WEDGETAIL
PROJECT CONSULTING

EPBC Preliminary Documentation
Eagleton Quarry EPBC 2024/09967

13 Barleigh Ranch Way, Eagleton NSW 2324







Report prepared for:
Eagleton Rock Syndicate Pty Ltd

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26 August 2025

EPBC Preliminary Documentation

Eagleton Quarry EPBC 2024/09967

13 Barleigh Ranch Way, Eagleton NSW 2324

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1. INTRODUCTION

On 21 November 2024, the proposed action, Eagleton Quarry Project, was determined to be a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), due to likely significant impacts to the following controlling provision:

- *Listed threatened species and communities (s18 & s18A)*

It has been determined that your proposed action will be assessed by preliminary documentation.

This document has been prepared by Wedgetail Project Consulting (WPC) for Eagleton Quarry Syndicate Ptd Ltd (the proponent) in line with specific information required by the Minister under section 95A of the EPBC Act and detailed in *Attachment A – Preliminary documentation additional information request* [EPBC Ref: 2024/09967].

The following terms are used throughout this report to describe geographical areas associated with the proposed action (see **Figure 2**):

- **Project Area**: 13 Barleigh Ranch Way, Eagleton NSW (Lot 2 DP 1108702). Inclusive of the Disturbance Footprint, Avoidance Area, Retention Area, Ancillary Developments, and Temporary Works. This has an area of 101.06 hectares (ha).
  - **Disturbance Footprint**: The area within the Project Area subject to the proposed action, including ancillary roads, infrastructure, and impact buffers. This has an area of 33.44 ha.
  - **Avoidance Area**: The area within the Project Area proposed to be avoided, albeit not subject to onsite conservation, inclusive of the existing Garden World premise (10.09ha).
  - **Retention Area:** The area within the Project Area proposed for use as an Onsite Offset Site to be established under the NSW Biodiversity Offsets Scheme (BOS) (approximately 57.53ha)
  - **Locality**: Land within a 5-kilometre (km) radius of the Project Area.

1.1 DESCRIPTION OF THE PROPOSED ACTION

Description of the proposed clearing, earthworks and construction activities or other elements proposed to be taken within the construction footprint

The proposed action involves the development of a gravel and aggregate quarry with a production capacity of up to 600,000 tonnes per annum over a 30-year period.

The proposed action includes:

- **Clearing:** Clearing of vegetation within the Disturbance Footprint to allow for quarry operations. No clearing will occur within the Avoidance and Retention Areas
- **Earthworks:** Earthworks will be undertaken to establish the quarry pit, excavation areas, internal haul roads, and associated operational zones. The earthworks will begin from the northern ridgeline and progress in a south-easterly direction, utilizing the natural topography

of the site as an acoustic and visual barrier to mitigate potential impacts on surrounding areas.

- **Quarry Pit and Processing Plant Construction:** The quarry pit will be excavated, and the processing plant will be positioned at an excavated level of RL 45m in the northern section of the quarry. This location minimises noise disturbance to the south. The hill located to the south will remain as a natural barrier, maintaining a minimum height of RL 57.5m until the final year of operations, after which additional noise barriers will be installed around the plant as needed.
- **Access Road Construction:** A private access road will be constructed from Barleigh Ranch Way to the quarry pit, forming the primary route for the transport of extracted material. No new construction activities are proposed for Barleigh Ranch Way, the right of the carriageway, Italia Road, or the Pacific Highway, as these areas were previously approved under separate local council approvals.
- **Rehabilitation:** Progressive rehabilitation throughout the project life, culminating in a final landform with revegetated benches, grass areas, and scattered trees.

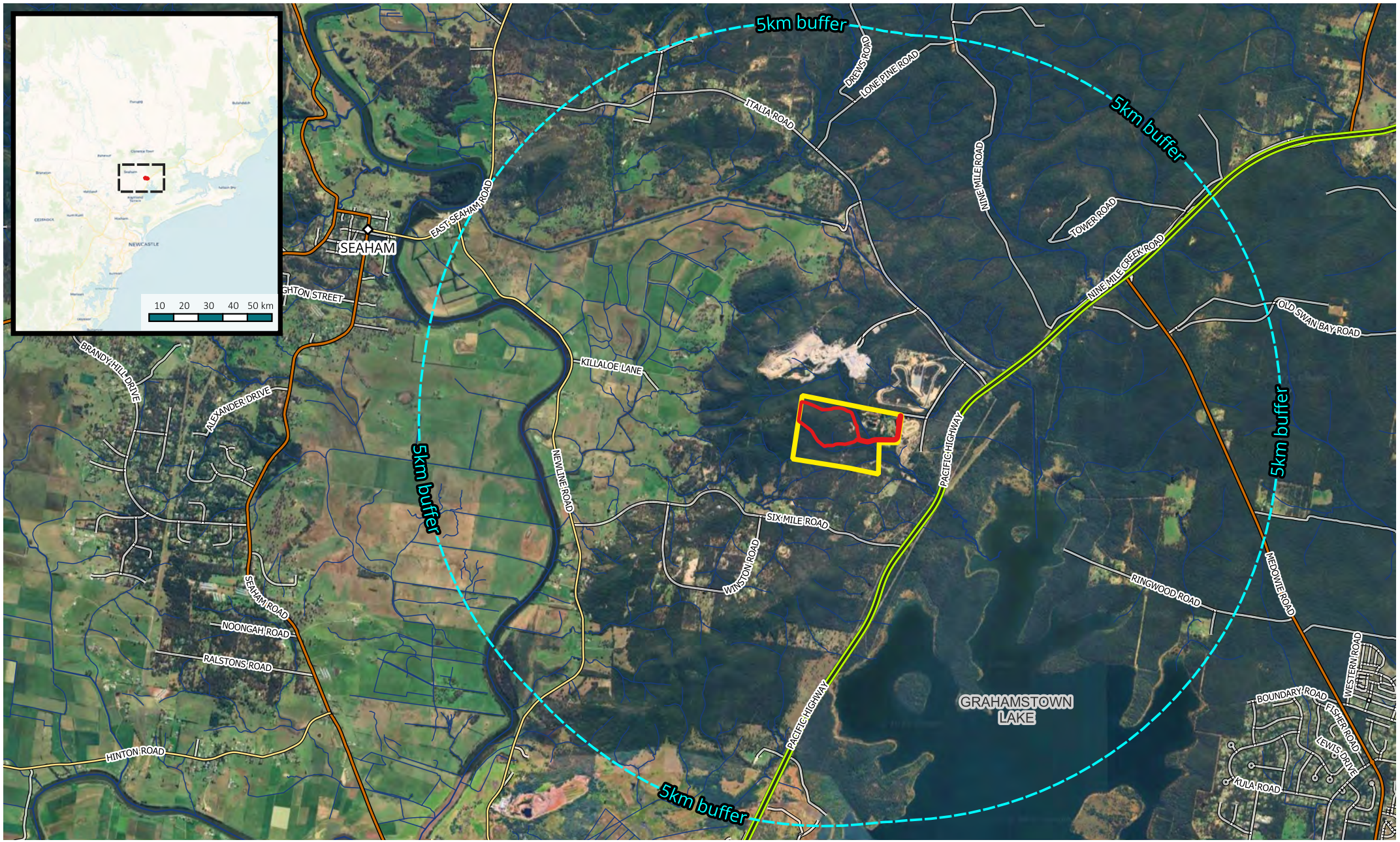
No construction activities beyond those outlined above are proposed, as the existing buildings and infrastructure will be utilised. All activities are consistent with the approved State Significant Development Consent (SSD 7332) granted on 8 July 2024.

Operating Hours

The operating times for the proposed quarry are detailed below:

Table 1: Operating Times

Activity	Permissible Operating Hours
Site Establishment and construction	• 7am to 6pm Monday to Friday • 8am to 1pm Saturday • At no time on Sundays or public holidays
Quarry operations	• 7am to 6pm Monday to Friday • 7am to 4pm Saturday • At no time on Sundays or public holidays
Loading and dispatch of product trucks	• 5am to 6pm Monday to Friday • 5am to 4pm Saturday • At no time on Sundays or public holidays
Blasting	• 9am to 4pm Monday to Friday • At no time on Saturdays, Sundays or public holidays
Maintenance and environmental management	• 24 hours per day, 7 days per week provided that these activities are not audible at any privately-owned residence if outside of the operational hours



Impact Area
Project Area
Buffer (5km)
Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

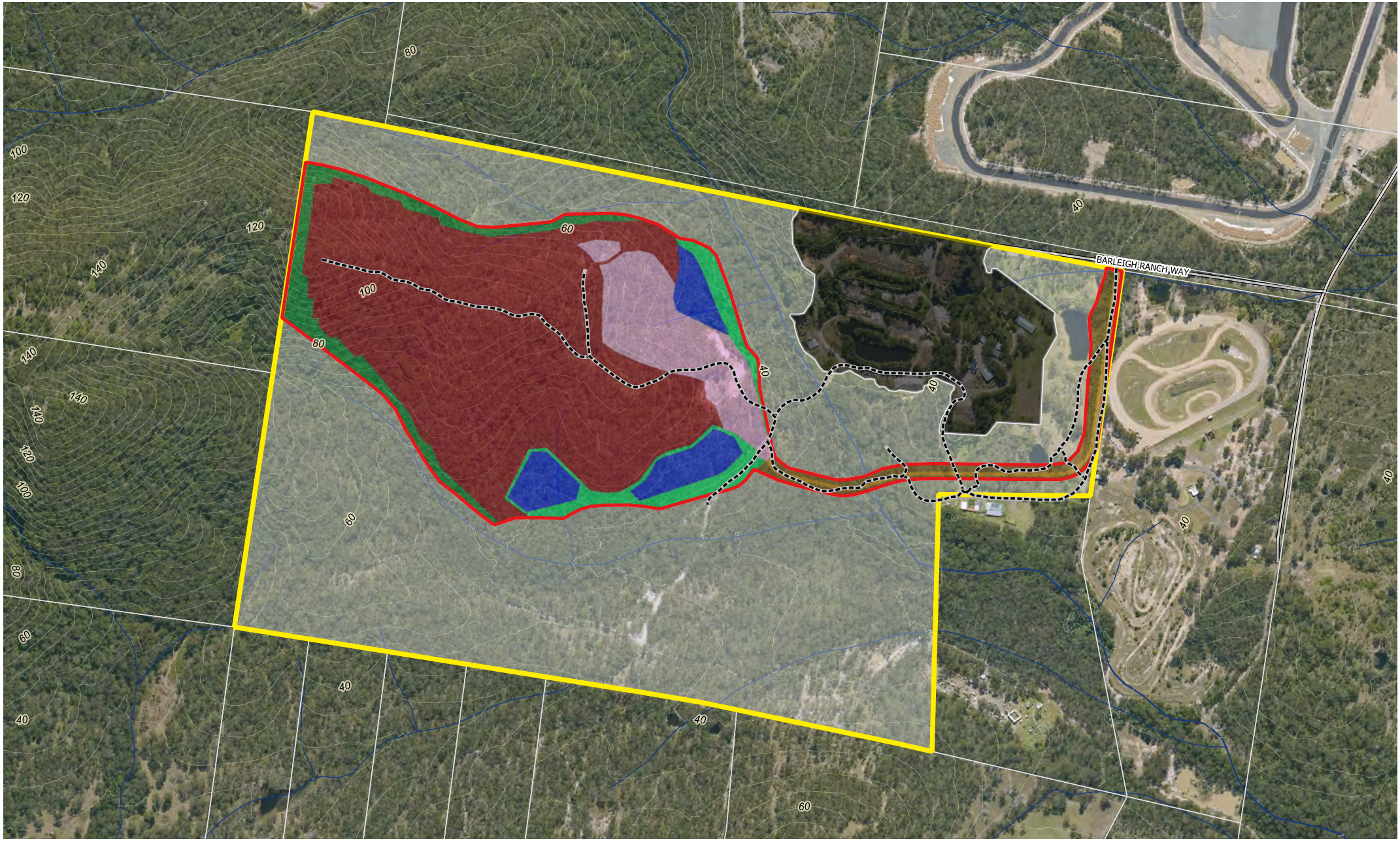
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13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 1. Locality

0.5 1 1.5 2 2.5 km

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Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56



Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

- Impact Area
- Project Area
- Retention Area
- Extraction Area
- Development Site- Access
- Development Site- Buffer
- Processing Area
- Dams
- Landscaped Dam Buffers
- Site Access / Haulage
- Avoidance Area
- Lot
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 2. Proposed Action

100 200 300 400 500 m

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Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Descriptions of the preconstruction, construction, and operational phases of the proposed action

The proposed action will be progressively developed over an approximate life span of 30 years. Delivery of the action will take place over four (4) stages (Construction Phase, Operation Year 1, Operation Year 1-5, and Operation Year 5 Onwards). These stages are set out below:

- **Preconstruction Phase** – The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).
- **Construction Phase** – Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.
- **Operation Year 1** – Establishment of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase. See **Appendix 1** for Year 1 quarry extent.
- **Operation Year 1 to 5** – Expansion of the initial extraction areas through creating benches and faces and expanding the processing area to accommodate a more efficient plant layout and stockpile configuration. Processing area will transition from diesel powered processing equipment to electric powered processing equipment near the end of this period. Additional water quality and quantity control devices will be implemented including the construction of a second dam. See **Appendix 1** for Year 3 quarry extent.
- **Operation Year 5 onwards** – Expansion of the initial extraction areas through creating benches and faces. See **Appendix 1** for the Year 5 quarry extent, and ultimate quarry footprint. See **Plate 1** for an example of quarry expansion.

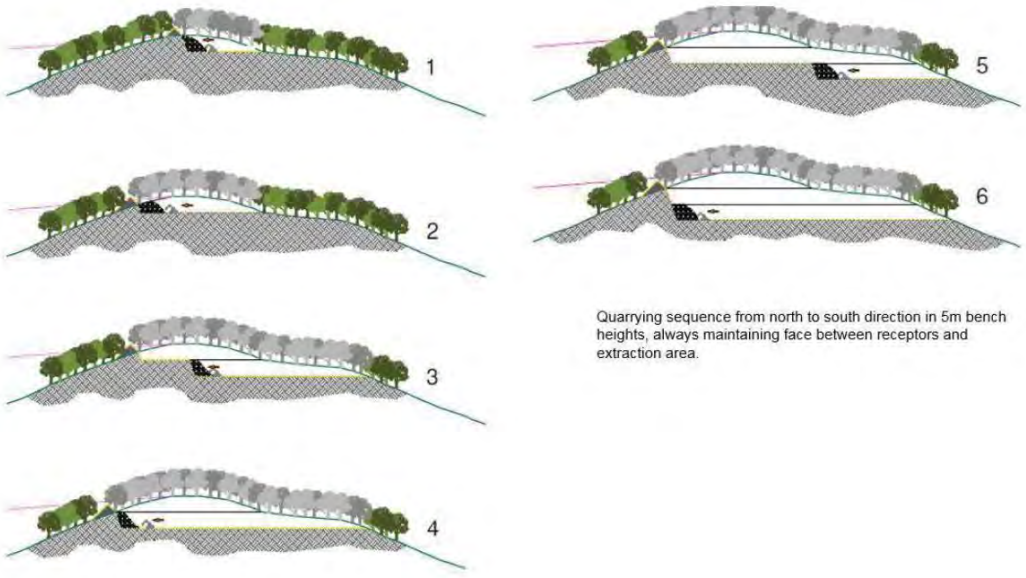


Figure 10 – Approach to Extraction
Source: Eagleton Rock

Plate 1: Eagleton Quarry Sequence

Closure and Rehabilitation -

The broad rehabilitation objective for the post-quarry landform is to establish a similar land use on the disturbed areas. The proposed quarry operation will result in a final landform that comprises a series of 10 m wide and 15 m high benches at the western end of the quarry, in an amphitheatre configuration. Each stepped bench will be revegetated (see **Plate 2**).

The final pit/void will be approximately 28.6ha in area. Until such time that extraction has ceased, rehabilitation will occur around the perimeter of the pit only along the benches, and will not involve the pit floor.

For further information a Rehabilitation and Closure Management Plan has been prepared by SLR and is provided at Appendix Q of the Environmental Impact Statement (EIS).

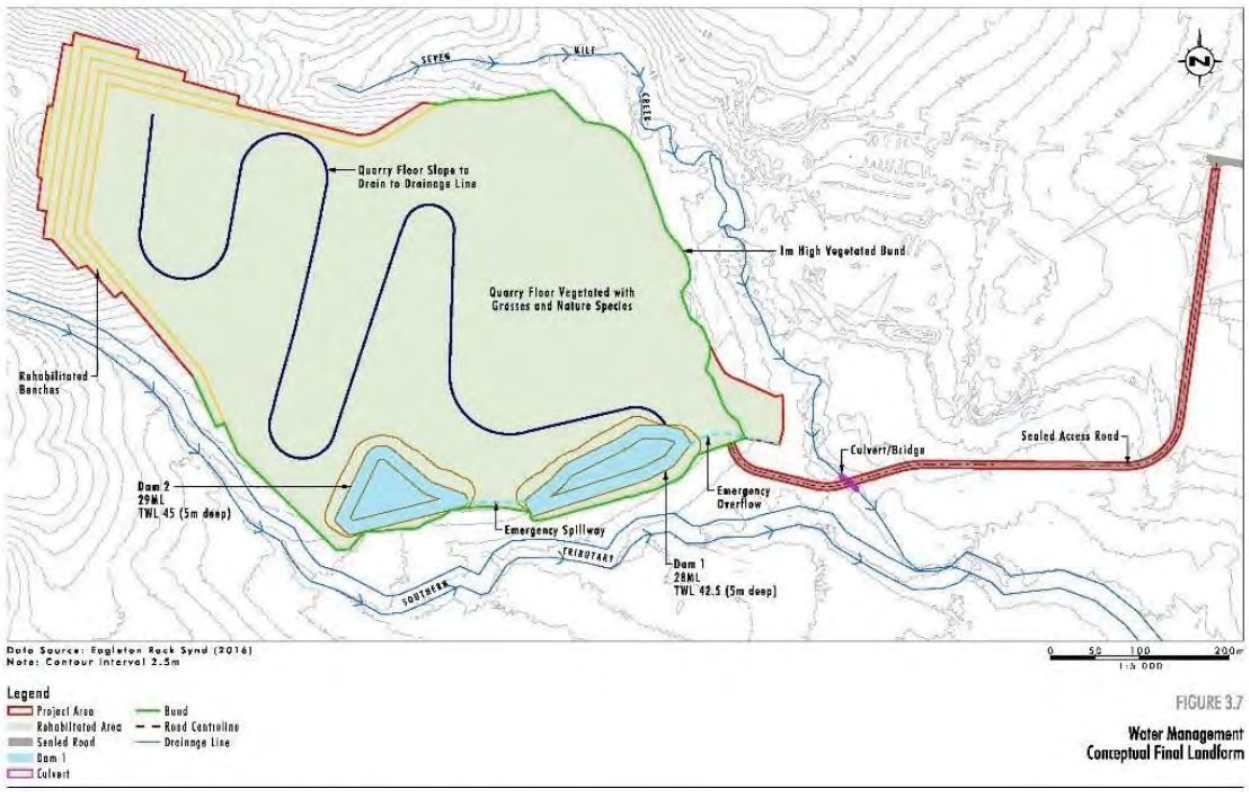


Figure 13 – Final Landform Water Management Plan
Source: Umwelt

Plate 2: **Final Landform Excerpt (Eagleton Quarry EIS 2017)**

The anticipated timing and duration (including start and completion dates) for each known activity, stage, or element of the proposed action.

The proposed action intends to commence construction of the quarry as soon as practical (considering, finance and required approvals). The proposed action will be progressively developed over an approximate life span of 30 years. Delivery of the action will take place over four (4) stages (Construction Phase, Operation Year 1, Operation Year 1-5, and Operation Year 5 Onwards) (see **Plate 1** above).

Feasible alternatives to the proposed action or elements of the proposed action, and justification for the preferred option.

No Quarry Development

Choosing not to proceed with the quarry was assessed but ultimately dismissed. The Lower Hunter region faces significant demand for crushed rock and aggregate products due to rapid population growth, with an expected addition of 115,000 dwellings, alongside major infrastructure projects such as the expansion of coal export activities at Port Newcastle. Without the quarry, there would be a scarcity of construction materials, leading to increased costs and the need to transport materials from more distant quarries in locations like Karuah, Port Macquarie, or Marulan. This would not only raise costs but also increase environmental impacts due to longer haulage distances, such as higher greenhouse gas emissions and road degradation.

Alternative Sites

Various alternative sites were explored between the Pacific Motorway and Martins Creek. However, the proposed site was identified as the most suitable due to its proximity to existing quarries, such as the Boral Seaham Quarry, which extracts similar materials. The geological composition ensures high-quality aggregate deposits, reducing the need for extensive land clearing or overburden removal. Additionally, the site's closeness to major transport routes minimises haulage distances, reducing fuel consumption and emissions, and making it both environmentally and economically advantageous.

Quarry Layout Alternatives

Quarry layout was considered throughout the assessment process to optimise operations and minimise environmental impacts. The selected layout was designed to:

- Protect surface water and groundwater resources through appropriate drainage management.
- Minimise noise, dust, and air quality impacts by positioning processing areas away from sensitive receptors.
- Retain high ecological value areas.
- Reduce operational inefficiencies, such as double handling of materials and unnecessary land disturbance.

Quarry Access Options

Access alternatives included creating a new intersection with the Pacific Highway or modifying existing routes. After consultation with Roads and Maritime Services (RMS), the creation of a new intersection was deemed unlikely to gain approval due to safety concerns, potential biodiversity impacts, and the need for extensive land clearing.

The preferred option involves using the existing right of carriageway via Italia Road, which is legally established and minimises environmental disturbances. Various internal access road alignments were also assessed. The selected alignment reduces potential conflicts with the neighbouring Gardenland landscape supplies business, provides a safer crossing over Seven Mile Creek, and allows efficient access to the processing and dispatch areas.

Justification for the Preferred Option:

The preferred option was selected based on its ability to:

- Meet regional demands for construction materials sustainably.
- Minimise environmental impacts related to water, air quality, noise, and biodiversity.
- Ensure economic feasibility through reduced haulage costs and operational efficiencies.
- Maintain legal access with minimal safety risks and land-use conflicts.
- Leverage the site's optimal geological characteristics, land availability, and environmental suitability, making it the most feasible and appropriate location for the quarry.
- This balanced approach ensures that the quarry can support regional development while maintaining environmental integrity and operational effectiveness.

Consultation about the proposed action that is planned or has been completed, including any documented results or responses.

Early Consultation

As part of the preparation for the Secretary's environmental assessment requirements (SEARs) for the EIS (JBA, 2017), the Department of Planning and Environment (DPE) consulted with a range of relevant government agencies, including the Department of Industry, the Department of Primary Industries, the NSW Environment Protection Authority, and the Office of Environment and Heritage. Additionally, the SEARs required Eagleton Rock to consult with several organisation, including the NSW Rural Fire Service, Hunter Local Land Services, and Port Stephens Council, among others.

A community consultation program was coordinated by Umwelt Australia in 2016, which provided an opportunity for 66 stakeholders to participate in the process. The program had a 32% response rate, including 11 residents, 8 local businesses, and 2 agencies. Key surrounding businesses, including Port Stephens Gardenland, Boral's Seaham Quarry, and others, were also part of the consultation. Key issues in relation to the Project included noise, dust, blasting, company ownership and traffic movements.

Public Exhibition 2017

The EIS was publicly exhibited between 3 February 2017 and 6 March 2017, during which time submissions were received from members of the public and government agencies.

A Response to Submissions Report was submitted in October 2017, addressing the issues raised by agencies and the local community. As part of the review and response to submissions process, Eagleton Rock reviewed the design and layout of the proposed Eagleton Quarry. This resulted in a change to the design and delivery of quarry works over the life of the quarry, to reduce noise and visual impacts and improve the water management regime to be implemented.

Public Submission 2023

The Project Amendment Report (SSDA) was lodged with the DPE in September 2023 and was placed on public exhibition until 6 November 2023.

Further submissions were received from government agencies, including from the RMS (now part of Transport for NSW [TfNSW]) which identified ongoing concerns in relation to the safety and suitability

of Italia Road / Pacific Highway intersection for increased heavy vehicle movements. These issues have been subject of further consultation and coordination between TfNSW and Eagleton Rock and are the subject of the Project Amendment.

In relation to the Public Exhibition of the SSDA, a total of 21 submissions were received from members of the public and community groups, and 10 submissions were received from NSW Government agencies, as well as a submission from Port Stephens Council. The top three key themes were traffic and road condition/safety impacts (85.7%), impacts to the environment and biodiversity (76.2%), and increased noise, dust, and vibration (71.4%).

Further Submissions

During May and June 2024, the public was invited to make further submissions during the assessment process by the Independent Planning Commission (IPC).

All submissions and responses to submissions are available on the NSW Major Projects Portal.

Requirements for assessment and approval under state legislation, including any conditions that apply (or will apply) to the proposed action, in addition to any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action.

The proposed activity is subject to Commonwealth, State, and Local legislative requirements, including:

Commonwealth Environment Protection and Biodiversity Conservation Act 1999:

Ecological surveys identified species listed under the EPBC Act, requiring consideration of potential impacts to matters of national environmental significance (MNES).

Threatened Species Conservation Act 1995 (TSC Act) & NSW Biodiversity Conservation Act 2016 (BC Act):

The project, being a pending planning application, was assessed under the TSC Act provisions that are still in effect, despite its repeal. A Biodiversity Assessment Report (BAR) and BOS were prepared in accordance with the NSW Biodiversity Offsets Policy for Major Projects (2014), instead of a Biodiversity Development Assessment Report (BDAR), which would have otherwise been required.

Strategic Context:

The project supports the objectives of the Hunter Regional Plan 2041, aiming to strengthen economic resilience and address the region's shortage of local quarry materials, which poses a risk to infrastructure delivery and development projects.

Conditions will include mitigation measures for biodiversity, water management, traffic, and other impacts as outlined in the relevant legislation and planning documents.

Details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action.

NSW Environmental Planning and Assessment Act 1979 (EP&A Act):

The proposed development is considered under the EP&A Act, which is the principal planning instrument for development within NSW. The Environmental Protection Licence (EPL) required

under the Protection of the Environment Operations Act 1997 (POEO Act) aligns with the SSD consent under Section 89K of the EP&A Act.

Port Stephens Local Environmental Plan 2013 (LEP): The site is located within the Port Stephens Local Government Area, and relevant provisions of the Port Stephens LEP apply:

- **Zoning**: The site is zoned RU2 – Rural Landscape, and the development is permissible with consent under this zone.
- **Clause 5.9 (Tree Preservation)**: The proposal will involve vegetation clearing and the necessary consent for this will be sought.
- **Clause 7.1 (Acid Sulfate Soils)**: The site is classified as Class 5, meaning this clause is not applicable.
- **Clause 7.8 (Drinking Water Catchment)**: The site is located within the Grahamstown Dam drinking water catchment, and any potential impacts on water quality must be considered and managed in accordance with the clause.

Port Stephens Comprehensive Koala Plan of Management 2002: This local policy applies to the protection of koala habitat within the Port Stephens area and is relevant to the proposed development.

State Environmental Planning Policy No 44 (1995): This policy applies to koala habitat protection and remains applicable to the project, as the application was lodged before March 2020.

Note: Because the development application was lodged before 1 March 2020, the Project must also be assessed under SEPP 44 as it existed at the time of the application, despite more recent amendments to SEPPs governing the impacts of developments on Koalas.

Other Approvals:

- **Environmental Protection Licence**: Under the POEO Act.
- **Road Works Approval**: Under Section 138 of the Roads Act 1993 for works to Italia Road and Barleigh Ranch Way.
- **Aquifer Interference Approval**: Under the Water Management Act 2000 for works impacting groundwater resources.
- **Aboriginal Heritage Impact Permit**: If required, under the National Parks and Wildlife Act 1974.

Port Stephens Development Control Plan 2014 (DCP): As the development is SSD, the provisions of the Port Stephens DCP do not apply, but the development is expected to comply with relevant controls.

Other Relevant NSW Legislation and Policies:

- NSW Biodiversity Offsets Policy for Major Projects (OEH 2014)
- Fisheries Management Act 1994 (FM Act)
- NSW Groundwater Dependent Ecosystem Policy 2002

How the action relates to any other action (of which the proponent is aware) that is being or will be taken in the region.

Surrounding Commercial/Recreational Development

Boral's Seaham quarry is located on lot C DP1645505 and Lot 66 DP753200 immediately to the north and northwest. The site is also surrounded by a number existing recreational uses including:

- The MG Car Club located at Lot 1 DP 245116 and Lot 2 DP 1158962 to the northeast of the proposed Eagleton Quarry. The MG Car Club currently takes its access from the same right of carriageway as the Eagleton Quarry is proposed to. However, a Development Application (16-2011-564-3) was approved by Port Stephens Council in October 2013 (and subsequently modified in July 2015) for an upgraded racing track facility including a new intersection to provide access directly to the MG Car Club from Italia Road. The upgraded MG Car Club race track is approved for race meetings and Supersprint and Hillclimb events on weekends, and for general track use 9am- 5pm 7-days per week. Lot 1 DP 245116 and Lot 2 DP 1158962 contain the right of carriageway which benefits the proposed Eagleton Quarry site.
- Hunter Valley Paintball is located at Lot 1 DP 1108702 to the southeast of the proposed quarry, and immediately south of the existing landscape supplies operation. Hunter Valley Paintball also relies on the right of carriageway for access.
- Hunter MCC Raceway and MX Central are located at Lot 481 DP 611651 to the east of the site, between the landscape supplies operation and the Pacific Highway. Hunter MCC Raceway and MX Central also rely on the right of carriageway for access.

Future Residential Area of Kings Hill

The future Kings Hill residential area located south of Six Mile Road is predicted to result in significant residential intensification. At its most northerly extent the future R1 zoned residential area is limited to land within approximately 500m of the Pacific Highway, with the residual land zoned for large lot residential and environmental living.

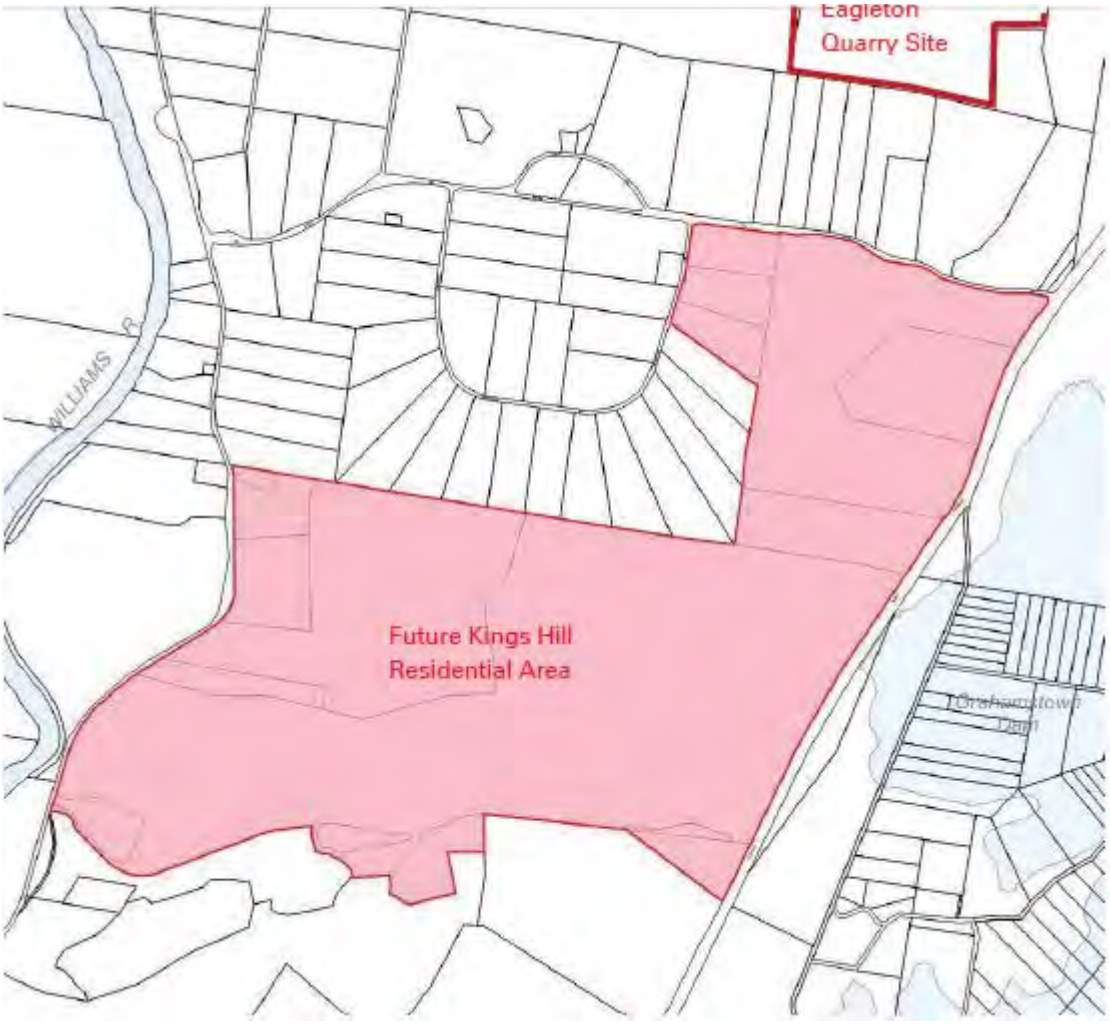


Plate 3 Location of Future Kings Hill Residential Area.

1.2 DESCRIPTION OF THE ENVIRONMENT

A detailed description of the existing environment within the Subject Land is provided within the BAR completed for the proposed action. A summary is provided below.

1.2.1 Vegetation Communities

A total of two (2) vegetation communities were identified within the Project Area;

- *HU804: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest*
- *HU798: White Mahogany – Spotted Gum – Grey Myrtle Semi-mesic Shrubby Open Forest*

These are described below:

HU804: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest

The canopy layer of this community on the site is typically dominated by ***Corymbia maculata*** with a range of co-dominant species across the site including ***Eucalyptus punctata***, ***E. acmenoides***, ***E. fibrosa***, ***E. crebra***, and ***E. globoidea***. Within the drainage lines, other co-dominants the relative abundance of *E. punctata* and *E. acmenoides* is higher, and other co-dominants such as *E. siderophloia*, *C. gummifera* and *Angophora costata* also occur.

The midstorey is sparse across most of the site, with a higher midstorey cover typically occurring in the drainage lines. Common midstorey species include *Dodonaea triquetra*, *Allocasuarina torulosa*, *Acacia falcata*, *Persoonia linearis*, *Melaleuca nodosa*, *Myrsine variabilis*, *Glochidion ferdinandi*, *Acacia irrorata* and *Melaleuca styphelioides*.

The shrub layer ranges from moderately sparse to dense, with common species including *Leucopogon juniperinus*, *Breynia oblongifolia*, *Bursaria spinosa*, *Pultenaea villosa*, *Leptospermum polygalifolium*, *Zieria smithii*, *Acacia ulicifolia*, *Acrotriche divaricata* and *Notelaea ovata*.

Common native species in the ground layer include *Imperata cylindrica*, *Microlaena stipoides*, *Themeda australis*, *Entolasia stricta*, *Oplismenus aemulus*, *Lepidosperma laterale*, *Dianella caerulea*, *Lomandra longifolia*, *Lomandra multiflora*, *Pratia purpurascens*, *Desmodium rhytidophyllum* and *Cheilanthes sieberi*.

This majority of this vegetation zone has a relatively low abundance of exotic species. The most abundant exotic species in this vegetation zone is Lantana camara, which occurs most frequently in the drainage lines and lower slopes.

HU798: White Mahogany – Spotted Gum – Grey Myrtle Semi-mesic Shrubby Open Forest

This vegetation zone is floristically similar to the vegetation in zone 1 but has a dominance of *Eucalyptus acmenoides*, *Backhousia myrtifolia*, *Melaleuca linearifolia*, *Callistemon salignus* and ferns in the understorey.

The dominance of such species and the mesic understorey is consistent with a wet sclerophyll forest formation.

Equivalent Eastern NSW Plant Community Types (PCTs)

Equivalent Eastern NSW PCTs were determined for both vegetation communities identified within the Project Area including:

- *PCT 3244: Lower North Spotted Gum- Mahogany- Ironbark Sheltered Forest*
- *PCT 3236: Hunter Valley Hills Wet Vine Forest*

These equivalent PCTs and justification for their determination is outlined below in **Table 2**.

