quails from other button-quails and from true quails. Nevertheless, care is needed to distinguish males and juveniles from Painted Button-quails (*Turnix varia*), the ranges of which may overlap. The call of females is a very low and resonant repeated booming oo-oom, which is also described as a low and tremulous drumming.

The Black-breasted Button-quail is endemic to south-eastern Queensland and far north-eastern NSW, at scattered sites from the Byfield region south to the Border Ranges and mainly on and east of the Great Divide but extending inland to the inner western slopes, up to 300 km from the coast. There have been few recent records in north-eastern NSW, with only ten records, from six localities, in the 20 years to 2000, though there are many records directly adjacent to NSW across the Queensland border. Records from the 1990s are considered doubtful and it hasn't been detected in NSW since 2000, despite numerous targeted surveys over this time.

Its preferred habitat includes drier low closed forests, including dry rainforests, vine forest and vine thickets, often in association with Hoop Pine, and Bottletree scrubs. The understorey may be dense or sparse, but a deep, moist leaf-litter layer, in which the birds forage, is an important component of habitat.

Tyto tenebricosa – Sooty Owl

This owl is medium-sized, as long as 45 cm. It has dark eyes in a flat, heart-shaped facial disc. The general body colour is dark sooty-grey, with large eyes in a lighter grey face, fine white spotting above and below the face, and a pale belly.

Tyto tenebricosa is known or predicted to live in the Chaelundi IBRA sub-region, and PCT 3288 is listed as habitat for this species.

According to the NSW Department of Environment and Conservation (2006), tree hollows used by Sooty Owls need to be greater than 40 cm wide, while the NSW Scientific Committee (2008) review specifies hollows greater than 30 cm wide. Both sources specify roosting and nesting in dark, secluded areas (e.g., gullies, caves), normally within 100 m of a stream. BioNet lists hollows greater than 20 cm diameter as the habitat constraint, so any hollows greater than 20 cm will be considered potential habitat for Sooty Owl.

Additionally, BioNet Atlas states:

*"On sites where the species is determined to be present **AND** suitable caves are present **AND** breeding has been detected/proven any impact could be serious and irreversible. Any other impact on the species' habitat is unlikely to be a potential serious and irreversible impact."*

Vespadelus troughtoni – Eastern Cave Bat

A small chestnut-brown bat with rufous tones on the head, and darker wings. It has smallish, conical ears and a short, up-tipped nose. The species is very difficult to separate from several other closely related species that occur in similar areas.

Vespadelus troughtoni is known to live in the Chaelundi IBRA sub-region, and although PCT 3288 is not listed specifically as supporting this species, habitat constraints (rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or old mines, tunnels, old buildings or sheds) may be present within two kilometres of the subject land.

5.3. Survey methods

Fauna surveys were conducted between 24 and 29 January 2023, inclusive, apart from targeted tree-hollow surveys and targeted Sooty Owl surveys, which took place on 6 and 7 March 2023 and 17 to 20 April 2023 respectively.

5.3.1. Bats

Four nights of surveys were undertaken using an Anabat Swift detector to record bat calls (24th to 27th January 2023, with recordings active from sunset to sunrise). This meets survey effort requirements for both *Chalinolobus dwyeri* and *Vespadelus troughtoni.*

No old buildings (potential breeding for both species) are on-site. The closest building is about 125 m away and another is approximately 210 m away, both on adjoining properties. Tunnels, culverts, and rocky areas potentially containing caves, overhangs, escarpments, outcrops, crevices, or boulder piles *probably* exist within 2 km of the proposed quarry expansion site. These buildings and rocky areas were the trigger for conducting anabat surveys. The buildings and rocky were not inspected due to potential safety issues (e.g., operational timber mill) and because they were off-site (possible rocky areas), and/or on private property (timber mill and quarry).

No caves, overhangs, crevices, or other suitable breeding habitat for these two species exist within the subject land or within 100 m of the area proposed to be cleared.

5.3.2. Frogs

The frogs listed (*Litoria subglandulosa* and *Mixophyes balbus*) require permanent or ephemerally-flowing streams with permanent pools. A meander survey determined that no suitable breeding habitat exists for the frog species listed. The survey guidelines for both frog species require transects along potential breeding habitat (NSW Government, 2020). As no suitable habitat was present, targeted frog surveys were not required.

5.3.3. *Erythrotriorchis radiatus* (Red Goshawk) and *Turnix melanogaster* (Black-breasted Button-quail)

Surveys for Red Goshawk and the Black-breasted Button Quail were conducted during all vegetation and fauna surveys undertaken for this report. This involved active observation of birdlife on the site to identify if this species was present, either within or flying over vegetation within the subject land. For the quail, particular attention was paid to any birds that were flushed from the undergrowth (of which there were none). Further to this, trees were surveyed for the presence of stick nests.

5.3.4. *Olearia flocktoniae* (Dorrigo Daisy Bush) *Tasmannia glaucifolia* (Fragrant Pepperbush) and *Rhodamnia rubescens* (Scrub Turpentine)

All flora species observed were recorded within the two 20 x 20 m floristic plots, including any threatened species. A comprehensive meander of the project footprint and disturbed areas to the east of the existing quarry included a thorough search for threatened flora species. Surveys for these species were carried out in late January, during *O. flocktoniae's* flowering time and suitable survey time for *R. rubescens*.

5.3.5. *Petrogale penicillata* (Brush-tailed Rock-wallaby)

This species was surveyed via habitat assessment as well as deployment of three baited motion-sensor cameras baited with a mixture of honey, peanut butter and oats. See Figure 16 for location of each camera.

5.3.6. *Tyto tenebricosa* (Sooty Owl)

Targeted surveys for Sooty Owl were conducted looking for suitable breeding habitat as described above. The surveys took place on 6 and 7 March 2023 within the area proposed for the quarry expansion and a 100 m buffer around that area. Details of every tree bearing a hollow of diameter 10 cm or greater (NSW Government, 2023c) were recorded (Figure 18). Hollow size was estimated by an experienced researcher who used binoculars and a thermal drone to observe the hollows. Thermal imaging was used to identify occupants of hollows, and the ground around each hollow-bearing tree was inspected for signs of use. These signs included a concentration of feathers or droppings on the ground, and pellets nearby.

In accordance with the required survey effort for Sooty Owl, six (6) call playback sessions and spotlighting surveys were conducted from 17 to 20 April 2023. Hollow-bearing trees that had been identified as suitable for the Sooty Owl were again inspected for signs of use or breeding.

5.3.7. *Phascolarctos cinereus* (Koala)

As the area proposed for clearing is currently zoned RU1, Chapter 3 (NSW Government 2021a) of the NSW State Environmental Planning Policy (SEPP) (Biodiversity and Conservation, 2021) applies (NSW Government, 2021). The list of trees recorded on-site was compared with the list of koala habitat trees in Schedule 2 *Koala use tree species* of the SEPP.

Thirteen two-minute surveys (Figure 15) were conducted using the Koala Spot Assessment Technique (Phillips & Callaghan, 2011).

As a result of desktop searches and on-site scat surveys, it was established that no core koala habitat is present on the project site. The site is outside the NSW Areas of Regional Koala Significance (DPE, 2015), and the Clarence Valley Council's Comprehensive Koala Plan of Management does not include the site of the quarry (Clarence Valley Council, 2015). The site is within the North Coast Koala Management Area (NSW Government, 2021a).

5.3.8. Motion-sensor cameras

Three motion-sensor cameras were positioned across the project footprint area (Figure 15). Each camera lens was pointed towards a bait (mixture of rolled oats, peanut butter, and honey) inside a cage and affixed to a tree. The cameras and baits were installed and left for four nights before collection. All photographs were inspected for threatened species.

Figure 16: Fauna Survey Locations (KSAT, Anabat and Baited Motion Sensor Camera)

6 Results

6.1. Weather conditions during site visits

Table 7 describes weather observations during the surveys and the associated impact on survey methods/species detection.

Table 7: Weather Conditions During Field Work

Date	Survey Purpose	Notes on Weather	Impact on Survey
23 Sept 2023	• Koala Survey • Floristics Plots • Threatened Flora Survey • Diurnal bird survey • Habitat assessments	Heavy rain (over 121 mm in Tyringham [BOM, 2023]) Cool Spring temperature.	No significant Impact. Slightly reduced bird activity during day likely.
24-29 Jan 2023	• Threatened Flora Survey • Installation of Anabat and Motion Sensor cameras • Threatened Flora Survey • Diurnal bird survey	Cloudy with light rain on most days, except the 26th and 29th, which did not experience rain. Temperature approximately 17 to 28 degrees each day, based on Wildlife Camera records.	No significant Impact
6-7 Mar 2023	• Mapping of trees with hollows • Diurnal bird survey • Habitat assessments	No rain recorded. Moderate Autumn temperatures.	No Impact
17-20 April 2023	• Sooty Owl call playback and spotlighting • Koala Survey (spotlighting) • Diurnal and nocturnal bird survey (incl. spotlighting)	Cool and misty all days/nights. Very light rain and overcast on 17th, partly cloudy for the 18th and 19th. Clear for 20th.	No significant Impact. Slightly reduced bird activity during day likely.

6.2. Floristic Plots

A total of 19 species was recorded in Plot 1 and 20 in plot 2. Species, strata, growth form, percent cover, and abundance are detailed in Table 8. No threatened flora species were recorded within the floristic plots.

Table 8: Flora species recorded during detailed floristic surveys in two 20 x 20 m plots within the project footprint

Plot	Species	Strata	Growth form	Cover (%)	Abundance
1	*Entolasia stricta*	Ground	Grass	0.1	10
	Eucalyptus cameronii	Canopy	Tree	5.0	2
	Eucalyptus campanulata	Canopy	Tree	5.0	2
	Eucalyptus obliqua	Canopy	Tree	20	5
	Geranium potentilloides	Ground	Forb	0.1	2
	Glycine clandestina	Ground	Forb	0.1	2
	Hardenbergia violacea	Ground	Forb	0.1	1
	Hibbertia scandens	Ground	Forb	0.1	3
	Hovea sp.	Mid	Shrub	1.0	3
	Imperata cylindrica	Ground	Grass	0.1	2
	Leucopogon lanceolatus	Ground	Shrub	1.0	5
	Lomandra longifolia	Ground	Other	30	20
	Lomatia silaifolia	Ground	Shrub	0.1	1
	Ozothamnus diosmifolius	Ground	Shrub	0.1	3
	Patersonia glabrata	Ground	Other	0.3	1
	Poa labillardieri	Ground	Grass	0.1	5
	Podolobium ilicifolium	Ground	Shrub	2.0	25
	Poranthera microphylla	Ground	Forb	0.1	1
	Pteridium esculentum	Ground	Fern	0.1	3
2	*Acacia falciformis*	Mid	Shrub	2.0	10
	Entolasia stricta	Ground	Grass	0.1	5
	Eucalyptus brunnea	Canopy	Tree	2.0	1
	Eucalyptus cameronii	Canopy	Tree	5.0	1
	Eucalyptus campanulata	Canopy	Tree	15.0	4
	Eucalyptus obliqua	Canopy	Tree	15.0	4
	Geranium potentilloides	Ground	Forb	0.1	2
	Hardenbergia violacea	Ground	Forb	0.1	1
	Hibbertia scandens	Ground	Forb	0.1	2
	Hovea sp.	Mid	Shrub	0.1	2
	Imperata cylindrica	Ground	Grass	5.0	50
	Leucopogon lanceolatus	Ground	Shrub	0.1	3
	Lomandra longifolia	Ground	Other	5.0	50
	Lomatia silaifolia	Ground	Shrub	0.1	2
	Ozothamnus diosmifolius	Ground	Shrub	0.1	3
	Patersonia glabrata	Ground	Other	0.1	1
	Poa labillardieri	Ground	Grass	1.0	20
	Podolobium ilicifolium	Ground	Shrub	0.1	2
	Poranthera microphylla	Ground	Forb	0.1	1
	Pteridium esculentum	Ground	Fern	30.0	100

6.3. Fauna

A total of five (5) threatened species were recorded on-site during surveys in 2023 per Table 9. Each is further discussed in the following sections.