Table 2: Equivalent Eastern NSW PCTs

Existing Vegetation Community (Map Unit)	Equivalent PCT	Retention Area (ha)	Project Area Total (ha)	Determination and Justification
HU804: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	*PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest*	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	**Selected** This vegetation community was determined to be the most comparable with the vegetation within the Subject Land. This is based on the following: Canopy: The canopy contains a high cover of *Corymbia maculata* (Spotted Gum) and where eucalypts do occur it is commonly *Eucalyptus acmenoides* (White Mahogany), as described in the PCT. Midstory: mid-dense – sparse layer of shrubs very frequently includes *Leucopogon juniperinus* commonly with *Acacia ulicifolia* and *Persoonia linearis.* Groundcover: very frequently include *Lomandra longifolia*, *Lobelia purpurascens, Imperata cylindrica, Entolasia stricta Themeda australis, Dianella caerulea* Geology: Known to occur on acid volcanics as described under the Ten Mile Road soil landscape occurring within the Project Area. Landscape position: This PCT is found on low elevation wet coastal foothills and ranges between Watagan Ranges and Taree.
	PCT 3433: Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter- Macleay Dry Sclerophyll Forests	**Excluded** This community was considered to be a close fit floristically and spatially related, however was excluded based this PCTs known occurrence on Permian sediments, while the

				vegetation within the Project Area occur on Carboniferous sediments and acid volcanics in the Medowie Lowlands and Clarencetown Hills regions (Ten Mile Road Soil Landscape Unit)
	PCT 3446: Lower North Foothills Ironbark- Box- Gum Grassy Forest	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter- Macleay Dry Sclerophyll Forests	**Excluded** This community was considered to be possible fit for the vegetation within the Project Area. However, while PCT 3446 is similarly dominated by *Corymbia maculata* the vegetation within the Project Area has a number of co-dominant canopy species which are not described within PCT 3446 including *Eucalyptus punctata*, *E. acmenoides*, and *E. globoidea*.
HU798: White Mahogany – Spotted Gum – Grey Myrtle Semi-mesic Shrubby Open Forest	*PCT 3236: Hunter Valley Hills Wet Vine Forest*	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	**Selected** This vegetation community was determined to be the most comparable with the vegetation within the Project Area. This is based on the following: Canopy: The canopy contains a high cover of *Corymbia maculata* (Spotted Gum) and where eucalypts do occur it is commonly *Eucalyptus acmenoides* (White Mahogany), as described in the PCT. Midstory: lower mid-dense layer of shrubs very frequently includes *Backhousia myrtifolia*, and occasionally *Melaleuca styphelioides* Vines: diversity of mesic climbers that very frequently include, *Geitonoplesium cymosum*, *Pandorea pandorana subsp. pandorana*, *Eustrephus latifolius* Groundcover: very frequently include *Lomandra longifolia*, *Doodia aspera* and, occasionally with *Adiantum aethiopicum.* Geology: Carboniferous sediments on northern side of the Hunter Valley. Landscape position: This PCT is found on mid-low foothills on Hinterland Regions between Muswellbrook and Dungog.

	PCT 3241: Lower North White Mahogany- Spotted Gum Moist Forest	Wet Sclerophyll Forests (Shrubby sub-formation)	Northern Hinterland Wet Sclerophyll Forests	**Excluded** This community is considered to be a close fit with canopy species and PCT Locality and Geology. However, very low frequency of *Callistemon salignus* and *Backhousia myrtifolia* within PCT 3241 description is not consistent with the floristic description of the vegetation within the Project Area. The PCT being described as having a "dominance of *Backhousia myrtifolia* and *Callistemon salignus*.

These communities were assigned to vegetation zones based on condition (see **Figure 3**). Areas of each vegetation zone within the Project Area is provided in **Table 3**.

Table 3: Vegetation Zones within the Project Area

Vegetation Mapping Area		Disturbance Footprint (ha)	Retention Area (ha)	Project Area Total (ha)
PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest	Vegetation Zone 1 PCT 3244 Moderate – Good Condition	31.8	45.75	76.75
	Vegetation Zone 2 PCT 3244 Moderate – Good (medium) Condition	-	2.98	2.98
	Vegetation Zone 2 PCT 3244 Moderate – Good (poor) Condition	0.19	0.12	0.3
	Vegetation Zone 1 PCT 3244 Low Condition	0.61	1.22	1.83
PCT 3236: Hunter Valley Hills Wet Vine Forest	Vegetation Zone 2 PCT 3236 Moderate Condition	0.23	5.49	5.73
Excluded (Tracks, cleared land and Gardenland)		1.37	1.40	12.86
Dams		0.04	0.57	0.61
Total		**33.44**	**57.53**	**101.06**

Threatened Ecological Communities (TECs)

None of the selected PCTs are associated with Threatened Ecological Communities (TECs) as described under the NSW Biodiversity Conservation Act 2016 (BC Act) or the Commonwealth's Environment Protection Biodiversity Conservation Act 1999 (EPBC Act). While not linked to either PCT within the Project Area one (1) EPBC Act listed TEC was considered owing to the location of

the proposal within the Hunter Valley; *Central Hunter Valley eucalypt forest and woodland ecological community* Critically Endangered Ecological Community (CEEC).

The vegetation within the Project Area was determined to be inconsistent with the TEC as it did not meet the following key diagnostic characteristics listed under Section 1.5.1 of the *Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community* (Department of the Environment 2015):

- *"It typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from Permian sedimentary rocks"* – **the vegetation within the Project Area occurs on Carboniferous sediments and acid volcanics**
- "*Allocasuarina torulosa (forest oak/ she-oak, rose she-oak/oak), Eucalyptus acmenoides (white mahogany) and E. fibrosa (red/broad-leaved ironbark) are largely absent from the canopy of a patch*" – **the vegetation within the Project Area is known to include *Allocasuarina torulosa* and *Eucalyptus acmenoides***

In accordance with the Approved Conservation Advice (Department of Environment 2025) for the TEC "*to be considered a Matter of National Environmental Significance under the EPBC Act, areas of the ecological community must meet: the Key diagnostic characteristics (in Section 1.5.1); AND at least the minimum Condition thresholds for Moderate quality (i.e. for class C or C, in Section 1.5.3)*.

As the vegetation is inconsistent with the diagnostic characteristics of the TEC the vegetation within the Project Area is **not consistent** with *Central Hunter Valley eucalypt forest and woodland ecological community* CEEC.

Table 4: TEC Determination

Plant Community Type (PCT)	Vegetation Zone	Associated TEC	TEC	Impact Area (ha)
Commonwealth Listed Threatened Ecological Communities (TEC)				
PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest	**Veg Zone 1:** PCT 3244 (Mod - Good Condition)	**Critically Endangered Ecological Community (CEEC)** *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*	**No**	-
	Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)		**No**	-
	Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)		**No**	-
	Veg Zone 4: PCT 3244 (Low Condition)		**No**	-
PCT 3236: Hunter Valley Hills Wet Vine Forest	**Veg Zone 5:** PCT 3236 (Mod Condition)	Not Applicable	**N/A**	-
			Total EPBC Act listed TEC Area	**0**

1.2.2 Habitat

An average Habitat Tree density of 6 trees/ha was recorded across the Project Area (includes Hollow-bearing Trees and Dead Stags with hollows). The proposed action is expected to impact 38% of Habitat Trees within the Project Area. Hollows sizes (small [<8 cm], medium [8-20 cm], large [>20 cm]) are summarised below in **Table 5**.

Species-specific habitat assessment results are provided in the following subsections.

Table 5: Summary of Habitat Assessment conducted by Kleinfelder in May 2017

Habitat Type	No. within Disturbance Footprint	No. within Project Area	% present within Disturbance Footprint
Hollow-bearing trees	132	406	32%
Dead Stags (with hollows)	80	151	53%

1.2.3 Threatened Flora

No threatened flora species were recorded in the Project Area during the surveys undertaken by WPC (2023, 2024), Kleinfelder (2013, 2016), PDA Services (2012), and GHD (2012). The Disturbance Footprint is not considered suitable habitat for threatened flora. See survey effort in **Table 6**. Detailed survey methods and results for listed MNES are provided in the following subsections of this report (see **Section 2.1**).

Table 6: EPBC Act Threatened Flora Survey Effort

Survey effort is summarised below. **Species**	**Likelihood of Occurence**	**Survey Requirements**	**Survey Adequacy (2024)**
Angophora inopina Charmhaven Apple	Low	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016. Low habitat suitability (**Appendix 2**). **Survey effort considered adequate for this species.**
Asperula asthenes Trailing Woodruff	Low	October to December	Targeted surveys undertaken in October 2016. Additional surveys undertaken in October 2023. **Survey effort considered adequate for this species.**
Cryptostylis hunteriana Leafless Tongue Orchid	Low	November – January	Surveys undertaken in December 2012, January/February 2013. A greater level of survey effort in now required for this species (5 m transects) according to BAM 2020 guidelines, however, this species has a low likelihood of occurrence within the Project Area. **Survey effort considered adequate for this species.**
Cynanchum elegans White-flowered Wax Plant	Low	All year (easiest when flowering in August - May)	Surveys undertaken in December 2012, January/February 2013 and October 2016 are **considered adequate for this species.**
Eucalyptus glaucina Slaty Red Gum	Nil	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016 are **considered adequate for this species.**
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea	Low	August to November	Surveys undertaken in December 2012, January/February 2013 and October 2016. Additional surveys undertaken in October 2023 are **considered adequate for this species.**

Survey effort is summarised below. **Species**	**Likelihood of Occurence**	**Survey Requirements**	**Survey Adequacy (2024)**
Melaleuca biconvexa Biconvex Paperbark	Low	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016 are **considered adequate for this species.**
Persicaria elatior Knotweed	Low	December - May	Surveys undertaken in December 2012, January/February 2013 are **considered adequate for this species.**
Rhizanthella slateri Eastern Underground Orchid	Low	September - November	Targeted surveys undertaken in October 2016. Additional surveys undertaken in October 2023 are **considered adequate for this species.**
Tetratheca juncea Black-eyed Susan	Low	September to October	Targeted surveys undertaken in October 2016. Additional surveys undertaken in October 2023 are **considered adequate for this species.**
Rhodamnia rubescens Scrub Turpentine	Moderate	All year	Targeted surveys undertaken in April 2024 are **considered adequate for this species.**
Rhodomyrtus psidioides Native Guava	Moderate	All year	Targeted surveys undertaken in April 2024 are **considered adequate for this species.**

1.2.4 Threatened Fauna

Field surveys and habitat mapping for fauna species credit species were conducted by Kleinfelder in January and February 2013 in accordance with the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft)* (Department of Environment and Conservation [DEC], 2004). Further surveys were conducted by Kleinfelder on the 18, 19, 29 and 30 May 2017. Additional surveys were conducted by WPC in 2023 and 2024. A summary of the fauna survey effort is provided in **Table 7**.

Detailed survey methods and results for listed MNES are provided in the following subsections of this report (see **Section 2.1**).

Table 7: EPBC Act Threatened Fauna Survey Effort

Survey Method	**Hours / Trap Nights**	**Effort required for stratification unit between 50-150 ha (DEC 2004)**	**Compliance with DEC (2004) guidelines**	**Compliance with current EPBC Act Survey Guidelines**
Kleinfelder Surveys – 2012-2016				
Terrestrial Elliot A traps	25 traps per transect over 4 nights (total 300 trap nights)	200 trap nights	Yes – exceeds guidelines	Yes – additional to terrestrial hair tubes
Terrestrial Elliot B traps	10 traps / transect over 4 nights (total 120 trap nights).	200 trap nights	Partial*	Not required
Arboreal Elliot B traps	10 traps / transect over 4 nights (total 120 trap nights).	48 trap nights	Yes – exceeds guidelines	Not required
Terrestrial cage traps	Three traps / transect over 4 nights (total 36 trap nights).	24 trap nights	Partial*	Not required

Survey Method	Hours / Trap Nights	Effort required for stratification unit between 50-150 ha (DEC 2004)	Compliance with DEC (2004) guidelines	Compliance with current EPBC Act Survey Guidelines
Arboreal hair tubes	10 hair tubes / transect over 4 nights (120 trap nights).	60 trap nights	Yes – exceeds guidelines	Not required
Terrestrial hair tubes	10 hair tubes / transect over 4 nights (120 trap nights). Hair tubes used by Kleinfelder are cone shaped and narrow towards the bait, allowing for the full size range of mammals to be sampled.	80 trap nights	Yes – exceeds guidelines	Yes
Harp traps	1 harp trap / transect over 4 nights (total 12 trap nights).	4 trap nights	Yes – exceeds guidelines	Yes – additional to Anabat recordings
Anabat recording	One Anabat recording overnight for 2 nights / transect (total 72 hours or 6 Anabat nights).	Two Anabats recording overnight for two nights (4 Anabat nights)	Yes – exceeds guidelines	Yes
Bird surveys	One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys)	No specific methodology detailed – however, states that the Loyn 2 ha/20 min area search is an accepted methodology per stratification unit	Yes – meets guidelines	Yes
Spotlighting (targeting nocturnal mammals, amphibians and reptiles)	One person hour per transect per night over on two separate nights (total of 6 hours spotlighting).	Mammals: 2 x 1 hour on 2 separate nights (up to 200 ha stratification unit) Amphibians: 30 mins on two separate nights targeting suitable habitat.	Yes – exceeds	Not suitable for Green and Golden Bell Frog or Stuttering Frog, therefore surveys have been updated below.
Owl call playback	20 mins at each transect on two nights.	At least 5 visits for the Powerful Owl and up to 8 visits for the Masked Owl	Partial	Yes – Suitable for yellow-bellied Glider.
Targeted Koala surveys	Two nights call playback Diurnal searches. 14 Koala Spot Assessment Technique (SAT) tests.	N/A	N/A	Yes Koala SATs were undertaken at suitable intensity; however the grid approach was not used.

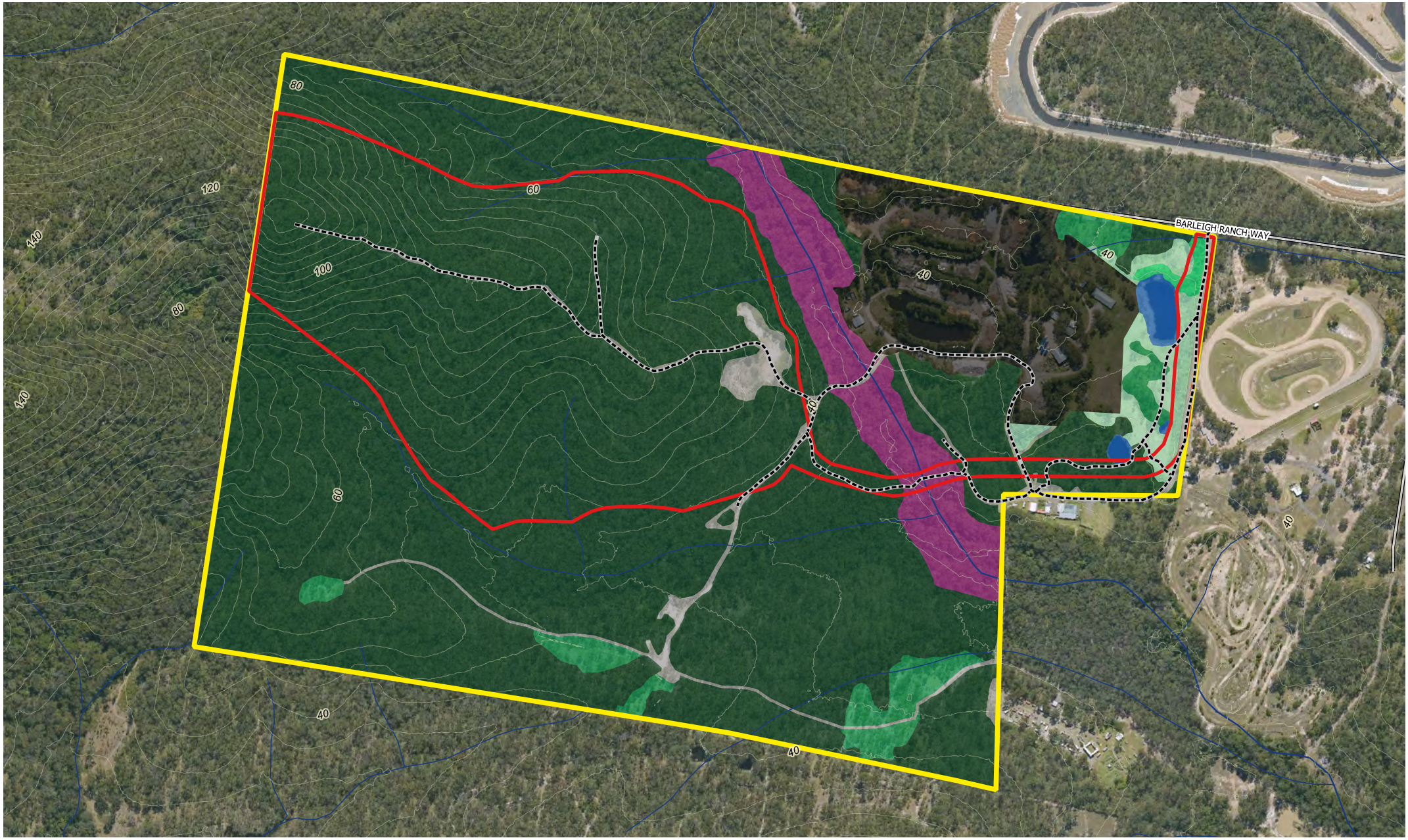
Survey Method	Hours / Trap Nights	Effort required for stratification unit between 50-150 ha (DEC 2004)	Compliance with DEC (2004) guidelines	Compliance with current EPBC Act Survey Guidelines
WPC Surveys – 2023-2024				
Terrestrial Elliot A traps	20 traps per transect (5) over 4 nights (total 400 trap nights)	400 trap-nights per 50 ha (DSEWPC, 2011)	Yes – exceeds guidelines	Terrestrial Elliot A traps
Bird surveys	Point-transect methodology, 12 person hours over 3 days including one afternoon and two mornings with two observers using 10 x 40 magnification binoculars. All fauna species observed or heard were recorded. Additional surveys conducted for Glossy-black Cockatoo (GBC; *Calyptorhynchus lathami lathami*) including searches for suitable vegetation, and 5 hrs over one day.	Diurnal area searches or transect-point surveys in areas of favoured habitat in and around the Project Area. (DEWHA, 2010b)	Yes – meets guidelines	Bird surveys
Anabat recording	Four (4) Anabats recording overnight for four (4) nights	Minimum 4 nights < 50 ha (DEWHA, 2010a)	Yes – exceeds guidelines	Anabat recording
Amphibian Surveys	Four person hours (480 mins)	A minimum for four nights (DEWHA, 2010c)	Yes – meets guidelines	Amphibian Surveys
Targeted Koala surveys	15 SAT tests	These surveys were undertaken across the whole Project Area (100 ha) therefore 250 m grid (for areas > 50 ha) was applied to the area as per Koala BAM Survey Guidelines (BAM 2022).	Yes – meets guidelines	Targeted Koala surveys

A total of five (5) Commonwealth listed species and two (2) migratory species were identified within the Project Area (refer to Table 8).

Table 8: EPBC Act threatened fauna species

Scientific name Common name	BC status	EPBC status	Habitat type identified on-site	MNES Controlling Provision?
Phascolarctos cinereus Koala	E	E	Yes (suitable habitat identified in the Disturbance Footprint)	Yes – see **Section 2.1.1**

Scientific name Common name	BC status	EPBC status	Habitat type identified on-site	MNES Controlling Provision?
Pteropus poliocephalus Grey-headed Flying-fox (GHFF)	V	V	No (foraging habitat only; no breeding habitat identified on the Disturbance Footprint)	Yes – see **Section 2.1.2**
Calyptorhynchus lathami lathami Glossy-black Cockatoo	V	V	Foraging	Yes – see **Section 2.1.3**
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies	V	V	Yes (suitable habitat identified in the Disturbance Footprint)	Yes – see **Section 2.1.4**
Chalinolobus dwyeri Large-eared Pied Bat	V	E	No (foraging habitat only; no breeding habitat identified on the Disturbance Footprint)	No
Myiagra cyanoleuca Satin Flycatcher	-	M	-	No
Rhipidura rufifrons Rufous Fantail	-	M	-	No



Impact Area
Project Area

Vegetation
PCT 3236: Hunter Valley Hills Wet Vine Forest
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)

Dams
Excluded
Avoidance Area
Named Watercourse
Minor Watercourse

Contours (5m)
Local Road
Tracks

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 3. Existing Environment

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

2. CONTROLLING PROVISIONS

2.1 LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

The following summarises additional information in relation to the threatened species required by the department. A total of eight (8) threatened species have been identified, including;

- Koala (*Phascolarctos cinereus*) combined populations of QLD, NSW and the ACT – Endangered
- Grey-headed Flying Fox (*Pteropus poliocephalus*) – Vulnerable
- Glossy Black Cockatoo (*Calyptorhynchus lathami lathami*) – Vulnerable
- Brown Treecreeper (South-Eastern) (*Climacteris picumnus victoriae*) – Vulnerable
- Regent Honeyeater (*Anthochaea phrygia*) – Critically Endangered
- Swift Parrot (*Lathamus discolor*) – Critically Endangered
- Yellow-bellied Glider (South-eastern) (*Petaurus australis australis*) – Vulnerable
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable

A summary of the information required for each threatened entity is provided in the following subsections.

2.1.1 Koala (*Phascolarctos cinereus*) combined populations of QLD, NSW, and the ACT

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 9: Koala Occurrence

Item	Details
Species Records	
Records from Surveys Completed	Two (2) koalas were sighted in the southwestern part of the Project Area during field surveys by Kleinfelder (2017). SAT tests (2013 & 2024) detected Koala activity in the southwest, central, and northeast parts of the Project Area.
Historical Records	111 records occur within the locality dating from 1945 to 2024 (see **Figure 4**). The Project Area is mapped as containing both Marginal Koala Habitat and Preferred Koala Habitat under the Port Stephens Comprehensive Koala Plan of Management (CKPoM) (PSC 2002). The Development Footprint is mapped as Marginal Koala Habitat. Retained Areas within the Project Area are mapped as both Preferred Koala and Marginal Koala Habitat.
Individuals within the proposed action area	
Number of individuals within the proposed action area	Two (2) koalas were sighted in the southwestern part of the Project Area during field surveys by Kleinfelder (2017). SAT results indicate the average Koala activity level across the Project Area is 8% for both 2013 & 2024 indicating Low Use by Koalas and indicating that the habitat is "likely to be transitory" (Phillips and Callaghan, 2011). Higher SAT results were recorded within the Retention Area along creeklines with the highest activity level being recorded at 26% at SAT location 30 (see **Figure 5**). Activity levels within the Disturbance Footprint were between 1% and 7%, indicating "Low Use" by Koala. Riparian vegetation outside of the Disturbance Footprint was considered the most suitable habitat for the species owing to the high concentration of Koala Feed Trees (KFTs) and alluvial soils (conducive to higher nutrient feed), and higher activity levels. The distribution of higher suitability koala habitat and SAT detections are illustrated in **Figure 5**.
Survey Methodology	
Detail the survey methodology used	Koala Surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) please see **Table 10** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**Low-use/transitory Koala Habitat** SAT results indicate the average Koala activity level across the Project Area is 8% for both 2013 & 2024 indicating Low Use by Koalas and indicating that the habitat is "likely to be transitory" (Phillips and Callaghan, 2011). Riparian vegetation outside of the Disturbance Footprint was considered the most suitable habitat for the species owing to the high concentration of KFTs and alluvial soils (conducive to higher nutrient feed), and higher activity levels. The distribution of higher suitability koala habitat and SAT detections are illustrated in **Figure 5**. The Koala population within the Project Area is part of the broader Port Stephens Koala Population, which consists of three (3) sub-populations including the Tomaree Population, the Medowie-Tilligerry sub-population, and the Ferodale-Karuah sub-population. Koalas recorded within the Project Area likely form part of the latter of the three (i.e. the Ferodale-Karuah sub-population) (NSW TSSC 2018). While the Pacific Highway is recognized as a significant barrier to the Port Stephens Koala Population to the west, a total of 322 records of the species occur within 5 km and the Port Stephens population is estimated to be about 800 individuals (NSW TSSC). The Port Stephens population occurs across a total of 39,926 ha of mapped koala habitat across the Port Stephens Local Government Area (LGA) (Lunney *et.al* 1998). The Project Area (101.06 ha) is largely mapped as Marginal Use Koala Habitat under the Port Stephens CKPoM (PSC 2002) and represents 0.25% of suitable habitat for the species within the LGA, while the Disturbance Footprint (33.44 ha) represents 0.08% of suitable habitat in the LGA.
Important populations	

Item	Details
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of koala based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** The Disturbance Footprint is not known to be a key source for breeding and represents transitory habitat for the species. No evidence of breeding has been found within the Disturbance Footprint or Project Area. ***Populations that are necessary for maintaining genetic diversity, and/or*** The population within the Disturbance Footprint would not be necessary for maintaining genetic diversity in the region due to its low levels of activity and lack of good quality habitat within the Disturbance Footprint. ***Populations that are near the limit of the species range.*** The species is not near the limit of its range.
Habitat Extent	
Habitat requirements	Habitat for the Koala (*Phascolarctos cinereus*) is highly variable across the species' broad geographic range spanning coastal and inland areas from far-north Queensland to the south-east corner of South Australia. Koala habitat suitability is regionally variable and influenced by the availability and nutritional quality of food trees, presence of suitable resting trees and microclimates, age structure of habitat, management history, and barriers to dispersal (DAWE, 2022a). Measures of Koala habitat suitability and quality in the following subsections is based on the following measures • Foraging Habitat Availability • Habitat Suitability (Regional) • Population Connectivity **Foraging Habitat** The koala is a specialist herbivore feeding almost entirely on the leaves of eucalypts, across a variety of vegetation types ranging from tropical forests to semi-arid woodlands throughout their geographic range. In New South Wales (NSW) alone, koalas have been recorded to use 66 eucalypt species and seven (7) non-eucalypts (DECC, 2008; Phillips and Callaghan, 2011). However, species selection is highly dependent on the region, with koalas in any one area feeding almost exclusively on a small number of preferred species (preferred food trees). Koalas are also known to use a number of tree and shrub species for purposes other than primary food species, including supplementary food species and shelter. Multiple resources providing assignment, and ranking, of feed tree species for the koala are available across the species' broad range. We have used three (3) resources to assess koala foraging habitat value within the Project Area: *Commonwealth Guidelines* *The Review of Koala Tree Use Across New South Wales* (OEH 2018) provides a summary of koala use species including 'regional high use', 'local high use', 'significant use', 'irregular use', and 'low use' species, for each Koala Management Area. *State Koala Habitat Protections* At the time of the assessment the relevant State Environmental Planning Policy governing Koala habitat protection was SEPP 44. This policy has been replaced by Chapter 3 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021*. This SEPP provides a list of Feed Tree Species (Schedule 1) used to assess Koala foraging habitat quality within the Project Area. These include; *Eucalyptus tereticornis* (Forest red gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus punctata* (Grey Gum), *Eucalyptus viminalis* (Ribbon or manna gum), *Eucalyptus camaldulensis* (River red gum), *Eucalyptus haemastoma* (Broad leaved scribbly gum), *Eucalyptus signata* (Scribbly gum), *Eucalyptus albens* (White

Item	Details
	box), *Eucalyptus populnea* (Bimble box or poplar box), and *Eucalyptus robusta* (Swamp Mahogany). *Local Koala Plan of Management* The Port Stephens Council's key koala management document is the *Port Stephens CKPoM*. This document details three (3) tree species preferentially utilised by Koalas within the Port Stephens LGA, including; *Eucalyptus robusta* (Swamp Mahogany) and *E. parramattensis* (Parramatta Red Gum) on all substrates where they occur; and *E. tereticornis* (Forest Red Gum) where it occurs on soils derived from Quaternary alluvials and volcanics. It is also recognised that hybrids of any of these species are likely to be Preferred Koala Food Trees. **Habitat Suitability** Koala habitat suitability is a product of several factors in addition to that of preferred feed tree occurrence with the core drivers of habitat suitability varying at different scales, including at the site level (e.g. food, shelter, breeding needs), to the broader landscape (e.g. climate, habitat connectivity). The Koala Habitat Information Base (DPIE 2019) provides a series of spatial datasets detailing koala habitat suitability and occupancy across New South Wales. The Koala Habitat Information Base datasets reviewed in relation to koala habitat within the Project Area include the following: • The Koala Habitat Suitability Model (KHSM) • The Koala Tree Index (KTI) • Koala Likelihood Map (1999 – 2018) • Areas of regional koala significance (ARKS) *The Koala Habitat Suitability Model* The KHSM provides a measure of koala habitat suitability at any location. The model predicts the likelihood of finding habitat that is ecologically similar to where koalas have been observed over the past 40 years. The model predicts the spatial distribution of potential koala habitat across NSW using a value between 0 and 1 (i.e. a higher value represents a higher probability that a specific location will contain habitat suitable for koalas). *The Koala Tree Index* The KTI provides a measure of the probability of finding a tree species that koalas are known to prefer for food or shelter. *Koala Likelihood Map (1999 – 2018)* The Koala Likelihood Map (KLM) provides the likelihood of koalas occurring across a 10-square-kilometre grid covering NSW, based on available arboreal mammal records from the past 20 years. *Areas of regional koala significance* This dataset provides mapping of regions that have high known koala occurrence using analysis of koala observation densities. **Population Connectivity (Dispersal)** The home range of the koala in Port Stephens is estimated to be 80-90 ha. The koala population recorded within the Project Area is highly connected to areas of similar habitat value to the north, west and south, with connectivity to the east likely reduced by the Pacific Highway.
Type(s) of habitat available	The Project Area contains foraging habitat and potential movement corridors for the species. The extent, location and value of these habitats is outlined below. **Foraging Habitat** Foraging Habitat occurs within the Project Area, extent and value is summarised below:

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>
<u>Feed Tree Occurrence:</u> Reviewing available resources detailing koala food tree species, the following applies to the Project Area:

Commonwealth - The Project Area contains four (4) ‘tree species listed as Locally important koala trees for North Coast NSW’ - Eucalyptus acmenoides (White Mahogany), E. siderophloia (Northern Grey Ironbark), E. tereticornis and E. punctata (Grey Gum).
State – A total of two (2) species listed as KFTs in Schedule 1 of the Biodiversity and Conservation SEPP 2021 (Chapter 3) occur within the Project Area; E. punctata and E. tereticornis.
Local – only one preferred KFT listed under the Port Stephens CKPoM was identified within the Project Area, E. tereticornis.

<u>Feed tree use:</u> SAT Tests (2024) showed that koalas were using White Mahogany (E. acmenoides), Grey Gum (E. punctata) and Grey Ironbark (E. siderophloia), with the majority of scats located under White Mahogany trees.

<u>Existing Mapping:</u> The Project Area is largely mapped as “Marginal Koala Habitat” under the Port Stephens CKPoM, with a small area of “Preferred Koala Habitat” occurring in the south-west of the Project Area (outside of the Disturbance Footprint).

<u>Site Specific Mapping:</u> Detailed assessment of KFT density across the Project Area to map koala foraging habitat. In accordance with Chapter 3 of the Biodiversity Conservation SEPP 2021 areas of potential koala habitat (i.e. trees of the types listed in Schedule 1 of the Biodiversity Conservation SEPP 2021 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component). A total of 52.76 ha (of 101.06 ha) of the Project Area was mapped as suitable koala foraging habitat, of this a total of 11.1 ha occurs within the Disturbance Footprint (i.e. 21% of suitable habitat within the Project Area) (see Figure 5).

<u>Associated PCTs</u>

Only one (1) PCT within the Project Area is associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC);

PCT 3244: Lower North Spotted Gum- Mahogany- Ironbark Sheltered Forest

The total area of suitable foraging habitat for Koala within the Disturbance Footprint (11.13 ha) represents 0.2% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5974.32ha). PCT mapping indicates that the mapped PCTs associated with the species within the Disturbance Footprint represents 0.5% of mapped PCTs associated with the species within the locality (5km buffer).
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with Koala</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="3">PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Item</th><th colspan="4">Details</th></tr>
<tr><td rowspan="4"></td><td></td><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>NO</td><td>0</td></tr>
<tr><td colspan="3">Total Koala Habitat PCTs Area (ha)</td><td>32.6</td></tr>
<tr><td colspan="4">Habitat Suitability
Environmental parameters predicting habitat suitability are modelled across the Project Area. These parameters reflect the results of foraging resource mapping, with higher suitable foraging habitat occurring alongside Seven Mile Creek and its tributaries.

<u>The Koala Habitat Suitability Model</u>
Areas of higher habitat suitability occur along Seven Mile Creek and its tributaries, outside of the proposed Disturbance Footprint. Lower suitability habitat occurs within the proposed Disturbance Footprint (see Figure 7).
<u>Koala Likelihood Map (1999 – 2018)</u>
The Koala Likelihood Map and Koala Likelihood Confidence Map (Figure A3) indicates that the likelihood of finding a koala within the development site ranges between 0.26 to 0.50 (within a moderate confidence area) (see Figure 8).

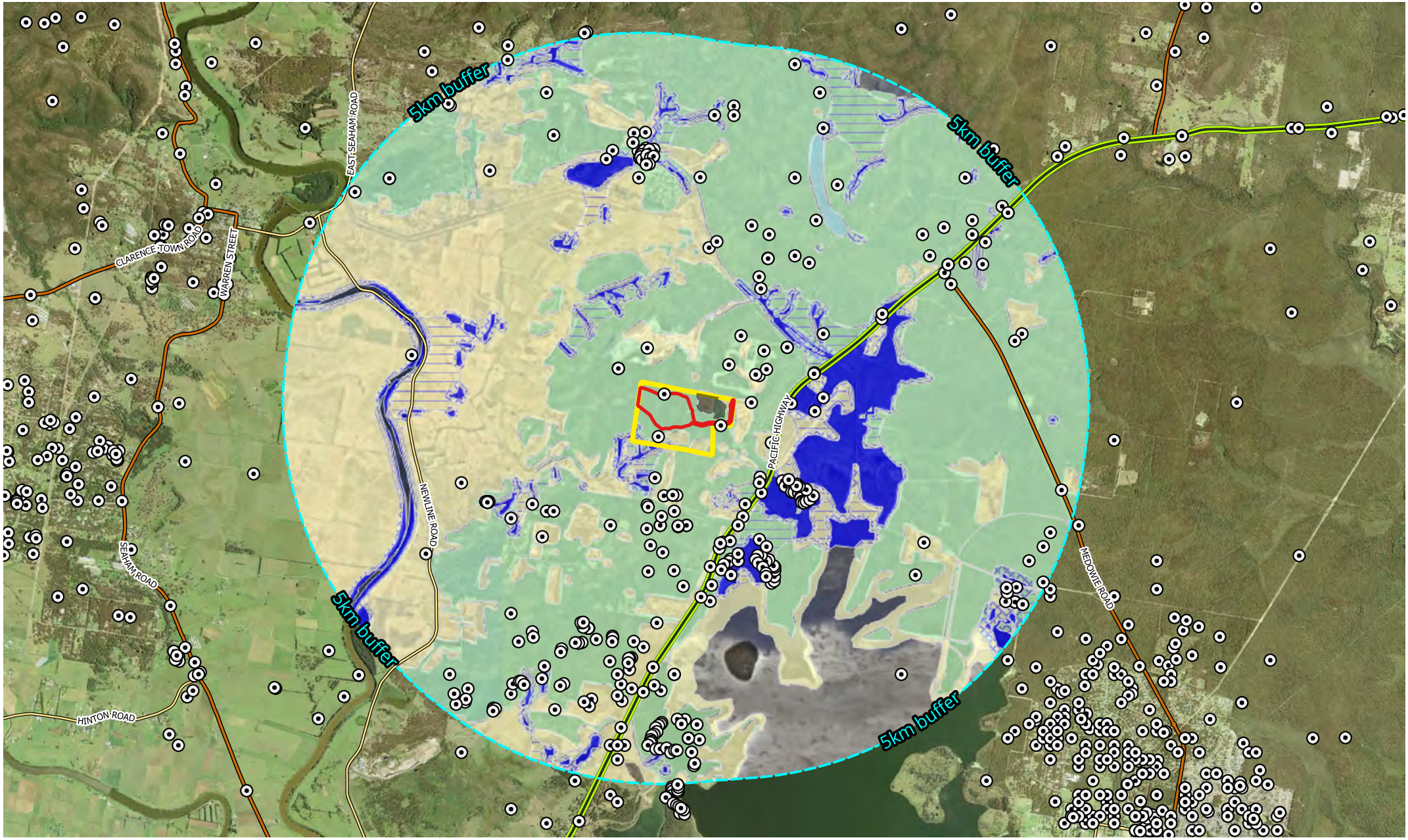
<u>The Koala Tree Suitability Index</u>

The Koala Tree Suitability Index indicates the Disturbance Footprint comprises vegetation with a moderate to high tree suitability index, indicating a higher likelihood of preferred foraging and/or shelter trees. However, surveys outlined above indicated that more preferred feed trees occur along Seven Mile Creek and its tributaries (see Figure 9).
<u>Areas of regional koala significance</u>

The Subject Site is within Wang Wauk State Forest ARKS which identifies regions mapped as having key koala populations with potential for long-term viability. The ARKS extends from Hexham in the south to Nabiac in the north and has an area of 174,864 ha. Proportionally, the ARKS is comprised of 32% high functional habitat, 35% moderate function habitat, 24% low functional habitat and 9% very low functional habitat. The ARKS is noted to have moderate resilience, high fragmentation risk, high wildlife risk, moderate vehicle strike risk, moderate heat stress risk, moderate disease risk, high dog attack risk and moderate climate change risk. In total, there are 418 koala records from within the ARKS (see Figure 10).

Dispersal Habitat
The home range of the koala in Port Stephens is estimated to be 80-90 ha. A review of the distribution of koala records within the locality and within the Subject Site, and habitat suitability modelling have allowed for the identification of several potential koala movement corridors within the vicinity of the Subject Site. These corridors are primarily within intact vegetation alongside watercourses (see Figure 5).</td></tr>
<tr><td>Quality of the habitat</td><td colspan="4">SAT results indicate the average Koala activity level across the Project Area is 8% for both 2013 & 2024 indicating Low Use by Koalas and indicating that the habitat is “likely to be transitory” (Phillips and Callaghan, 2011). Riparian vegetation outside of the Disturbance Footprint was considered the most suitable habitat for the species owing to the high concentration of KFTs and alluvial soils (conducive to higher nutrient feed), and higher activity levels. The distribution of higher suitability koala habitat and SAT detections are illustrated in Figure 5. The indicative local movement corridor based on koala records and habitat suitability is also illustrated in Figure 5.</td></tr>
</table>

Item	Details
Key habitat features	Key habitat requirements for the species are detailed above under the item "*Habitat requirements*", the extent and occurrence of these habitat features within the Project Area are outlined in the item "*Type(s) of habitat available*""
Habitat critical to the survival of the species	*Habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:* ***For activities such as foraging, breeding, roosting, or dispersal;*** The site represents foraging habitat only for the species no Breeding, roosting or dispersal habitat was seen during surveys conducted within the Disturbance Area. ***For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*** The Disturbance Footprint represents low quality foraging habitat only for the species. ***To maintain genetic diversity and long-term evolutionary development; or*** The proposed Disturbance Footprint will not effect the genetic diversity or long-term development of the species with no evidence of the species using the area for breeding only low quality foraging habitat exists within the Disturbance Footprint. A total of 57.53ha of habitat will be retained within onsite offset area with higher quality foraging habitat for the species. ***For the reintroduction of populations or recovery of the species or ecological community.*** The Disturbance Footprint represents low quality foraging habitat for the species and is not habitat critical for the species.
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The local Koala population likely uses preferred koala foraging habitat along Seven Mile Creek as part of a broader area of available habitat. The riparian vegetation also likely plays a role in supporting connectivity of these habitats across the locality. **Long Term:** The koala is threatened by climate change factors, including more frequent droughts, high temperatures, and increased bushfire risk, leading to habitat loss (Adams-Hosking et al. 2011; McAlpine et al. 2015; Runge et al. 2021a). The preferred habitat within the Project Area likely plays a role in enabling connectivity of habitats and the movement of Koalas, including in response to climatic extremes, bushfire, and longer term climate drivers.



Impact Area
Project Area
Avoidance Area

Koala (ATLAS)

CKPoM mapping
Preferred Koal Habitat

Marginal Koala Habitat
50m Buffer Over Cleared
Link Over Marginal

Mainly Cleared
50m Buffer Over Marginal
Not Applicable

Primary Road
Arterial Road
Sub-Arterial Road

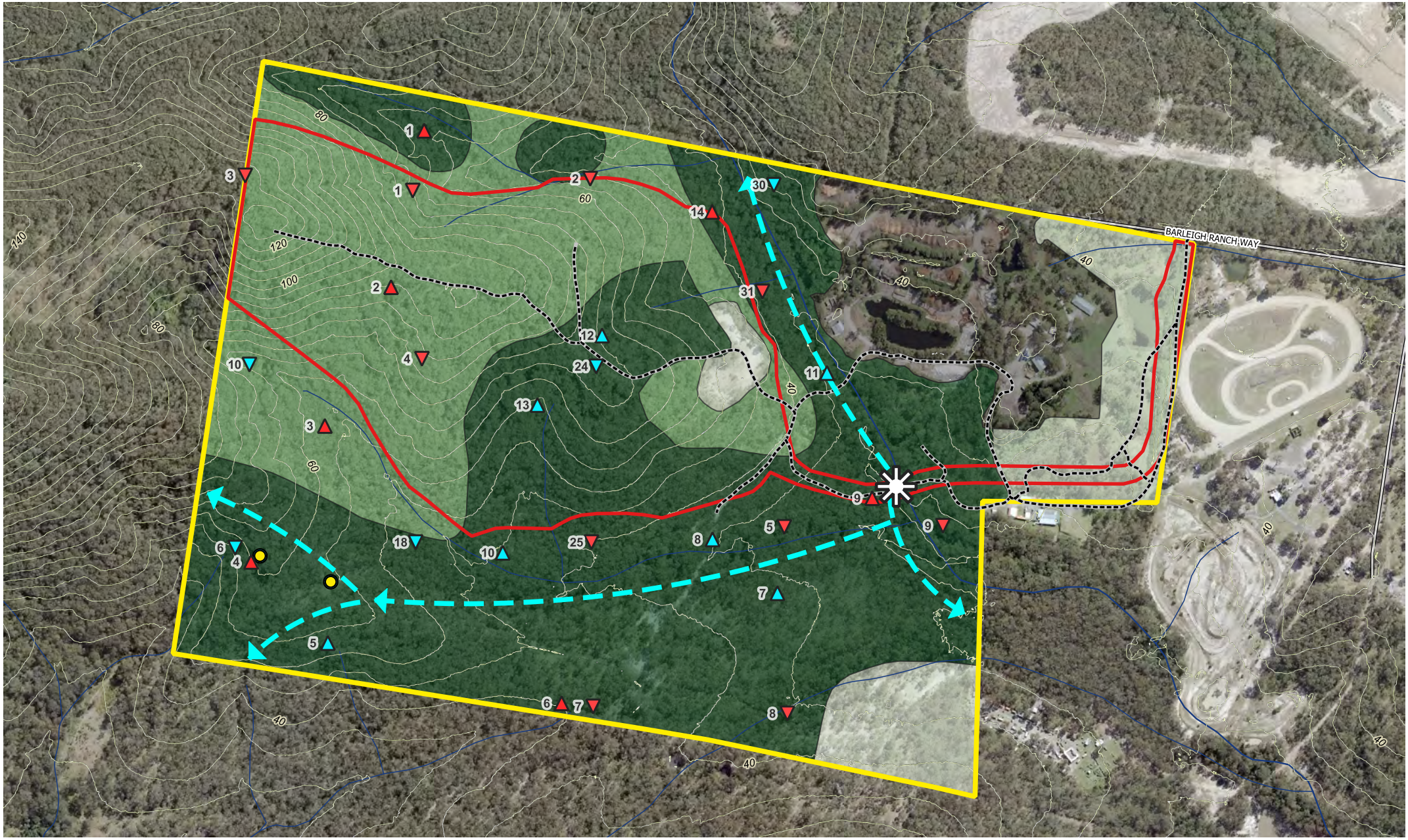
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Fig. 4. Koala Context

0.5 1 1.5 2 2.5 km

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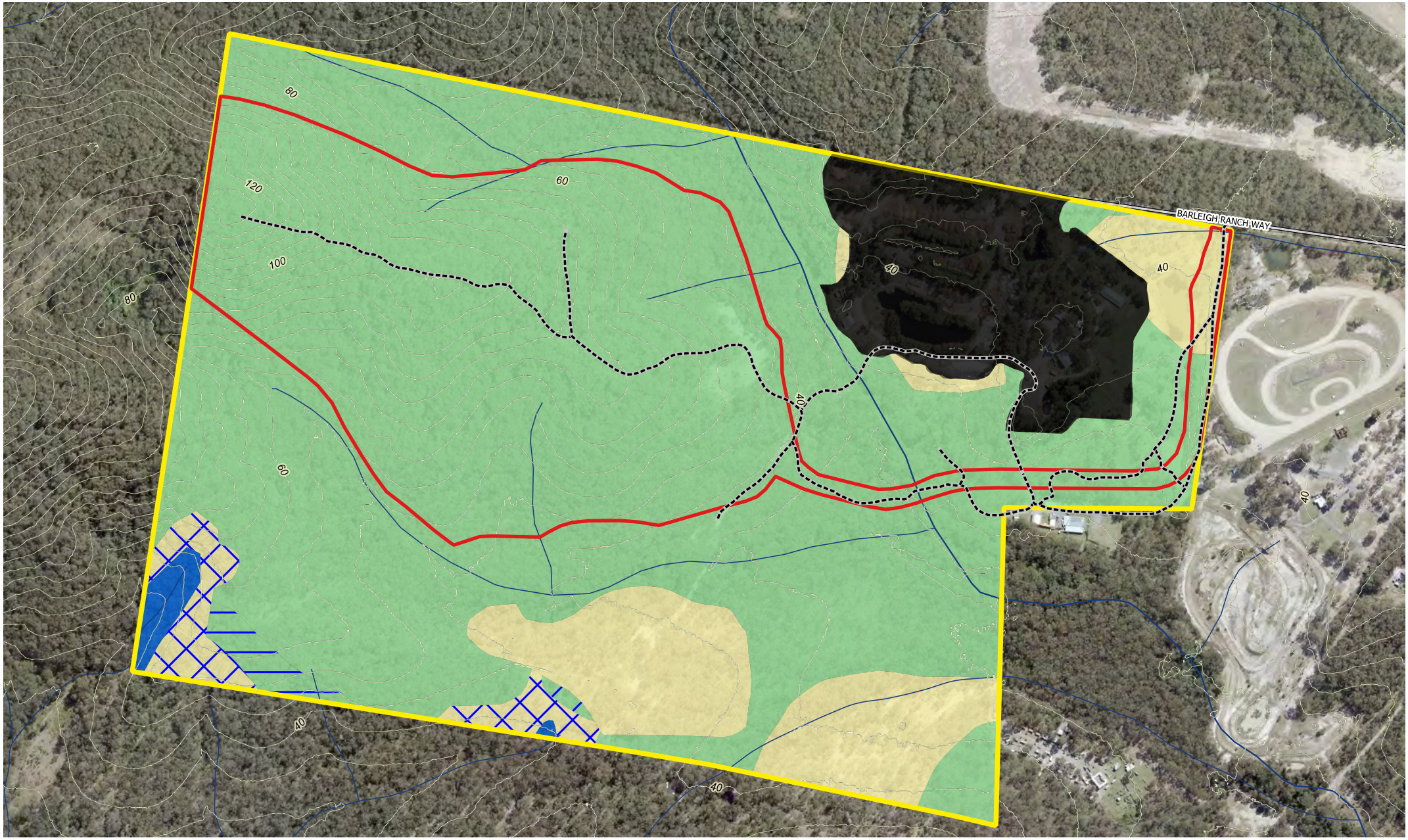


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Fig. 5. Koala Habitat

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Impact Area
Project Area
Avoidance Area

CKPoM mapping
Preferred Koal Habitat
Marginal Koala Habitat
50m Buffer Over Cleared
Link Over Marginal
Mainly Cleared
50m Buffer Over Marginal
Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

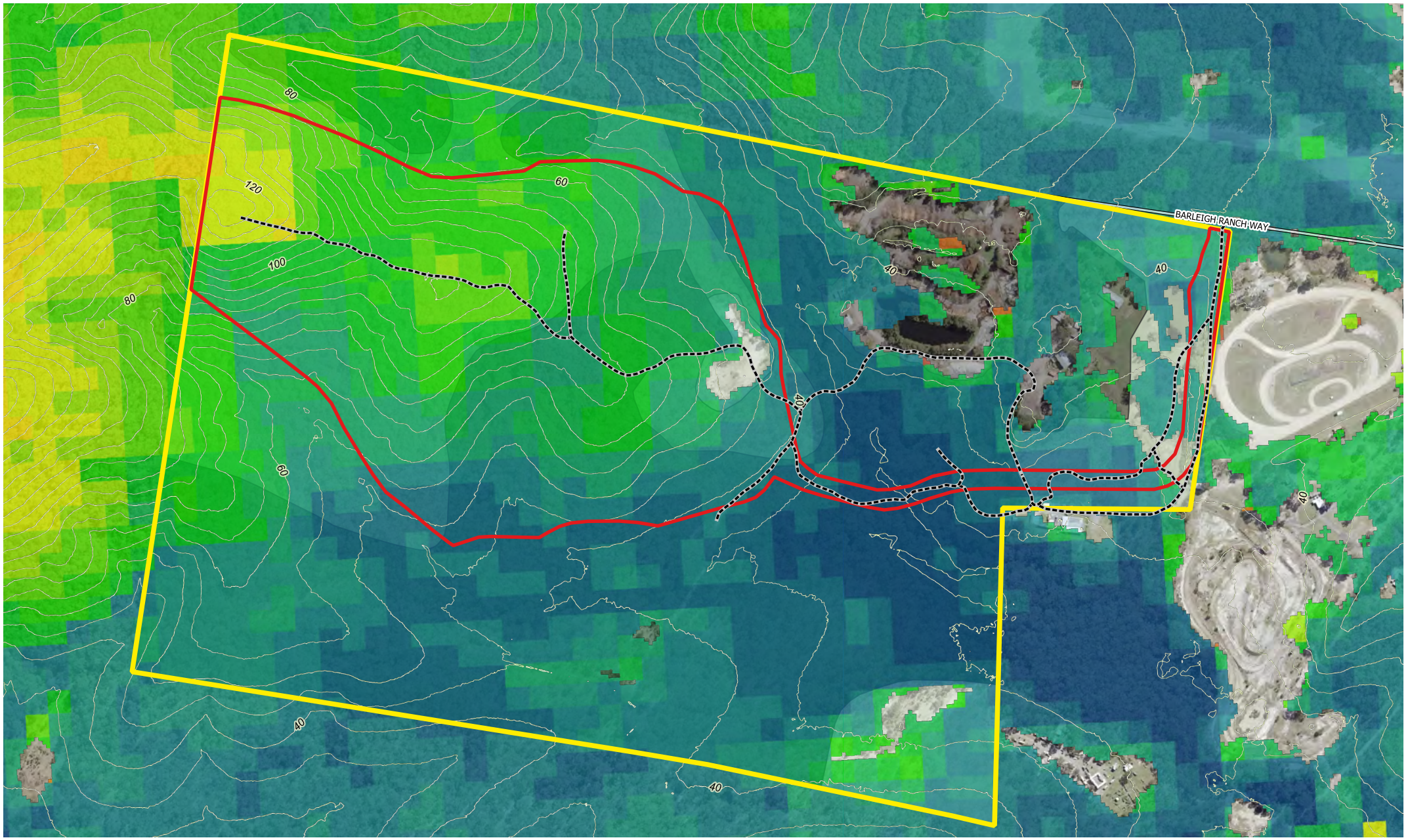
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Fig. 6. Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) Mapping

50 100 150 200 250 m

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Impact Area
Project Area
Local Road
Contours (5m)

Koala Habitat Suitability - Central Coast
Band 1 (Gray)

0.000- 0.0500
0.0000- 0.2500
0.2500- 0.5000
0.5000- 0.7500
0.7500- 1.0000

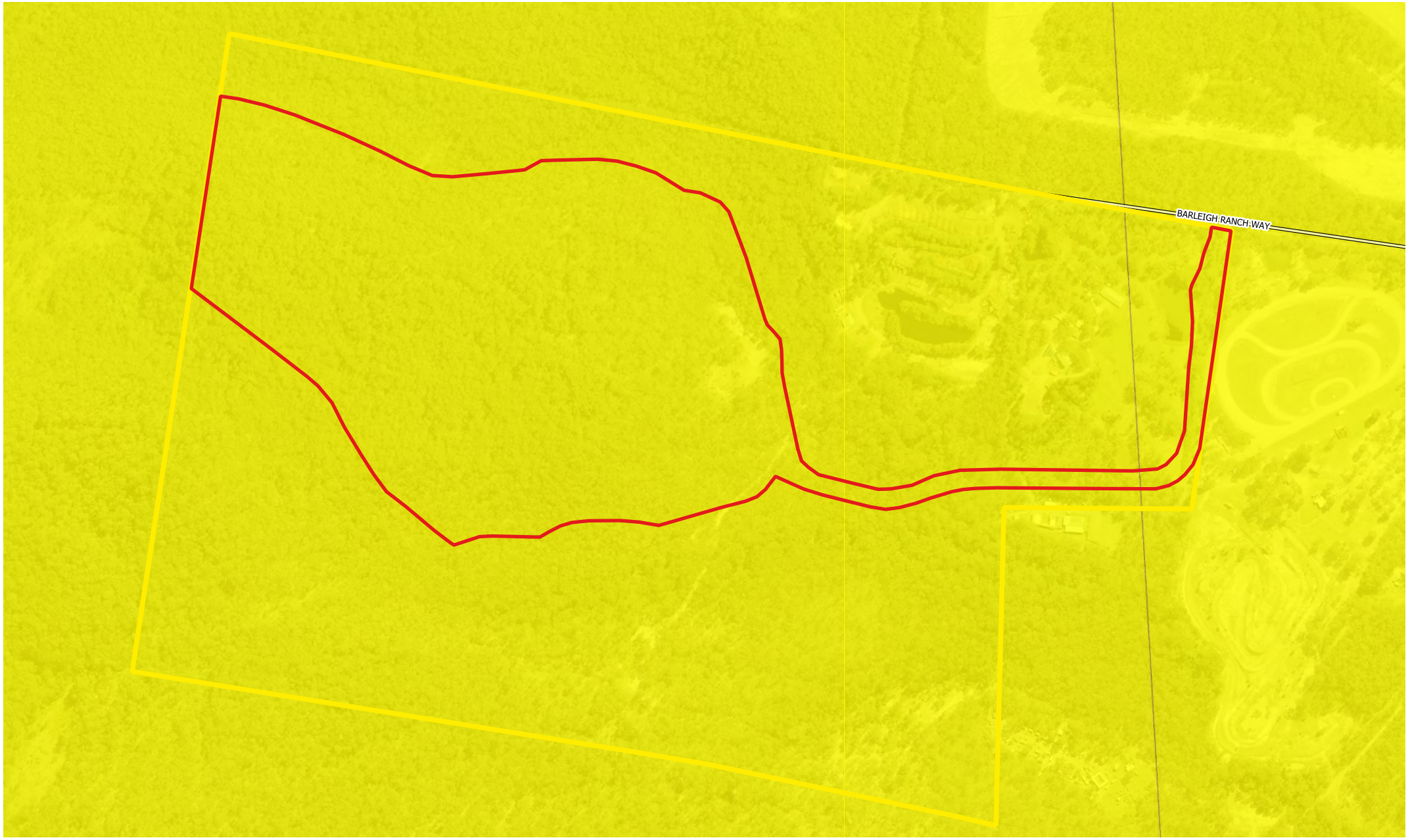
Fig. 7. Koala Habitat Suitability Map (KHSM)

50 100 150 200 250 m

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Impact Area
Project Area
Local Road
Contours (5m)
Koala Liklihood (v2.0) Map
No Koala Records
0.0000- 0.2500
0.2500- 0.5000
0.5000- 0.7500
0.7500- 1.0000

Fig. 8. Koala Liklihood Map (KLM)

50 100 150 200 250 m

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Impact Area
Project Area
Local Road
Contours (5m)
Koala Tree Index - Central Coast

0.1000- 0.2000
0.2000- 0.3000
0.3000- 0.4000
0.4000- 0.5000
0.5000- 0.6000
0.6000- 0.7000
0.7000- 0.8000
0.8000- 0.9000
0.9000- 1.0000

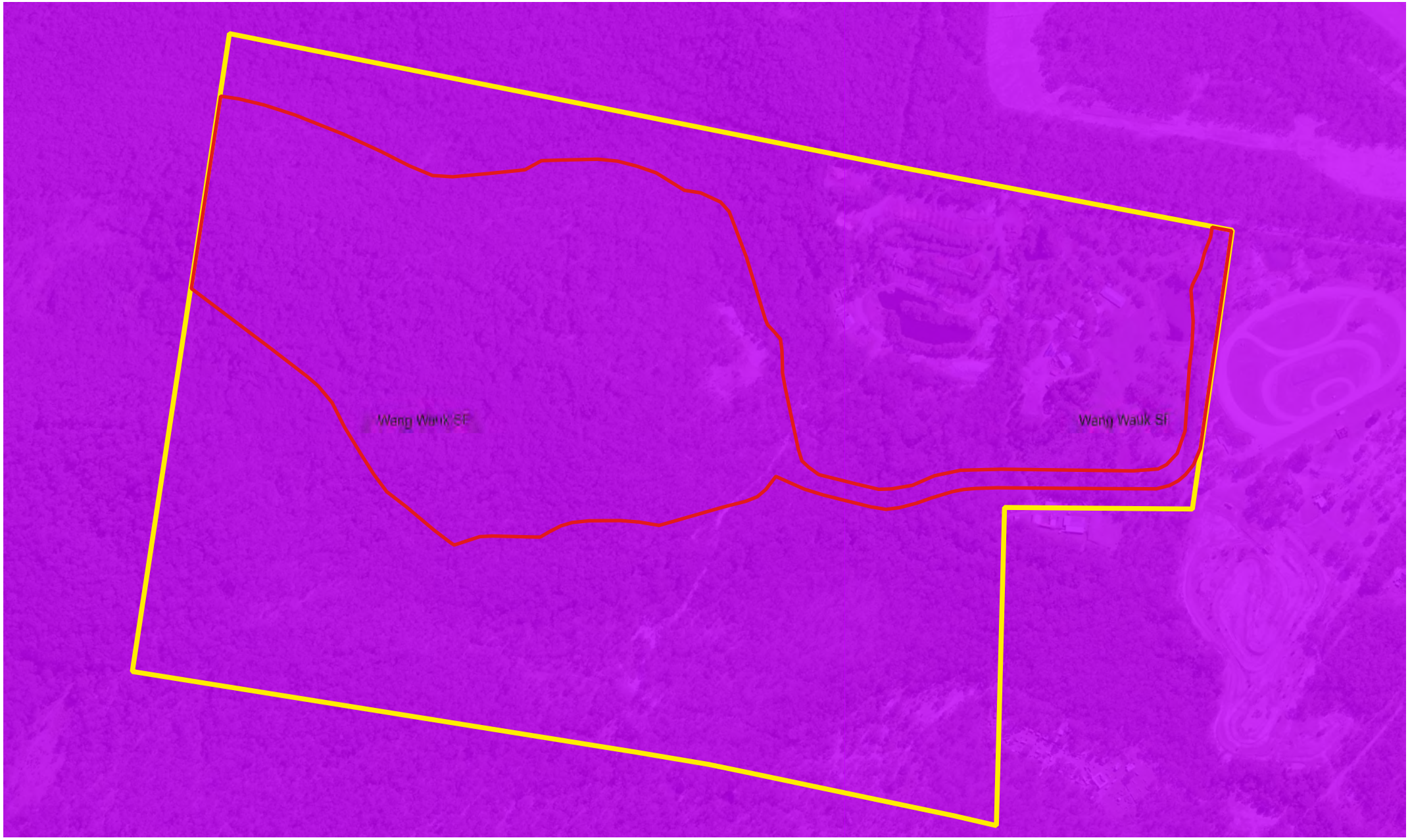
Fig. 9. KHSM Koala Tree Index Map

50 100 150 200 250 m

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Impact Area Project Area Areas of Regional Koala Significance (ARKS)

Fig. 10. KHSM Koala ARK Map

50 100 150 200 250 m

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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW Biodiversity Assessment Method (BAM), endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

If no surveys were undertaken for a species, provide justification

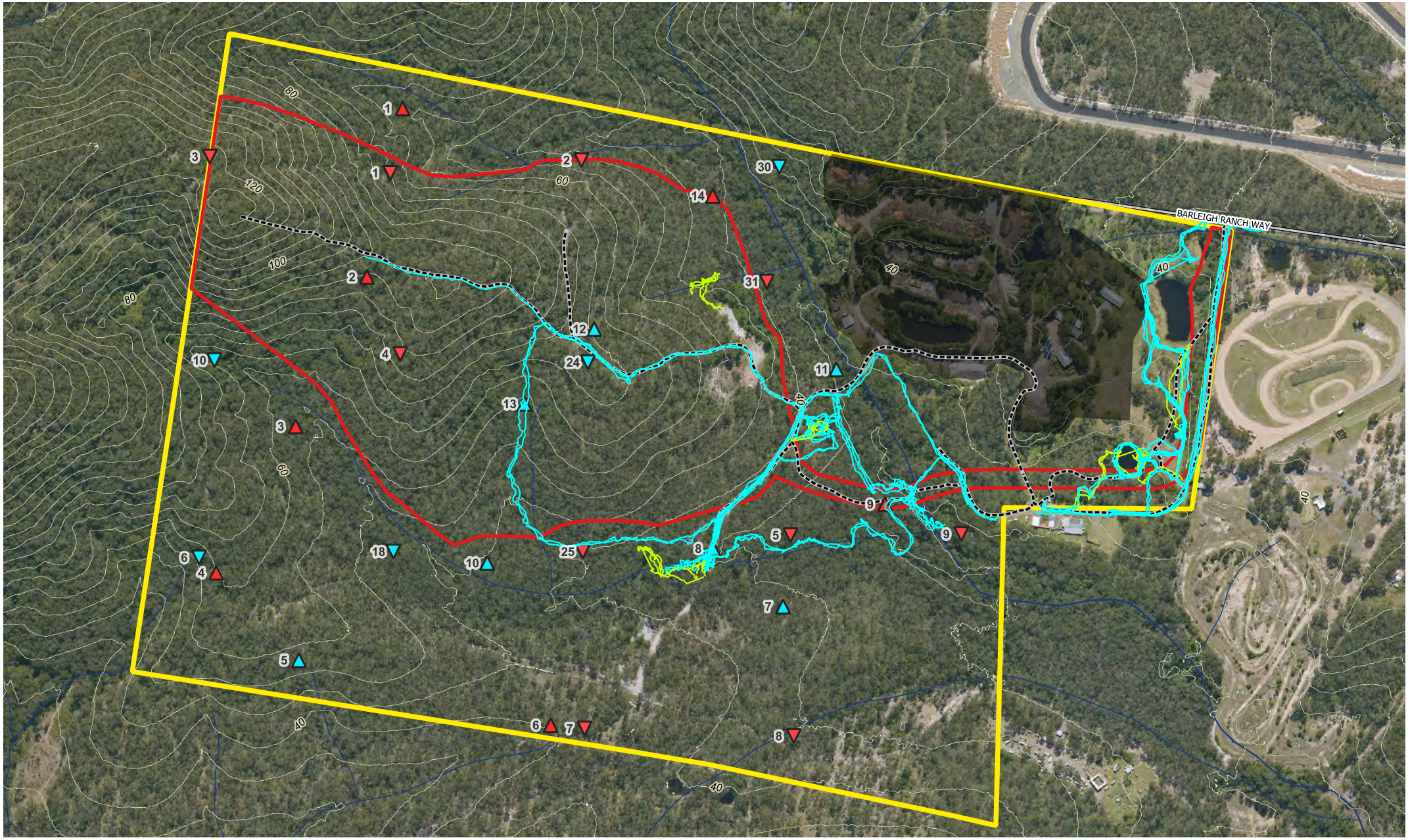
Append survey results to the main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR*).*

Table 10: Koala Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Spot Assessment Technique	**Department Survey Guidelines** *Not Applicable*	Field surveys and habitat mapping following the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004) across the entire Project AreaTargeted Koala surveys were conducted as follows: **Kleinfelder (2012–2016):** Two nights of call playback, diurnal searches, and 14 SAT tests. While SATs were undertaken at suitable intensity, a grid approach was not used. **WPC (2023/2024):** 15 SAT tests were conducted across the entire 100 ha Project Area. A 250 m grid was applied, in line with the *Koala BAM Survey Guidelines (BAM 2022)* for areas >50 ha. These surveys meet current (2024) EPBC guidelines for compliance. Survey effort completed in 2023 and 2024 is mapped in **Figure 11**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM Koala (*Phascolarctos cinereus*) BAM Guide (DPE, 2022) requires the completion of 2.25 SATs (for 150 m grid spacing) per hectare of suitable habitat. Areas of suitable habitat <5ha require a minimum of three SAT sites located within different PCTs, where relevant. SATs are to be completed in accordance with the protocol detailed in Phillips & Callaghan (2011).	
	Other (best practice survey methodology) SATs are completed in accordance with the protocol detailed in Phillips & Callaghan (2011). *The SAT technique is a simplified version of the Koala Habitat Atlas method, assessing tree species preferences and koala activity by detecting faecal pellets. Smaller plots (20×20m) yield similar results, but for accuracy, at least 30 trees with a minimum 100mm diameter must be sampled.*	

Survey Type	Survey Requirements	Surveys Completed
Spotlighting	**Department Survey Guidelines** *Not Applicable*	Spotlighting surveys were conducted on 15–16 January 2013 for a total of six person-hours across all survey events. Surveys were performed on foot along each transect, with trees inspected during daylight hours for the presence of habitat hollows. Any identified hollows were observed at dusk to record nocturnal bird and mammal activity. Call playback surveys were conducted at each transect over two nights. **Survey Effort Compliance** • Mammals: 2 x 1-hour surveys on two separate nights, in line with DEC (2004) guidelines for stratification units between 50–150 ha (up to 200 ha). Survey effort completed in 2023 and 2024 is mapped in **Figure 11**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM Koala (*Phascolarctos cinereus*) BAM Guide (DPE, 2022) requires spotlighting surveys to be conducted over two separate nights to detect koalas in suitable habitat. For habitat ≥5 ha, two 200 m transects per 5 ha must be surveyed, spaced ≥100 m apart to ensure representative coverage. For habitat <5 ha, a single transect is required. Surveyors must walk at 10 m/min, using a hand-held spotlight (750–1500 lm) to detect eye-reflectance. Vehicle-based spotlighting (≤5 km/h) may be used in low-density vegetation areas, with all detections confirmed by binoculars.	
	Other (best practice survey methodology) *NSW DEC Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004)* *"Survey effort on foot will involve at least two searches, each for one hour with a hand-held spotlight of appropriate power for the conditions. This must be conducted on each of two separate nights along a traverse of at least one kilometre, which samples the least disturbed parts within the stratification unit. Where the stratification unit is too small to achieve a one kilometre traverse, a proportionate amount of spotlighting must be done. Where roads and tracks occur in a survey area, spotlighting from a vehicle may be appropriate. Spotlighting with a 100 watt spotlight from a vehicle should be undertaken twice, each over at least a kilometre within the same stratification unit at a speed not exceeding 5 km/h. This must be repeated at least once on a separate night. Foot and vehicle spotlight traverses must involve two observers, each using spotlights. Weather and moonlight conditions should all be discussed in the report as these can affect survey results".*	



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- Impact Area
- Project Area
- Spotlighting(20,21, & 22 February 2024)
- Spotlighting(8 November 2023)

SAT location

- Koala detected (KLF 2013)
- Koala detected (WPC 2024)
- Not detected (KLF 2013)
- Not detected (WPC 2013)
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 11. Koala Survey Effort

50 100 150 200 250 m

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Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury/mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 11 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during the survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, and potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 11: Koala Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
Preconstruction Phase The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *Risk of injury and mortality during native vegetation clearing* Vegetation clearing represents a risk to Koala injury and mortality, however this will be minimised through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 13** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *Loss of habitat* A total of 11.13 ha of native vegetation, representative of Koala habitat will be impacted by the proposed action. Based on an average home range size of 80–90 ha in the Port Stephens area (DECC 2008), only a small portion of one adult Koala's range would be impacted. However, the proposed action minimises direct impacts to preferred Koala foraging habitat. The proposed offset site will provide long-term protection of local Koala habitat. Given these factors, the project is unlikely to cause a long-term decline in the local Koala population. *Impacts to population connectivity and movement corridors* The proposed action minimises direct impacts to potential movement corridors associated with Seven Mile Creek and its tributaries. The installation of a koala underpass at the crossing of Seven Mile Creek will retain these movement corridors and long-term population dispersal
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
Construction Phase Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *Risk of injury and mortality during construction activities* The proposed action may lead to an increased risk of vehicle strikes due to higher traffic during quarry construction and operation. However, the installation of a koala underpass at the location of the main crossing of Seven Mile Creek (indicative koala movement corridor) will minimise vehicle strikes through the operation of the quarry. Speed limits will be limited during construction.
	Injury/mortality associated with the construction phase of the proposed action **will not result in a significant impact on the species**.
Operation Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *Introduction and/or spread of invasive weeds and pests* The introduction and spread of invasive weeds and pest may result in indirect impacts to the species habitat. Weed and pest management within the action area will be managed under a site-specific management plan. *Noise and vibration disturbance* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. These disturbances have the risk to disrupt the habitat quality and long-term health of the species and the local population including leading to behavioural changes or displacement from biologically important habitat areas. However, extraction sequencing has been

Item	Detail
	strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. The rate of extraction was carefully determined to balance environmental and operational factors. A rate of 600kt was selected, as it was found to be the most environmentally and logistically feasible based on traffic, noise, and dust assessments, with both higher and lower extraction rates considered during the design process. Additionally, the processing plant has been strategically positioned at an excavated level of RL 45m in the northern section of the quarry, ensuring it remains shielded by the existing hill to minimise noise disturbance to the south. Operation timing outlined in **Section 1.1** minimising noise impacts at night, minimizing indirect impacts to the species. These measures collectively ensure that the development effectively mitigates noise and dust impacts while maintaining environmental sustainability. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Artificial light will not be introduced, and with the implementation of mitigation measures in **Table 13**, noise and vibration impacts will be effectively mitigated. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of **11.13 ha** of Koala foraging habitat
Indirect Impact Area	Through the implementation of mitigation measures in **Table 13** the area of indirect impacts will be minimal.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will impact lower value Koala foraging habitat within the Project Area. The higher value foraging habitat and movement corridors will be retained and largely conserved through the establishment of an on-site offset site.
Regional scale	The proposed action will have a negligible impact on preferred koala habitat and potential movement corridors facilitating regional koala dispersal. The Port Stephens population is estimated to be about 800 individuals (NSW TSSC) and occurs across a total of 39,926 ha of mapped koala habitat across

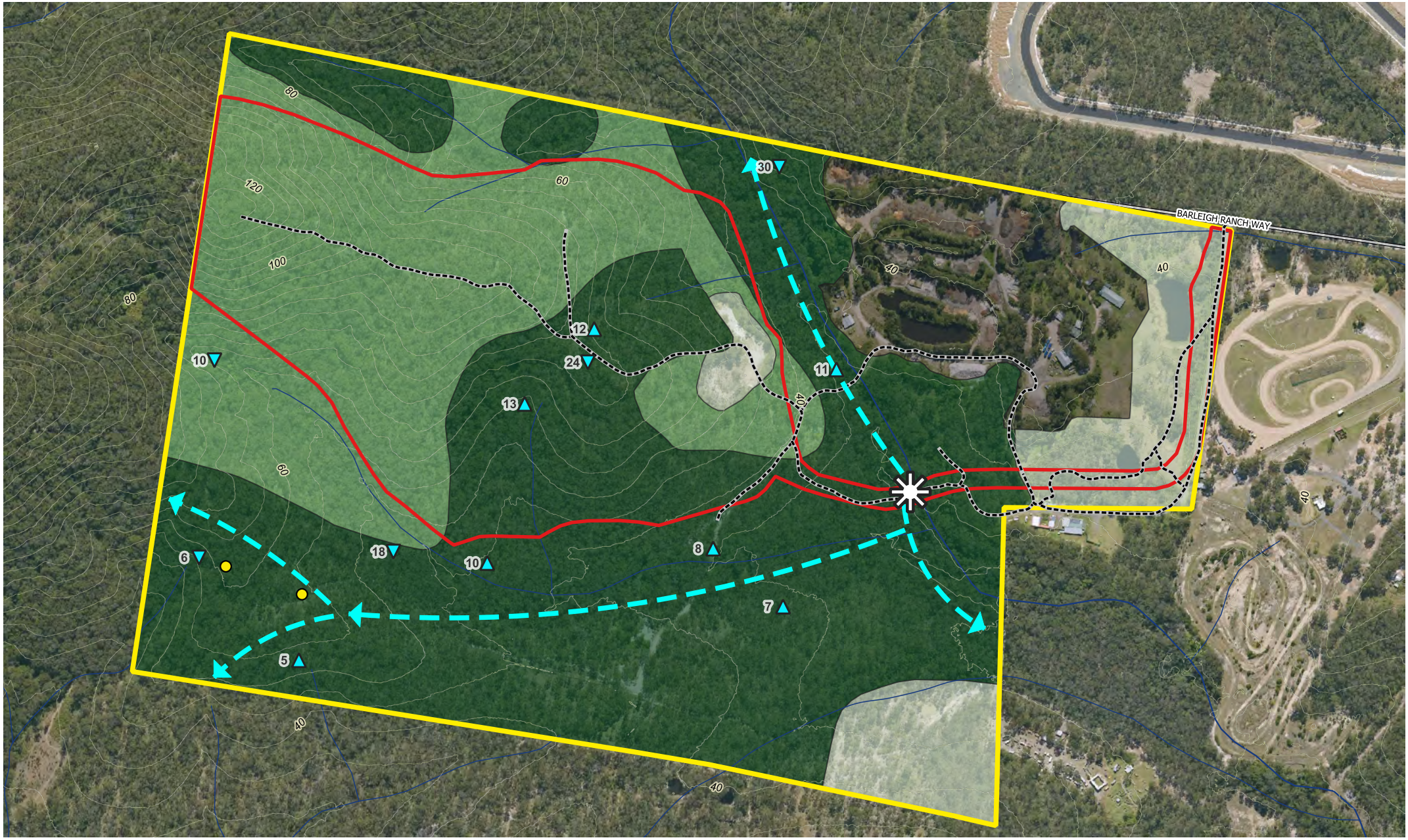
Item	Detail
	the Port Stephens LGA (Lunney *et.al* 1998). The Project Area (101.06 ha) is largely mapped as Marginal Use Koala Habitat under the Port Stephens CKPoM (PSC 2002) and represents 0.25% of suitable habitat for the species within the LGA. The Disturbance Footprint (33.44 ha) represents 0.08% of suitable habitat in the LGA. As the proposed action will only be impacting transitory marginally suitable koala habitat, and will maintain connectivity through the installation of a koala underpass and retain areas of more suitable koala habitat within a Biodiversity Stewardship Site, the proposed action is unlikely to result in a significant impact to the regional population. **Using PCT Mapping and PCT associations under the TBDC** The total area of suitable foraging habitat for Koala within the Disturbance Footprint (11.13 ha) represents 0.2% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5974.32ha). PCT mapping indicates that the mapped PCTs associated with the species within the Disturbance Footprint represents 0.5% of mapped PCTs associated with the species within the locality (5km buffer).
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The action will result impacts to a total of 11.13 ha of foraging habitat for the species. The proposal minimises impacts to preferred foraging habitat within the Project Area (19% impacted), with the retention of higher value foraging habitat and movement corridors associated with Seven Mile Creek and its tributaries. Higher value habitat will be managed and conserved in an onsite offset area, while local movement corridors will be largely maintained through the installation of a Koala underpass at the one crossing point of Seven Mile Creek. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 12: Koala – Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** Key impacts identified above include; Vegetation Clearing, , Injury/mortality, and Artificial light, noise and vibration disturbance. A total of 11.13 ha of native vegetation representative of marginal koala foraging habitat will be cleared. Based on the assessment of an average home range in the Port Stephens area of 80 – 90 ha (DECC 2008), the proposed action represents a minor impact to local koala home ranges. However, the proposed action minimises direct impacts to preferred Koala foraging habitat and potential movement corridors associated with Seven Mile Creek and its tributaries. The installation of a koala underpass at the crossing of Seven Mile Creek will retain these movement corridors and long-term population dispersal. The proposed offset site will provide long-term protection of local Koala habitat. Short-term impacts of vegetation clearing including the risk of Koala injury and mortality during clearing will be minmisied through the

Criteria	Response
	completion of pre-clearance surveys and clearing supervision as per management plans. The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. However, the staging of extraction has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties and Koala habitat.
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The proposed action will impact a total of 11.13 ha of foraging habitat for the species. However, this represents <0.01% of the known 19,428 km2 area of occupancy for the species. The proposed action is designed to minimise impacts to higher value Koala habitat alongside Seven Mile Creek and its tributaries. The total area of suitable foraging habitat for Koala within the Disturbance Footprint (11.13 ha) represents 0.2% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5974.32ha). PCT mapping indicates that the mapped PCTs associated with the species within the Disturbance Footprint represents 0.5% of mapped PCTs associated with the species within the locality (5km buffer).
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** The proposed action minimises direct impacts to more preferred Koala foraging habitat and potential movement corridors associated with Seven Mile Creek and its tributaries. The installation of a koala underpass at the crossing of Seven Mile Creek will retain these movement corridors during the construction and operation of the quarry, maintaining long-term population dispersal. The proposed offset site will provide long-term protection of local Koala habitat and these movement corridors.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The SAT surveys indicated low activity levels (7% in 2013 & 1% in 2024) within the Disturbance Footprint. The SAT surveys indicate that koalas are likely moving through the lower-lying areas of the Project Area (such as along creeklines) rather than through the elevated ridgeline and upper slopes where the Disturbance Footprint is situated. The Seven Mile Creek corridor (creekline and associated riparian habitat) is likely acting as the main movement corridor for koalas to move through the Project Area. As this area will be retained, the proposed action is unlikely to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species as breeding habitat has not been identified within the Project Area, while higher value foraging habitat and local movement corridors will also be retained under the proposed action.