Table 9: Threatened fauna species detected during surveys

Species Name	Common Name	Status	Credit Type	SAII
Dasyurus maculatus	Spotted-tailed Quoll	BC Act - V EBPC Act - E	Eco	No
Falsistrellus tasmaniensis	Eastern False Pipistrelle	BC Act – V EBPC Act - NL	Eco	No
Miniopterus orianae oceanensis	Large Bent-winged Bat	BC Act – V EBPC Act - NL	Dual	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	BC Act – V EBPC Act - NL	Eco	No
Tyto novaehollandiae	Masked Owl	BC Act – V EBPC Act - NL	Dual	No

Key: V = Vulnerable; NL = Not listed; Eco = Ecosystem Credit Species; Dual = Ecosystem and Species Credit Species.

6.3.1. Dasyurus maculatus (Spotted-tailed Quoll)

One threatened species (*Dasyurus maculatus*) was recorded on motion-sensor camera footage (Figure 17). *Dasyurus maculatus* is listed as Vulnerable under the BC Act (an ecosystem credit species and **not** an SAII entity) and Endangered under the EPBC Act.

Figure 17: Spotted-tailed Quoll photographed by motion sensor camera no. 2

6.3.2. Threatened Bats and Anabat Results

Of the 288 identifiable calls recorded using an Anabat Swift detector over four nights, 90% were readily attributed to 11 distinct species plus the *Nyctophilus* genus (Table 10). The other 10% of calls were allocated to several multi-species groups, all of which were otherwise positively identified from more typical calls. The full Anabat analysis report is presented in Appendix C. Three threatened bat species were identified on-site during Anabat surveys as mentioned above.

The target species *Chalinolobus dwyeri and Vespadelus troughtoni* were not recorded during Anabat surveys. *Miniopterus orianae oceanensis* was recorded however (10 calls recorded over 4 nights).

Although *Miniopterus orianae oceanensis* is a dual credit species, the 'species credit species' component is related to breeding habitat. The TBPDC requires that all breeding habitats, including caves or other features, used for breeding and the area immediately surrounding these features must be mapped, and that species polygon boundaries should have a 100 m radius buffer around an accurate GPS point location centred on the cave/feature entrance. As no breeding habitat exists within 100 m of the subject land, the species credit species component of this species is not triggered and therefore no SAII is predicted to occur.

The other two bat species detected (*Falsistrellus tasmaniensis* and *Scoteanax rueppellii*) are ecosystem credit species.

Table 10: Positively identified bat calls recorded using an Anabat Swift detector during four nights in January 2023

Scientific name	Common name	BC Act status	EPBC Act status
Chalinolobus gouldii	Gould's Wattled Bat	Not Listed	Not Listed
Chalinolobus morio	Chocolate Wattled Bat	Not Listed	Not Listed
Falsistrellus tasmaniensis	Eastern False Pipistrelle	**Vulnerable**	Not Listed
Nyctophilus sp.	Gould's Wattled Bat OR Lesser Long-eared Bat	Not Listed	Not Listed
Scoteanax rueppellii	Greater Broad-nosed Bat	**Vulnerable**	Not Listed
Scotorepens orion	Eastern Broad-nosed Bat	Not Listed	Not Listed
Vespadelus darlingtoni	Large Forest Bat	Not Listed	Not Listed
Vespadelus pumilus	Eastern Forest Bat	Not Listed	Not Listed
Vespadelus regulus	Southern Forest Bat	Not Listed	Not Listed
Miniopterus orianae oceanensis	Large Bent-winged Bat	**Vulnerable**	Not Listed
Austronomus australis	White-striped Free-tailed Bat	Not Listed	Not Listed
Ozimops ridei	Ride's Free-Tailed Bat	Not Listed	Not Listed
Chalinolobus gouldii	Gould's Wattled Bat	Not Listed	Not Listed

6.3.3. Erythrotriorchis radiatus (Red Goshawk)

No individual Red Goshawks (Critically Endangered BC Act, Vulnerable EPBC Act) were recorded during site visits or surveys. Two stick nests were found adjacent to the subject land, neither of which appear large enough to be that of a Red Goshawk and no evidence of occupation could be seen during survey in April 2023.

No stick nests were observed within the subject land; all observed nests were within 100 m of the subject land.

6.3.4. *Tyto tenebricosa* (Sooty Owl) and *Tyto novaehollandiae* (Masked Owl)

No Sooty Owls or evidence of their presence was observed during the surveys. A total of 36 hollow-bearing trees were identified within the proposed quarry expansion area plus 100 m buffer (Figure 18). Based on inspection with binoculars, thermal drone and investigation under the location of the hollow, no hollows showed signs of occupation by birds. None of the hollows were estimated to be greater than 100 cm deep, as preferred by the Sooty Owl (NSW Department of Environment and Conservation, 2006).

During call playback surveys for Sooty Owl in April 2023, probable Masked Owl (*Tyto novaehollandiae* – a dual credit species and **not** an SAII entity) calls were heard incidentally, in five out of six sessions. Masked Owl is listed as Vulnerable under the BC Act and not listed under the EPBC Act. Foraging habitat for Masked Owl has therefore been assessed as being present on the subject land. No Masked Owl breeding habitat was incidentally detected during surveys in April 2023. Despite the requirement for survey to be undertaken in May to August per the TBPDC, for the Masked Owl, "laying is irregular and unpredictable, occurring from late summer to spring but mostly March to July." (NSW *Approved Recovery Plan for Large Forest Owls*, DEC 2006).

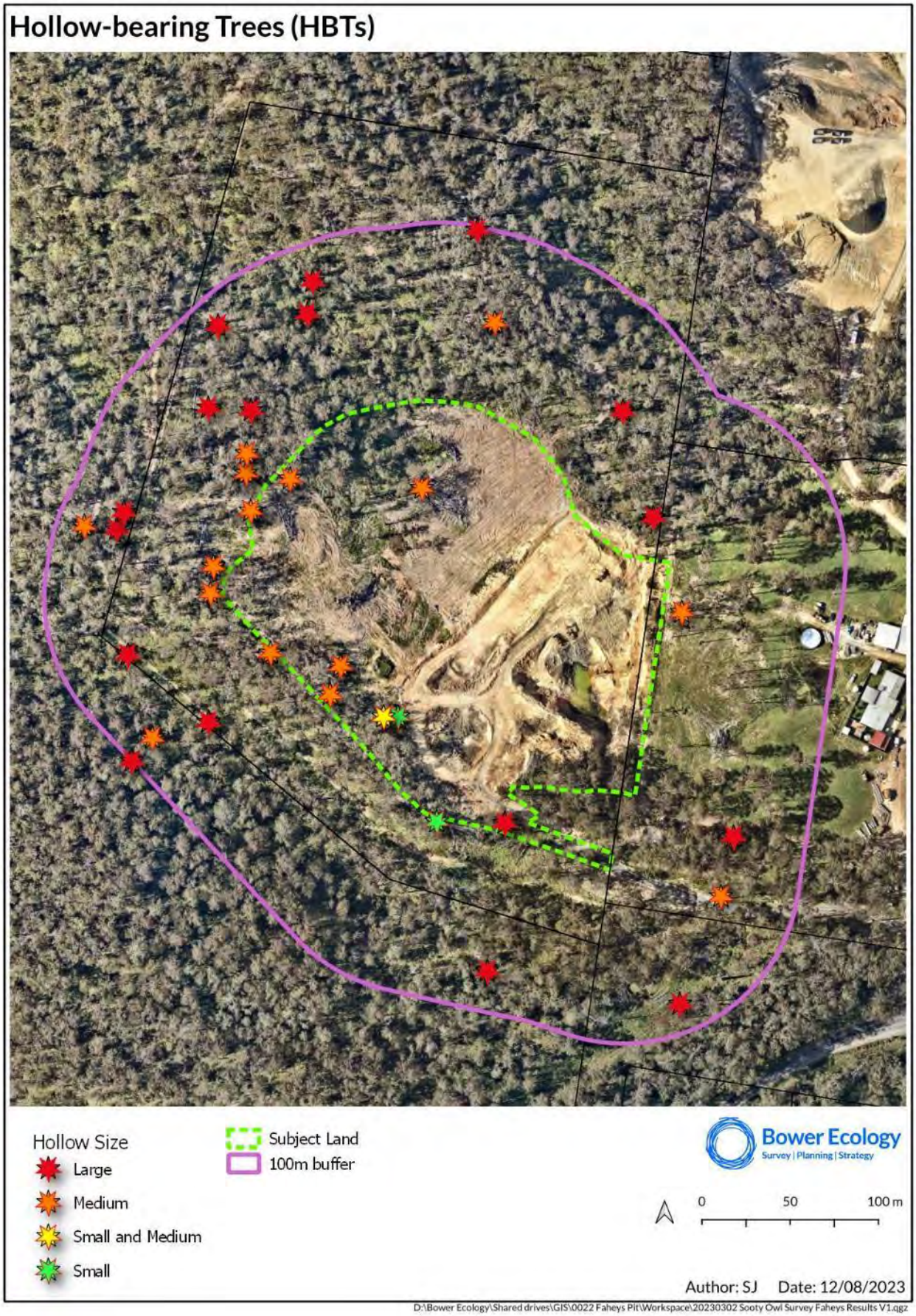

Figure 18: Hollow-bearing trees within 100 m of area proposed for clearing

6.3.5. Phascolarctos cinereus (Koala)

Although specimens of the koala-use tree *E. campanulata* trees (schedule 2 of the *State Environmental Planning Policy (Biodiversity and Conservation)* 2021b) were present on site, no evidence of koala presence (animals, bark scratches, scat, urine stains) was found during targeted surveys or meanders.

The other eucalypt species on site, *E. obliqua* and *E. cameronii*, although included as part of the koala scat survey for conservative reasons, are not considered koala use trees per Schedule 2 of the SEPP.

6.3.6. Motion-sensor camera results

Four species of fauna were identified in the photographs, one of which is a threatened species:

1. *Dasyurus maculatus* (Spotted-tail Quoll). Listed as vulnerable in NSW and Endangered under the Commonwealth EPBC Act. This is discussed above in section 6.3.1.
2. *Notamacrocarpus rufogriseus* (Red-necked Wallaby) – not a threatened species
3. *Tachyglossus aculeatus* (Short-beaked Echidna) – not a threatened species
4. Either *Isoodon macrourus* (Northern Brown Bandicoot) or *Perameles nasuta* (Long-nosed Bandicoot). Only one image included this animal, and insufficient detail was visible to enable accurate species identification. Neither of these species are threatened species in this location.

6.3.7. Threatened species in the locality

According to the BioNet Atlas, ten threatened fauna species have been recorded within 5 km of the quarry, none of which have been recorded within the subject land. The following ecosystem credit species have been recorded within 5 km of the subject land:

- *Chalinolobus nigrogriseus* (Hoary Wattled Bat)
- *Dasyurus maculatus* (Spotted-tail Quoll)
- *Hirundapus caudactus* (White-throated Needletail)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Ninox strenua* (Powerful Owl)
- *Pseudomys oralis (Hastings River Mouse)*

The following species credit species have also been recorded in the locality:

- *Macropus parma* (Parma Wallaby)
- *Petauroides Volans* (Greater Glider)
- *Philoria sphagnicolus* (Sphagnum Frog)
- *Phoniscus papuensis* (Golden-tipped Bat)

Potential habitat is present on the subject land for all these species except *Philoria sphagnicolus* (Sphagnum Frog).