Criteria	Response
Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of habitat within the Disturbance Footprint is not considered critical to the survival of the species. The proposed action has avoided the majority of high value koala habitat and local movement corridors within the Project Area. The proposed offset site will provide long-term protection of local Koala habitat and these movement corridors.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the establishment of a harmful invasive species.** Provided that a Landscape and Rehabilitation Management Plan is adhered to as outlined in Section 2.1.3.2 of the BAR, measures will be implemented to prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or invasive fauna species into the Disturbance Footprint.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disesase.** Diseases like koala retrovirus (KoRV) and Chlamydia (*Chlamydia pecorum*) present a significant risk to the species. However, the proposed action is unlikely to introduce these diseases to the Project Area.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** The Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the ACT (DAWE, 2022a) identifies mechanisms to conserve Koala habitat and increase our understanding of the biology and ecology of this species, as well as improving planning frameworks. The proposal does not contravene the objectives of the plan.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



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Impact Area
Project Area
Koala Sighting
Indicative Movement Corridor
Fauna Underpass

SEPP 44 Koala Habitat Mapping
>15% SEPP 44 Koala Feed Trees
< 15% SEPP 44 Koala Feed Trees
Avoidance Area (Gardenland)
N/A

SAT location
Koala detected (KLF 2013)
Koala detected (WPC 2024)
Named Watercourse
Minor Watercourse

Contours (5m)
Local Road
Tracks

Fig. 12. Koala Impacts

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 13: Koala Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed activity will avoid the majority of suitable Koala habitat within the Project Area (approximately 79%). The proposed action minimises direct impacts to preferred Koala foraging habitat and potential movement corridors associated with Seven Mile Creek and its tributaries. The installation of a koala underpass at the crossing of Seven Mile Creek will retain these movement corridors and long-term population dispersal. The proposed offset site will provide long-term protection of local Koala habitat under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	These retained areas of suitable Koala habitat (41.40 ha) would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement.
Avoidance of indirect noise impacts to retained koala population	Operating times detailed in **Section 1.1** restrict the timing of construction, operations, lading, and blasting to daylight hours minimising indirect impacts from operational noise to the species
Mitigation Measures Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all measures detailed within the CEMP and OEMP and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**).
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI*

Item	Detail
	Water 2012) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Landscape and Rehabilitation Management Plan**
Summary	The Landscape and Rehabilitation Management Plan is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the LRM will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Water Management Strategy**
Summary	The Water Management Strategy is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	The Water Management Strategy is designed to mitigate potential impacts on surface water quality and geomorphic stability through proactive monitoring, adaptive management, and compliance with best practice guidelines.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific conditions that must be met, including the preparation of a Water Management Plan. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.

Item	Detail
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Mitigation Measure	**Koala Underpass and Fencing along access road**
Summary	A koala underpass is required to be incorporated into the design and construction of the quarry access road bridge crossing Seven Mile Creek under the Conditions of consent Section B44. The koala underpass will be designed in consultation with koala experts. It is recommended that the underpass will provide a crossing of < 35m and include a reinforced box culvert with the dimensions of 1.2 m x 1.2 m (larger if possible). Koala exclusion fencing and koala grids will be installed so as to direct koalas through the underpass rather than crossing the access road. Examples of these elements are provided below.  **Plate 4 Example of a Koala underpass with timber post and rail furniture.**  **Plate 5 Example of a Koala underpass** 

Item	Detail
	Plate 6 Floppy Top Fencing (left) and Fencing with 600mm metal flashing (right)  **Plate 7 Example of a Koala Grid and Fencing**
Cost effectiveness of proposed measure	The adaptation of an already proposed access road bridge to provide a koala underpass allowing for the maintenance of local koala movement corridors is a cost effective measure.
Predictive effectiveness for species	The Koala underpass will be designed within the BMP for the Proposed Development. Implementation of Koala underpasses have seen to be effective in numerous other developments within the region.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (DPI Water 2012) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in Appendix 2.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	The current measure will assist in maintaining koala connectivity within the environment. Will facilitate movement of the koala from north to south along seven mile creek.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 14: Koala Residual Impacts and Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 11.13 ha of koala foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • 291 Species Credits for Koala (*Phascolarctos cinereus*)
Relevant Documentation	See appended BAR

2.1.2 Grey-headed Flying-fox (*Pteropus poliocephalus*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 15: Grey-headed Flying-fox Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species was recorded foraging within the Project Area (WPC 2023). The species was not recorded during surveys completed by Kleinfelder in 2013. No Grey-headed Flying Fox (GHFF) camps were recorded within the Project Area.
Historical Records	25 records of the species occur within the locality (see **Figure 13).** Most of the records occur to the south towards Raymond Terrace where there is a known GHFF Camp.
Individuals within the proposed action area	
Number of individuals within the proposed action area	No GHFF camps were detected within the Project Area during field surveys. Eucalypt species within the Disturbance Footprint are likely to provide foraging resources for this species.
Survey Methodology	
Detail the survey methodology used	Nocturnal Spotlighting Surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) see **Table 10** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**Opportunistic foraging habitat** The nearest active GHFF camp is located at Raymond Terrace (-32.759535, 151.752271), 8.7 km to the south-west of the Project Area (**Figure 13**). Historic GHFF camps nearer to the Project Area include the Wallaroo National Park, Italia Road GHFF Camp (-32.66083523, 151.805217) and the Medowie GHFF camp (-32.75174171, 151.8909452) have recorded zero animals since 2012 and 2015 respectively, as measured under the National Flying-fox Management Program. Results from long-term monitoring of the Raymond Terrace camp by the National Flying-fox Management Program indicates the average population of this camp is 6,140 GHFF (CSIRO 2024). The Project Area is located within the mean nightly travel distance for a GHFF (10.9km [DAWE 2021]), as such it is likely that the vegetation within the Project Area represents part-of the foraging habitat for the Raymond Terrace GHFF Camp. No camps occur within the Project Area. Discussion on foraging habitat extent and quality is described further below.
Important populations	
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of the GHFF based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** The Project Area is not a key source for breeding and is more likely used for seasonal foraging resources for the species. No evidence of breeding has been found within the Disturbance Footprint or Project Area (Camps). ***Populations that are necessary for maintaining genetic diversity, and/or*** There is not a current population of the species know to occur within the Project Area. ***Populations that are near the limit of the species range.*** The species is not near the limit of its range.
Habitat Extent	
Habitat requirements	**Foraging Habitat Requirements**

Item	Details

GHFF forage across diverse habitat types, including fragmented, degraded, and urban landscapes, roughly in proportion to their availability. They rely on eucalypt forests, which flower seasonally but unpredictably, and have no biological adaptations to withstand food shortages. When native food is scarce, they migrate and travel extensive distances—sometimes up to 148.3 km (average 10.9km from roosting site) — to locate resources (DAWE 2021). Their foraging behavior plays a crucial role in pollination and seed dispersal, supporting the ecological and evolutionary processes of forest communities.

The Raymond Terrace Flying-fox Camp Management Plan (PSC 2017) highlights the importance of winter flowering species for the nationally important Raymond Terrace GHFF camp, noting that within the region the greatest proportion of dietary species flower in Dec /Jan (14 spp, 52%) and species richness reaches low levels from late autumn to early spring (4 spp, 15%). Table 5 of the Raymond Terrace Flying-fox Camp Management Plan (PSC 2017) identifies a total of six (6) species of tree that flower in winter that are preferential food sources for Flying-foxes, recommending that these species should be subject to protection to assist with Flying-fox survival in the region. These species are shown below for bi-monthly periods; December-January (D-J), February-March (F-M), April-May (A-M), June-July (J-J), August-September (A-S), and October-November (O-N). Flowering period of each listed local foraging species is marked with "X", each species found within the Project Area is bold and in green. Important winter-flowering species are those flowering in J-J and A-S.

Species	D-J	F-M	A-M	J-J	A-S	O-N
Angophora costata						X
Angophora floribunda	X					
Banksia integrifolia			X	X	X	
Corymbia eximia						X
Corymbia gummifera		X				
Corymbia maculata		X	X	X		
Eucalyptus acmenoides	X					X
Eucalyptus albens				X	X	
Eucalyptus amplifolia						X
Eucalyptus botryoides	X					
Eucalyptus camaldulensis	X					
Eucalyptus deanei	X	X				
Eucalyptus fibrosa	X					X
Eucalyptus longifolia			X			
Eucalyptus moluccana		X				
Eucalyptus paniculata	X					
Eucalyptus parramattensis	X					
Eucalyptus pilularis	X	X				
Eucalyptus piperita	X					
Eucalyptus punctata	X	X				
Eucalyptus resinifera	X	X				

<table>
<tr><th>Item</th><th colspan="7">Details</th></tr>
<tr><td rowspan="7"></td><td>Eucalyptus robusta</td><td></td><td></td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>Eucalyptus saligna</td><td>X</td><td>X</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Eucalyptus siderophloia</td><td>X</td><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>Eucalyptus tereticornis</td><td></td><td></td><td></td><td></td><td>X</td><td>X</td></tr>
<tr><td>Melaleuca quinquenervia</td><td></td><td>X</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>Syncarpia glomulifera</td><td></td><td></td><td></td><td></td><td>X</td><td>X</td></tr>
<tr><td>Type(s) of habitat available</td><td colspan="7">Availability of GHFF Habitat within the Project Area
The Project Area contains native vegetation that provides foraging habitat for the GHFF. No camps were recorded within the Project Area, the nearest active mapped GHFF camp is located 8.7 km southwest of the Project Area at Raymond Terrace. As such, the vegetation within the Project Area is representative of foraging habitat for the GHFF and specifically the Raymond Terrace GHFF Camp. The extent, location and value of habitat within the Project Area is outlined below.

Foraging Habitat
Foraging habitat available is summarized below.

<u>Foraging Tree Occurrence:</u> Reviewing available resources detailing GHFF food tree species, the following applies to the Project Area:
• Commonwealth - The Project Area contains four (4) ‘tree species listed as Locally important koala trees for North Coast NSW’ - Eucalyptus acmenoides (White Mahogany), E. siderophloia (Northern Grey Ironbark), E. tereticornis and E. punctata (Grey Gum).
• State – A total of two (2) species listed as KFTs in Schedule 1 of the Biodiversity and Conservation SEPP 2021 (Chapter 3) occur within the Project Area; E. punctata and E. tereticornis.
• Local – a total of twelve (12) locally occurring GHFF feed trees recognized under the Raymond Terrace Flying-fox Camp Management Plan (PSC 2017) were identified within the Project Area. Of these a total of ten (10) species are known to be spring, summer, and early autumn food trees for the GHFF. The remaining two (2) species (Corymbia maculata and Eucalyptus tereticornis) are known to provide an important winter food resource. Spring, summer, and autumn species were the dominant canopy species recorded within the Project Area (species shown above).

<u>Existing Mapping:</u> The Flying fox Foraging Habitat Mapping NSW (Eby et. al. 2019) maps the following within the Project Area:
• Overall Rank - The vegetation within the Disturbance Footprint is mapped as having an overall conservation rank of the habitat of mostly 1 and to a lesser extent 2 (with 1 being the lowest, and 4 being the highest rank):
o 28.45 ha of Rank 1 (85% of Disturbance Footprint and 53 % of Rank 1 area within the Project Area)
o 5.01 ha of Rank 2 (15% of Disturbance Footprint and 13% of Rank 2 area within the Project Area)

When these mapping results are considered within the context of the locality and as a portion of available foraging habitat for the Raymond Terrace GHFF population the following is concluded (and shown in table below).</td></tr>
</table>

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>

The Disturbance Footprint contains 33.45 ha of mapped suitable foraging habitat for the GHFF representing 0.3% of mapped GHFF foraging habitat within 10.9km of the Raymond Terrace Camp (total mapped: 11,609.43 ha) and the following rank areas:

28.45 ha of Rank 1 foraging habitat (0.3% of Rank 1 within Raymond Terrace Camp Range)
5.01 ha of Rank 2 foraging habitat (0.2% of Rank 2 foraging habitat within Raymond Terrace Camp Range)
0 ha of Rank 3 and 4 foraging habitat (0% of Rank 3 and 4 foraging habitat within Raymond Terrace Camp Range)

The Disturbance Footprint contains 33.45 ha of mapped suitable foraging habitat for the GHFF representing 0.1% of mapped GHFF foraging habitat within 12km of the Project Area (total mapped: 29,558.75 ha)

<table>
<tr><th rowspan="2">Rank</th><th colspan="4">Mapped Foraging Habitat Area (ha)</th></tr>
<tr><th>Disturbance Footprint</th><th>Project Area</th><th>10.9km from Raymond Terrace</th><th>12km from Project Area</th></tr>
<tr><td>1</td><td>28.45</td><td>53.36</td><td>8516.35</td><td>16487.94</td></tr>
<tr><td>2</td><td>5.01</td><td>39.88</td><td>2756.94</td><td>12174.76</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>0</td><td>9.07</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>336.14</td><td>886.98</td></tr>
<tr><td>Total</td><td>33.45</td><td>93.24</td><td>11609.43</td><td>29558.75</td></tr>
</table>

Seasonality of Habitat - The vegetation within the Disturbance Footprint is mapped in regards to the foraging resource productivity seasonally. Within the Disturbance Footprint vegetation is mapped based on modeled vegetation communities and assigned a productivity score in two-monthly periods from 0 (low productivity) to 1 (high productivity). The seasonal productivity scores for each vegetation polygon mapped within the Disturbance Footprint is shown below. Bi-monthly periods are based on the following

December-January (D-J)
February-March (F-M)
April-May (A-M)
June-July (J-J)
August-September (A-S)
October-November (O-N)

<table>
<tr><th>Poly-gon</th><th>Area</th><th>D-J</th><th>F-M</th><th>A-M</th><th>J-J</th><th>A-S</th><th>O-N</th></tr>
<tr><td>1</td><td>0.56</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>0.61</td><td>0.26</td><td>0.74</td><td>0.48</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>0.75</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>0.04</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td></tr>
</table>

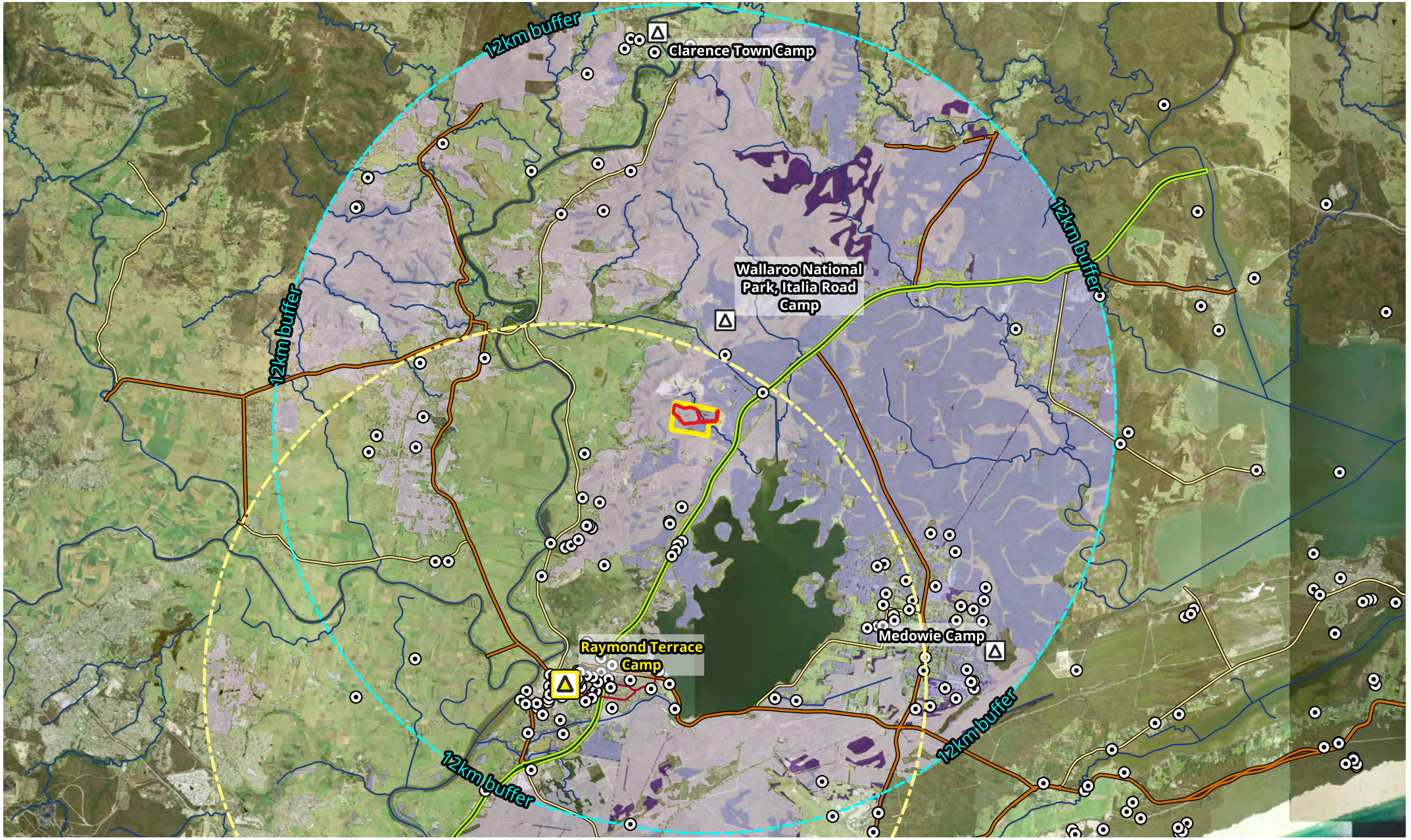
<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>
<table>
<tr><td>5</td><td>0.13</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>6</td><td>3.52</td><td>0.33</td><td>0.33</td><td>0</td><td>0</td><td>0</td><td>0.15</td></tr>
<tr><td>7</td><td>27.84</td><td>0.17</td><td>0.53</td><td>0.45</td><td>0</td><td>0</td><td>0.09</td></tr>
<tr><td colspan="2">Average Prod</td><td>0.11</td><td>0.23</td><td>0.13</td><td>0.00</td><td>0.00</td><td>0.03</td></tr>
</table>
Mapping Conclusion - These results indicate the vegetation within the Disturbance Footprint represents:

A low value foraging resource
A very small portion of foraging resources available to the Raymond Terrace GHFF Camp
A summer-autumn dominated foraging resource, with no winter resource important to the local population

<u>Associated PCTs</u>
Two (2) PCTs within the Project Area are associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC)
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with GHFF</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="4">PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
<tr><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>YES</td><td>0.23</td></tr>
<tr><td colspan="3">Total GHFF Habitat PCTs Area (ha)</td><td>32.83</td></tr>
</table>
</td></tr>
<tr><td>Quality of the habitat</td><td>
Breeding Habitat
No GHFF camps were detected within the Project Area, as such, the Project Area is only considered foraging habitat for the GHFF.
Foraging Habitat
The vegetation communities (PCTs) within the Project Area are associated with the GHFF and provides a foraging resource for the local Raymond Terrace GHFF Camp to the south-west of the Project Area. The vegetation within the Project Area contains a number of locally important foraging species, largely providing a resource within the summer and autumn. The vegetation within the Disturbance Footprint represents 0.3% of low rank and total foraging habitat available to the local Raymond Terrace GHFF Camp.
</td></tr>
</table>

Item	Details
Key habitat features	**Foraging Habitat** • Utilises diverse landscapes, including fragmented, degraded, and urban areas. • Relies on eucalypt forests, which flower seasonally and unpredictably. • Travels long distances in search of food with the the mean distance of a GHFF's foraging site from the camp in which the animal had roosted and to which it returned was 10.9 km (quartile range from 6.2km – 27.9km) (DAWE 2021). **Roosting Habitat** • Forms large camps in tree canopies, sometimes at sites used for over 100 years. • Camps serve as refuges for critical life stages, including birth, lactation, and mating. • Shows flexibility in camp locations, from continuous forests to small patches **Seasonal and Migration Patterns** • Camp occupation varies, with some sites continuously inhabited while others are used seasonally. • Population size in camps fluctuates • Food shortages influence camp locations and size,
Habitat critical to the survival of the species	GHFF rely on myrtaceous plants for food, but these plants flower seasonally and unpredictably, making it difficult to identify consistent foraging sites. Few species flower in winter, with reliable sources mainly found on coastal lowlands in northern NSW and southern Queensland. Spring forage is also insufficient during critical reproductive periods. Key winter and spring vegetation communities include various Eucalyptus, Banksia, Corymbia, Grevillea, Melaleuca, and Syncarpia species, which provide essential resources for the species' survival. **Habitat critical to the survival of the species** *Habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:* ***For activities such as foraging, breeding, roosting, or dispersal;*** The site represents foraging habitat only for the species no Breeding, roosting or dispersal habitat was identifed during surveys conducted. ***For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*** The Disturbance Footprint represents broadly suitable foraging habitat for the species, albeit part of a larger area of similar habitat available to the species throughout the locality. ***To maintain genetic diversity and long-term evolutionary development; or*** The proposed Disturbance Footprint will not effect the genetic diversity or long-term development of the species with no evidence of the species using the area for breeding only broadly suitable foraging habitat exists within the Disturbance Footprint. A total of 57.2ha of habitat will be retained within onsite offset area with higher quality foraging habitat for the species. ***For the reintroduction of populations or recovery of the species or ecological community.***

Item	Details
	The Disturbance Footprint represents broadly suitable foraging habitat for the species and is not habitat critical for the species. **National Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*)** In accordance with *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus* (DEW 2021) habitat critical to the survival of the Grey-headed Flying-fox includes the following: • Vegetation communities containing winter and spring flowering species including; *Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. seeana, E. sideroxylon, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora citriodora, C. eximia, C. maculata, Grevillea robusta, Melaleuca quinquenervia* or *Syncarpia glomulifera*. • Or vegetation communities not containing the above species, but which: - contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May) - contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or - contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department's interactive flying-fox web viewer. The vegetation within the Project Area contains a small number of winter and spring flowering species including *Eucalyptus crebra*, *E. fibrosa*, *E. siderophloia*, and *Corymbia maculata*. As such, the vegetation within the Project Area, along with much of the vegetation within the locality (see **Figure 13**) represents a winter/spring food resource and is considered critical to the species.
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The Project Area is within the range of the local Raymond Terrace GHFF camp, therefore individuals from the camp likely use the vegetation within the Project Area as part of the broader foraging habitat available to the species within the locality. **Long-term:** The vegetation within the Project Area largely contributes to the species' summer and autumn foraging resources and contains minimal over-winter resources for the local GHFF camp. As such, the species likely concentrates foraging within the Subject Land over the warmer months between November and May.

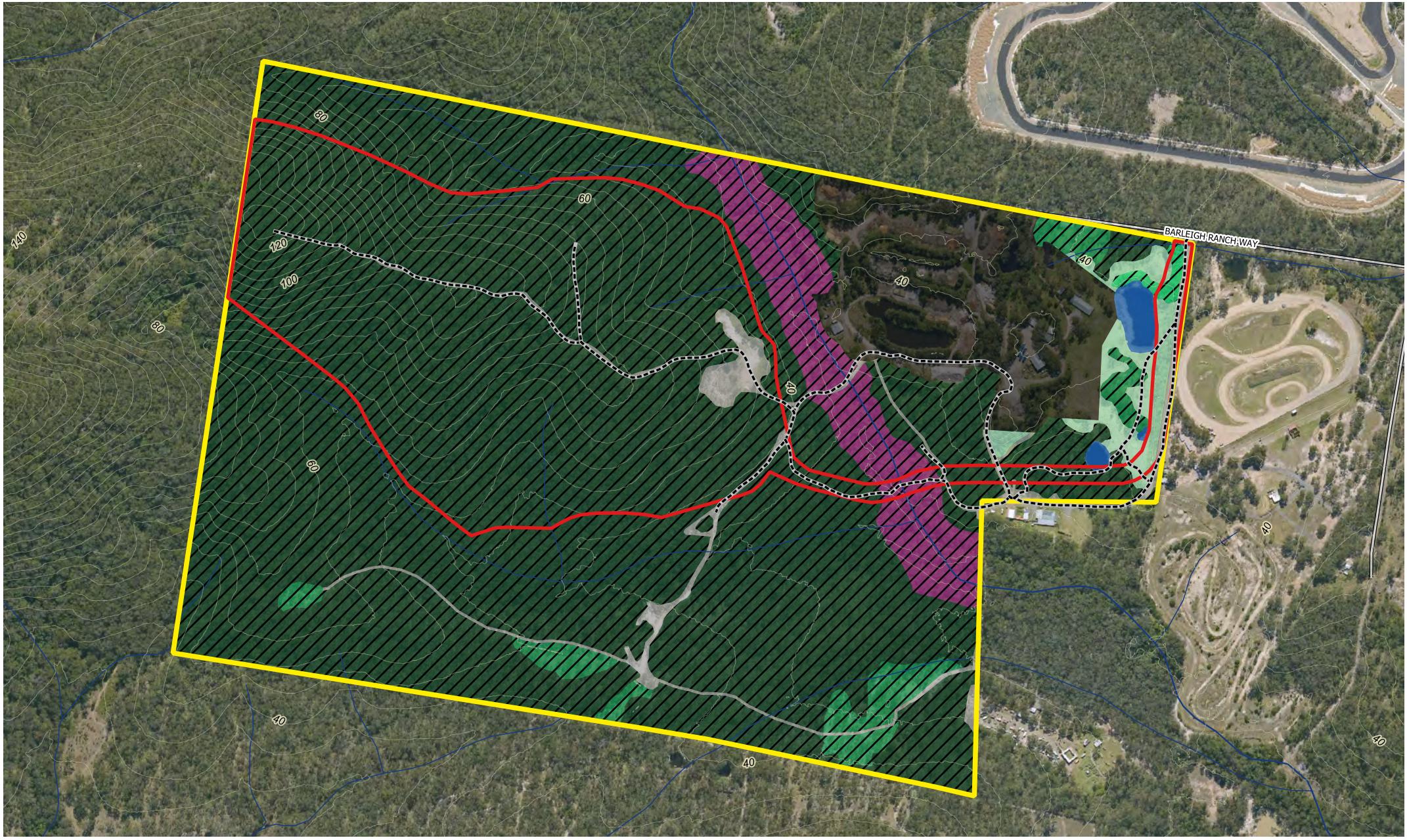


Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 13. Grey-headed Flying-fox Context

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- Impact Area
- Project Area
- Grey-headed Flying Fox Habitat

Vegetation

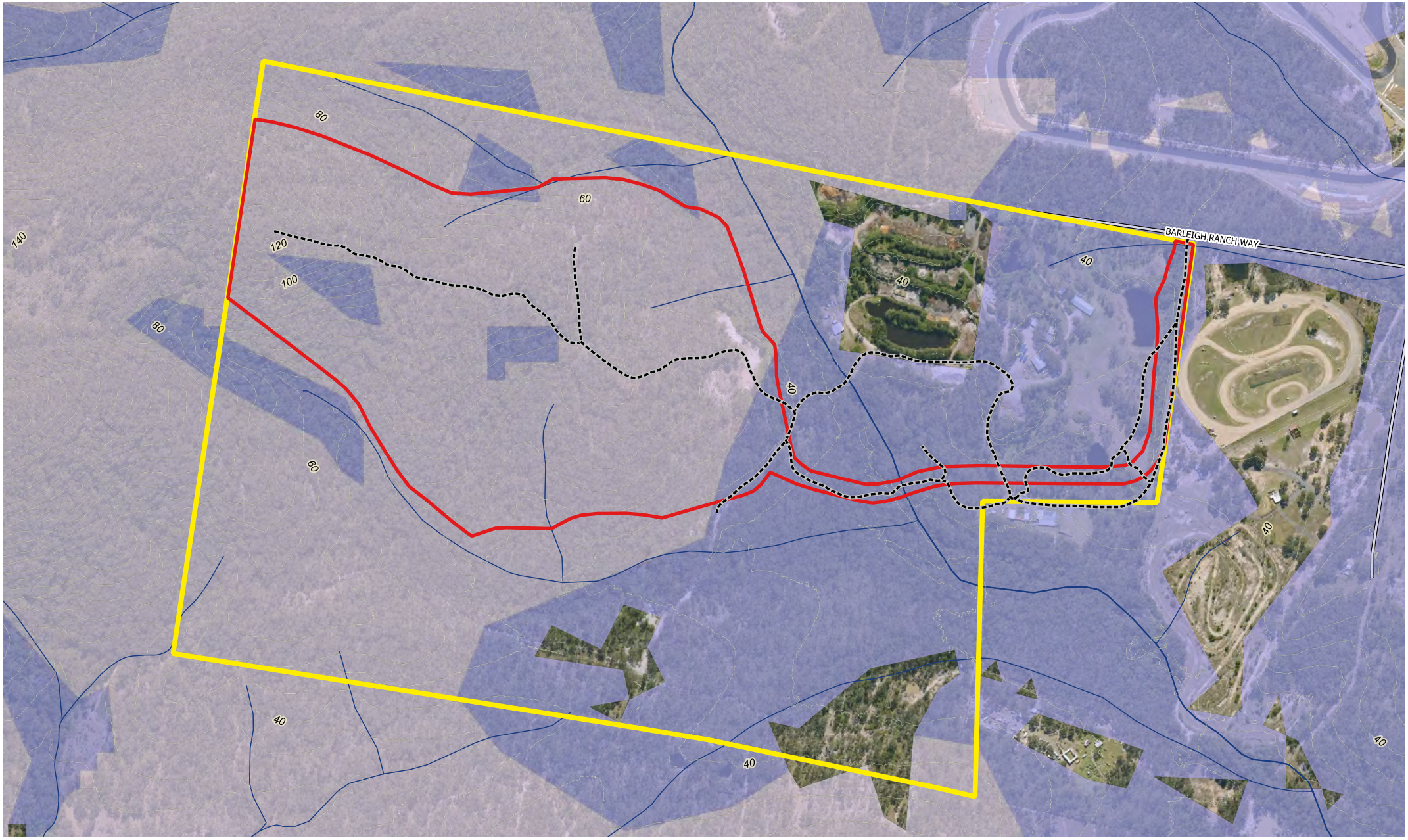
- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 14. Grey-headed Flying-fox Habitat

50 100 150 200 250 m

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Impact Area
Project Area

Grey Headed Flying Fox - Habitat Rank
1.00
2.00

Named Watercourse
Minor Watercourse

Contours (5m)
Local Road

Tracks

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
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Fig. 15. Grey-headed Flying-fox habitat rank

50 100 150 200 250 m

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Fig. 16. Grey-headed Flying-fox Productivity (Dec-Jan)

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Eagleton, NSW, 2324

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Fig. 17. Grey-headed Flying-fox Productivity (Feb-Mar)

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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Fig. 18. Grey-headed Flying-fox Productivity (Apr-May)

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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Fig. 19. Grey-headed Flying-fox Productivity (Jun-Jul)

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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GDA94 / MGA zone 56



Fig. 20. Grey-headed Flying-fox Productivity (Aug-Sep)

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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Fig. 21. Grey-headed Flying-fox Productivity (Oct-Nov)

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

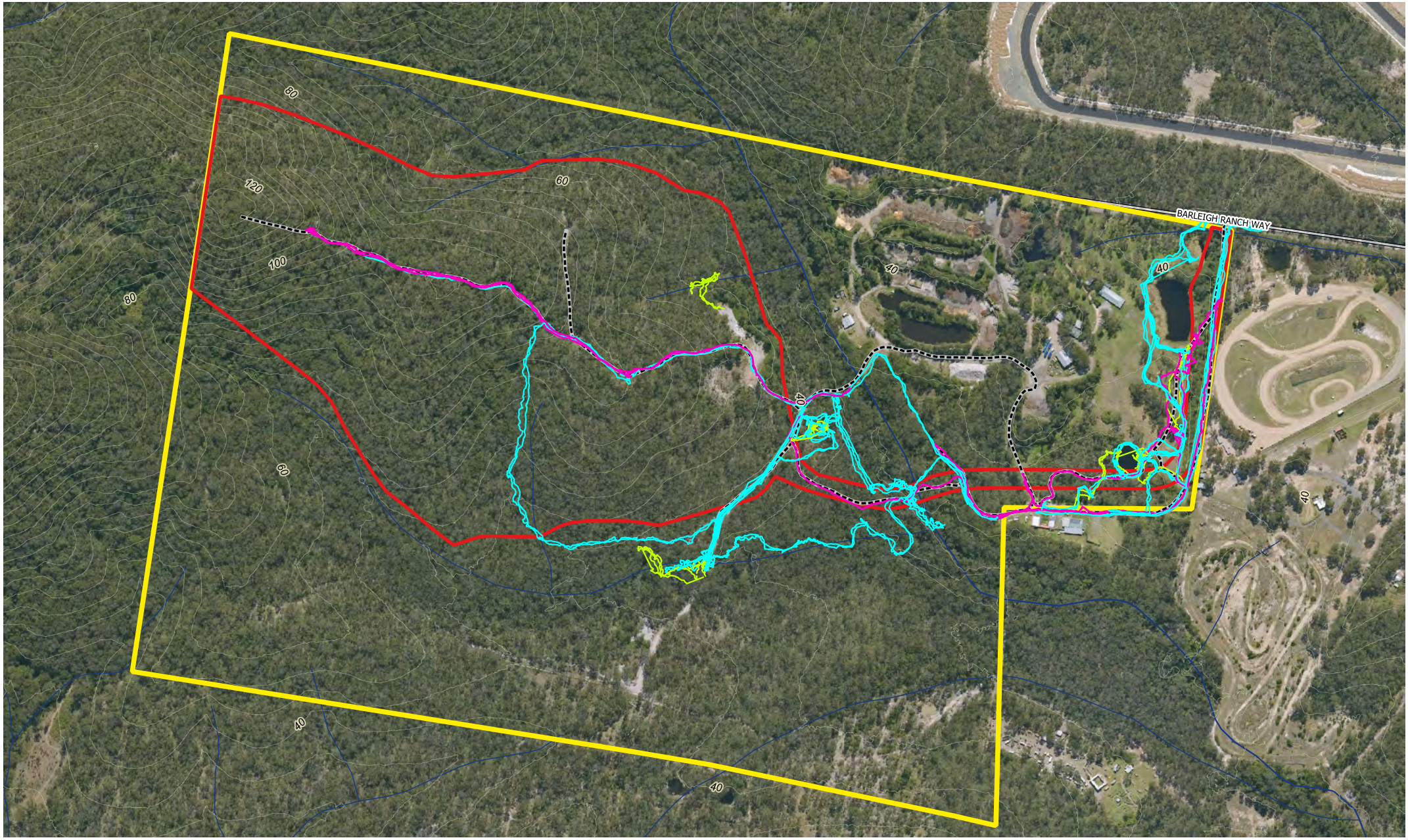
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 16: Grey-headed Flying-fox Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Habitat Assessment / Roost Search	**Department Survey Guidelines** *Survey Guideline for Australia's Threatened Bats* *"Daytime field surveys for camps.* *The primary method for determining the presence of unrecorded day roosts is to conduct field surveys. Flying foxes are recognised easily from a distance while they roost or are in flight, and have distinctive audible calls that are heard most frequently in the early morning or under sunny conditions. Other signs include their distinctive odour and droppings. Both the ground and foliage should be examined for flying fox scats. Some project areas may require access by boat. Note that this species rarely vocalises during rain and some periods of the day. Roosts can also be located by surveying for animals exiting at dusk. For very large and/or inaccessible project areas, it may be necessary to conduct an aerial survey for camps from a light aircraft"*	Field surveys and habitat mapping following the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004) across the entire Project Area targeted GHFF surveys were conducted as follows: **Diurnal Surveys** Hollow bearing tree surveys were conducted (2017). Further Surveys were conducted via Fauna Meanders 14-18 January 2013. Additional surveys were conducted on the 1 & 2 of February 2024 and 29 January 2024. Survey effort completed in 2023 and 2024 is mapped in **Figure 22**. Survey effort completed in 2017 is detailed further in Appendix 4.
	The NSW BAM *Daytime Camp Surveys during (October to December)*	
	Other (best practice survey methodology) *Not Applicable*	
Spotlighting	**Department Survey Guidelines** *Survey Guideline for Australia's Threatened Bats* *Night time surveys. Conduct walking transects (100 m apart) looking for feeding and flying bats. Smell can also provide a sign of their presence. Alternative methods may include night time audio recordings made at selected sites or fruiting food plants within the project area.*	**Spotlighting/Nocturnal Surveys** Spotlighting was undertaken for a total of six person hours across all survey events on 15-16 January 2013. Spotlighting surveys were conducted on foot around each transect. Additional spotlighting surveys were conducted on the 8 November 2023 and 20, 21, 22 February 2024. Survey effort completed in 2023 and 2024 is mapped in **Figure 22**. Survey effort completed in 2017 is detailed further in Appendix 4.
	The NSW BAM *Not Applicable*	
	Other (best practice survey methodology)	



Impact Area
Project Area

Fauna survey
HBT survey(01 & 02 February 2024)
Spotlighting(20,21, & 22 February 2024)
Spotlighting(8 November 2023)
Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 22. Grey-headed Flying-fox Survey Effort

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 17 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 17: Grey-headed Flying-fox Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *Risk of injury and mortality during native vegetation clearing* As no GHFF camps were identified within the Project Area or vicinity of the Project Area, and clearing will occur during daylight hours the species is unlikely to be impacted during this phase of development. The mitigation measures in **Table 13** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of breeding habitat</u>* No breeding camps occur within the Project Area, the nearest GHFF camp is located in Raymond Terrace. Impacts associated with the proposed action will not directly or indirectly impact the Raymond Terrace GHFF camp or any other breeding habitat for the species. *<u>Loss of foraging habitat</u>* The proposed action will impact 32.03 ha of foraging habitat within the Project Area. The vegetation within the Project Area contains important foraging species recognized at local, state and national scales. Regional mapping of foraging habitat resources indicate that the proposed action will impact 0.3% of low ranking, autumn and summer dominant foraging resources available to the local Raymond Terrace GHFF Camp (8.7km to the south-west). Due to the scale of impacts and the lack of impacts on important (and scarce) winter foraging resources available to the local Raymond Terrace GHFF camp the proposed action will not have a significant impact on the species. The proposed disturbance will be progressively rehabilitated, as such there is potential for these species to utilise the area as a foraging habitat once the rehabilitation reaches a suitable age. The loss of foraging habitat within the Disturbance Footprint is not considered critical to the survival of the species as large areas of similar foraging habitat occurs within the Retention Area and within the locality. Therefore, the proposed Action will not significantly reduce the area of occupancy of the species. *<u>Impacts to population connectivity and movement corridors</u>* The species is highly mobile with access to larger areas of suitable foraging habitat within the locality. As such, the population connectivity and movement corridors will not be directly or indirectly impacted by the proposed action.
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is very unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and since no camps are present onsite there will be no disturbance to the species. With the implementation of mitigation measures outlined in **Table 19**, the risk of injury is unlikely.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.

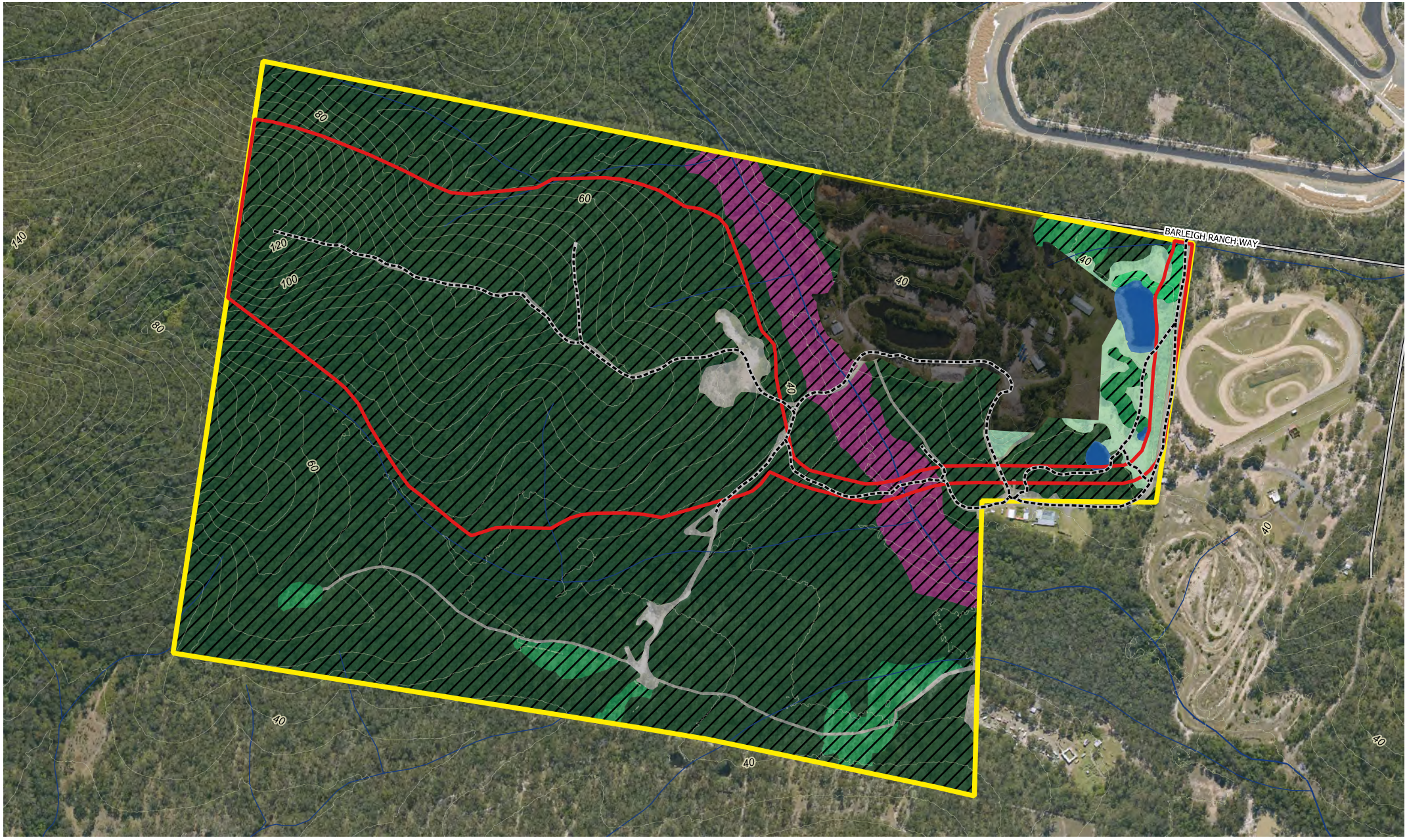
Item	Detail
Operation Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *Introduction and/or spread of invasive weeds and pests* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a stewardship site. Implementation of a vertebrate pest/weeds management plan as part of the stewardship site agreement, which would ensure potential impacts from vertebrate pests/weeds in the Project Area are managed. *Noise and vibration disturbance* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. These disturbances have the risk to disrupt the habitat quality and long-term health of the species and the local population including leading to behavioural changes or displacement from biologically important habitat areas. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that most noise and vibration disturbances likely to indirectly impact the nocturnal GHFF will occur during daylight times. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 13** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.

Item	Detail
Quantify the area of direct and indirect impacts	
Direct Impact Area	The direct impact on the GHFF during construction and life of operation is **32.03 ha** of foraging habitat will be removed.
Indirect Impact Area	Through the management of noise and vibration, dust, water quality and artificial light the proposed action is unlikely to result in indirect impacts to the GHFF, albeit it through impacts to lower ranked foraging habitat available to the Raymond Terrace GHFF camp.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not impact a breeding camp, or directly impact the species during pre-construction, construction or operation phases of this project. The proposed action will result in impacts to 32.03 ha of broadly suitable foraging habitat for the species. Owing to the species' high mobility, the proposed action will not have a significant impact on connectivity for the species through the Project Area. Higher value foraging resources will be retained within the Project Area and managed as a stewardship site.
Regional scale	The proposed action will result in impacts to 32.03 ha of regionally low ranked summer-autumn foraging habitat. This impact represents 0.3% of mapped foraging habitat available to the local Raymond Terrace GHFF Camp. As such, the proposed action is unlikely to result in a significant impact on the extent or quality of foraging habitat for the species at a regional scale.
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of broadly-suitable foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of alternative foraging areas, and the implementation of targeted mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 18: Grey-headed Flying Fox – Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** Suitable foraging habitat for the GHFF occurs within the Project Area. However, no breeding camps were recorded within the Project Area. Given the relatively small area of suitable foraging habitat proposed to be impacted it is unlikely that the action would lead to a long-term decrease in the size of local population.
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The proposed action will impact a total of 32.03 ha of foraging habitat for the species. However, this represents <0.01% of the known area of occupancy for the species. Impacts associated with the proposed action will be progressively rehabilitated, as such there is potential for these species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age.
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The proposed action will not impact on any areas that are critical for the survival of the species and will only impact broadly suitable foraging habitat. As such, the proposed action is not expected to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species as no camps or caves were recorded within the Disturbance Footprint or wider Locality.
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of foraging habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of similar vegetation representative of the region occur to the north of the Proposed Development. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the establishment of a harmful invasive species.** The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a biodiversity offset agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would

Criteria	Response
	ensure potential impacts from vertebrate pests in the Project Area are managed.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disesase.** Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** Conservation Advice for these species identifies habitat loss, particularly near breeding or roosting habitat, along with human disturbances as a key threats to the species. The proposed development will not result in impacts to or near breeding habitat for the species. The development will impact foraging habitat for the species. However, the proposed development is not likely to significantly interfere with the recovery of the species due to the small scale of impacts to foraging resources, the large area of foraging habitat within the locality, and the establishment of a stewardship site within the Project Area.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

- Impact Area
- Project Area
- Grey-headed Flying Fox Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 23. Grey-headed Flying-fox Impact

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 19: Grey-headed Flying-fox Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of suitable foraging habitat for the species, representing 0.3% of foraging habitat available to the local Raymond Terrace GHFF camp. However, the proposed action minimises direct impacts to a large area of higher ranked foraging habitat within the Project Area which will be subject to long-term protection under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	These retained areas of suitable Grey-headed flying fox habitat would be managed in-perpetuity under a Biodiversity Stewardship Site agreement.
Avoidance of indirect noise impacts to retained Grey-headed Flying Fox habitat	Operating times detailed in **Table 1** restrict the timing of construction, operations, lading, and blasting to daylight hours minimizing indirect impacts from operational noise to the species.
Mitigation Measures Proposed	
Mitigation Measure:	***Construction Environmental Management Plan***
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all measures detailed within the CEMP and OEMP and ensuring compliance with statutory conditions.
Mitigation Measure:	***Biodiversity Management Plan***
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**).
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally,

Item	Detail
	compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	***Landscape and Rehabilitation Management***
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the LRM will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 20: Grey-headed Flying Fox Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of GHFF foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits are required for the GHFF (*Pteropus poliocephalus*). • However the species will be offset through Ecosystem credits created from the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.3 South-eastern glossy black cockatoo (*Calyptorhynchus lathami lathami*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 21: South-eastern Glossy Black Cockatoo Occurrence

Item	Details
Species Records	
Records from Surveys Completed	Targeted surveys for the South-eastern Glossy Black Cockatoo (GBC) were conducted over multiple events throughout the survey period. No GBC were recorded within the Project Area. A habitat assessment completed within the Project Area identified 262 hollow-bearing trees and dead stags. Evidence of GBC foraging on Black She-oak (*Allocasuarina littoralis*) was recorded within riparian vegetation in the Project Area (outside the Disturbance Footprint) (see **Figure 25**).
Historical Records	21 records of the species occur within the locality dating between 1999 - 2024.
Individuals within the proposed action area	
Number of individuals within the proposed action area	No GBC were recorded within the Project Area during targeted bird surveys. No signs of breeding or breeding hollows were recorded within the Project Area. Signs of foraging were recorded within the Project Area, outside of the Disturbance Footprint. As such, the Project Area is considered suitable foraging habitat for the species.
Survey Methodology	
Detail the survey methodology used	GBC surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) see **Table 22** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**Opportunistic Foraging Habitat** No population estimate could be made for the Project Area. The GBC has an estimated total range of approximately 470,000 km² across southeastern Australia (see Conservation Advice for species [DCCEEW 2022]). Impacts to 32.03 ha of potential foraging habitat represents less than 0.0001% of the species' total suitable habitat.
Important populations	
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of the GBC based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** The Project Area is not a key source for breeding and is more likely used for foraging resources for the species outside the Disturbance Footprint. No evidence of breeding has been found within the Disturbance Footprint or Project Area (Nesting Trees). ***Populations that are necessary for maintaining genetic diversity, and/or*** There is not current population of the species know to occur within the Project Area. ***Populations that are near the limit of the species range.*** The GBC occurs "*from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria. Their distribution is continuous through the forested parts of the Great Dividing Range but becomes more scattered inland, to as far west as the Riverina in New South Wales"* (DCCEEW 2022). As such, the Project Area does not occur near the limit of its range.
Habitat Extent	

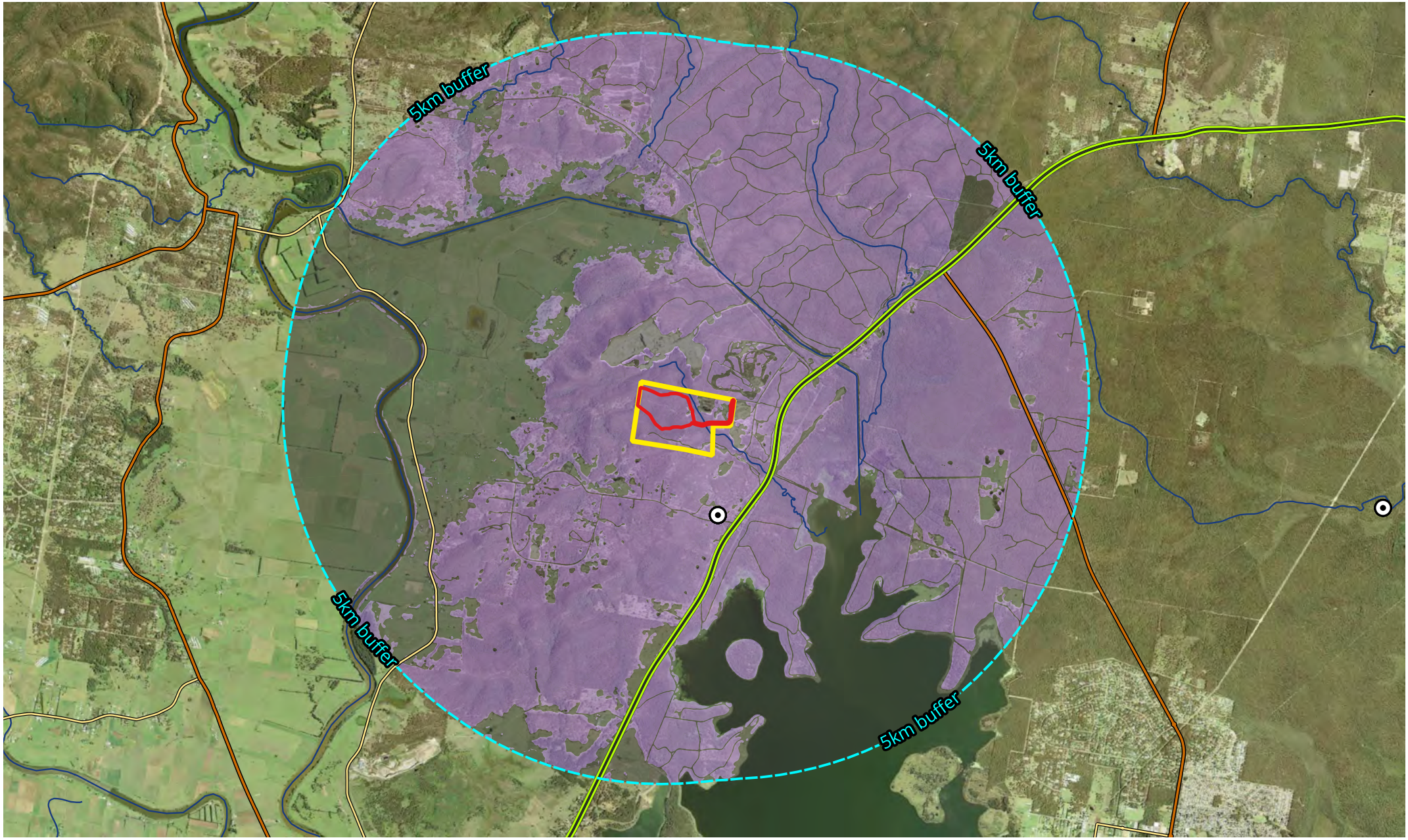
<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td>Habitat requirements</td><td>Foraging Habitat
The GBC relies on nine species of sheoaks (i.e. Allocasuarina spp. and Casuarina spp.) for feeding, with species used varying depending on the region, usually feeding on one or two species in a region (DCCEEW 2022). The preference within the locality is for Allocasuarina littoralis (Black Sheoak) and A. torulosa (Forest Sheoak) (DCCEEW 2022).
Breeding Habitat
The species is known to nest in living or dead trees with potential nesting hollows meeting the following traits: >8m above the ground, located in branches >30cm in diameter, branch or stem no more than 45 degrees, and minimum entrance diameter of >15cm (DCCEEW 2022). Research on the Kangaroo Island subspecies indicates that the GBC usually nests within 1km of their primary feed tree species, and 200m of permanent water, however they will travel up to 14 km between feeding and nesting areas without adversely affecting breeding success (DCCEEW 2022).</td></tr>
<tr><td>Type(s) of habitat available</td><td>Breeding Habitat
The hollow-bearing trees in the area do not meet the species' criteria for preferred breeding sites, as they are generally smaller than the large trees (DBH > 60 cm) preferred by GBCs for nesting. There were 262 hollow-bearing trees and dead stags with medium (8-20cm) to large (> 20 cm) hollows present within the Disturbance Footprint. Trees with hollows greater than 15 cm have potential to provide breeding habitat for GBC, where they are greater than 8 m in height. However, hollow-bearing trees within the Project Area where DBH was measured showed an average DBH of 35 cm, with a range from 16 cm to 60 cm. Therefore, trees within the Project Area were not large enough to satisfy GBC preferred habitat requirements. GBC have been found to preference very large trees (DBH greater than 60 cm) (Cameron, 2006).
In the broader locality, there are higher-condition habitats, particularly along the main perennial creek line and within the Biodiversity Offset Area, which are considered more suitable for both foraging and breeding. These habitats are more likely to support the species in the long term, offering a better quality of both foraging and breeding resources.

Foraging Habitat
The foraging habitat within the Disturbance Footprint consists of native vegetation with a low to moderate density of Black She-oak (Allocasuarina littoralis). However, while the area provides foraging habitat, it is not considered high-quality or preferred breeding habitat for the species. A total of 9,590 ha of native vegetation occurs within 5 km of the Project Area, of this a total of 6,231 ha is considered suitable habitat for the species, associated with the GBC in the TBDC. A total of 32.83 ha of vegetation within the Disturbance Footprint is associated with the species, representing 0.5% of suitable habitat for the species within a 5 km radius (based on associated PCTs under the TBDC).

<u>Associated PCTs</u>
Two (2) PCTs within the Project Area are associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC)
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with GBC</th><th>Disturbance Footprint (ha)</th></tr>
</table></td></tr>
</table>

Item	Details			
	PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest	**Veg Zone 1:** PCT 3244 (Mod - Good Condition)	**YES**	31.8
		Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)	**YES**	0
		Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)	**YES**	0.19
		Veg Zone 4: PCT 3244 (Low Condition)	**YES**	0.61
	PCT 3236: Hunter Valley Hills Wet Vine Forest	**Veg Zone 5:** PCT 3236 (Mod Condition)	**YES**	0.23
			Total Habitat	**32.83**
Quality of the habitat	The habitat within the Disturbance Footprint is of low to moderate quality for the GBC. It provides foraging opportunities with Black She-oak trees, but the hollow-bearing trees are smaller than the preferred breeding trees (DBH > 60 cm). Higher-quality habitat exists in the surrounding area, particularly along the main creek line and within the Biodiversity Offset Area, offering better foraging and breeding resources.			
Key habitat features	Key habitat requirements for the species are detailed above under the item "*Habitat requirements*", the extent and occurrence of these habitat features within the Project Area are outlined in the item "*Type(s) of habitat available*"			
Habitat critical to the survival of the species	*Habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:* ***For activities such as foraging, breeding, roosting, or dispersal;*** The site represents foraging habitat only for the species no Breeding, roosting or dispersal habitat was seen during surveys conducted within the Disturbance Footprint. ***For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*** The Disturbance Footprintt represents low quality foraging habitat only for the species. ***To maintain genetic diversity and long-term evolutionary development; or*** The proposed Disturbance Footprint will not effect the genetic diversity or long-term development of the species with no evidence of the species using the area for breeding only low quality foraging habitat exists within the Disturbance Footprint. A total of 57.53ha of habitat will be retained within onsite offset area with higher quality foraging habitat for the species. ***For the reintroduction of populations or recovery of the species or ecological community.*** The Disturbance Footprint represents low quality foraging habitat for the species and is not habitat critical for the species.			
Occupancy trends				

Item	Details
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The Project Area provides a foraging resource for the species as part of a broader area of suitable habitat extending into Wallaroo State Forest and Medowie State Conservation Area to the north-east. **Long-term:** The Project Area is located in the center of the species' known distribution, with high connectivity with similar habitat within the locality. Long-term occupancy trends including the influence of climate change may impact the species through changes to rainfall patterns and climate extremes (drought) which can influence resource availability (DCCEEW 2022). Areas of higher resource productivity (i.e. riparian vegetation adjacent to creeks within the Project Area) are largely retained.



Impact Area
Project Area
South-eastern Glossy Black-Cockatoo (Denatured point- ATLAS)

Glossyblack Cockatoo Habitat
Associated PCTs (Habitat)
Non-associated PCTs (Not Habitat)

Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

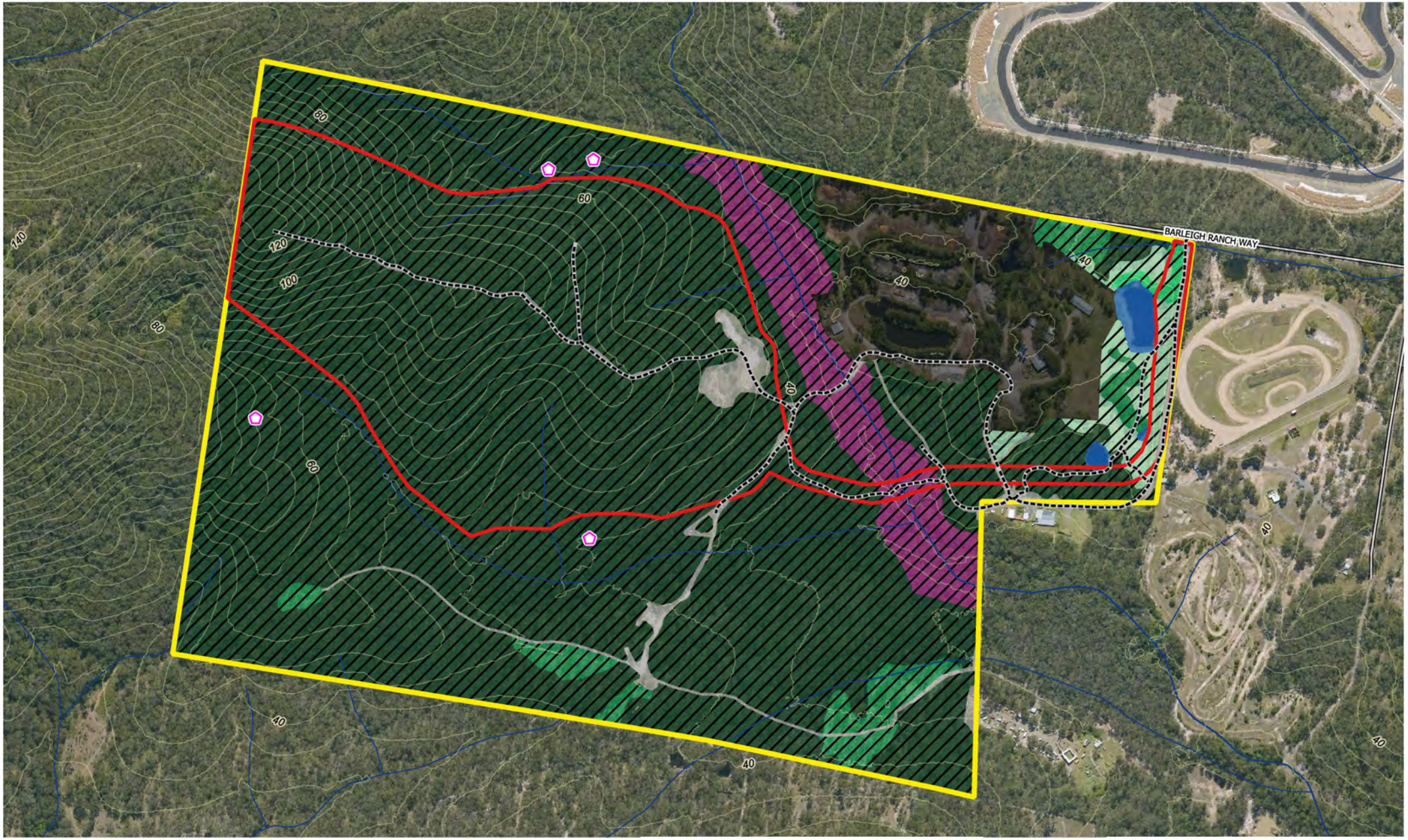
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Fig. 24. South-eastern Glossy Black Cockatoo Context

1 2 3 4 km

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Impact Area
Project Area
Glossy Black Foraging Evidence
Glossy Black Cockatoo Potential Habitat

Vegetation

PCT 3236: Hunter Valley Hills Wet Vine Forest
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
Dams
Excluded
Avoidance Area

Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

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Fig. 25. South-eastern Glossy Black Cockatoo Habitat

50 100 150 200 250 m

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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

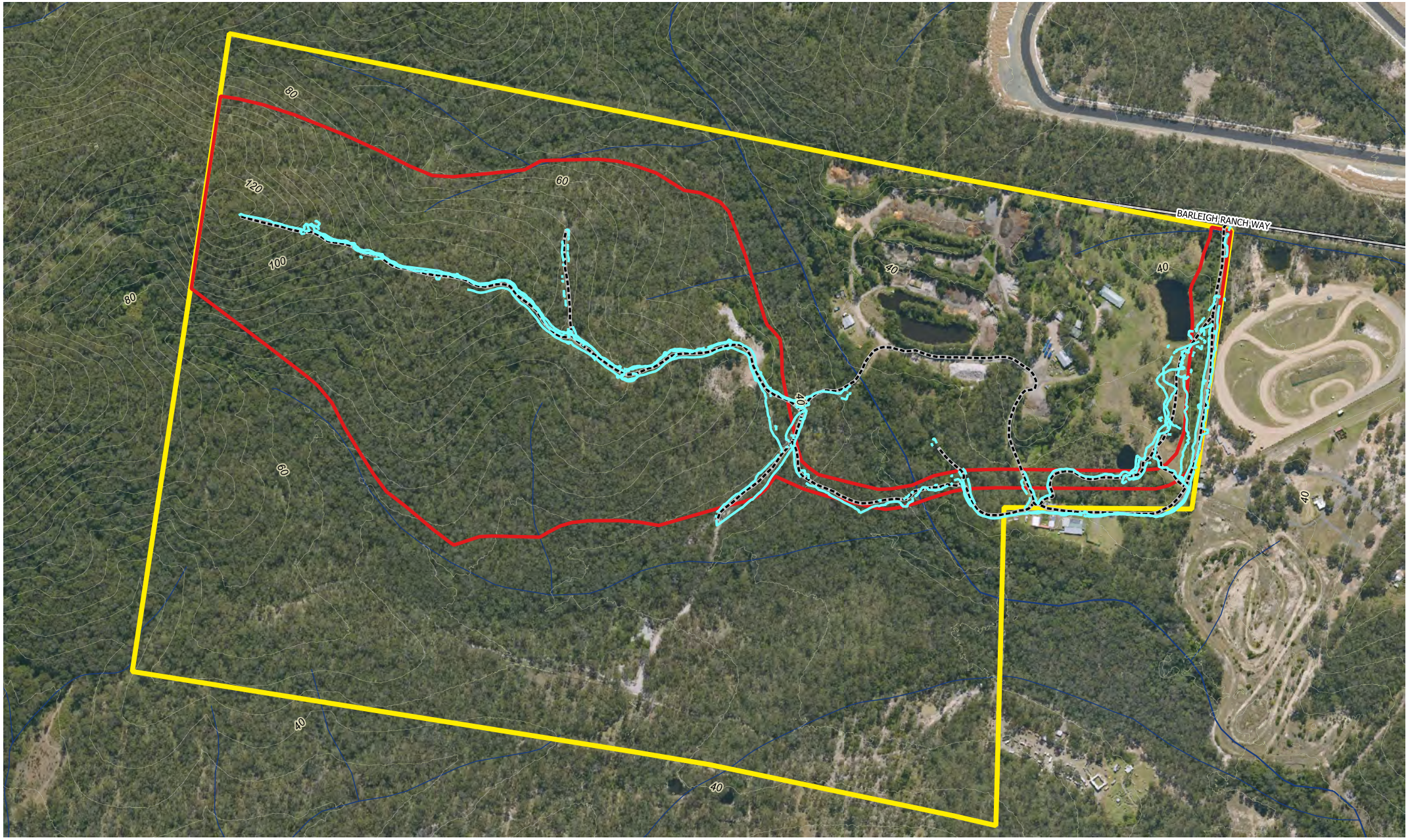
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 22: South-eastern glossy black cockatoo Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Point Transect	**Department Survey Guidelines** *The Survey Guidelines for Australia's Threatened Birds under the EPBC Act recommend detecting the South-eastern GBC through area searches or foot transects in drooping sheoak habitats. Presence is best confirmed by recent feeding signs, such as chewed cones that change colour over time, or by detecting birds during their peak activity periods—early morning and late afternoon—through calls, mandible clicking, and falling debris sounds. Surveys typically require one 2-hectare plot for 20 minutes on two occasions per transect, a total of six 20-minute surveys. The recommended survey effort includes up to 20 hours of land-based searches over four days for targeted detection.*	**Kleinfelder (2012–2016):** One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys) **WPC (2023/2024):** Point-transect methodology, 12 person hours over 3 days including one afternoon and two mornings with two observers using 10 x 40 magnification binoculars. All fauna species observed or heard were recorded. Additional surveys were conducted for GBC (Calyptorhynchus lathami lathami) including searches for suitable vegetation and 5 hrs over one day. The effort was appropriate for a stratification unit of less than 50 hectares, using diurnal area searches and transect-point surveys in areas of favoured habitat, following DEWHA (2010b) guidelines. The methodology complied with the 2024 EPBC Act survey guidelines. Survey effort completed in 2023 and 2024 is mapped in **Figure 26**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM Surveys to be completed in accordance with those detailed in the BioNet Threatened Biodiversity Data Collection (TBDC).	
	Other (best practice survey methodology)	



Impact Area
Project Area
Diurnal Bird Survey (29 January, 01 and 02 February 2024)
Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

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Fig. 26. South-eastern Glossy Black Cockatoo Survey Effort

50 100 150 200 250 m

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Produced By: Keryn Dowling
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Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 22 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 23: South-eastern glossy black cockatoo Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *Risk of injury and mortality during native vegetation clearing* Vegetation clearing represents a risk to GBC injury and mortality, however this will be minmisied through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 25** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of breeding habitat</u>* No breeding habitat for the GBC was identified within the Project Area. As such, it is unlikely that the proposed action will have a direct or indirect impact on the breeding habitat of the species. *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.03 hectares of native vegetation considered foraging habitat for the GBC. This represents 0.5% of mapped suitable habitat for the species within the locality (based on TBDC PCT associations) *<u>Impacts to population connectivity and movement corridors</u>* The species is highly mobile with access to larger areas of suitable foraging habitat within the locality. As such, the population connectivity and movement corridors will not be directly or indirectly impacted by the proposed action.
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is very unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and since no breeding habitat was identified within the Project Area there will be no disturbance to the species. With the implementation of mitigation measures outlined in **Table 25**, the risk of injury is unlikely.
	Injury/mortality associated with the construction phase of the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a stewardship site. Implementation of a vertebrate pest/weeds management plan as part of the stewardship site agreement, which would ensure potential impacts from vertebrate pests/weeds in the Project Area are managed. *<u>Noise and vibration disturbance</u>* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. These disturbances have the risk to disrupt the habitat quality and long-term health of the species and the local population including leading to behavioural changes or displacement from

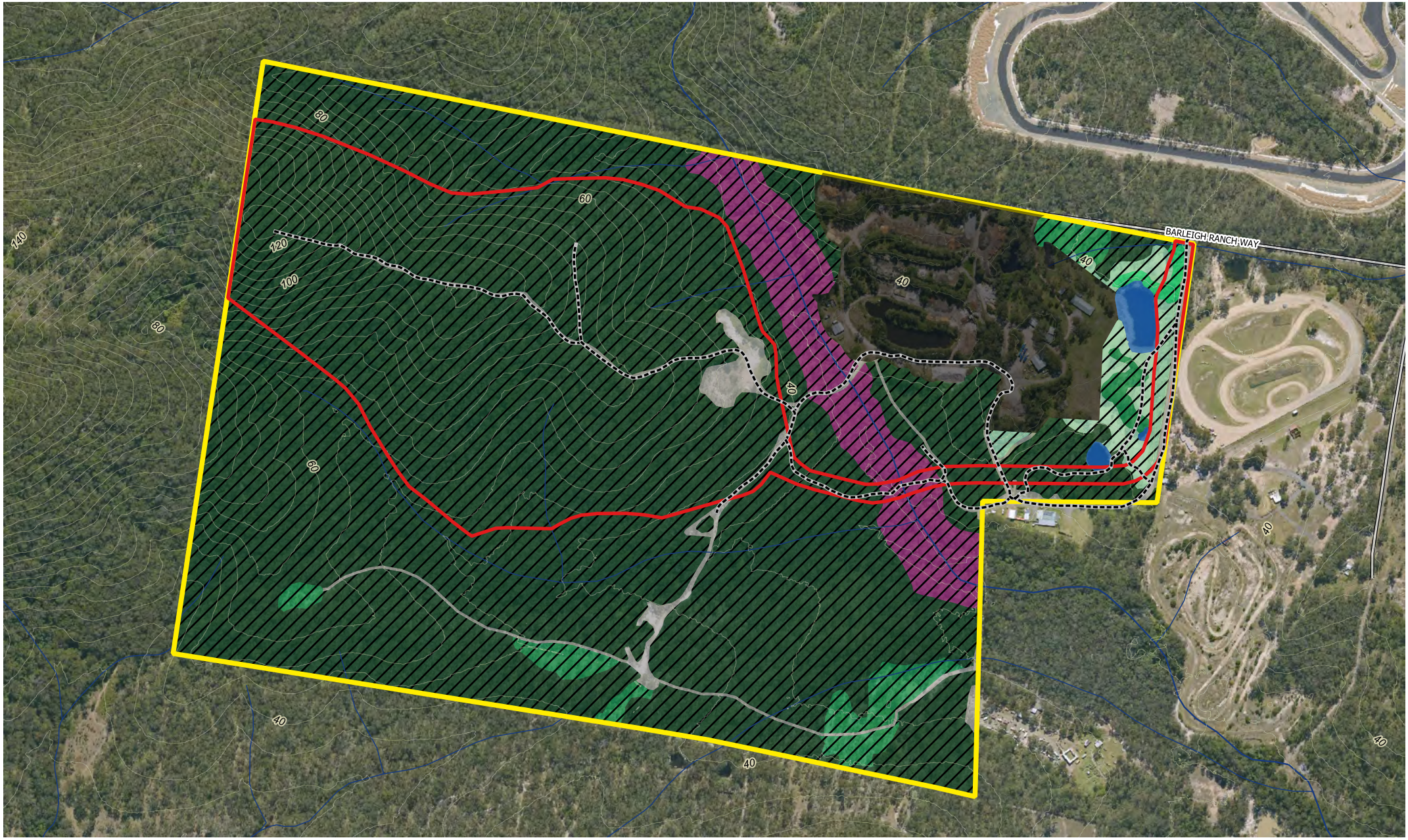
Item	Detail
	biologically important habitat areas. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that any potential noise and vibration disturbances are restricted to daylight times, reducing indirect impacts to surrounding habitat. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 25** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of **32.03 ha** of broadly suitable GBC foraging habitat will be impacted.
Indirect Impact Area	Through the establishment of an impact buffer and through the implementation of mitigation measures in **Table 25** the area of indirect impacts will be minimal.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not result in a significant impact to foraging resources locally and will not impact breeding habitat. Owing to the species' high mobility the proposed action is very unlikely to significantly impact connectivity for the species within the Project Area or locality. High value foraging habitat will be retained within the Project Area.
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale, with the vegetation within the Disturbance Footprint representing 0.5% of suitable habitat within 5 km of the Project Area. Considering the large area of suitable habitat within the locality the proposed action is considered unlikely to lead to a significant increase in habitat fragmentation/isolation within the locality.