Only one of these species was recorded during surveys, namely the Spotted-tail Quoll. The remaining species are considered unlikely to occur within, or rely on habitat within, the proposed expansion area.

As BioNet records are limited to areas where survey has occurred and has been reported on, it is predicted that other threatened fauna species, including koalas, are very likely to exist in the wider area, but no evidence of these was recorded during surveys or site visits.

7 Avoid and minimise impacts

The proposed quarry project will provide sufficient volumes of road base material to service existing and proposed local and regional road and related infrastructure projects. At present, the wider region is already facing pressure for the reliable supply of road base material in line with already committed projects. With these pressures set to continue, with limited opportunities for new or existing quarries being approved to meet these increased demands. At the same time, there are insufficient reliable, approved sources of quarry material required to feed these projects.

Although a detailed options analysis has not been undertaken, it is likely that expansion of the existing quarry will create fewer additional biodiversity impacts than establishing a new quarry at another location. As quarrying inevitably involves clearing of land and excavation and removal of material, the focus for the proposed quarry expansion has been to minimise further impact. The developer seeks quarrying on 4.1 ha of an 11.46 ha site. This is equivalent to 36% of the site area, with approximately 64% of the site to be retained as native vegetation.

It is noted that the Client has approval to clear along the boundary - excluding slopes of 18 degrees (32.5% slope), pursuant to the *Rural Boundary Clearing Code NSW*. These areas are shown in Appendix D. Clearance of these areas is not proposed, in order to avoid further disturbance of native vegetation. In addition, no asset protection zones (APZs) will be established surrounding the proposed quarry footprint, so further vegetation clearing has been avoided.

In the context of the quarry itself, options to minimise impacts have also been considered. This has included the following:

- The proposed quarry excavation has been limited to that required to access the resource only.
- Other locations for the quarry expansion on the property have been considered, however the proposed footprint represents the optimal location for resource extraction as it is centred upon the resource. Further, as it abuts the existing quarry footprint further impacts to vegetation clearing and fragmentation of habitat are avoided.
- During the design process, the entrance road alignment was reviewed in order to avoid impacts to vegetation. Nonetheless road alignment has been limited due to required road geometry and cut/fill requirements.
- No vegetation clearing is proposed outside of approved quarry footprint - all works are to be undertaken within approved quarry void / proposed entrance road upgrade.
- There will be limits on truck speeds to minimise potential conflict with fauna. A low (max. 30km/hour) speed limit will be imposed.
- No groundwater dependent ecosystems affected by quarry.
- Quarry design guidelines influence the minimum size(s) of the sediment dams required for water management on the subject land. The project has been designed to conform with these constraints and minimise hydrological impacts both within and beyond the subject land (Outline Planning Consultants Pty Ltd, 2023).
- Quarry times of operation will be limited to 11 hours/day Monday–Friday (7 am–6 pm), and 6 hours on Saturdays (7 am–1 pm). Nocturnal quarry activities will not occur, limiting the potential impact on native fauna.

Other mitigation measures designed to minimise impacts to biodiversity are provided in Section 10 of this report.

8 Assessment of impacts

8.1. Direct impacts

8.1.1. Threatened Flora

No threatened flora species were recorded on the subject land and therefore impacts to threatened flora species are not anticipated.

8.1.2. Vegetation clearing

The proposed quarry expansion seeks quarrying over 4.1 ha of an 11.46 ha site, or 36% of the site area, with approximately 64% of the site to be retained as native vegetation. The proposed development involves clearing 0.83 ha of native vegetation, including removing a total of 8 HBTs, within the footprint to allow for quarry activities. Approximately 0.14 ha of vegetation within the quarry expansion footprint will be retained (Figure 3). There is one PCT (3288) present within the proposed project footprint, which is not listed as threatened under the BC Act or the EPBC Act.

8.1.3. Direct impacts to fauna and their habitat

No significant direct impact to fauna is expected during vegetation clearing; however, the clearing itself does provide a residual risk to fauna due to direct mortality during clearing works. This risk can be mitigated as discussed in Section 10 (but not completely eliminated). The likelihood of direct mortality during clearing and quarrying works of a threatened fauna species is considered to be very low / improbable if appropriate mitigation in Section 10 is followed.

A direct impact to fauna habitat (foraging/breeding/shelter resources) will also occur due to the extent of clearing proposed (0.83 ha). As the proposal footprint is relatively small compared with the surrounding contiguous vegetation, the direct impacts of the proposed clearing on threatened fauna species are likely to be minimal. This is particularly the case if each of the five observed threatened fauna species are considered (Spotted-tail Quoll, Eastern False Pipistrelle, Greater Broad-nosed Bat, Large Bent-winged Bat, and Masked Owl) – all of which are highly mobile and occupy larger home ranges.

8.1.4. SAII

No SAII entities are predicted to be impacted given the nature of the project and survey results.

8.2. Indirect impacts

The impacts detailed below already occur due to the existing approved quarry operations. The expansion is unlikely to change the timing of such impacts but will expand the area of work to the east and therefore shift the associated ecological edge effects.

Table 11 details potential indirect impacts for quarry activities (clearing, quarrying and haulage).

Table 11: The nature, extent, timing, duration, frequency and significance of predicted indirect impacts

Relevant Aspect	Extent	Timing / Duration / Frequency	Residual Risk and Impact*
Vegetation Clearing			
Inadvertent impacts on adjacent habitat or vegetation	Vegetation / habitat areas immediately surrounding the works.	Once off during the single vegetation clearing campaign. Duration – 1 day.	Low risk of negligible impact to native vegetation and threatened fauna.
Dust impact to surrounding vegetation via dust deposition and associated impacts to plant biology / impacts to habitat value.	Vegetation / habitat areas immediately surrounding the works.	Once off during the single vegetation clearing campaign. Duration – 1 day.	Likely negligible impact to native vegetation No impact to threatened fauna.
Water Quality impacts to ecology values	Along drainage line immediately adjacent works. Extent limited as no aquatic habitat exists immediately adjacent the site, and any sediment loads are likely to deposit prior to discharge into Merchin Creek to the north-west. All stormwater runoff from cleared areas, including the quarry, is to be directed to the sediment basin at the base of the disturbed lands, with no runoff affecting neighbouring riparian vegetation.	Whilst exposed and unstable soils exist, during and after rain events, post clearing and prior to quarrying.	Unlikely negligible impact to native vegetation and threatened fauna.
Deposition of sediment downstream due to exposed soil	Along drainage line immediately adjacent works. Extent limited by the filtering effect of existing ground layer vegetation.	As above.	Likely negligible impact to native vegetation No impact to threatened fauna.
Noise of machinery and vegetation felling (edge effect)	Habitat immediately adjacent the works	Once off during the single vegetation clearing campaign. Duration – 1 day.	Likely negligible impact to threatened fauna. No impact to native vegetation.
Light spillage – impact to nocturnal fauna	Vegetation areas immediately surrounding the works	Will not occur during clearing.	No impact to native vegetation or threatened fauna.
Transport of weeds and pathogens from the site to adjacent vegetation	Potential spread into adjacent areas of vegetation.	Post clearing, as a result of introduction from the clearing campaign.	Unlikely negligible impact to native vegetation and threatened fauna.

Relevant Aspect	Extent	Timing / Duration / Frequency	Residual Risk and Impact*
Quarrying Activities			
Inadvertent impacts on adjacent habitat or vegetation	Vegetation / habitat areas immediately surrounding the works.	Once off accidental clearing.	Low risk of negligible impact to native vegetation and threatened fauna.
Dust impact to surrounding vegetation via dust deposition and associated impacts to plant biology / impacts to habitat value.	Vegetation / habitat areas immediately surrounding the works.	For the life of the quarry operations.	Likely negligible impact to native vegetation. No impact to threatened fauna. Similar to existing impact of operations. I.e., limited additional impact.
Water Quality impacts to ecology values / Deposition of sediment downstream due to exposed soil	Along drainage line immediately adjacent works. Extent limited as no aquatic habitat exists immediately adjacent the site, overland flows within the quarry footprint will be contained within dams within the quarry itself.	During overflow events only (rare, significant rainfall events)	Likely negligible to minor impact to native vegetation. No impact to threatened fauna.
Reduced viability of adjacent habitat due to edge effect	Vegetation / habitat areas immediately surrounding the works.	For the life of the quarry operations.	Similar to existing impact of operations. I.e., limited additional impact. Likely negligible impact to native vegetation (due to changes in light penetration and associated floristic change) and likely minor impact to threatened fauna due to visual disturbance and noise.
Noise of quarry operations – general	as above	as above	Similar to existing impact of operations,i.e., limited additional impact. No impact to native vegetation and likely negligible to minor impact to threatened fauna due to noise disturbance (potential foraging, resting, and breeding).

Relevant Aspect	Extent	Timing / Duration / Frequency	Residual Risk and Impact*
Noise of quarry operations – blasting	Vegetation / habitat areas surrounding the works.	Infrequent and temporary. Hours of blasting are to be restricted to 9.00am to 3.00pm Monday to Friday.	No impact to native vegetation. Minor and temporary disturbance to threatened fauna in local area (potential foraging and resting). Similar to existing impact of operations, i.e., limited additional impact.
Light spillage – impact to nocturnal fauna	Vegetation areas immediately surrounding the works	Will not occur during operations.	No impact to native vegetation or threatened fauna.
Transport of weeds and pathogens from the site to adjacent vegetation (via machinery)	Potential spread into adjacent areas of vegetation.	For the life of the quarry. Risk only occurs when new machinery is introduced.	Likely negligible impact to native vegetation and likely no perceptible impact to threatened fauna.
Increased risk of starvation or exposure, and loss of shade or shelter	Within subject land.	Not applicable given extent of contiguous habitat in the area.	None.
Loss of breeding habitat (assumed to be related to breeding habitat not directly impacted by works)	Vegetation areas surrounding the works	For the life of the quarry operations.	Noise disturbance may interrupt breeding behaviours of species that use hollows in the immediate vicinity of works. Minor impact, though similar to existing impact of operations, i.e., limited additional impact.
Trampling of threatened flora species	Within quarry area.	For the life of the quarry operations.	Very unlikely to occur.
Inhibition of nitrogen fixation and increased soil salinity	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted.
Fertiliser drift	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted as fertiliser will not be used during operations except sparingly in in progressive rehabilitation areas.
Rubbish dumping	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted as site access is restricted via locked gate.
Wood collection	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted.
Removal and disturbance of rocks, including bush rocks	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted.
Increase in predators	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted.

Relevant Aspect	Extent	Timing / Duration / Frequency	Residual Risk and Impact*
Increase in pest animal populations	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted.
Changed fire regimes	Vegetation areas surrounding the works.	For the life of the quarry operations.	No impact is predicted as fire regimes will continue as per current arrangements.
Disturbance to specialist breeding and foraging habitat (e.g., beach nesting for shorebirds).	Not applicable	Not applicable	Not applicable
Haulage / Road Transport			
Transport of weeds and pathogens from the site to adjacent vegetation (via trucks)	Potential spread into adjacent areas of vegetation.	For the life of the quarry.	Negligible and unlikely. The quarry is not likely to be a source of weeds and pathogens.
Noise	An increase in traffic is predicted due to operations. This will apply habitat areas alongside roads on haulage routes.	For the life of the quarry.	Operations will add negligible additional impact to noise on the current road network.

* Assuming standard mitigation measures are in place per Section 10. EECs are not mentioned as none are relevant to the impact assessment.

9 Prescribed impacts

9.1. Karst, caves, crevices, cliffs, rocks, and other geological features of significance

There are no examples of karst, caves, cliffs, rocks, or other geological features of significance which will be affected by the proposed expansion.

9.2. Human-made structures and non-native vegetation

No human-made structures or non-native vegetation will be affected by the proposed clearing.

9.3. Habitat connectivity

The site is adjacent to very large areas of intact vegetation (>100,000 ha, Figure 19), including the Hyland State Forest. The area of vegetation proposed to be impacted by the quarry expansion is comparably small, and no isolated patches of vegetation will be created. Therefore, any impacts are unlikely to influence wildlife connectivity in the area.

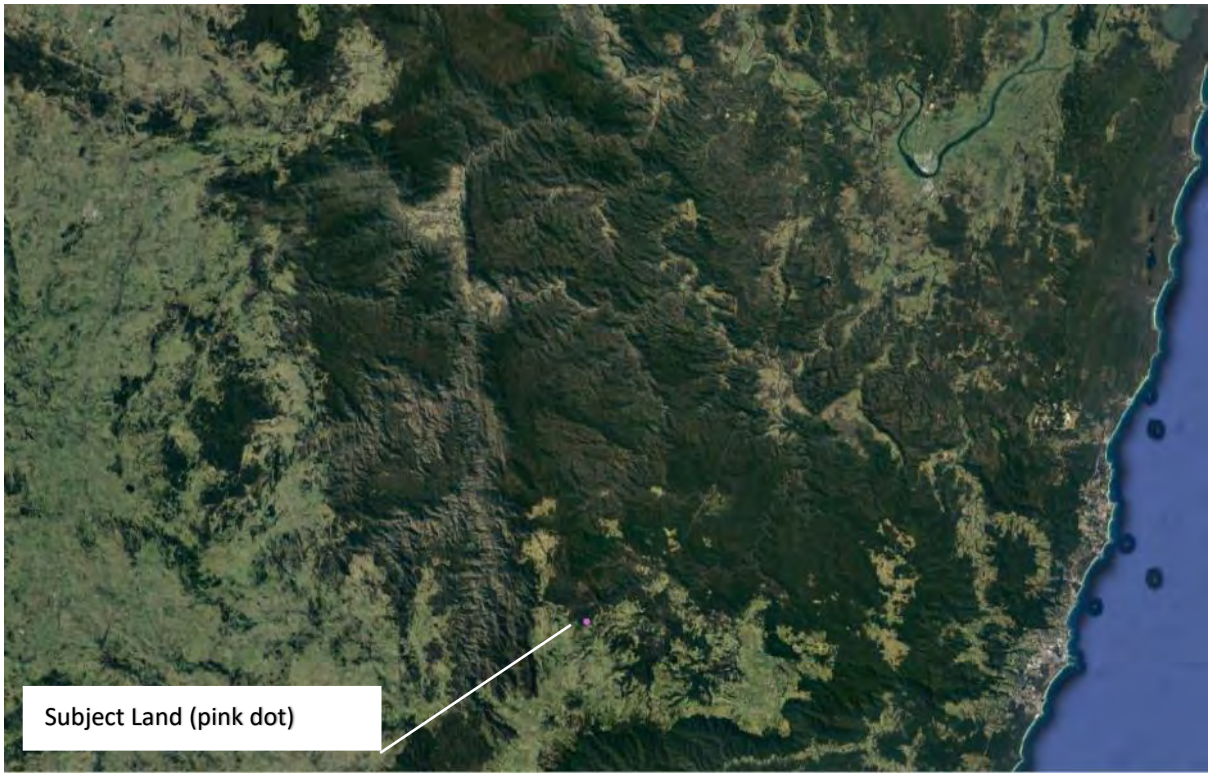

Figure 19: Aerial photograph showing extensive areas of contiguous vegetation in the wider region.

9.4. Water bodies, water quality and hydrological processes

9.4.1. Streams

There are no permanent watercourses within the project footprint. Three drainage lines (1st order streams) within 40 m of the quarry trickle after rain, although there is no floristic differentiation between the drainage lines and the surrounding vegetation. They are recognisable only because of the site topography.

Vegetation within the stream (and immediately adjacent the stream) will be removed as part of the expansion. The vegetation is shown in Figure 8 and Figure 9.

It is assumed the stream to the north-west (~300 m away) is permanent and, therefore, the closest natural permanent water. There is also a sediment basin in the base of the Clarence Valley Council's quarry (Ellis' Pit) on the adjoining property (Lot 1 DP 1139996), approximately 150 m to the north-east.

An upstream portion of one stream will be directly impacted by the quarry expansion, as shown on Figure 20. The stream will be removed due to the proposed quarry excavation.

9.4.2. Water Quality

A centrepiece of the soil and water management strategy as described in the associated EIS for the project (Outline Planning Consultants, 2023) is the diversion of 'clean' water around the new quarry area and the collection and retention of all 'dirty' water in constructed dams (i.e., runoff from disturbed areas) within the active areas of the quarry (Figure 1 and Figure 2). This will help prevent water flowing downstream.

The sediment content in the on-site dams will be monitored and, if necessary, flocculated with gypsum or other EPA-approved material to reduce suspended solids. In the unlikely event that the capacity of the sediment dams is exceeded, water will be discharged into the downstream creek system.

It is not anticipated that water quality of the sediment dams will be of a condition fit for stock purposes until rehabilitation of the quarry has been completed (Outline Planning Consultants, 2023).

The quality of site-contained water has been considered in depth within the EIS (Outline Planning Consultants, 2023), as the quarry is within a drinking water catchment. Broader water quality and sediment management has therefore been considered to address associated requirements (please refer to the EIS – Outline Planning Consultants, 2023).

9.4.3. Hydrology

The primary measure to mitigate potential impacts of the proposed quarry expansion on riparian vegetation and waterways is to wholly contain all stormwater runoff from the quarry within the quarry footprint itself, with no quarry runoff affecting neighbouring riparian vegetation.

As such, the proposed quarry expansion will result in containment of environmental flows that would have flowed downstream via the ephemeral stream shown on Figure 20. Despite this, the impact is to surface water hydrology is considered to be minor as the associated stream is ephemeral, is not floristically different to the immediately surrounding vegetation (based on observation further downstream; Figure 8 and Figure 9) and the proposed quarry expansion area represents a negligible area of the overall catchment. Further, the other two streams to the north and south of the proposed quarry expansion will not be impacted. It is not expected that downstream vegetation or habitat value will be compromised due to the containment of surface water associated with the quarry expansion.

The project does not propose to extract water from any watercourse.

Figure 20: Drone photograph of the existing quarry and location of the ephemeral stream

9.5. TECs

No TECs are associated with the vegetation proposed to be cleared.

9.6. Vehicle strikes

A traffic impact assessment (Streetwise, 2022) has calculated there will be approximately 60 quarry-generated trips due to the proposed expansion. The trips would transport quarry product via wider road network, and therefore pose a minor threat to wildlife via vehicle strike.

Vehicle strike is not considered to pose a significant threat to any fauna identified on-site, threatened or otherwise, however. Vehicles travel in and out of the quarry site along a designated road, during daylight hours. Animals recorded on site are unlikely to be at risk during these times, as all are active at night. Further, a 30 km/hr speed limit will be imposed and signed on site.

10 Mitigation and management of impacts

Mitigation and management for direct and indirect impacts is described in Table 12.

Table 12: Avoidance and minimisation measures for direct, indirect, and prescribed impacts.

Timing	Action	Responsibility
Vegetation Clearing		
Pre-clearing	The limits of works and 'no-go areas' will be delineated using appropriate signage and barriers (e.g., orange bunting fence), identified on site construction drawings and during construction staff induction.	Quarry operator
Pre-clearing	Where significant or large trees are outside the area of excavation, but their Tree Protection Zones are incurred upon by excavations, the trees will be earmarked for retention where they do not pose an ongoing hazard or safety risk, and where they do not impinge of approved quarry activities. Trees to be retained are to be marked with bright flagging tape, and the meaning of the tape will be communicated to all relevant staff. AQF Level 5 qualified arborist will be sought to determine retention requirements.	Quarry operator
Pre-clearing	A suitably qualified ecologist is to undertake preclearing surveys 48 hours prior to the commencement of any vegetation removal works on the development site. The surveys are to be undertaken on two consecutive nights prior to the vegetation removal works. Any fauna residing in the vegetation that is to be removed from the development site is to be relocated under the supervision of a suitably qualified ecologist. All clearing works are to be suspended until recorded fauna has been relocated.	Quarry operator to engage appropriately qualified person.
Pre-clearing	Sediment and erosion control measures shall be designed and installed and effectively maintained to control surface water flows. All disturbed and exposed that are proposed to be left for more than 6 weeks shall be immediately stabilised and revegetated on completion of clearing. The use of a sterile hydro-mulch or locally suited pasture species are required for the stabilisation of large exposed areas. Repeat treatments may be required if germination does not occur within two weeks.	Quarry operator
During clearing	A suitably qualified fauna spotter / catcher is required to be present on site during all vegetation removal works to inspect tree hollows and to rescue and relocate any fauna within in accordance with approved animal care and ethics licencing.	Quarry operator to engage appropriately qualified person.
During clearing	A 'stop work' procedure will be enacted in the case of an unexpected threatened flora or fauna encounter (Figure 21)	Quarry operator / all staff

During clearing	• The following shall also apply to wildlife handling:
	  ○ Allow fauna to leave an area without intervention as much as possible.
	  ○ Use a licensed fauna ecologist or wildlife carer with specific animal handling experience to carry out any fauna handling
	  ○ If injured or sick wildlife are encountered:
	  ▪ Contact the local rescue agency/ wildlife care group (WIRES 1300 094 737) or vet if an animal is injured.
	  ▪ Keep the injured animal in a box in a quiet, warm, dark place until transferred. If an injured animal is dangerous, carefully place a box over the top of it if possible, or section off the area and wait for an experienced and licensed fauna ecologist or wildlife carer to arrive.
	• Never deliberately kill a snake as all snakes are protected under the NSW *National Parks and Wildlife Act 1974* (NPW Act)
		Quarry operator / all staff

	• If a snake must be handled to remove the risk of harm to the snake or people, then handling should only be done by a licensed fauna ecologist or wildlife carer with skills and experience in snake handling. • Any fauna requiring relocation shall be released in the adjacent suitable habitat areas. • Records will be kept of fauna captured and relocated. • Report any injury to or death of a threatened species to the environmental manager	
During clearing	A means of pit egress must be provided for fauna, such as pit access track / ramp when site is unattended.	Quarry operator
During clearing	Any vegetation removal is to be undertaken in a manner that ensures the ongoing integrity of retained vegetation and/or adjacent native plants.	Quarry operator
During clearing	No consent is granted for the removal of any tree or vegetation outside the propose clearing extent.	Quarry operator
During clearing	There is to be no vegetation clearance, earthworks and/or storage of any native vegetative matter, goods and/or equipment within identified fenced off "No Go" Areas.	Quarry operator
During clearing	Where earthworks are occurring in close proximity to significant or large trees that are identified to be retained, works shall be directed by an AQF Level 5 qualified arborist. Any impacts to the root zones or overhanging branches of adjacent vegetation will be minimised via direction from the arborist.	Quarry operator
During clearing	Clearing is to be conducted using machinery of an appropriate size and type to reduce impacts on surrounding environmental values.	Quarry operator
During clearing	Any felled timber is to be incorporated into adjacent rehabilitation works to provide microhabitat. Habitat elements (such as placement of logs) will be placed away from pathways and access points. Felled timber will not be dragged but lifted and placed appropriately outside the construction footprint in an adjacent area to enhance habitat. If long logs are required to be cut to assist relocation, they must be cut away from any hollow ends.	Quarry operator
Quarry Operations		
Once-off	5 medium sized, and 3 large nest boxes will be installed to the west of the project footprint. Nest box condition will be monitored, and each will be maintained. If the owner of the neighbouring property on the western boundary of the quarry is agreeable, further nest boxes will be installed in that forest to help ameliorate potential edge effects resulting from the operation of the quarry.	Quarry operator
Throughout the life of quarry operations	All relevant staff will be inducted as to the environmental management requirements during operation.	Quarry operator
Throughout the life of quarry operations	All stormwater runoff from cleared areas, including the quarry, will be directed to the sediment basin at the base of the base of the disturbed lands and contained within the catchment of the quarry footprint, This water is used for product moisture, dust control and rehabilitation works, or eventual discharge offsite. Quarry runoff and dam function shall be monitored, and dams flocculated as necessary. No runoff would affect neighbouring riparian vegetation.	Quarry operator