Item	Detail
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of broadly-suitable foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of alternative foraging areas, and the implementation of targeted mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 24: South-eastern glossy black cockatoo – Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** While the species was not recorded within the Project Area, the vegetation is considered suitable foraging habitat for the GBC. However, no suitable breeding hollows were recorded within the Project Area. Given the relatively small area of suitable foraging habitat proposed to be impacted it is unlikely that the action would lead to a long-term decrease in the size of local population..
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The total extent of occurrence for the species is 470,000 km^2 (i.e. 47,000,000 ha), and the area of occupancy for the species is 40,000km2 (4,000,000 ha). The proposed action will impact a total of 32.03 ha of foraging habitat, representing < 0.01 % of suitable habitat for the highly mobile species (nationally) (DCCEEW, 2022). As such, due to the large area of suitable habitat in the surrounding area, the proposed Action will not significantly reduce the area of occupancy of the species.
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The proposed action will only impact a total of 32.03ha of native vegetation considered representative of foraging habitat for the species. As such, the proposed action is not expected to adversely affect habitat critical to the survival of the species.

Criteria	Response
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species as the vegetation was not determined to be representative of breeding habitat for the species (following the completion of repeated targeted bird surveys in 2013 and 2024).
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of foraging habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of more suitable foraging habitat occur within the locality, to the south of the Disturbance Footprint and surrounding the Project Area. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the establishment of a harmful invasive species.** The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a biodiversity offset agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the Project Area are managed.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** There is no recovery plan for the species. However, Conservation Advice for the species identifies habitat loss, degradation, and fragmentation as a key threat to the species. The proposed action will not result in impacts to breeding habitat for the species. The action will impact foraging habitat for the species. However, the proposed development is not likely to significantly interfere with the recovery of the species. This is because of the small scale of impacts to foraging resources, the large area of foraging habitat north of the Disturbance Footprint, and the establishment of the Conservation Areas within the Project Area.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



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- Impact Area
- Project Area
- Glossy Black Cockatoo Potential Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 27. South-eastern Glossy Black Cockatoo Impact

50 100 150 200 250 m

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Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 25: South-eastern glossy black cockatoo Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of suitable foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area. The proposed offset site will provide long-term protection of foraging habitat for the species under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	The retained areas of suitable GBC habitat would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement
Avoidance of indirect noise impacts to retained GBC population	Operating times detailed in **Table 1** restrict the timing of construction, operations, lading and blasting to daylight hours minimizing indirect impacts from operational noise to the species
Mitigation Measure Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**)
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**)
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.

Item	Detail
Statutory or policy basis for the measures	The proposed measures align with statutory requirements under the *BC Act* and the BOS. The NSW Development Consent (8 July 2024) outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	***Landscape and Rehabilitation Management***
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**:
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the landscape and rehabilitation management will include monitoring and mitigation strategies to minimise species impacts, with ongoing assessments to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 26: Southern-eastern glossy black cockatoo Residual Impacts and Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of GBC foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits for GBC with no breeding habitat observed within the Project Area. • However the species will be offset through Ecosystem credits in accordance with the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.4 Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

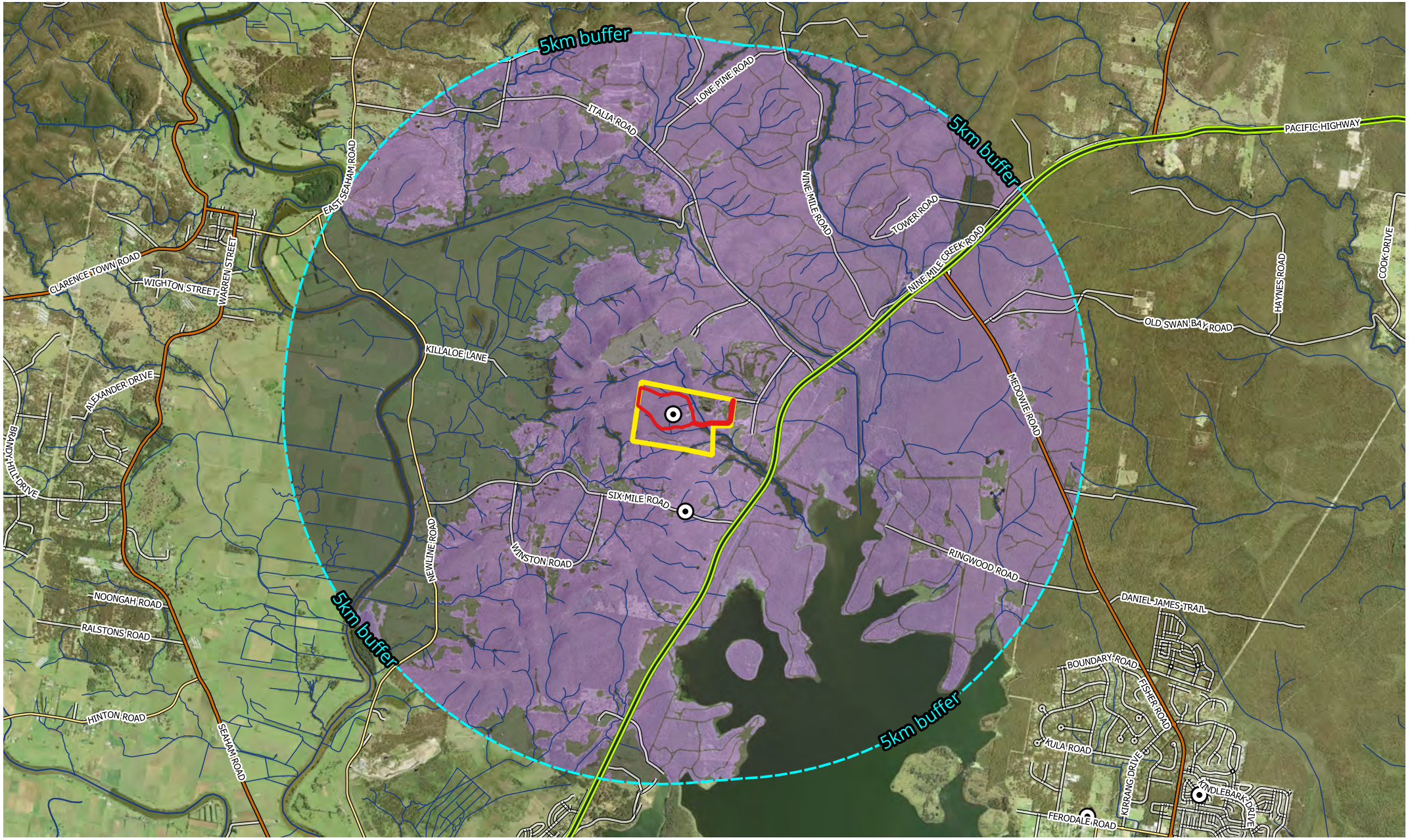
- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 27: Brown Treecreeper (south-eastern) Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species was recorded during GHD surveys in 2012, however was not recorded again during targeted bird surveys in 2024.
Historical Records	A total of four (4) bionet records occur within 5km of the Project Area, of these two (2) occur within or adjacent to the Disturbance Area and are dated to 2013. The other records occur across the 5 km buffer.
Individuals within the proposed action area	
Number of individuals within the proposed action area	The species was recorded during earlier surveys by GHD in 2012. The species was not recorded as part of the Kleinfelder 2016 assessment or the Wedgetail Project Consulting 2024 additional targeted bird surveys.
Survey Methodology	
Detail the survey methodology used	Targeted bird surveys were completed in 2016 (Kleinfelder 2016) and by Wedgetail Project Consulting in 2024. See summary of survey effort in **Table 28**.
Population size and extent	
Provide data on likely population size and extent	**Low Occurrence** The estimated population size for the Brown Treecreeper across its range is a total of 68,000 individuals (DCCEEW 2023). The species is distributed from the Grampians in Victoria to the Bunya Mountains in Queensland. The likely population size and extent of the Brown Treecreeper within the Project Area is likely to be zero to a couple individuals which would use the vegetation within the Project Area opportunistically as part of a broader range.
Important populations	
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of the Brown Treecreeper based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** The Project Area is not a key source for breeding and is more likely used for foraging resources for the species outside the Disturbance Footprint. No evidence of breeding or dispersal has been found to occur within the Disturbance Footprint or Project Area. ***Populations that are necessary for maintaining genetic diversity, and/or*** There is not current population of the species know to occur within the Project Area. ***Populations that are near the limit of the species range.*** The species is not near the limit of its range.
Habitat Extent	
Habitat requirements	**Foraging Habitat Requirements** The Brown Treecreeper (south-eastern) primarily inhabits dry, open eucalypt forests and woodlands, often dominated by stringybarks or rough-barked eucalypts, with an open grassy understorey. The species avoids dense shrub layers and is absent from heavily degraded or rocky hills. These birds thrive in areas with some ongoing disturbance, such as historical Indigenous burning practices, which prevent the ground layer from becoming too dense

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>and uniform. They forage both on the ground and in mature trees, feeding on a variety of invertebrates, nectar, sap, and occasionally lizards (DCCEEW 2023).
Breeding Habitat
Nesting occurs in tree cavities, often in standing dead or live trees, with nests built cooperatively by the breeding group. Breeding happens from July to February, with typically 2–3 eggs per clutch and two broods per season. Brown Treecreepers are sedentary and occupy permanent territories, often foraging in pairs or small family groups. They have higher breeding success in areas with moderate ground cover, lower shrub densities, substantial fallen timber, and greater invertebrate biomass (DCCEEW 2023).</td></tr>
<tr><td>Type(s) of habitat available</td><td>Foraging and Potential Breeding Habitat
The proposed project area impacts 32.03 ha of suitable habitat for the Brown Treecreeper (eastern subspecies), which includes 3 hollow logs and 212 habitat trees, 35 of which contain small hollows. However, similar habitat is available in the surrounding area and within the proposed Biodiversity Offset area, which contains 26 hollow logs and 345 habitat trees, with 206 having small hollows. The species, known for its high mobility, is expected to utilize these surrounding areas, which would form part of the species' broader habitat.</td></tr>
<tr><td></td><td><u>Associated PCTs</u>
Two (2) PCTs within the Project Area are associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC).
The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.5% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5918.06ha).
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with Brown Treecreeper</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="4">PCT 3244: Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
<tr><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>YES</td><td>0.23</td></tr>
<tr><td colspan="3">Total GHFF Habitat PCTs Area (ha)</td><td>32.83</td></tr>
</table></td></tr>
</table>

Item	Details
Quality of the habitat	The Project Area represents broadly suitable habitat for the Brown Treecreeper (eastern subspecies), with suitable foraging habitat and suitable nesting habitat trees. The vegetation within the Project Area likely represents part of a broader habitat range for the species within the locality.
Key habitat features	Key habitat features for the Brown Treecreeper (eastern subspecies) include dry, open eucalypt forests and woodlands, often dominated by stringybarks or rough-barked eucalypts, with an open grassy understorey. They rely on hollow logs and habitat trees for foraging and nesting, and prefer areas with moderate ground cover, low shrub densities, and substantial fallen timber. These areas also provide a high invertebrate biomass, which is essential for feeding. Tree cavities in standing dead or live trees serve as nesting sites, crucial for breeding success.
Habitat critical to the survival of the species	*Habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:* ***For activities such as foraging, breeding, roosting, or dispersal;*** The site represents potential habitat for the species breeding, roosting or dispersal habitat are potential to occur within the Project Site although no evidence was detected. ***For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*** The Disturbance Area is not key to the long-term maintenance of the species with larger areas of suitable habitat for the species in the region. ***To maintain genetic diversity and long-term evolutionary development; or*** The proposed Disturbance Footprint will not effect the genetic diversity or long-term development of the species with no evidence of the species using the area for breeding, roosting or dispersal. A total of 57.53ha of habitat will be retained within onsite offset area with higher quality foraging and breeding habitat for the species. ***For the reintroduction of populations or recovery of the species or ecological community.*** The Disturbance Footprint represents lower quality habitat for the species and is not critical habitat for the species.
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The Project Area provides a foraging resource for the species as part of a broader area of suitable habitat extending into Wallaroo State Forest and Medowie State Conservation Area to the north-east. **Long-term:** The Project Area is located in the center of the species' known distribution, with high connectivity with similar habitat within the locality. Long-term occupancy trends including the influence of climate change may impact the species through changes to rainfall patterns and climate extremes (drought) which can influence resource availability (DCCEEW 2022). Areas of higher resource productivity (i.e. riparian vegetation adjacent to creeks within the Project Area) are largely retained.



Impact Area

Project Area

Brown Treecreeper- eastern subspecies (ATLAS)

Brown Treecreeper Habitat

Associated PCTs (Habitat)

Non-associated PCTs (Not Habitat)

Named Watercourse

Primary Road

Arterial Road

Sub-Arterial Road

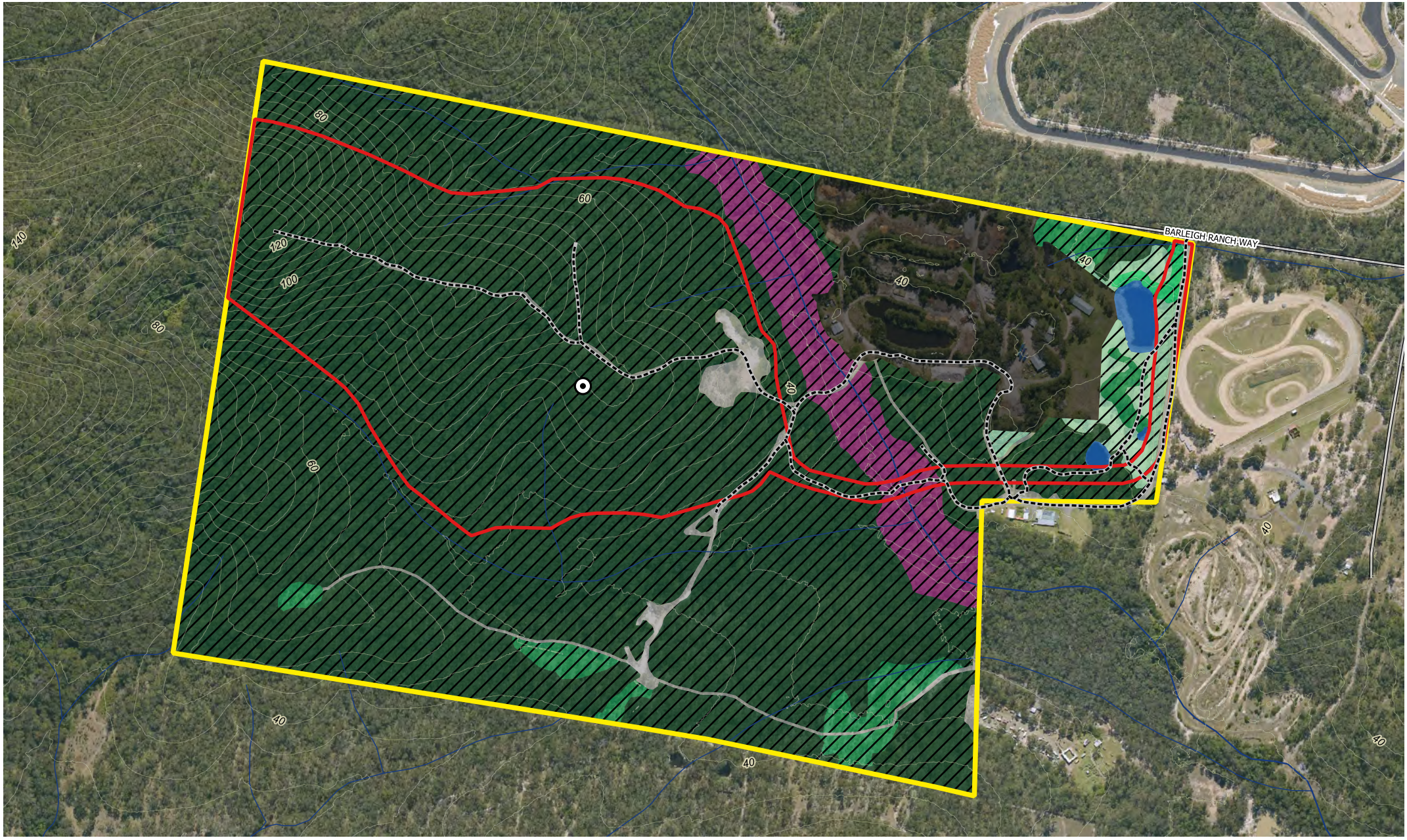
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Fig. 28. Brown Treecreeper Context

1 2 3 4 km

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
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GDA94 / MGA zone 56



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- Impact Area
- Project Area
- Brown Treecreeper-eastern subspecies (ATLAS)
- Brown Treecreeper Potential Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 29. Brown Treecreeper Habitat

50 100 150 200 250 m

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Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

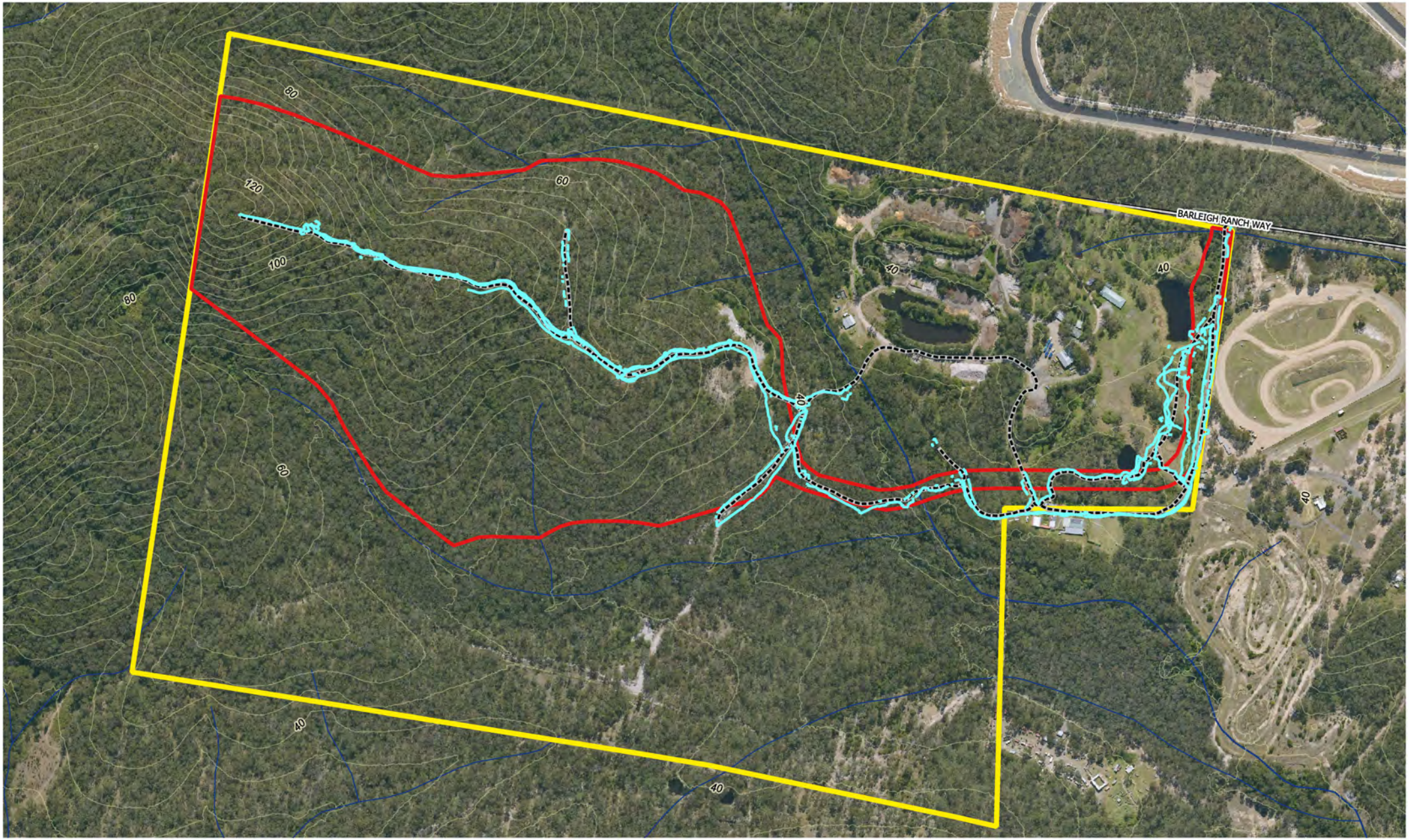
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 28: Brown Treecreeper (south-eastern) Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Point Transect	**Department Survey Guidelines** *Diurnal area searches or transect-point surveys in areas of favoured habitat in and around the study area. Detection mostly by sighting and calls. Early morning broadcast surveys for secretive species (for example, bristlebirds) within favoured habitat. Detect solicited calls and sightings. Usually most effective before and during the breeding season.*	**Kleinfelder (2012–2016):** One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys) **WPC (2023/2024):** Point-transect methodology, 12 person hours over 3 days including one afternoon and two mornings with two observers using 10 x 40 magnification binoculars. All fauna species observed or heard were recorded. The effort was appropriate for a stratification unit of less than 50 hectares, using diurnal area searches and transect-point surveys in areas of favoured habitat, following DEWHA (2010b) guidelines. The methodology complied with the 2024 EPBC Act survey guidelines. Survey effort completed in 2023 and 2024 is mapped in **Figure 30**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM *No Information*	
	Other (best practice survey methodology) *Area search methods, where observers walk around an area of pre-determined size for a* *pre-determined length of time. A 1ha (200m x 500m) 20-minute search is the most common method (Loyn 1986), although as described later in this section this method is not as effective as surveys of longer duration;*	



Impact Area
Project Area
Diurnal Bird Survey (29 January, 01 and 02 February 2024)
Local Road
Named Watercourse
Minor Watercourse
Contours (5m)
Tracks

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Fig. 30. Brown Treecreeper Survey Effort

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 29 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 29: Brown Treecreeper (south-eastern) Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *<u>Risk of injury and mortality during native vegetation clearing</u>* Vegetation clearing represents a risk to Brown Treecreeper injury and mortality, however this will be minimised through the completion of pre-clearance surveys and clearing supervision as per management plans. The Brown Treecreeper is highly mobile and unlikely to be impacted by the clearing of native vegetation within the short-term. The mitigation measures in **Table 31** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered suitable habitat for the Brown Treecreeper (eastern subspecies). This includes the loss of 3 hollow logs and 212 habitat trees, with 35 of these trees containing small hollows. However, similar habitat is available in Retained Area, including 26 hollow logs and 345 habitat trees, 206 of which have small hollows. The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.5% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5918.06ha).
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is very unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and with the implementation of mitigation measures outlined in **Table 31**, the risk of injury is unlikely.
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a stewardship site. Implementation of a vertebrate pest/weeds management plan as part of the stewardship site agreement, which would ensure potential impacts from vertebrate pests/weeds in the Project Area are managed. *<u>Noise and vibration disturbance</u>* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. These disturbances have the risk to disrupt the habitat quality and long-term health of the species and the local population including leading to behavioural changes or displacement from

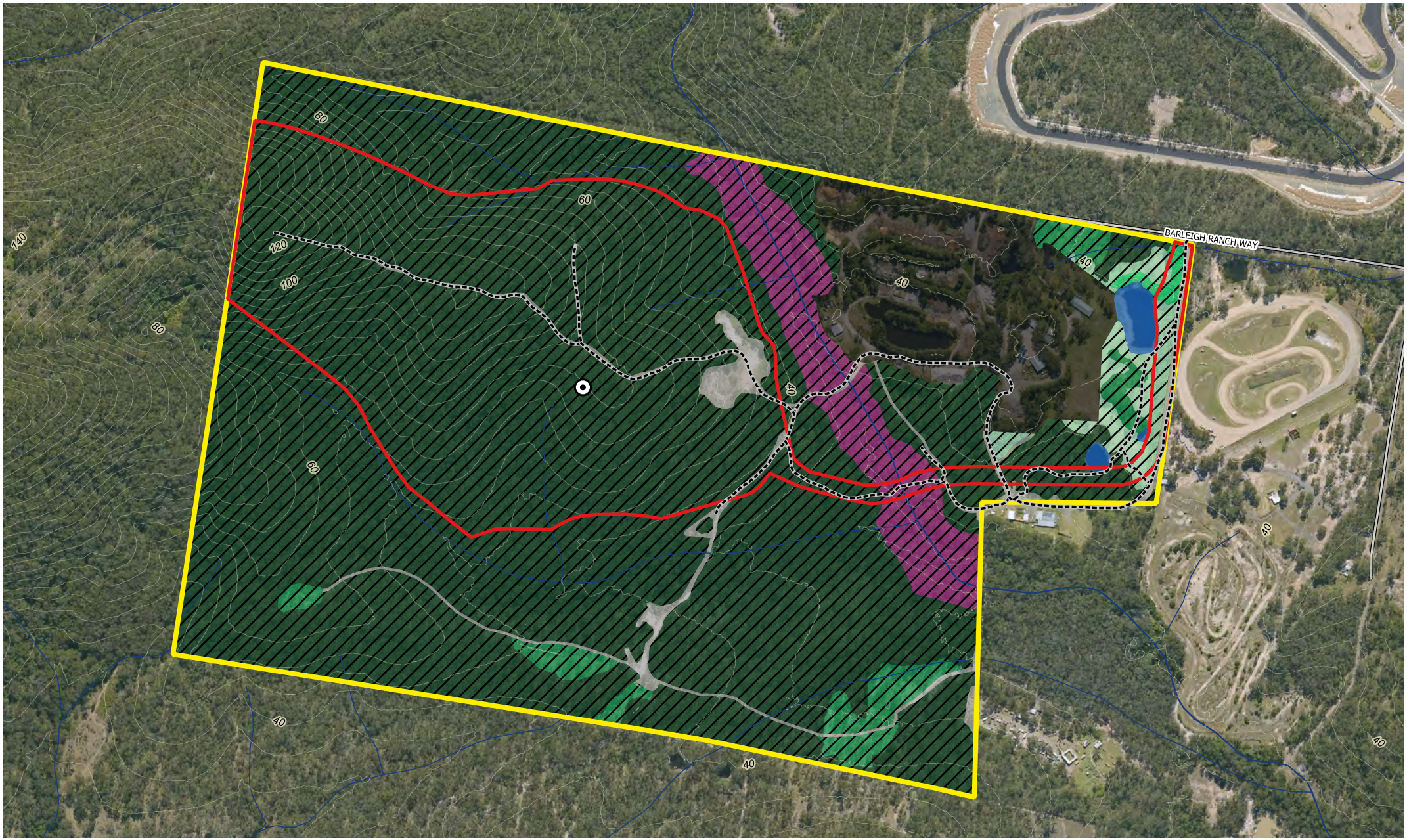
Item	Detail
	biologically important habitat areas. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that any potential noise and vibration disturbances are restricted to daylight times, reducing indirect impacts to surrounding habitat. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 13** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 31**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of 33.02ha of suitable foraging and potentially suitable breeding habitat for the Brown Treecreeper will be impacted.
Indirect Impact Area	Through the implementation of mitigation measures in **Table 31** the area of indirect impacts will be minimal.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not result in a significant impact to foraging resources locally and will not impact breeding habitat. Owing to the species' high mobility the proposed action is very unlikely to significantly impact connectivity for the species within the locality. High value foraging habitat will be retained within the Project Area.
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale, with the vegetation within the Disturbance Footprint representing 0.5% of suitable habitat within 5 km of the Project Area. Considering the large area of suitable habitat within the

Item	Detail
	locality the proposed action is considered unlikely to lead to a significant increase in habitat fragmentation/isolation within the locality.
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of broadly-suitable foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of alternative foraging areas, and the implementation of targeted mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 30: Brown Treecreeper (south-eastern) Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** The Project Area provides suitable foraging habitat and potential breeding habitat for the Brown Treecreeper. The proposed action will impact a total of 32.03 ha of native vegetation considered foraging habitat and potentially breeding habitat for this species. A total of 3 hollow-logs and 212 habitat trees will also be directly impacted by the action, with 35 of these trees contain small hollows (suitable for the Brown Treecreeper). However, there is large areas of suitable habitat surrounding the Disturbance Area, within the Project Area and within the broader locality. This includes a total of 26 hollow logs and 345 habitat trees occur within the Retained Area within the Project Area, of these 206 of the habitat trees have small hollows. Based on the low records of the species within the Project Area, the species' known high mobility, and large areas of surrounding habitat, the proposed action is unlikely to lead to a long-term decrease in the size of the population of the Brown Treecreeper (eastern subspecies).
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The area of occupancy for the species is 30,000km2 (3,000,000 ha). The proposed action will impact a total of 32.03 ha of native vegetation considered potential habitat for this species, representing <0.01% of suitable habitat for the species (nationally). As such, the level of impacts associated with the proposed action is unlikely to significantly reduce the area of occupancy of the species. The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.5% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5918.06ha).
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The proposed action will only impact a total of 32.03 ha of native vegetation considered habitat for the species. Extensive areas providing similar habitat for this species occur within native vegetation to the west, south and north of the site, as well as within the wider locality. As such, the proposed action is not expected to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species due to the small area of impact and the wider area of suitable habitat surrounding the development.

Criteria	Response
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of more suitable foraging habitat occur within the locality, to the south of the Disturbance Footprint and surrounding the Project Area. The proposed action is unlikely to destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the establishment of a harmful invasive species.** The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a biodiversity offset agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the Project Area are managed.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** There is no recovery plan for the species. However, Conservation Advice for the species identifies habitat degradation, and fragmentation, habitat loss and invasive weeds as key threats to the species. The proposed action will result in impacts to 32.03 ha of suitable foraging and potentially suitable breeding habitat for the species. However, the proposed development is not likely to significantly interfere with the recovery of the species due to the small scale of impact, the large area of similar habitat available within the locality, and the establishment of the Conservation Areas within the Project Area.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

- Impact Area
- Project Area
- Brown Treecreeper-eastern subspecies (ATLAS)
- Brown Treecreeper Potential Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 31. Brown Treecreeper Impact

50 100 150 200 250 m

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Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 31: Brown Treecreeper (south-eastern) Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of suitable foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area. The proposed offset site will provide long-term protection of foraging habitat for the species under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	The retained areas of suitable Brown Treecreeper habitat would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement
Avoidance of indirect noise impacts	Operating times detailed in **Table 1** restrict the timing of construction, operations, lading and blasting to daylight hours minimizing indirect impacts from operational noise to the species
Mitigation Measures Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**)
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**)
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will include monitoring and mitigation strategies to minimise species impacts, with ongoing assessments to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements under the *BC Act* and the BOS. The NSW Development Consent (8 July 2024) outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally,

Item	Detail
	compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2.**
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Landscape and Rehabilitation Management**
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the landscape and rehabilitation management will include monitoring and mitigation strategies to minimise species impacts, with ongoing assessments to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 32: Brown Treecreeper (south-eastern) Residual Impacts and Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of Brown Treecreeper foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits are required for the Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*) • However the species will be offset through Ecosystem credits created from the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.5 Regent Honeyeater (*Anthochaera Phrygia*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 33: Regent Honeyeater Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species was not recorded within the Project Area during any of the surveys carried out.
Historical Records	No records occur within the locality (5km) of the Project Area.
Individuals within the proposed action area	
Number of individuals within the proposed action area	The species was not recorded within the Project Area. The highly nomadic species may use the Project Area opportunistically as part of a broader range.
Survey Methodology	
Detail the survey methodology used	Regent Honeyeater surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) see **Table 34** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**No records - Potential Opportunistic Foraging Habitat** No population estimate could be provided for the Project Area as the species was not recorded within the Project Area during targeted surveys. The highly nomadic species may use the Project Area opportunistically as part of a broader range. The proposed action will impact 32.03 ha of open forest, representing potential supplementary foraging habitat for the species.
Important populations	
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of the Regent Honeyeater based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** No evidence of breeding or dispersal has been found to occur within the Disturbance Footprint or Project Area. ***Populations that are necessary for maintaining genetic diversity, and/or*** There is not current population of the species know to occur within the Project Area. ***Populations that are near the limit of the species range.*** The species is not near the limit of its range.
Habitat Extent	
Habitat requirements	**Foraging Habitat** The Regent Honeyeater is commonly found in box-ironbark eucalypt associations, on more fertile sites with high soil water content, including creek flats, broad river valleys and lower slopes (DotE 2016). The species also regularly utilises wet lowland coastal forests dominated by swamp mahogany (*Eucalyptus robusta*), spotted gum-ironbark associations and riverine woodlands (DotE 2016). Key tree and mistletoe species for the Regent Honeyeater include the following: • *Eucalyptus sideroxylon* (Reg Ironbark/Mugga Ironbark) • *Eucalyptus melliodora* (Yellow Box) • *Eucalyptus albens* (White Box) • *Eucalyptus leucoxylon* (Yellow Gum) • *Corymbia maculata* (Spotted Gum) • *Eucalyptus robusta* (Swamp Mahogany)

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>

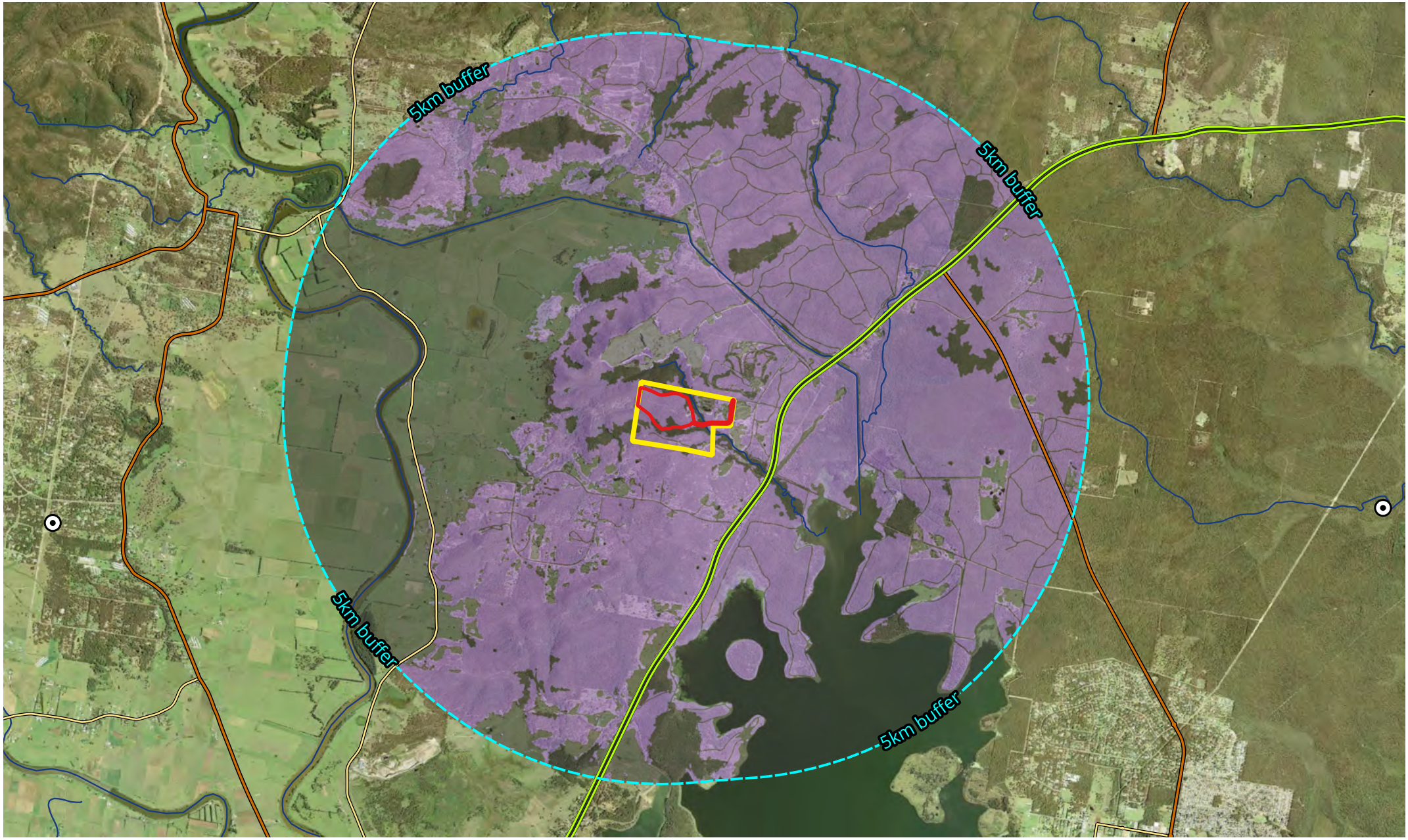
Amyema cambagei (Needle-leaf Mistletoe) on Casuarina cunninghamiana (River Sheoak)
Amyema miquelii (Box Mistletoe)
Dendrophthoe vitellina (Long-flower Mistletoe)

With other species being regionally important, for example within Lower Hunter Spotted Gum forests, species such as Eucalyptus fibrosa (Broad-leaved Ironbark), Eucalyptus eugenioides (Thin-leaved Stringybark) and other stringybarks are known to be important (DotE 2016).