Throughout the life of quarry operations	Weed control protocols shall be developed and implemented as part of the quarry operation plan.	Quarry operator
Throughout the life of quarry operations	Due care should be made by all vehicle operators to take care and avoid any potential collision with fauna, such as macropods (kangaroos/wallabies) that may transverse the project site. A site speed limit of 30 km/h will be observed.	Vehicle operators
Throughout the life of quarry operations	Pest animals such as rodents, foxes, rabbits, wild dogs, feral cats and pigs are controlled on a needs basis	Quarry operator
Throughout the life of quarry operations	The only general waste products which will be generated at the quarry are waste oil, unserviceable machinery parts, and site office and lunchroom wastes (e.g., paper, plastic, food scraps). Waste disposal will comprise: • The waste oil will be taken to an oil recycler. • Waste metal will be sold to a scrap metal merchant. • All other general waste materials will be taken to Council's landfill site at Dorrigo for disposal. Separation of recyclable materials (e.g., paper, glass, plastics) will be carried out wherever possible. If site office and lunchroom is established on site, a recycling bin and general waste bin will be provided to allow the separation of recyclable wastes. The different waste streams shall be appropriately separated and disposed at Council's landfill site. Sanitary facilities for the lunchroom and toilet facilities at the workshop have been provided in accordance with the Building Code of Australia.	It will be the responsibility of the quarry operator and contractors to take responsibility for the disposal of any waste that they create on site.
Post Operations		
Upon progressive closure / full closure	A progressive rehabilitation plan shall be implemented. This plan is further described in Section 11.	Quarry operator

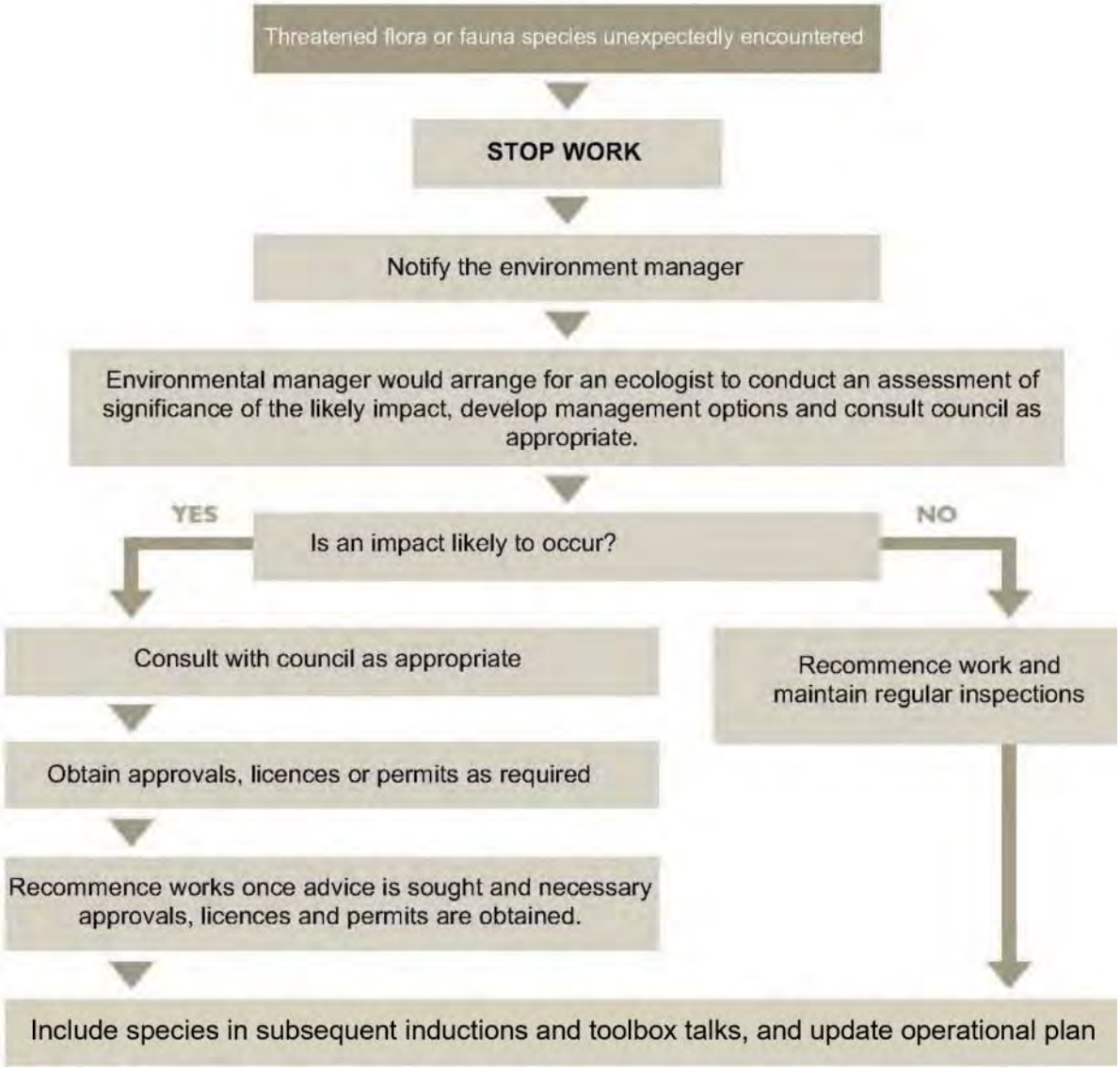

Figure 21 Stop work procedure for unexpected finds of flora or fauna

11 Progressive Rehabilitation

11.1. Overview

A plan showing the final quarry design is provided in Figure 2. It shows benching in the east and a final quarry floor. As excavation progresses in a westerly direction, benches in the east and north-east will be established and rehabilitated. Once the resource is exhausted, final closure of the quarry will then enable the quarry floor area to be rehabilitated. The access road from Armidale Road to the Project Site to be retained for future maintenance, agricultural and/or forestry uses.

The timing of rehabilitation works will be dependent on the rate of resource extraction and the final levels of the base of the quarry floor. Rehabilitating planning within this report is considered to be conceptual, and further planning may be required to elucidate details. The key components of the rehabilitation process proposed are as follows:

- Progressive removal of structures, equipment and other materials associated with quarrying from existing works areas, with appropriate erosion and sedimentation control measures.
- Quarry benches in the east / north-east (Figure 2) will be constructed and capped with a layer of overburden and then topsoil, and planted with native species characteristic of vegetation within the surrounding landscape.
- Upon closure, the quarry pit will be filled to the extent possible using overburden and other material from on-site sources. The quarry is to be rehabilitated to form a free draining and sustainable landform as consistent as possible with surrounding landforms. The working quarry area (pit bottom) will be reshaped to enable future use for grazing.
- Once completed, the aim will be to rehabilitate the quarry site to a stable condition. The relevant guidelines note that the primary aim of the closure and rehabilitation phase of a quarry is to minimise long-term erosion through effective revegetation (source: Managing Urban Stormwater: Soils and Construction, Volume 2E Mines and Quarries (DECC, 2008).

11.2. Topsoil and Overburden

Topsoil and overburden material for revegetation within the quarry is to be sourced from soil stored on-site which will have been stockpiled as part of the initial clearing and soil removal process.

The removal of topsoil and overburden will occur predominately during site establishment and early phases of quarry operations at Fahey's Pit. Soil-based material that is intended for quarry rehabilitation purposes will be temporarily stockpiled within the quarry footprint area until they can be reused at the site. Because of the small amount of overburden and the nature of the resource it is not expected that large quantities of topsoil or overburden will be generated. Overburden would constitute excavated natural material and can be deposited or re-used on-site. Until required for use in the permanent rehabilitation works, the stockpiles will be:

- Shaped into a low mound up to approximately 1 m in height (topsoil) or approximately 3 m (overburden), as it becomes available.
- Track-rolled with a dozer to prevent wind and water erosion.
- After the steps above, sown within 14 days of placement (topsoil) or 28 days (overburden) with a seed and fertiliser mix as per EIS Table 3.6 (Outline Planning Consultants, 2023).

Filter fences will be placed downslope of the topsoil and overburden stockpiles, as part of the erosion and sediment control works.

Topsoil and overburden stockpiles are proposed to be located away from trafficked areas and from drainage lines within the active quarry area. Stockpiles will be placed in areas so as to avoid impediment of natural localised drainage lines and minimise the likelihood of water ponding against the stockpile. Stockpiles to be kept longer than six months will be sown with a suitable cover crop to minimise soil erosion and invasion of weed species. Any stockpiles that have evidence of any weeds will be treated prior to the use in rehabilitation, principally by way of scalping.

11.3. Plant Establishment

11.3.1. Benches

Rehabilitation of the benches will be done via seeding ground layer and shrub species, as well as planting of tube stock (for tree species). For bushfire prevention purposes, benches directly abutting the neighbouring Timber Mill will not be planted with tree species.

To encourage growth and to control weeds, an appropriate seed mix is required. The native groundcover and shrub seed mix sown at a total combined rate of approximately 10 kg/ha. Seed will be broadcast evenly onto prepared batter slopes. Care will be taken to ensure it will not be buried. Seeding will be conducted in late spring and early autumn giving increased risk of success due to higher ground temperatures. Species which could be used for revegetation (dependent upon seed and tubestock availability) are listed below in the accompanying Table 13. The species identified are typical of those found in PCT 3288 Northern Escarpment Messmate Moist Grassy Forest, with the addition of *Cynodon dactylon* to assist with ground cover establishment.

Table 13: Planting / seeding palette for rehabilitation works

Species	Relative Abundance (approx.)
Tree Layer (tubestock installation) – 5m spacings	
Eucalyptus campanulata	50% of tubestock
Eucalyptus obliqua	50% of tubestock
Shrub Layer (seeded) 4 kg/ha	
Acacia dealbata	15% of mix
Acacia falciformis	15% of mix
Acacia melanoxylon	40% of mix
Acmena smithii	10% of mix
Allocasuarina torulosa	5% of mix
Elaeocarpus reticulatus	5% of mix
Leptospermum polygalifolium	10% of mix
Ground Layer (seeded) 6kg/ha	
Lomandra longifolia	25% of mix
Poa labillardieri	25% of mix
Cynodon dactylon	50% of mix

11.3.2. Quarry Floor

Upon closure of the quarry, the quarry floor will be seeded with pasture grass to support grazing.

11.4. Rehabilitation Maintenance

The rehabilitated quarry areas will be maintained by site personnel engaged by the quarry operator or owners until vegetation is well established. Regular inspections shall be carried out to monitor the progress of rehabilitation and identify areas that require maintenance. These maintenance activities

will include soil erosion control, control of noxious and environmental weeds, fencing repairs for access control, feral pest control, and bushfire hazard management.

In NSW all plants are regulated with a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable.

Environmental weeds and animal pests are to be controlled in accordance with best practice land management practices. At the end of quarrying operations all Weeds of National Significance will be eradicated from the rehabilitation area by the quarry operator. Weed control measures shall be employed seasonally for the first two years of rehabilitation, and then on an as-needs basis.