Breeding Habitat
Breeding location and timing can vary between years, while there is some fidelity to nesting sites, breeding pairs may change breeding sites between seasons. A number of known breeding areas are mapped in the National Recovery Plan for the Regent Honeyeater (DotE 2016) including Key Breeding Areas at; the Hunter Valley, Capertee Valley, Bundarra-Barraba, and Victorian Box-Ironbark (Chiltern), and Other Breeding Areas; Victorian Box-Ironbark (Lurg-Benalla District), Mudgee-Wollar, Pilliga Woodlands, and Gore-Karara.
The Project Area is not within any of the mapped breeding areas for the species.
The species is known to nest in the canopy of mature trees with rough bark, e.g. ironbarks, sheoaks (Casuarina spp.), and Rough-barked Apple (Angophora spp.).
</td></tr>
<tr><td>Type(s) of habitat available</td><td>
Foraging Habitat
The vegetation within the Project Area broadly meet the description of spotted gum-ironbark associations known to represent foraging habitat for the species, with a total of three (3) listed foraging species; Corymbia maculata (Spotted Gum), Eucalyptus fibrosa (Broad-leaved Ironbark), and Eucalyptus eugenioides (Thin-leaved Stringybark). However, these species represent a low cover within the Project Area, and with no records of the species within 5km there is no evidence that the vegetation likely represents important foraging habitat for the species.
The vegetation is considered potential supplementary foraging habitat for the species.
<u>Associated PCTs</u>
One (1) PCT within the Project Area is associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC): PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest.
The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.6% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5372.30ha).
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with GBC</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="3">PCT 3244: Lower North Spotted Gum-Mahogany- Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
</table>
</td></tr>
</table>

Item	Details			
		Veg Zone 4: PCT 3244 (Low Condition)	**YES**	0.61
	PCT 3236: Hunter Valley Hills Wet Vine Forest	**Veg Zone 5:** PCT 3236 (Mod Condition)	**NO**	0
			Total Habitat	**32.6**
	Breeding Habitat The vegetation within the Project Area broadly meets the description of possible breeding habitat for the species (mature rough-barked trees), however the Project Area is not located with any of the mapped Key or Other Breeding Areas identified within the National Recovery Plan for the Regent Honeyeater (DotE 2016). The vegetation within the Project Area is not considered important breeding habitat for the species.			
Quality of the habitat	The habitat quality for the Regent Honeyeater is Low, as it primarily serves as opportunistic foraging habitat rather than core breeding or feeding areas. Its value increases during times of low nectar availability in key foraging regions, but it may not consistently support the species' long-term survival.			
Key habitat features	Key habitat requirements for the species are detailed above under the item "*Habitat requirements*", the extent and occurrence of these habitat features within the Project Area are outlined in the item "*Type(s) of habitat available*"			
Habitat critical to the survival of the species	Habitat critical to the survival of the Regent Honeyeater include: • Any breeding or foraging habitat in areas where the species is likely to occur (as defined by the distribution map provided in the National Recovery Plan for the species [DotE 2016]). • Any newly discovered breeding or foraging locations Key areas include the Bundarra-Barraba, Pilliga Woodlands, Mudgee-Wollar and the Capertee Valley and Hunter Valley areas in New South Wales, and the Chiltern and Lurg-Benalla regions of north-east Victoria (DotE 2016). While the vegetation within the Project Area occurs within the mapped "*areas where the species is likely to occur*", the Project Area: • is not located within a key area listed above, • does not occur within a mapped Important Bird Area for the Species (inc. Key Breeding Areas and Other Breeding Areas in Figure 1 of the National Recovery Plan [DotE 2016]), • does not meet the description of important foraging habitat for the species, and • does not occur in close proximity to records of the species (no records of the species within 5km of the Project Area) As such, the vegetation within the Project Area is unlikely to represent "*Habitat critical to the survival of the species*".			
Occupancy trends				
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The species is nomadic and may utilise the food resources within the Project Area temporarily and only when higher value foraging resources further inland are unavailable. **Long-term:** The vegetation within the Project Area represents low value foraging habitat. During periods of drought the species may utilise foraging resources outside of their known			

Item	Details
	range. However, there are no records of the species within the locality, as such their utilisation of the vegetation during droughts may be very minimal (if non-existent).



Impact Area
Project Area
Regent Honeyeater(Denatured point ATLAS)

Regent Honeyeater Habitat
Associated PCTs (Habitat)
Non-associated PCTs (Not Habitat)

Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

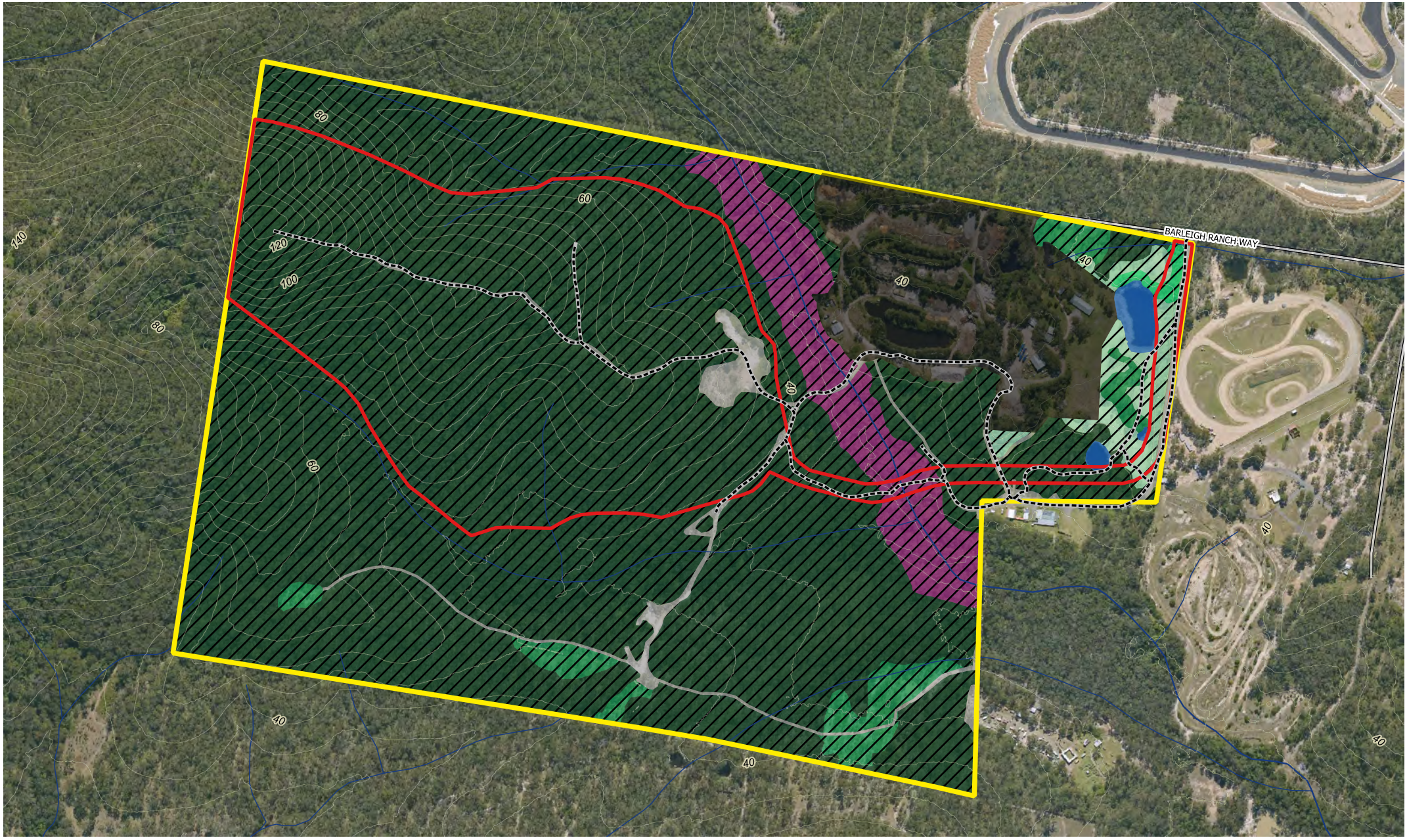
Fig. 32. Regent Honeyeater Context

1 2 3 4 km

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

- Impact Area
- Project Area
- Regent Honeyeater Potential Foraging Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 33. Regent Honeyeater Habitat

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

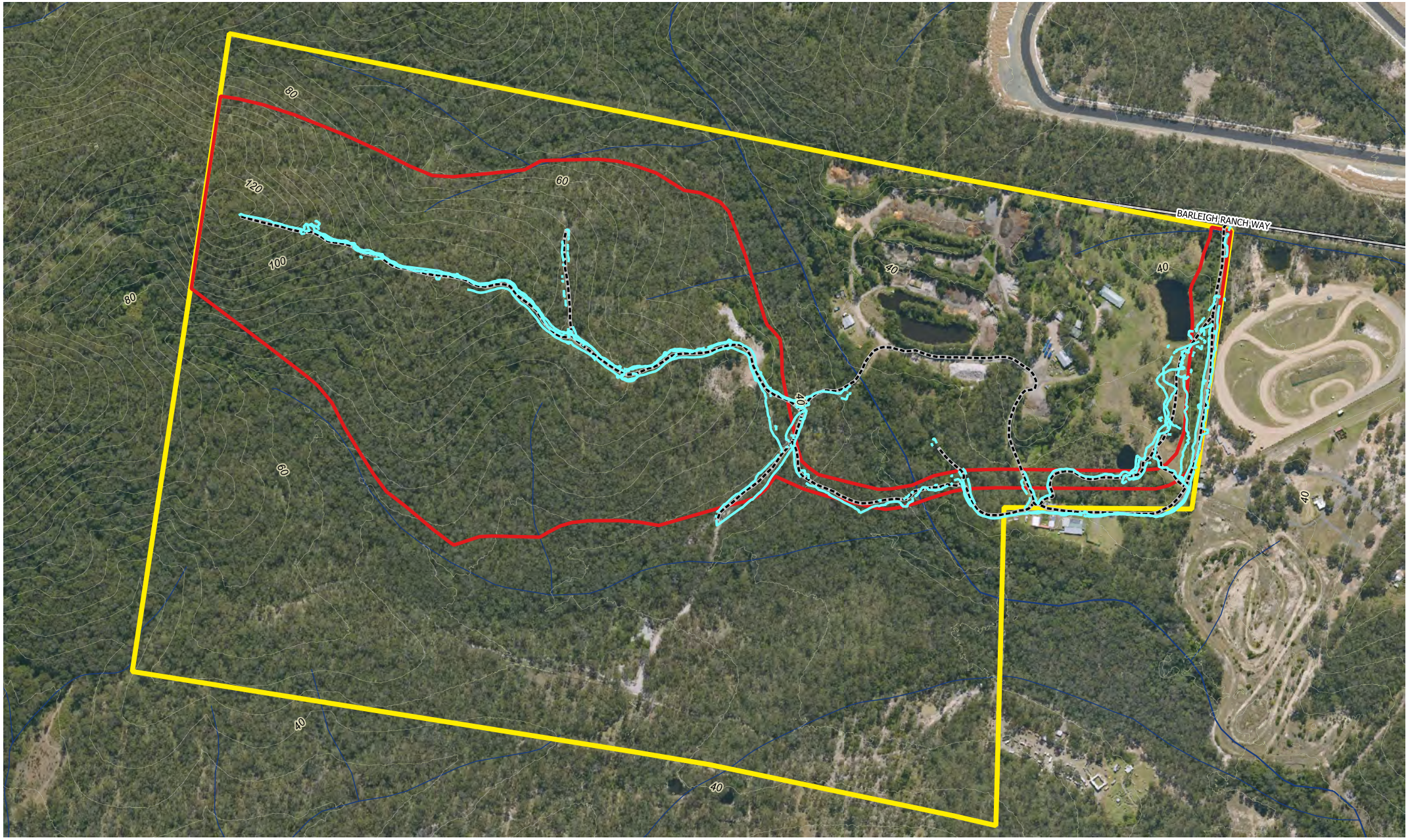
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 34: Regent Honeyeater Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Point transect	**Department Survey Guidelines** *Area searches in suitable habitat, preferably in the morning but other times may also be appropriate. Detection by call is possible when birds are most vocal (outside the breeding season). Otherwise, detection is by sighting. Targeted searches of woodland patches with heavily flowering trees is useful, especially around waterpoints such as dams and creeklines. Also check among flocks of other blossom nomads such as lorikeets and other honeyeaters. Broadcast surveys immediately before and during the breeding season may also be useful.*	**Kleinfelder (2012–2016):** One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys) **WPC (2023/2024):** Point-transect methodology, 12 person hours over 3 days including one afternoon and two mornings with two observers using 10 x 40 magnification binoculars. All fauna species observed or heard were recorded. Survey effort completed in 2023 and 2024 is mapped in **Figure 34**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM Important Area Habitat Mapping	
	Othe (best practice survey methodology) *Area search methods, where observers walk around an area of pre-determined size for a* *pre-determined length of time. A 1ha (200m x 500m) 20-minute search is the most* *common method (Loyn 1986), although as described later in this section this method is* *not as effective as surveys of longer duration;*	



Impact Area
Project Area
Diurnal Bird Survey (29 January, 01 and 02 February 2024)
Local Road
Named Watercourse
Minor Watercourse
Contours (5m)
Tracks

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 34. Regent Honeyeater Survey Effort

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 35 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 35: Regent Honeyeater Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *<u>Risk of injury and mortality during native vegetation clearing</u>* Vegetation clearing is unlikely to represent a risk to Regent Honeyeater injury and mortality as the Project Area is not considered breeding habitat for the species. Despite this, any residual risk to the species will be further minmisied through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 37** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of breeding habitat</u>* No breeding habitat for the Regent Honeyeater was identified within the Project Area. As such, it is unlikely that the proposed action will have a direct or indirect impact on the breeding habitat of the species. *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered potential opportunistic foraging habitat for the Regent Honeyeater. However, similar habitats are available in the surrounding area, and there are opportunities for habitat restoration through post-project rehabilitation. The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.6% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5372.30ha).
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is very unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and since no breeding habitat was identified within the Project Area there will be no disturbance to the species. With the implementation of mitigation measures outlined in **Table 37**, the risk of injury is unlikely.
	Injury/mortality associated with the construction phase of the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. Weed and pest management within the action area will be managed under a site-specific management plan. *<u>Noise and vibration disturbance</u>* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. These disturbances have the risk to disrupt the habitat quality and long-term health of the species and the local population including leading to behavioural changes or displacement from biologically important habitat areas. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby

Item	Detail
	properties. Operation times (shown in **Table 1**) illustrate that any potential noise and vibration disturbances are restricted to daylight times, reducing indirect impacts to surrounding habitat. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 25** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of 32.03 ha of potential supplementary foraging habitat for the Regent Honeyeater will be impacted.
Indirect Impact Area	Through the implementation of mitigation measures in **Table 37** the area of indirect impacts will be minimal.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not result in a significant impact to foraging resources locally and will not impact breeding habitat. Owing to the species' high mobility the proposed action is very unlikely to significantly impact connectivity for the species within the locality.
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale. Also, the proposed action will not lead to a significant increase in habitat fragmentation/isolation within the locality. The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.6% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5372.30ha).
Unknown, unpredictable or irreversible Impacts	

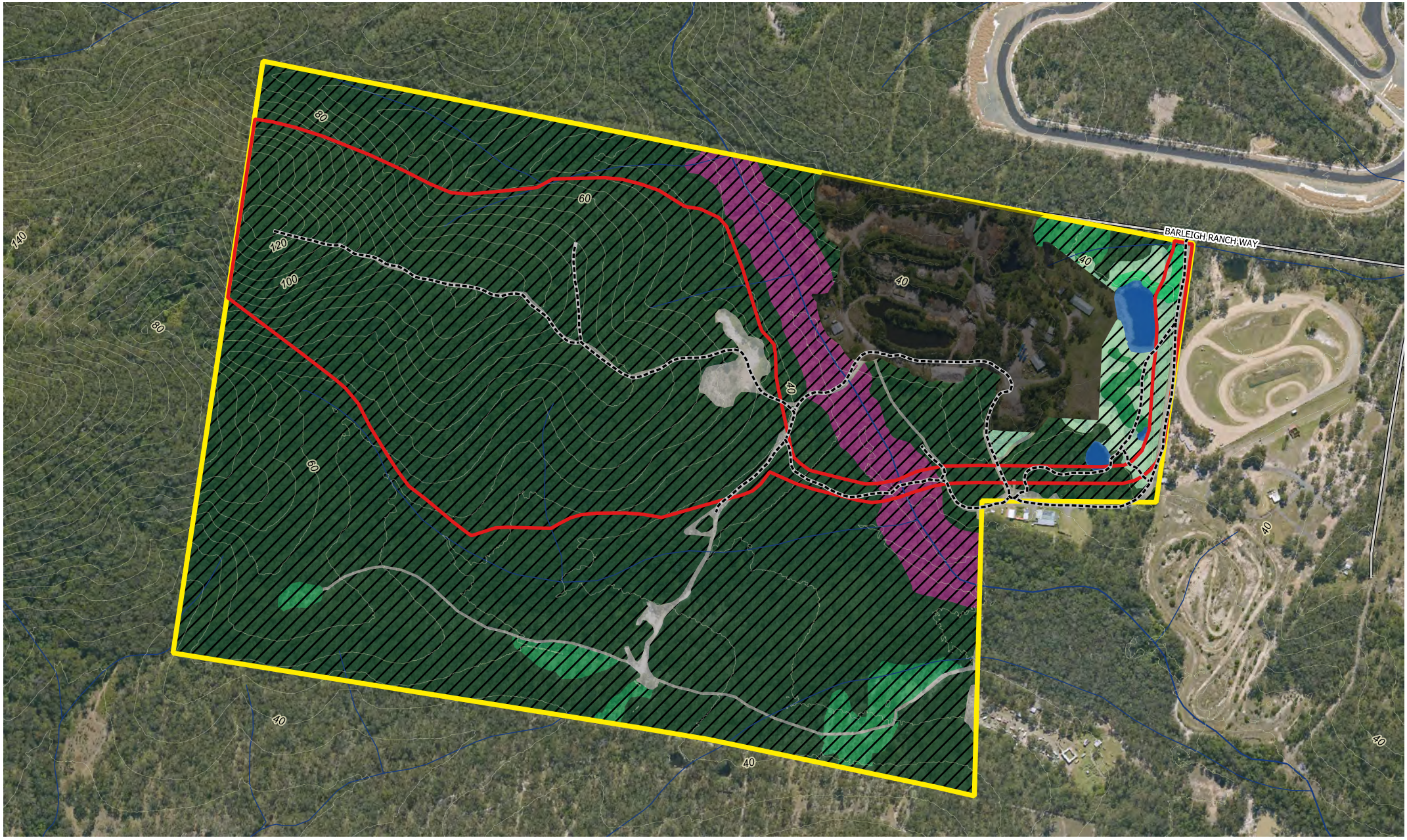
Item	Detail
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of opportunistic foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of foraging habitat in the locality, and the implementation of mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 36: Regent Honeyeater Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** The Project Area represents potential foraging habitat for the Regent Honeyeater. However, the Project Area is not mapped as important habitat under the NSW BOS Important Area Mapping, and the species has not been recorded within the Project Area during the completion of targeted surveys. The proposed action will remove 32.03 ha of potential foraging habitat. However, due to the nomadic nature of the species and availability of similar habitat within the locality, the proposed action is unlikely to a long-term decrease in the size of their populations. Similar habitat will be retained and maintained within the Project Area (the Retention Area), and habitat within the Disturbance Footprint will be progressively rehabilitated throughout the operation of the quarry. Therefore the action is not likely to lead to a long-term decrease in the size of a population for these species.
Will the action reduce the area of occupancy of the species?	**No, the action is unlikely to reduce the area of occupancy of the species.** The species is not known to occupy the Project Area. The action will lead to the removal of up to 32.03 ha of potential opportunistic foraging habitat for the species. However, this habitat will be progressively rehabilitated throughout the operation of the quarry and forms part of a larger area of suitable habitat within the locality. The total area of potential habitat for the species within the Disturbance Footprint (32.03 ha) represents 0.6% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 5372.30ha).

Criteria	Response
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** The National Recovery Plan for the Regent Honeyeater identifies that any breeding or foraging areas where the species is likely to occur is habitat critical to their survival (Commonwealth of Australia, 2015). As such, in the region the 'important bird area' around Cessnock (Birdlife International 2016) is likely to be the only area critical to the survival of the species. The vegetation within the Project Area likely provides opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas. As such, it is unlikely that the 32.03 ha of potential foraging habitat within the Disturbance Footprint is critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The Regent Honeyeater is known to breed in three key areas: two of them in NSW i.e. Bundarra-Barraba and Capertee Valley. There have been some historical breeding records from within the Hunter Region but these have occurred in the Kurri – Cessnock area. Therefore, the proposed action is unlikely to disrupt the breeding cycle of the species.
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of similarly suitable foraging habitat occur within the locality. The proposed action is unlikely to destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a BMP are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a BMP are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** The proposal does not contravene the objectives of the draft National Recovery Plan for the Regent Honeyeater (Commonwealth of Australia, 2015).

Criteria	Response
Conclusion	**The proposed action is not expected to have a significant impact on these species.**



Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

- Impact Area
- Project Area
- Regent Honeyeater Potential Foraging Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 35. Regent Honeyeater Impact

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 37: Regent Honeyeater Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of potential supplementary foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area. The proposed offset site will provide long-term protection of foraging habitat for the species under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	The retained areas of suitable Regent Honeyeater habitat would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement
Avoidance of indirect noise impacts to retained Regent Honeyeater population	Operating times detailed in **Table 1** restrict the timing of construction, operations, lading and blasting to daylight hours minimizing indirect impacts from operational noise to the species
Mitigation Measure Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**)
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**)
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements under the *BC Act* and the BOS. The NSW Development Consent (8 July 2024) outlines specific biodiversity conditions that must be met, including the

Item	Detail
	establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Landscape and Rehabilitation Management**
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**:
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the landscape and rehabilitation management will include monitoring and mitigation strategies to minimise species impacts, with ongoing assessments to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 38: Regent Honeyeater Residual Impacts and Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of Regent Honeyeater supplementary foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits for Regent Honeyeater is required for the proposed action as the vegetation within the Disturbance Footprint is not mapped as Important Areas under the BOS. • The species will be offset through Ecosystem credits in accordance with the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.6 Swift Parrot (Lathamus discolor)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 39: Swift Parrot Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species was not recorded within the Project Area during any of the surveys carried out.
Historical Records	Only three (3) records exists for the species within the locality they are approximately 4km to the north west of the Project Area. Records are from 2016 and 2005.
Individuals within the proposed action area	
Number of individuals within the proposed action area	Not recorded within the Project Area
Survey Methodology	
Detail the survey methodology used	Targeted bird surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) see **Table 40** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**No records, potential opportunistic foraging habitat** The Swift Parrot occurs as a single, panmictic migratory population, declining from an estimated 2,000 mature individuals in 2011 to 750 (ranging from 300-1,000) individuals in 2020 (DCCEEW 2024b). No individuals were identified within the Project Area, as such the vegetation within the Project Area (32.03 ha) is considered potential foraging habitat for the species. However, no resident population of the Swift Parrot occurs within the Project Area.
Important populations	
Provide information that identifies important populations	The Disturbance Footprint was not identified as containing an important population of the Swift Parrot based on the following criteria set out in the EPBC Significant Impact Guidelines: *"An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are":* ***Key source populations either for breeding or dispersal*** No evidence of breeding or dispersal has been found to occur within the Disturbance Footprint or Project Area. ***Populations that are necessary for maintaining genetic diversity, and/or*** There is not current population of the species know to occur within the Project Area. ***Populations that are near the limit of the species range.*** The species is not near the limit of its range.
Habitat Extent	
Habitat requirements	**Breeding Habitat** The Swift Parrot is only known to breed in Tasmania. **Foraging Habitat** The Swift Parrot spends the winter on mainland Australia migrating to eucalypt woodlands and forests in South Australia, Victoria, New South Wales, the Australian Capital Territory, and Queensland (DCCEEW 2024b). Key foraging species include *Eucalyptus leucoxylon* (Yellow Gum), *Eucalyptus tricarpa* (Red Ironbark), *Eucalyptus sideroxylon* (Mugga Ironbark), *Eucalyptus macrocarpa* (Grey Box), *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus pilularis* (Blackbutt), and *Corymbia maculata* (Spotted Gum).

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>Other foraging species may be important at certain times of the year. Swift Parrots also rely heavily on lerp for food (DCCEEW 2024b).</td></tr>
<tr><td>Type(s) of habitat available</td><td>
Breeding Habitat

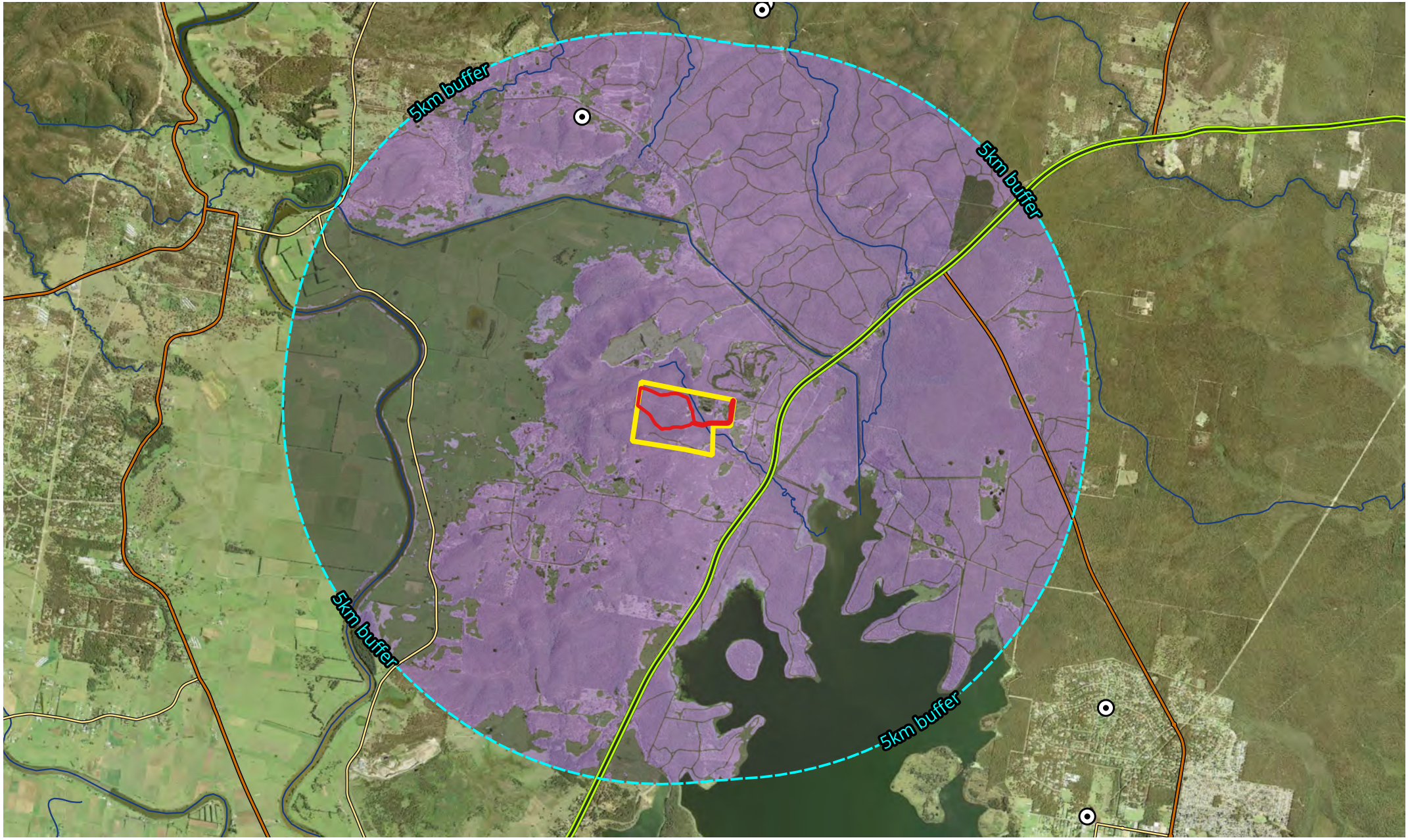
The Project Area does not represent breeding habitat for the species.

Foraging Habitat

The vegetation within the Project Area contains a number of known Swift Parrot feed trees including; Eucalyptus tereticornis (Forest Red Gum), Eucalyptus fibrosa (Red Ironbark), Corymbia gummifera (Red Bloodwood), Corymbia maculata (Spotted Gum), and Eucalyptus punctata (Grey Gum). The vegetation is considered suitable foraging habitat, likely supplementary during periods of low nectar availability in core foraging habitat mapped under the NSW BOS Important Area Mapping. A total of 32.03ha of vegetation within the Disturbance Footprint is considered representative of this supplementary foraging habitat for the Swift Parrot.
<u>Associated PCTs</u>

Two (2) PCTs within the Project Area are associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC).
A total of 9,590 ha of native vegetation occurs within 5 km of the Project Area, of this a total of 6,231 ha is considered suitable habitat for the species, associated with the Swift Parrot in the TBDC. A total of 32.83 ha of vegetation within the Disturbance Footprint is associated with the species, representing 0.5% of suitable habitat for the species within a 5 km radius.
</td></tr>
<tr><td></td><td>
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with GBC</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="4">PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
<tr><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>YES</td><td>0.23</td></tr>
<tr><td colspan="3">Total Habitat</td><td>32.83</td></tr>
</table>
</td></tr>
<tr><td>Quality of the habitat</td><td>The vegetation within the Project Area represents supplementary foraging habitat for the Swift Parrot.</td></tr>
<tr><td>Key habitat features</td><td>Key habitat requirements for the species are detailed above under the item “Habitat requirements”, the extent and occurrence of these habitat features within the Project Area are outlined in the item “Type(s) of habitat available”</td></tr>
</table>

Item	Details
Habitat critical to the survival of the species	Apart from breeding habitat (restricted to Tasmania), habitat critical to the survival of the Swift Parrot includes overwintering foraging habitat regularly visited and with a high abundance of feed trees. The National Recovery Plan for the Swift Parrot (DCCEEW 2024b) details that "*noting the requirements of the species, habitat critical to the survival of the Swift Parrot includes*: ***Breeding and foraging habitat in Tasmania*** • *In different years the majority of the breeding population may be concentrated within a subset of the potential breeding range, according to spatially and temporally variable flowering patterns of preferred foraging species.* • *Therefore, within areas where breeding is most likely to occur based on known breeding records, scientific literature and expert opinion, habitat critical to survival of Swift Parrots comprises both potential foraging habitat – which is native forest and woodland containing either Blue Gum (E. globulus) and/or Black Gum (E. ovata) as a dominant, subdominant or low density species, and potential nesting habitat – which is forests or woodlands containing hollow-bearing eucalypt trees within foraging range (~10 km) of potential foraging habitat that is old enough to flower.* ***Foraging habitat on the Australian mainland*** • *All preferred foraging species within known and likely foraging habitat on the mainland including Yellow Gum (E. leucoxylon); Red Ironbark (E. tricarpa); Mugga Ironbark (E. sideroxylon); Grey Box (E. macrocarpa); White Box (E. albens); Yellow Box (E. melliodora); Swamp Mahogany (E. robusta); Forest Red Gum (E. tereticornis); Blackbutt (E. pilularis); and Spotted Gum (Corymbia maculata)"* While the vegetation within the Project Area contains two (2) of the above listed preferred foraging tree species, the vegetation is not considered high value foraging habitat for the species. The vegetation likely represents supplementary foraging habitat for the species, used opportunistically as part of the species' broader range
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The species overwinters in NSW and may utilise the food resources within the Project Area temporarily and when higher value foraging resources are unavailable. **Long-term:** The species breeds in Tasmania and overwinters in South-eastern Australia. The species therefore is only likely to utilise the vegetation within the Project Area opportunistically during their migration along the NSW coast.