Weed regrowth is to be controlled through methods, as detailed on the Department of Primary Industries' 'Weed Wise' website (or other suitable reference come the time rehabilitation commences).

11.5. Rehabilitation Completion

The key project rehabilitation completion criteria to be applied to the project site are summarised in the accompanying table.

Table 14: Project Rehabilitation Completion Criteria

Feature	Rehabilitation completion criteria
Decommissioning	All quarry plant and equipment and other infrastructure will be decommissioned and removed
Landform	Achieve a stable landform, with no erosion, free of any hazardous materials associated with past use of site as a quarry
Soil	Topsoil or a suitable alternative has been spread uniformly over the identified rehabilitation surfaces
Water	Sediment basin system retained for erosion control and as a water supply for stock. No runoff to pose a threat to downstream water quality.
Revegetation, control of feral pests and weeds	Progressive revegetation of quarry benches as quarrying proceeds on the site. Approximately 80% combined canopy / shrub cover is required, as well as approximately 80% cover of ground cover species. Weed control measures to be implemented, with no WONS present. Control of feral pests to be undertaken by landowner.
Bushfire hazard	Appropriate bushfire hazard controls to be implemented
Ongoing public safety	Appropriate mechanisms to be established to control access and manage public safety post-closure

12 Biodiversity offset strategy

As the BOS has not been triggered, no biodiversity credits have been calculated for the proposed quarry expansion.

As discussed in Section 8 and Appendix A, there are no TECs present on the subject land, and no threatened species at risk of an SAII were recorded during surveys. As such, impacts to SAII entities are not anticipated.

The strategy to offset the clearance of 0.83 ha of PCT 3288 would be resolved following discussion with Council.

13 Legislative framework

This section identifies relevant local, state and commonwealth planning and environmental legislation and discusses the application of these planning provisions relevant to the project.

13.1. Commonwealth Environmental Protection and Biodiversity Conservation Act (1999)

The EPBC Act (1999) regulates actions that could lead to significant impacts to Matters of National Environmental Significance (MNES). Relevant MNES includes threatened and migratory species and threatened ecological communities. Under the EPBC Act, proponents are required to 'refer' the project to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) if the project is likely to result in significant impacts to MNES.

No EPBC Act listed Threatened Ecological Communities (TECs) were recorded on site, whilst the only threatened species recorded on site was the Spotted-tail Quoll (Endangered). Given the extent of adjacent habitat and the fact that this species as very large home ranges, a significant impact to this species (as defined under the EBPC Act) is not anticipated.

It is not expected that any threatened species or ecological communities listed under the EPBC Act will be significantly impacted by the proposed quarry expansion. Neither is the project likely to result in significant impacts to MNES. Referral to DCCEEW is, therefore, not considered necessary.

13.2. The NSW Environmental Planning and Assessment Act 1979

The EP& A Act (1979) governs planning and assessment of development projects in NSW including quarry projects. The planning legislation is administered by local councils and by the Department of Planning & Environment. The Project is classified as regionally significant development pursuant to the provisions of Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021* because of its small size (< 500,000 tonnes per annum, total resource < 5 million tonnes) and the land on which the proposed quarry expansion is to take place is not an environmentally sensitive area according to clause 7(1)(c) of Schedule 1 of state significance, as defined in s.2.2 of SEPP (Planning Systems) 2021. Consequently, the Northern Regional Planning Panel (NRPP) is the consent authority for this proposed quarry development.

13.3. The NSW Biodiversity Conservation Act (2016)

The BC Act provides a framework for the conservation of biodiversity in NSW. The Act establishes the Biodiversity Offset Scheme (BOS) which requires impacts of development over a certain threshold to be offset through direct payment to the Biodiversity Conservation Trust, purchasing of offset credits on the open market, or creating a land-based biodiversity stewardship site to generate the required credits.

As discussed in Section 1 and Appendix A, this project does not qualify for entry into the BOS and biodiversity credits were not calculated.

13.4. The NSW Biosecurity Act (2015)

The *Biosecurity Act* (2015) includes a general biosecurity duty for matters such as the introduction, presence, spread or increase of a pest. This general biosecurity duty provides that any person who deals with biosecurity matter has a biosecurity duty to ensure that the biosecurity risk is prevented, eliminated, or minimised, so far as is reasonably practicable. The project will satisfy the biosecurity duty via the removal and appropriate disposal of weeds during clearing, as well as via the integration

of the footprint into any existing weed management programs. The rehabilitation plan to be enacted on closure of the quarry will also include ongoing weed management until the rehabilitation becomes self-sustaining.

13.5. NSW State Environmental Planning Policy (Biodiversity and Conservation) 2021

The 2021 Biodiversity and Conservation SEPP commenced on 1 March 2022. It consolidates, transfers and repeals provisions relating to:

1. SEPP (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)
2. SEPP (Koala Habitat Protection) 2020 (Koala SEPP 2020)
3. SEPP (Koala Habitat Protection) 2021 (Koala SEPP 2021)
4. Murray Regional Environmental Plan No 2—Riverine Land (Murray REP)
5. SEPP No 19—Bushland in Urban Areas (SEPP 19)
6. SEPP No 50—Canal Estate Development (SEPP 50)
7. SEPP (Sydney Drinking Water Catchment) 2011 (Sydney Drinking Water SEPP)
8. Sydney Regional Environmental Plan No 20 – Hawkesbury – Nepean River (No 2 – 1997) (Hawkesbury–Nepean River SREP)
9. Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Sydney Harbour Catchment SREP)
10. Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (Georges River REP)
11. Willandra Lakes Regional Environmental Plan No 1 – World Heritage Property (Willandra Lakes REP).

Of the above listed plans and policies, only the SEPP (Koala Habitat Protection) 2021 is relevant to this development. The SEPP – Koala Habitat Protection applies to all local government areas listed on Schedule 1 of the policy, except land dedicated under the *National Parks and Wildlife Act* (1974) or the *Forestry Act* (1916). The identification of an area of land as SEPP 44 Potential Koala Habitat is determined by the presence of koala use trees species listed within Schedule 2 of the policy. The subject land is situated within Clarence Valley Council LGA, which is listed in Schedule 1 of the policy.

The subject property does support one species of potential koala use tree (*Eucalyptus campanulata*), as listed in Schedule 2 of the Koala SEPP (NSW Government, 2021). However, the vegetation on the subject land is not identified as core koala habitat under the Clarence Valley Council *Comprehensive Koala Plan of Management* (2015). Additionally, 13 targeted KSAT surveys and subsequent spotlighting found no evidence of their presence on site (Section 5.3.7). Therefore, a koala plan of management is not required. No further action is required under this SEPP.

13.6. Water Management Act (2000)

Refer to the EIS for further information (Outline Planning Consultants, 2023).

13.7. NSW Fisheries Management Act (1994)

The area of the proposed quarry expansion will not affect any areas identified as aquatic reserve, key fish habitat, or habitat for threatened fish as listed under the *NSW Fisheries Management Act* (1994).

13.8. North Coast Regional Plan 2041

The North Coast Regional Plan (NCRP 2041) offers guidance for local councils with preparing various locally-effective plans.

Objective 3 of the NCRP 2041 is to "*Protect regional biodiversity and areas of high environmental value"* (NSW Government, 2022c, p21). This objective includes protecting High Environmental Value Assets (HEVs). To this end, HEV assets need to be identified and used to guide project planning.

Potential HEV assets are shown at the regional scale on the Potential High Environmental Values map of the NCRP, and include:

- land with high biodiversity value that is particularly sensitive to impacts from development and clearing (as shown on the NSW Government's Biodiversity Values map)
- native vegetation of high conservation value, including vegetation types that have been over cleared or occur within over cleared landscapes, threatened ecological communities, old growth forest[1] and rainforest
- key habitat of threatened species
- important wetlands, estuaries, and lakes
- areas of geological significance

Fahey's Pit falls outside the definition of HEV assets, as identified in the Plan, and, therefore, meets Objective 3 of the NCRP 2041.

13.9. Clarence Valley Council Local Environment Plan (2011)

The Clarence Valley Council LEP (2011a) aims to provide environmental planning provisions for land within the Clarence Valley LGA. Within the CVC LEP (2011a), the relevant objective relating to RU1-zoned lands is "To minimise the fragmentation and alienation of resources lands".

The quarry site is within land use zone RU1 (Primary Production). Under the LEP, extractive industries are permitted, with consent, in land use zone RU1. There is no land zoned for conservation associated with the Project. The development, and associated rehabilitation upon closure will assist with meeting the aims of the LEP.

13.10. Clarence Valley Comprehensive Koala Plan of Management (2015)

This Plan of Management aims to ensure that the current extent of koala habitat is maintained, improved, and not reduced; and mitigate processes which are limiting koala occupancy rates and/or population sizes.

The koala assessment and survey undertaken as part of this ecological assessment revealed the proposed footprint does not constitute core koala habitat, and no evidence of koala was observed. Further, only one Koala use tree species listed in Schedule 2 of the Koala SEPP 2021 was recorded in the vegetation proposed for clearing.

Upon closure of the quarry, there is opportunity to rehabilitate the site and provide greater habitat value for koala via planting *Eucalyptus campanulata*.

[1] Assumed to be the Old Growth mapping undertaken as part of the Comprehensive Regional Assessment Process (State Government of NSW and Department of Planning and Environment 2011).

13.11. Clarence Valley Council Rural Zones Development Control Plan (2011b)

Please refer to the project EIS (Outline Planning Consultants, 2023) for an assessment of the project against the Clarence Valley Rural Zones DCP 2011. Further to this, *Part R – Controls for Biodiversity and Habitat Protection* of the Rural Zones DCP applies. The objectives of Part R are:

a) To protect, maintain and improve native biodiversity in the Clarence Valley LGA.

b) To provide a framework for assessing development that is likely to impact on native vegetation and biodiversity in conjunction with aims (2) (d) and (g) in clauses 1.2(2) (d) and (g) of CVLEP 2011 where there is potential to degrade biodiversity and ecological values.

c) To retain native vegetation and habitats of significant species in parcels of a size and configuration that will enable existing plant and animal communities to survive in the long term.

d) To offset unavoidable habitat losses in accordance with contemporary best practice

e) To ensure retained vegetation and offset areas are securely protected and managed in perpetuity.

f) To ensure that construction and indirect impacts of development are mitigated using current best practice standards.

Assessment against Part R's biodiversity planning principles are provided in Table 15.

Table 15: Assessment of the development against relevant sections of the rural zones DCP

Section	Biodiversity Planning Principle	Assessment
R4(A)	The 3 principles of Ecologically Sustainable Development are to be followed in the implementation of this plan: (1) The precautionary approach (2) Inter-generational equity (3) Conservation of biodiversity and ecological integrity	This report has been guided by the BC Act and will therefore meet this DCP requirement. I.e. the purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.
R4(B)	Development should be consistent with overarching biodiversity strategies.	The Project is consistent with actions and objectives within the *Northern Rivers Regional Biodiversity Management Plan* or the *Clarence Valley Biodiversity Strategy 2020-2025*.
R4(C)	Development should maintain or improve vegetation condition.	The strategy to offset the proposed clearance of 0.83 ha of native vegetation will be resolved following discussion with Council. A further 0.14 ha of vegetation will be retained and rehabilitation will occur progressively and upon closure of the quarry (see Section 11 of this BDAR).
R4(D)	Habitat retention is the first priority.	See Section 7 of this report.
R4(E)	Environmental impacts should be avoided at the source.	See Section 7 of this report.
R4(F)	Development should not contribute to habitat fragmentation	The proposed development will not result in fragmentation.
R4(G)	EECs must be retained	No EECs are impacted by the proposed development.
R4(H)	Measures should be taken to mitigate edge effects and other threats to small patches of retained habitat.	See Section 10 of this report.
R4(I)	Indirect impacts on biodiversity should be avoided.	See Sections 7 and 10 of this report.

R4(J)	Degraded habitat forming part of development site should be rehabilitated.	Rehabilitation will occur progressively and upon closure of the quarry (see Section 11 of this report).
R4(K)	The costs of ongoing management of biodiversity values should be met by the development.	The costs of ongoing management of biodiversity values will be met by the quarry operator.
R5(1)	The site investigation and analysis shall classify the habitat of the development footprint based on the findings of the ecological assessment and the criteria or thresholds outlined in Clause R6 and tables 1 to 7 (of the DCP) as being an area that is either: • Green flag area – area that can be developed (least impact). • Amber flag areas – areas with low conservation value where development can occur with identified impacts minimised and any loss of habitat offset • Red flag areas – areas with high conservation value status where retention of habitat is essential	The adjacent vegetation is not considered to be: • an EEC or within 20m of an EEC • an O*vercleared Vegetation Type,* or within 20m of an *Overcleared Vegetation Type*. • A wetland, or within 50m of a wetland. • On land >18 degrees (based on GIS analysis using ELVIS 1m resolution Digital Elevation Model [Geoscience Australia 2021]). • Old Growth Vegetation, or within 20m of Old Growth Vegetation[2]. • Protected Habitat The adjacent vegetation is therefore assumed to an amber flag vegetation, for which an offset will be secured. Establishment of an offset area will assist in satisfying Table 1 to 7 of Part R of Rural Zones DCP 2011.

[2] Assumed to be the Old Growth mapping undertaken as part of the Comprehensive Regional Assessment Process (State Government of NSW and Department of Planning and Environment 2011).

14 Conclusion

This ecological assessment report has been prepared to assess the impacts associated with the proposed expansion of Fahey's Pit on biodiversity values, as defined under the BC Act and *Biodiversity Conservation Regulation 2017*. Although the BOS was not triggered and a BDAR is not required, the structure of this assessment was guided by the BAM (NSW Department of Planning, Industry and Environment, 2020) Appendix C: *Streamlined assessment module – small area,* as advised by the Client.

In accordance with the Clarence Valley Rural Zones DCP 2011, the clearance of 0.83 ha of native vegetation (PCT 3288) is proposed to be offset. The offset strategy would be resolved following discussion with Council.

Five threatened species were recorded on site during surveys. However, no significant impacts on these species are predicted to occur due to the proposed quarry expansion. No SAII entities are anticipated to be impacted by the proposal.

Overall, the development has been designed to consider environmental requirements within the SEARs, and within relevant legislation and plans. We trust that this report provides sufficient information to allow assessment of the project.

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Vipac Engineers and Scientists Limited (2023) Fahey's Pit Air Qualit Assessment. Spring Hill, Australia.

Appendix A: Test of Significance

The below assessment applies to the proposed quarry expansion at Fahey's Pit.

Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats—

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposed quarry expansion would involve the clearance of 0.83 ha of native vegetation which forms potential habitat for a number of threatened species. This native vegetation does not constitute breeding or critical foraging habitat for threatened species targeted for survey or observed on site.

A total of eight hollow-bearing trees (HBTs) would be removed within the area proposed to be cleared, however, none of the hollows were observed to be occupied by threatened species and no evidence of breeding (behaviour, owl pellets, etc) was seen during targeted surveys and hollow searches. A total of 27 HBTs would be retained within a 100 m buffer of the quarry footprint.

No permanent or semi-permanent waterways that could support species at a critical life stage would be impacted by the Project, and all stormwater runoff would be contained within the quarry footprint.

As such, the Project is not likely to impact the life cycle of any species such that the species would be under increased threat.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

The native vegetation proposed to be cleared has been identified as PCT 3288 and is not equivalent to an endangered or critically endangered ecological community. Regardless, the clearance of 0.83 ha of the community would not adversely affect or modify the composition of the surrounding occurrence of PCT 3288.

c. in relation to the habitat of a threatened species or ecological community—

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

Five threatened species were recorded on site during surveys in 2023, namely Spotted-tail Quoll, Eastern False Pipistrelle, Greater Broad-nosed Bat, Large Bent-winged Bat, and Masked Owl.

These species are likely to use habitat in the locality, including the 0.83 ha of PCT 3288 proposed to be cleared. However, the extent of vegetation proposed to be cleared compared to the large area of contiguous vegetation to be retained around the quarry footprint, is relatively small. The five observed threatened fauna species are highly mobile and occupy larger home ranges.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No areas of habitat will become fragmented or isolated as a result of the proposed quarry expansion, as the small area proposed to be cleared (0.83 ha) is around the edge of the existing cleared quarry footprint, and will not reduce connectivity to surrounding areas of native vegetation.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The 0.83 ha of PCT 3288 (not a TEC) proposed to be removed does not constitute breeding habitat or provide critical foraging habitat for any threatened species targeted during surveys or observed on site. A total of eight HBTs would be removed as part of the proposed vegetation clearance, however, no threatened species were observed occupying the hollows and no evidence of breeding was seen. As such, the removal of this small area (0.83 ha) of native vegetation is unlikely to be detrimental to the long-term survival of these species.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity value (AOBV) occur within the proposed quarry footprint. No indirect impacts on off-site AOBV are predicted to occur.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project involves clearing of native vegetation and loss of hollow-bearing trees, which are considered key threatening processes in NSW. The removal of eight HBTs within 0.83 ha of native vegetation is unlikely to significantly increase the impact of these key threatening processes in the locality, due to the presence of HBTs and equivalent contiguous native vegetation in the immediate vicinity of the area proposed to be cleared.

Appendix B: SEARs

Gary Peacock
Director
Outline Planning Consultants Pty Ltd
Suite 2301, Level 3, Quattro Building
No. 4 Daydream Street
Warriewood, NSW 2102

Via email: gpeacock@outline.com.au

30 August 2022

Planning Secretary's Environmental Assessment Requirements
Faheys Pit Project (EAR 1722)

Dear Mr Peacock

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 Department is awaiting advice from several agencies. This advice will be forwarded for your consideration once it is received. You must have regard to this advice 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.

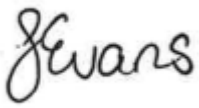
If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environmental Protection and*

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 the NSW Resources Regulator regarding 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 James McDonough on 02 9585 65313 or email at james.mcdonough@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 1722
Proposal	Continuation of an existing gravel quarry to extract up to 150,000 tonnes per annum for a period of approximately 20 years from an estimated resource of 1.3 Million tonnes.
Location	Faheys Pit – 9720 Armidale Road, Tyringham 2453 (Lot 31 DP 1203488)
Applicant	Outline Planning Consultants Pty Ltd
Date of Issue	30/08/2022
Date of Expiry	30/08/2024
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in 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; • **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 Gunnedah 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
	Clarence Valley Local Environmental Plan 2011
Risk Assessment	
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
Land	
	State Environmental Planning Policy No. 55 – Remediation of Land
	Agricultural Land Classification (DPI)
	Rural Land Capability Mapping (OEH)
	Soil and Landscape Issues in Environmental Impact Assessment (NOW)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)
	Guidelines for Consultants Reporting on Contaminated Sites (EPA)
	Agricultural Issues for Extractive Industry Development (DPI)
Water	
Groundwater	NSW Aquifer Interference Policy 2012 (NOW)
	NSW State Groundwater Policy Framework Document (NOW)
	NSW State Groundwater Quality Protection Policy (NOW)
	NSW State Groundwater Quantity Management Policy (NOW)
	Australian Groundwater Modelling Guidelines 2012 (Commonwealth)
	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	Guidelines for the Assessment & Management of Groundwater Contamination (EPA)
Surface Water	NSW State Rivers and Estuary Policy (NOW)
	NSW Government Water Quality and River Flow Objectives (EPA)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom) and associated Volume 2E: Mines and Quarries (DECC)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control (EPA)
	Technical Guidelines: Bunding & Spill Management (EPA)
	A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
	NSW Guidelines for Controlled Activities (NOW)
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)
	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)
	Strategic Framework for Mine Closure (ANZMEC-MCA)

ATTACHMENT 2

AGENCY CORRESPONDENCE

Appendix C: Anabat Analysis Report

Microbat Call Identification Report

Prepared for ("Client"):	Bower Ecology
Survey location/project name:	Hernani, NSW
Survey dates:	24-27 January 2023
Client project reference:	
Job no.:	BOW-2301
Report date:	3 March 2023

Methods

Data received

Balance! Environmental received 2538 zero-crossing (ZC) format ultrasonic acoustic files, recorded over four consecutive nights (24th – 27th January 2023) using an Anabat Swift detector.

Call analysis and species identification

The data were analysed in Anabat Insight (Version 2.0.6; Titley Scientific, Brisbane). A region-specific Decision Tree was applied to filter out files containing only non-bat noise and apply tentative species labels to the remaining files based on the average characteristic frequencies (Fc) of calls present in each file. Call identities within each labelled file were then validated and adjusted manually by comparing call spectrograms and derived metrics with those of regionally relevant reference calls and published call descriptions (*e.g.*, Reinhold et al. 2001; Pennay et al. 2004). The likelihood of species' occurrence in the study area was also confirmed by referring to the Australasian Bat Society's *BatMap* application (https://www.ausbats.org.au/batmap.html) and other published distributional 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

Noise filtration excluded 2261 ZC files from further analysis. The remaining 277 files contained 288 identifiable bat calls.

Ninety percent (261) of the calls were reliably attributed to 11 distinct species plus the *Nyctophilus* genus (see top portion of **Table 1**). Two *Nyctophilus* species potentially occur in the study area – *N. geoffroyi* and *N. gouldi* – but their calls cannot be reliably differentiated.

The other 27 calls each had characteristics potentially attributable to two or more species and were allocated to several multi-species groups (**Table 1**, lower section); however, all those calls represented species that were otherwise positively identified from more typical calls.

Sample call spectrograms are presented in **Appendix 1**.

Table 1 Bat species detected during the Hernani survey, 24-27 January 2023.

Number of calls recorded per site.

Night:	24-Jan	25-Jan	26-Jan	27-Jan	Species Total
Positively identified calls					
Chalinolobus gouldii	7	64	3		74
Chalinolobus morio	5	1	1		7
Falsistrellus tasmaniensis	12	8	12		32
Nyctophilus sp.	4	7	10	1	22
Scoteanax rueppellii			1		1
Scotorepens orion	4	3	7		14
Vespadelus darlingtoni		3	3		6
Vespadelus pumilus	1	1	1		3
Vespadelus regulus	24	12	12	9	57
Miniopterus orianae oceanensis	1	4	2	3	10
Austronomus australis	15	2	8		25
Ozimops ridei	5	2	4		11
Unresolved calls					
C. gouldii / O. ridei		1	1		2
S. rueppellii / S. orion	1	1			2
S. orion / F. tasmaniensis		3	2		5
V. darlingtoni / V. regulus	2	2	2	2	8
Vespadelus sp. */ M. o. oceanensis*	2	2		5	9
Detector-night Total	83	116	69	20	288

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

Churchill, S. (2008). Australian Bats. Jacana Books, Allen & Unwin; Sydney.

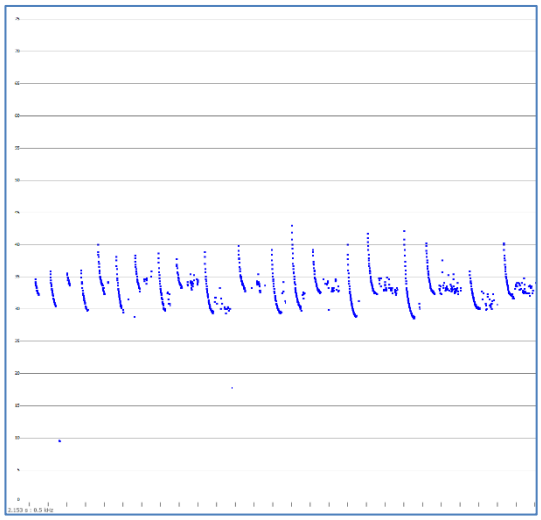
Pennay, M., Law, B., and Reinhold, L. (2004). Bat calls of New South Wales: Region based guide to echolocation calls of Microchiropteran bats. NSW Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. Australasian Bat Society Newsletter 20, 41-43.

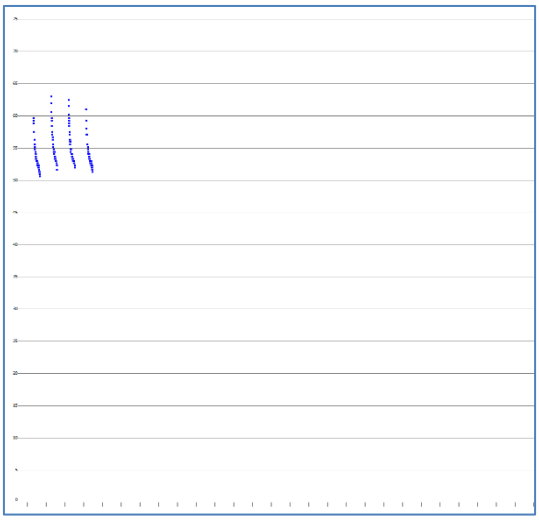
Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). Key to the bat calls of south-east Queensland and north-east New South Wales. Department of Natural Resources and Mines, Brisbane.

van Dyck, S., Gynther, I. and Baker, A. (ed.) (2013). Field Companion to the Mammals of Australia. New Holland; Sydney.

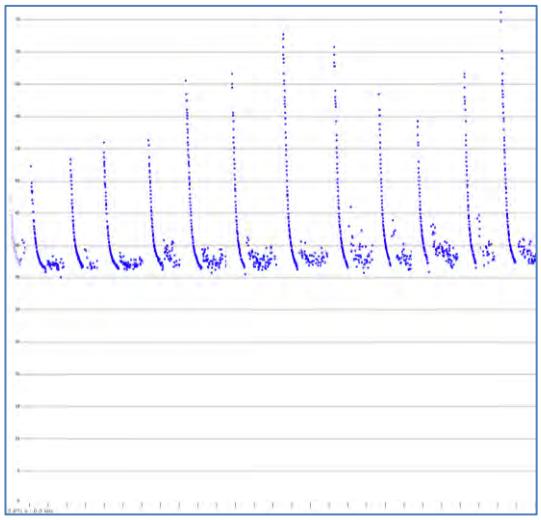
Appendix 1 Representative spectrograms from the Hernani survey, 24-27 January 2023.
X-axis (time)=10 msec per tick; time between pulses removed ("compressed")



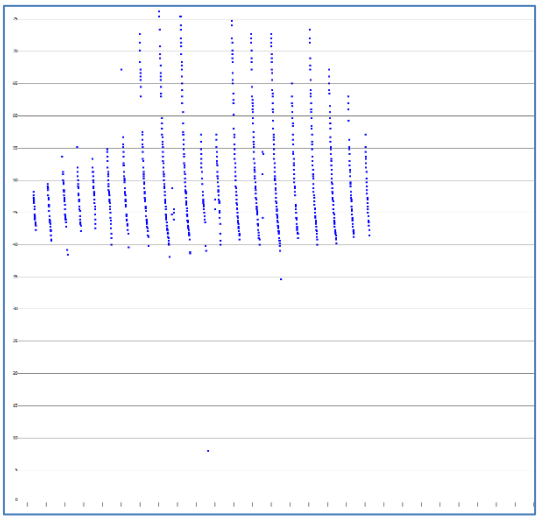
Chalinolobus gouldii



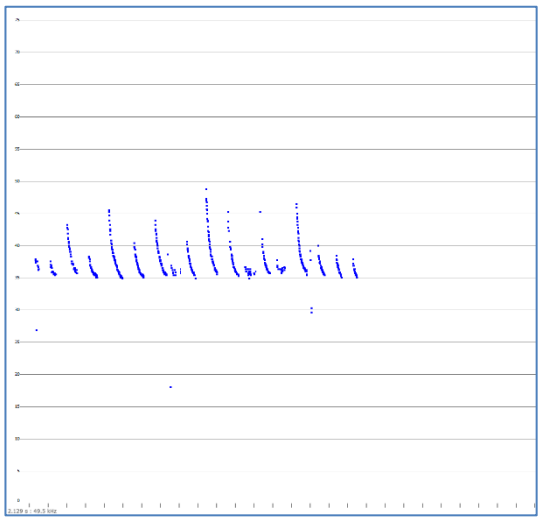
Chalinolobus morio



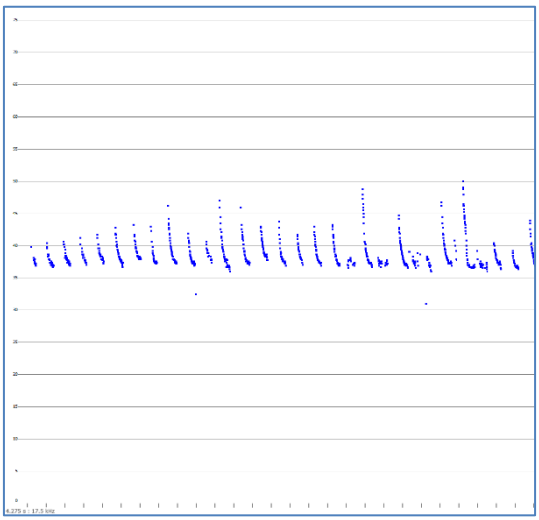
Falsistrellus tasmaniensis



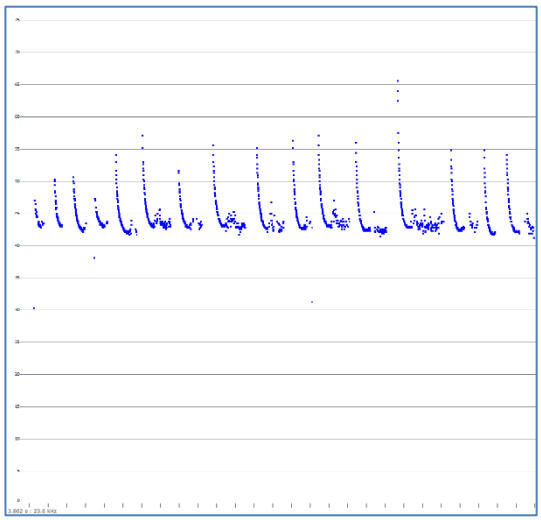
Nyctophilus sp.



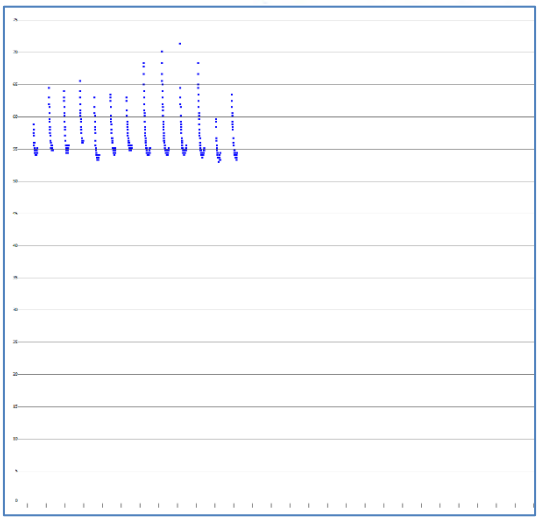
Scoteanax rueppellii



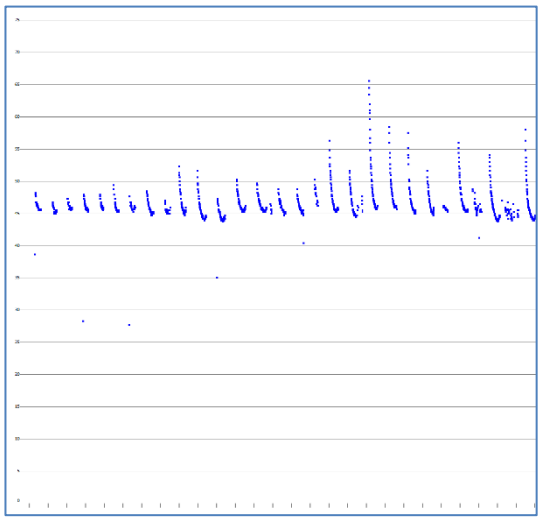
Scotorepens orion



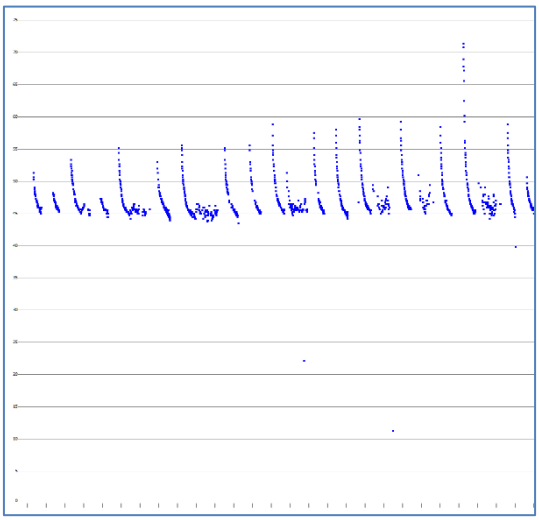
Vespadelus darlingtoni



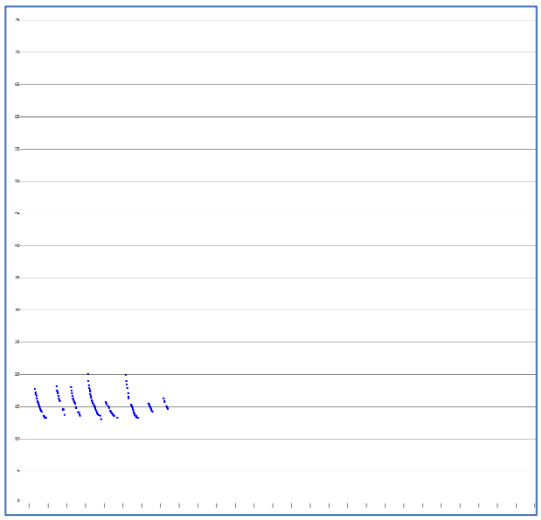
Vespadelus pumilus



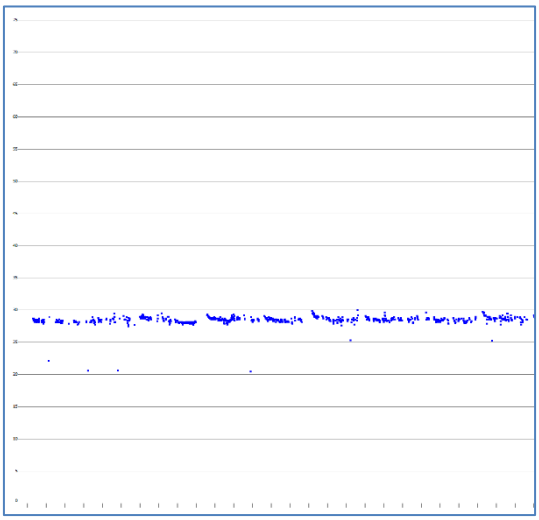
Vespadelus regulus



Miniopterus orianae oceanensis



Austronomus australis



Ozimops ridei

Appendix D: Sheridans Hard Rock Quarry – Slopes >32.5%