Impact Area
Project Area
Swift Parrot (ATLAS)

Swift Parrot Habitat
Associated PCTs (Habitat)
Non-associated PCTs (Not Habitat)

Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

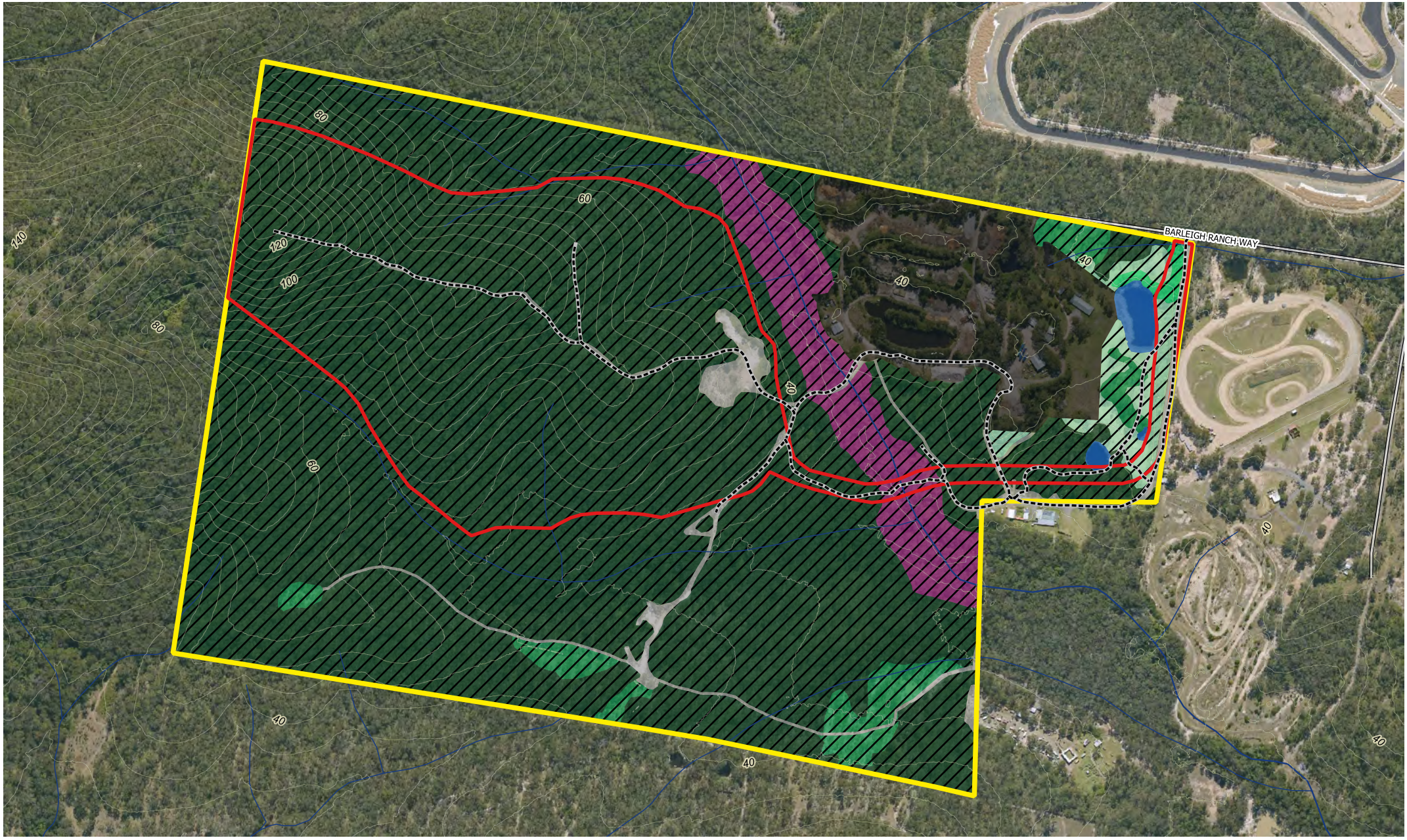
Fig. 36. Swift Parrot Context

1 2 3 4 km

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

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- Impact Area
- Project Area
- Swift Parrot Potential Foragaing Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 37. Swift Parrot Habitat

50 100 150 200 250 m

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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

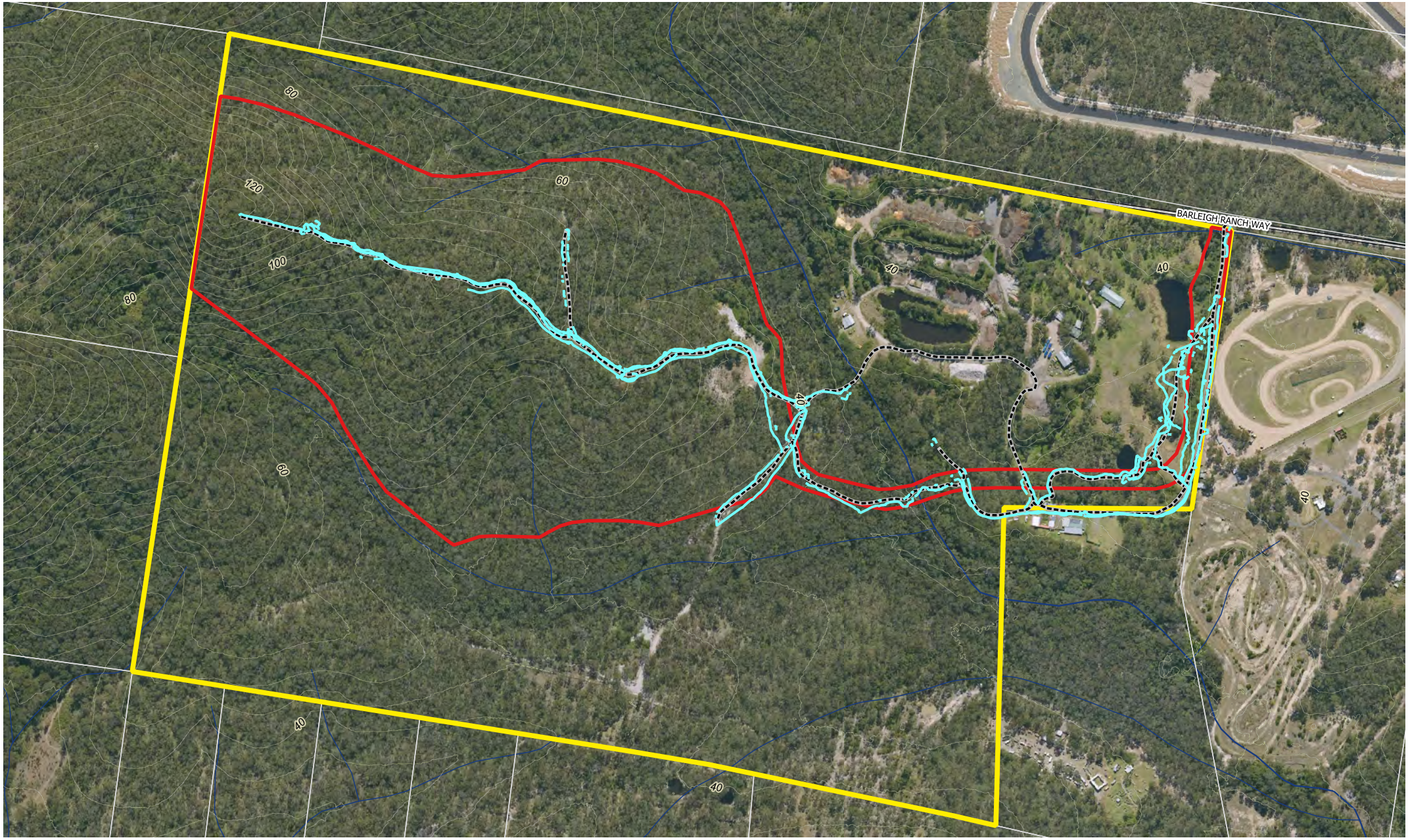
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 40: Swift Parrot Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Point Transect	**Department Survey Guidelines** *Area searches or transect surveys of suitable habitat, preferably in the early morning and afternoon when birds are most active and vocal. Detection by sighting or call. Slow-moving vehicle transects also effective in expansive areas, detecting loud, distinctive 'clinking' call that can be heard over noise of engine. Targeted surveys of patches of heavily flowering eucalyptus may be useful.*	**Kleinfelder (2012–2016):** One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys): An area search was carried out to survey for diurnal birds. In total, three two hectare survey plots were conducted at each transect. Each plot was surveyed for 20 minutes and repeated over two mornings (16-17 January 2013). Birds were identified either visually, with the aid of binoculars, or by call interpretation. Surveys were conducted in the morning when bird activity is maximized. Additional field surveys to collect further information on the density and location of hollow-bearing and habitat trees within the study area. The field survey was conducted on 18, 19, 29 and 30 May 2017 and was undertaken over 47.5 person hours via meander traverses of the study area. Details of these surveys are provided in **Appendix 4**. During the habitat assessment, no Swift Parrot was recorded. The timing of these surveys aligns with the peak period in which the species migrates to the mainland and foraging in the forests of NSW. Considering the highly mobile nature of the species, a habitat assessment was determined to be an accurate way to assess habitat suitability, if no individuals are recorded. **WPC (2023/2024):** Point-transect methodology, 12 person hours over 3 days including one afternoon and two mornings with two observers using 10 x 40 magnification binoculars. All fauna species observed or heard were recorded. Surveys completed on 29 January 2024, and 1-2 February 2024. Assessment of habitat suitability through review of available BOS Important Habitat Mapping. This review indicated that no important habitat occurs within the Project Area or locality. Survey effort completed in 2023 and 2024 is mapped in **Figure 38**. Survey effort completed in 2017 is detailed further in **Appendix 4**. **Limitations** Targeted bird surveys completed as part of this assessment were outside the recommended survey period for the species. However, the completion of habitat assessments and opportunistic fauna surveys were completed within the survey period (May). This, along with reference to important habitat mapping was used to determine the likelihood of long-term species occurrence within the locality. The species is known to have high fidelity and therefore this combination of methods was determined a suitable approach to assess habitat suitability for the purposes of this assessment.
	The NSW BAM Important Area Habitat Mapping	
	Othe (best practice survey methodology) *Area search methods, where observers walk around an area of pre-determined size for a* *pre-determined length of time. A 1ha (200m x 500m) 20-minute search is the most* *common method (Loyn 1986), although as described later in this section this method is* *not as effective as surveys of longer duration;*	



Impact Area
Project Area
Diurnal Bird Survey (29 January, 01 and 02 February 2024)
Local Road
Named Watercourse
Minor Watercourse
Contours (5m)
Tracks

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Fig. 38. Swift Parrot Survey Effort

50 100 150 200 250 m

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Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 41 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 41: Swift Parrot Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *<u>Risk of injury and mortality during native vegetation clearing</u>* Vegetation clearing is unlikely to represent a risk to Swift Parrot injury and mortality as the Project Area is not considered breeding habitat for this highly mobile species. Risk to the species will be further minmisied through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 43** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of breeding habitat</u>* No breeding habitat for the Swift Parrot occurs within the locality. *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered supplementary foraging habitat for the Swift Parrot. However, similar habitats are available in the surrounding area, and there are opportunities for habitat restoration through post-project rehabilitation. A total of 9,590 ha of native vegetation occurs within 5 km of the Project Area, of this a total of 6,231 ha is considered suitable habitat for the species, associated with the Swift Parrot in the TBDC.
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is very unlikely to injure or kill any individuals of the species with the implementation of mitigation measures outlined in **Table 43**
	Injury/mortality associated with the construction phase of the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. Weed and pest management within the action area will be managed under a site-specific management plan. *<u>Noise and vibration disturbance</u>* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that noise and vibration disturbances are restricted to daylight hours, reducing indirect impacts to surrounding habitat. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *<u>Artificial light disturbance</u>* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 43**

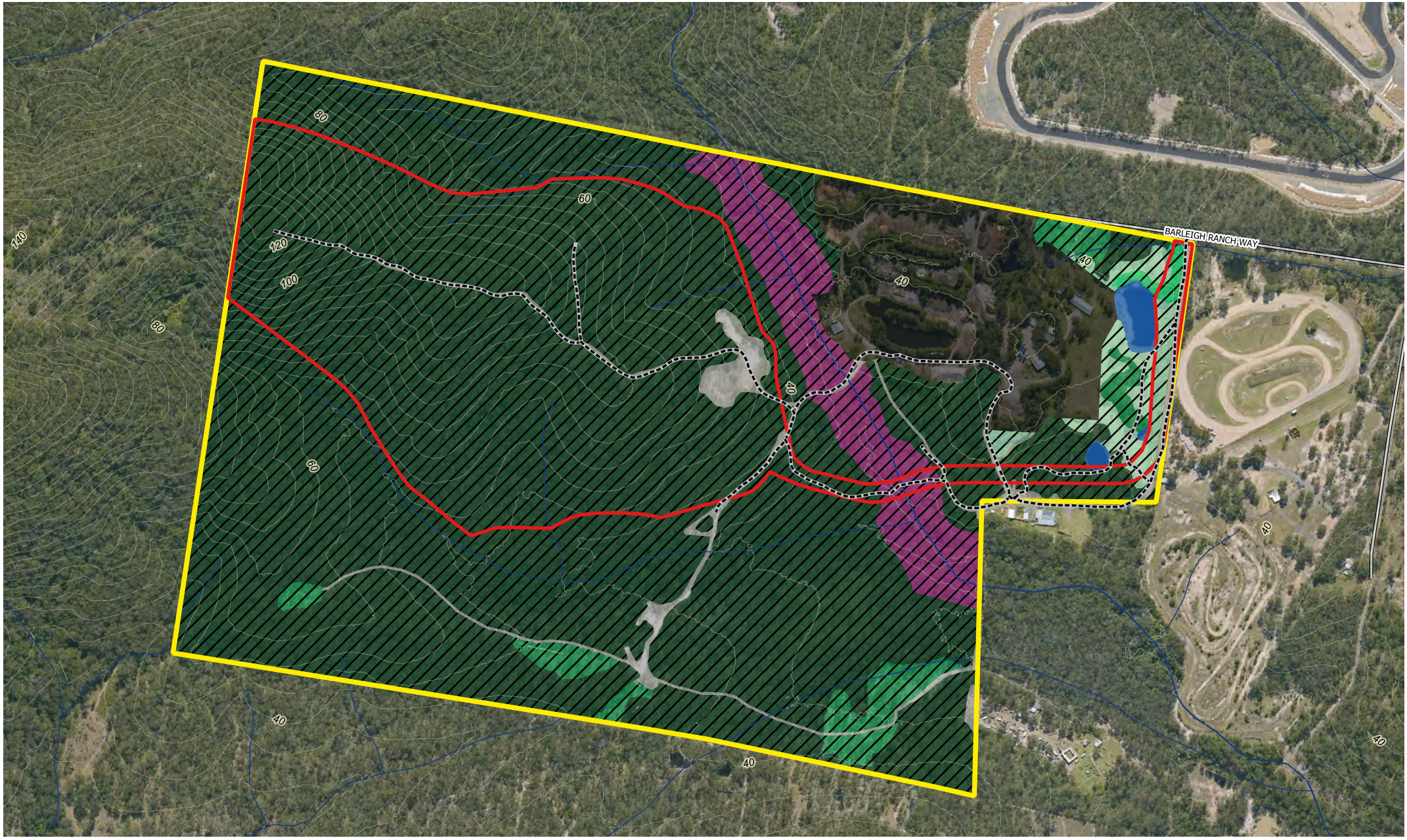
Item	Detail
	allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as foraging habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of 32.03 ha of broadly suitable supplementary foraging habitat for the Swift Parrot will be impacted. This represents 0.5% of suitable foraging habitat within the locality (5km from the Project Area).
Indirect Impact Area	Through the implementation of mitigation measures in **Table 43** the area of indirect impacts will be minimal.
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not result in a significant impact to foraging resources locally and will not impact breeding habitat. Owing to the species' high mobility the proposed action is very unlikely to significantly impact connectivity for the species within the locality.
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale (0.5% of suitable habitat within 5km of the Project Area). Also, the proposed action will not lead to a significant increase in habitat fragmentation/isolation within the locality.
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of opportunistic foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of foraging habitat in the locality, and the implementation of mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy.	

Item	Detail
Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 42: Swift Parrot Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** The Project Area represents potential foraging habitat for the Swift Parrot. However, the Project Area is not mapped as important habitat under the NSW BOS Important Area Mapping, and the species has not been recorded within the Project Area. The proposed action will remove 32.03 ha of potential foraging habitat. However, due to the species' migratory behavior, location of breeding sites in Tasmania, and availability of similar foraging habitat within the locality, the proposed action is unlikely to a long-term decrease in the size of their populations. Similar habitat will be retained and maintained within the Project Area (the Retention Area), and habitat within the Disturbance Footprint will be progressively rehabilitated throughout the operation of the quarry. Therefore the action is not likely to lead to a long-term decrease in the size of a population for these species.
Will the action reduce the area of occupancy of the species?	**No, the action is unlikely to reduce the area of occupancy of the species.** The species is not known to occupy the Project Area. The action will lead to the removal of up to 32.03 ha of potential opportunistic foraging habitat for the species (0.5% of suitable habitat within 5km of the Project Area). However, this habitat will be progressively rehabilitated throughout the operation of the quarry and forms part of a larger area of suitable habitat within the locality.
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** The National Recovery Plan for the Swift Parrot (Saunders et al., 2010) outlines that 'habitat critical to the survival of the Swift Parrot includes; those areas of priority habitat for which the Swift Parrot has a level of site fidelity or possess phenological characteristics likely to be of importance to the Swift Parrot, or are otherwise identified by the recovery team'. The vegetation within the Project Area likely provides opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas. As such, it is unlikely that the 32.03 ha of potential foraging habitat within the Disturbance Footprint is critical to the survival of the species.

Criteria	Response
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The Swift Parrot is only known to breed in Tasmania. Therefore, the proposed action is unlikely to disrupt the breeding cycle of the species.
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of similarly suitable foraging habitat occur within the locality. The proposed action is unlikely to destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a BMP are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a BMP are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** The proposal does not contravene the objectives of the National Recovery Plan for the Swift Parrot (DCCEEW, 2024b)
Conclusion	**The proposed action is not expected to have a significant impact on these species.**



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- Impact Area
- Project Area
- Swift Parrot Potential Foragaing Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 39. Swift Parrot Impact

50 100 150 200 250 m

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Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 43: Swift Parrot Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of supplementary foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area.
Retention and management of suitable habitat in-perpetuity	The retained areas of suitable Swift Parrot supplementary foraging habitat would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement
Mitigation Measure Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**)
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**)
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements under the *BC Act* and the BOS. The NSW Development Consent (8 July 2024) outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.

Item	Detail
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	***Landscape and Rehabilitation Management***
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**:
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the landscape and rehabilitation management will include monitoring and mitigation strategies to minimise species impacts, with ongoing assessments to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS).

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 44: Swift Parrot Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of supplementary Swift Parrot foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits for the Swift Parrot is required as the Project Area is not mapped as Important Habitat under the BOS. • However the species will be offset through Ecosystem credits in accordance with the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.7 Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

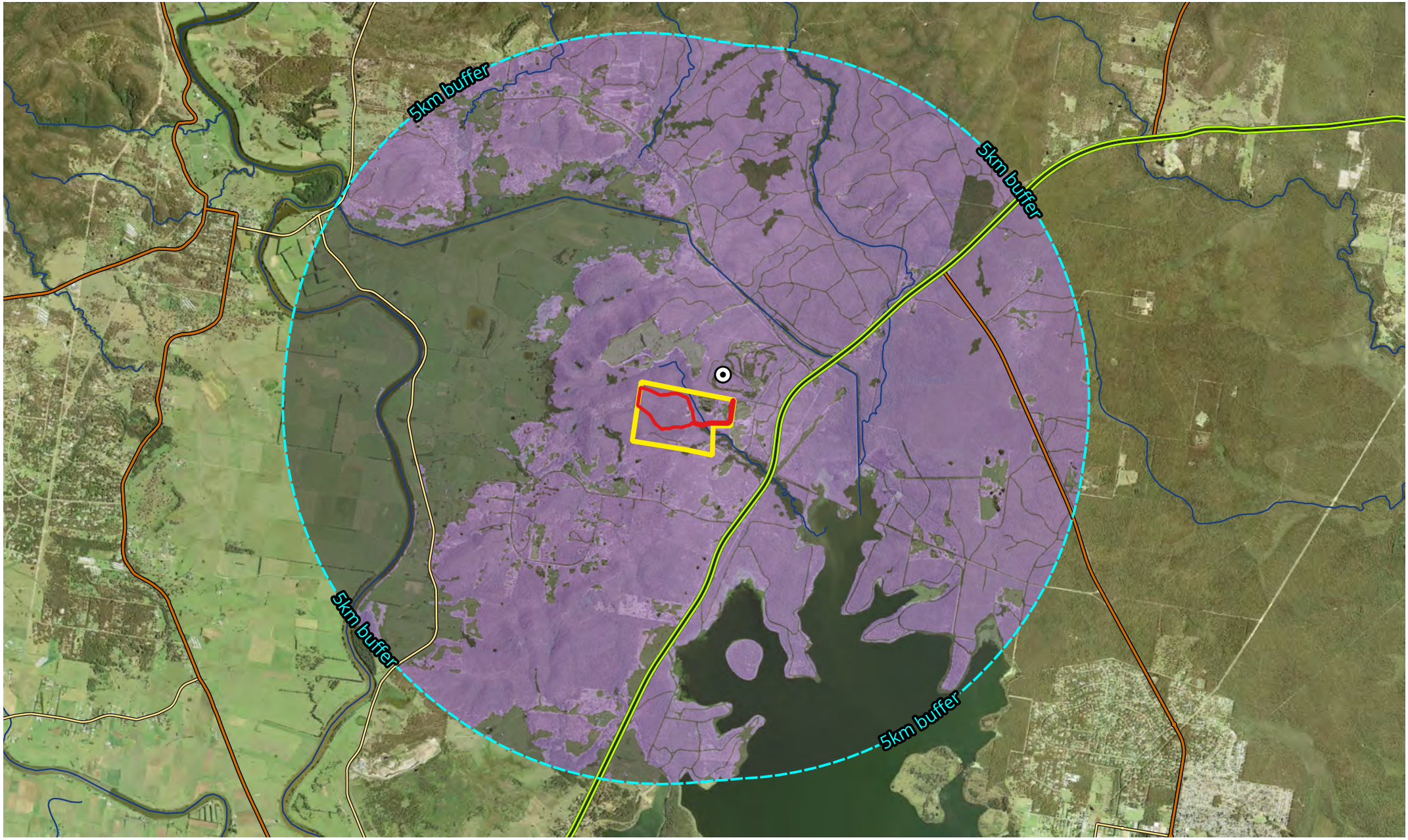
Table 45: Yellow-bellied Glider (south-eastern) Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species has not been recorded within the Project Area.
Historical Records	One historical record occurs within the locality (5km) (dated 2005). The species was not detected at nearby Stoneridge Quarry during targeted Spotlighting & Call playback Surveys or within the Project Area during Remote Camera Surveys completed in 2018, 2019 or 2022.
Individuals within the proposed action area	
Number of individuals within the proposed action area	No individuals of this species have been recorded within the Project Area.
Survey Methodology	
Detail the survey methodology used	Targeted surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) please see **Table 46** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**Unlikely to inhabit** The species has not been recorded within the Project Area and there is only one historical record of the species within the Locality. If present, the species may use the vegetation within the Project Area as part of a broader range including large areas of comparable habitat in the Locality. The population size of the species across south-eastern Australia is likely between 10,000 and 100,000 mature individuals.
Important populations	
Provide information that identifies important populations	The Yellow-bellied Glider (YBG) is distributed across several regions, and important populations for its survival have been identified, which are crucial for the species' ongoing conservation. According to the EPBC Act and state/territory environmental legislation, populations important to the survival of YBG include: 1. **Carnarvon Range (Inland population; Qld)** A stronghold population in Queensland. 2. **Blackdown Tableland (Inland population; Qld)** Another key population in Queensland, significant for the species' distribution in inland regions. 3. **Bago Plateau (Endangered under NSW legislation; NSW)** An endangered population under NSW legislation, making it an important focus for conservation efforts. 4. **Richmond Range National Park (research population; NSW)** A research population located within the Richmond Range National Park, valuable for scientific studies on the species. 5. **Blacktown Range (population near urban area; NSW)** A population near urbanized areas, highlighting the species' ability to adapt to human-influenced environments. 6. **Shoalhaven populations (severely fire-affected, surveyed; NSW)** Populations in the Shoalhaven area that have been severely affected by fire, with recovery efforts ongoing. 7. **Populations between Coffs Harbour, Dorrigo, Glen Innes, and Grafton (affected by fire and timber harvesting, research populations; NSW)** Populations impacted by both fire and timber harvesting, with research populations in the area. 8. **Populations between Nimmitabel and Cathcart (affected by fire and timber harvesting, research populations; NSW)**

Item	Details
	Another set of populations affected by fire and timber harvesting, with research populations monitoring their recovery. 9. **Populations near Waratah Creek (affected by fire and timber harvesting, research populations; NSW)** Populations near Waratah Creek that have been impacted by both fire and timber harvesting, and are part of ongoing research efforts. 10. **South Australian population (only SA population, potentially an ESU, six individuals, may be extinct; SA)** A very small population in South Australia, potentially an Evolutionarily Significant Unit (ESU), but at risk of extinction. 11. **Western Victoria populations (outlying populations, potentially an ESU; Vic)** Populations in Western Victoria that are outlying and may represent an ESU, crucial for maintaining genetic diversity.
Habitat Extent	
Habitat requirements	**Foraging and Breeding Habitat** The Yellow-bellied Glider (south-eastern) thrives in eucalypt-dominated woodlands and forests, including both wet and dry sclerophyll forests. It is particularly dependent on large, mature old-growth forests, where the abundance of suitable trees provides both foraging and shelter (DAWE 2022b). The glider has a preference for forests with a high proportion of winter-flowering and smooth-barked eucalypts, as these trees offer a variety of foraging substrates. Additionally, a diverse range of plant species is essential to provide a steady food supply year-round, making forests dominated by just one or two tree species unsuitable for long-term habitation. Hollow-bearing trees, especially living, smooth-barked eucalypts, are a critical feature of its habitat, as these trees are used for shelter during the day (DAWE 2022b). The glider feeds primarily on sap from these trees, as well as on insects, nectar, pollen, and manna. A variety of eucalypt species are used as sap-feeding trees, with those that produce intermittent sap flow being particularly important. The species is nocturnal and lives in social groups of 2-6 individuals within home ranges of 50–65 ha, although this can vary, and large areas of suitable forest are necessary to support viable subpopulations. Dispersal is limited to the gliding distance, which can reach up to 140 meters in optimal conditions, but the average glide distance is around 25.2 meters (DAWE 2022b).
Type(s) of habitat available	**Foraging Habitat** The Project Area contains native vegetation broadly representing foraging habitat for the species. However, noting that only one record of the species occurs within 5km of the Project Area the use of the Project Area is likely to be minimal. A total of 9,577.90 ha of native vegetation occurs within 5 km of the Project Area, of this a total of 5,844.13 ha is considered suitable habitat for the species, associated with the Yellow-bellied Glider in the TBDC. A total of 32.03 ha of vegetation within the Disturbance Footprint is associated with the species, representing 0.5% of suitable habitat for the species within a 5 km radius. *Associated PCTs* One (1) PCT within the Project Area is associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC): *PCT 3244: Lower North Spotted Gum- Mahogany- Ironbark Sheltered Forest*

<table>
<tr><th>Item</th><th colspan="4">Details</th></tr>
<tr><td rowspan="6"></td><td>Plant Community Type (PCT)</td><td>Vegetation Zone</td><td>Associated with GBC</td><td>Disturbance Footprint (ha)</td></tr>
<tr><td rowspan="4">PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
<tr><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>NO</td><td>0</td></tr>
<tr><td colspan="3">Total Habitat</td><td>32.6</td></tr>
<tr><td>Quality of the habitat</td><td colspan="4">The vegetation within the Project Area contains foraging habitat with a number of feed tree species listed in Appendix A of the species conservation advice (DAWE 2022b) including; Acacia mearnsii, Corymbia gummifera, Corymbia maculata, Eucalyptus pilularis, and Eucalyptus punctata. The vegetation within the Project Area is contiguous with similar quality foraging habitat within the locality.</td></tr>
<tr><td>Key habitat features</td><td colspan="4">Key habitat features for the species include large, mature eucalypt-dominated woodlands and forests, both wet and dry sclerophyll. These areas provide hollow-bearing trees, primarily smooth-barked eucalypts, which are essential for shelter and nesting. The presence of trees with sap flow is crucial for feeding, and a diverse range of plant species ensures a year-round food supply. The gliders require large, undisturbed habitat areas, with home ranges typically spanning 50-65 ha, and suitable den trees, usually over 1 metre in diameter, are vital for daytime shelter.</td></tr>
<tr><td>Habitat critical to the survival of the species</td><td colspan="4">Habitat critical to the survival of the species is defined in the species' Conservation Advice (DAWE 2022b) as:
Key considerations in environmental impact assessments relevant to the yellow-bellied glider (south-eastern) should include the following factors about the subspecies:
• Highly specialised diet and requirement of trees with unknown characteristics for sap feeding;
• Prefer to den in living hollow-bearing trees;
• Groups live in large, exclusive home ranges as foraging substrates are dispersed and variable through time and space; and
• Large areas of forest are required to maintain population viability.
Habitat critical to the survival of the yellow-bellied glider (south-eastern) may be broadly defined as areas containing the following attributes (noting that geographic areas containing habitat critical to survival needs to be defined by forest type on a regional basis):
• Large contiguous areas of floristically diverse eucalypt forest, which are dominated by winter-flowering and smooth-barked eucalypts,</td></tr>
</table>

Item	Details
	including mature living hollow-bearing trees and sap trees (see Appendix A); The vegetation within the Project Area is contiguous with similar quality foraging habitat within the locality. The vegetation contains a number of feed tree species listed in Appendix A of the species conservation advice including; *Acacia mearnsii*, *Corymbia gummifera*, *Corymbia maculata*, *Eucalyptus pilularis*, and *Eucalyptus punctata*. • ***Areas identified as refuges under future climate change scenarios;*** The vegetation within the Project Area is unlikely to provide refuges under future climate change scenarios. However, riparian vegetation within the Project Area (located outside of the Disturbance Footprint) is likely to provide some shelter during higher temperatures. • ***Short or long-term post-fire refuges (i.e., unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas;*** The vegetation within the Project Area is unlikely to represent short or long-term post fire refuges. • ***Habitat corridors required to facilitate dispersal of the subspecies between fragmented habitat patches and/or that enable recolonization or movement away from threats. yellow-bellied gliders (south-eastern) have a glide ratio (horizontal distance/height dropped) of around 2.0, and corridors spanning gaps larger than the distance gliders are likely to be able to travel should be considered critical to the survival. There is not enough evidence to define the canopy and width characteristics of appropriate corridors. In the absence of such information, a precautionary approach should be taken to maximise dispersal by considering all habitat corridors in the species' range to be habitat critical to the survival; and*** Potential movement corridors may occur along riparian vegetation associated with Seven Mile Creek within the Project Area. This vegetation will be retained under the proposed action and protected under an onsite offset site. • ***Areas in which some trees have evidence of use for sap extraction by yellow-bellied glider (south-eastern).*** There was no evidence of Yellow-bellied Glider feeding within the Project Area The vegetation within the Project Area is unlikely to represent habitat critical to the survival of the Yellow-bellied Glider.
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** The species is nocturnal and based on the lack of records of the species within the Project Area it is unlikely to roost within the Project Area. As such, the species may utilise the vegetation within the Project Area as supplementary foraging habitat at night. **Long-term:** The species may utilise the vegetation within the Project Area as foraging habitat, and as part of a broader habitat range. The utilisation of the habitat within the Project Area is unlikely to change as a result of climate change as the Project Area does not occur at the extent of the species range.



Impact Area
Project Area
Yellow-bellied Glider (ATLAS)

Yellow-bellied Glider Habitat
Associated PCTs (Habitat)
Non-associated PCTs (Not Habitat)

Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

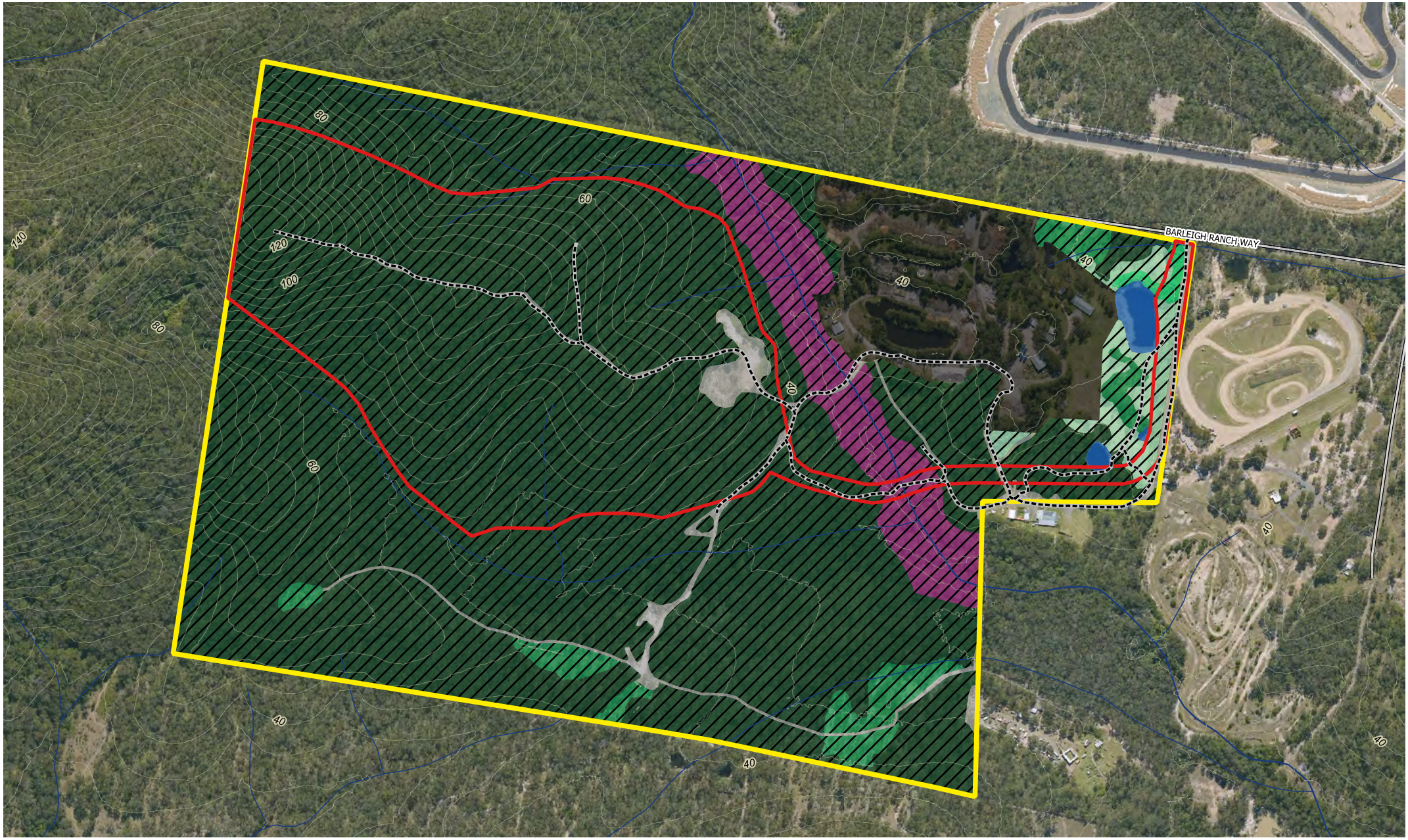
Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 40. Yellow-bellied Glider Context

1 2 3 4 km

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Eagleton, NSW, 2324

- Impact Area
- Project Area
- Yellow-bellied Glider Potential Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig.41. Yellow-bellied glider Habitat

50 100 150 200 250 m

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Produced By: Keryn Dowling
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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

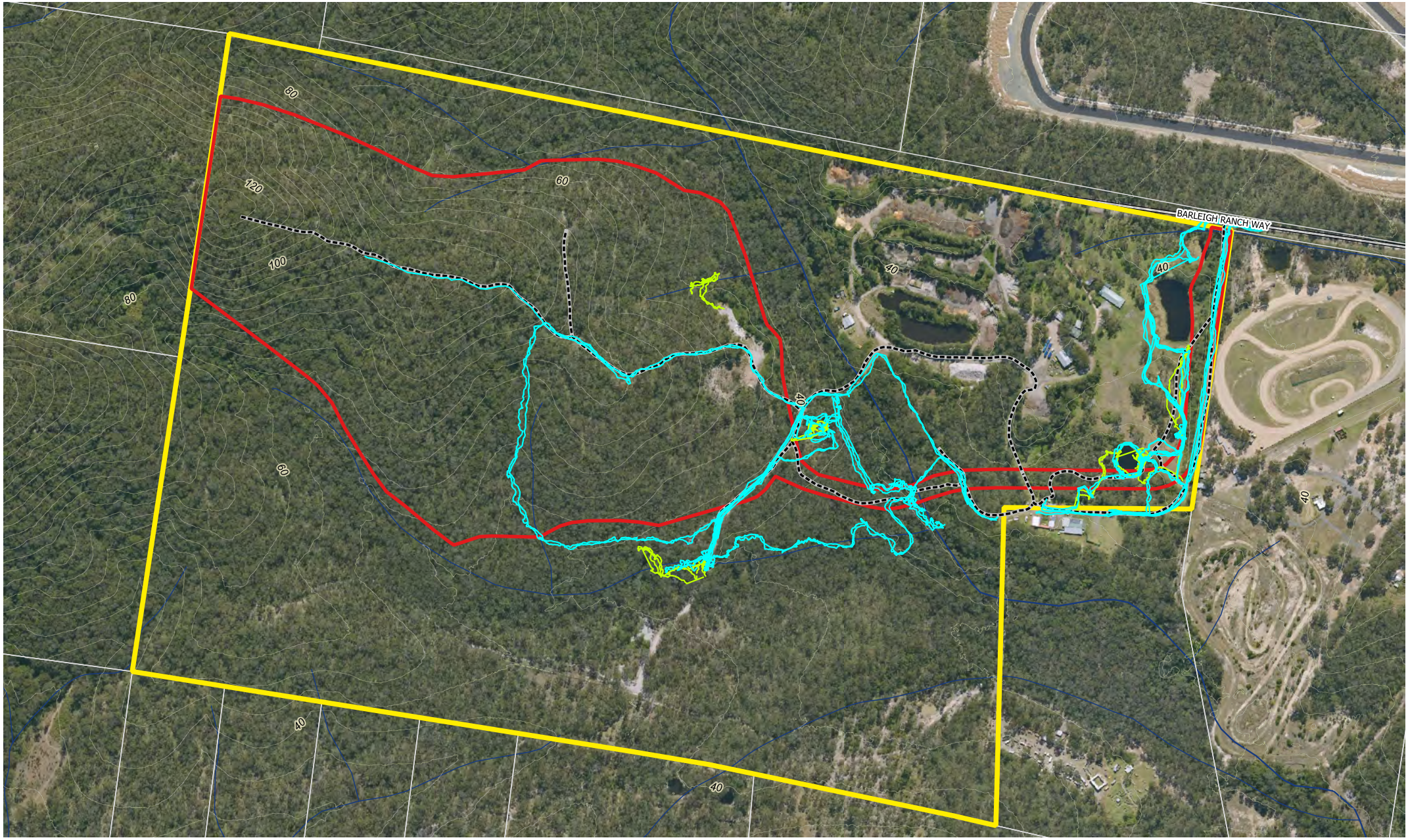
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 46: Yellow-bellied Glider (south-eastern) Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Trapping and Spotlighting	**Department Survey Guidelines** *Survey guidelines for Australia's threatened mammals (DSEWPC, 2011) provides recommended survey methods for the Yellow-bellied Glider (Wet Tropics) which is applicable to the south-eastern population considered for this assessment. Survey recommendations include;* • *Habitat Assessment (signs of foraging)* • *Spotlighting – at least two 200 m transects per 5 ha, repeated over two nights* • *Call Playback – survey over two separate nights* • *Elliot trapping*	**(Kleinfelder 2012 – 2016)** • 1 person hour per transect per night over two separate nights (total of 6 hours spotlighting). • **Mammals**: 2 x 1 hour on 2 separate nights (up to 200 ha stratification unit). **Terrestrial Elliot B traps**: • 10 traps per transect over 4 nights, a total 120 trap nights. • **Required effort**: 200 trap nights. **Arboreal Elliot B traps**: • 10 traps per transect over 4 nights, a total 120 trap nights. • **Required effort**: 48 trap nights. **Terrestrial cage traps**: • 3 traps per transect over 4 nights, a total of 36 trap nights. • **Required effort**: 24 trap nights. **Arboreal hair tubes**: • 10 hair tubes per transect over 4 nights, a total of 120 trap nights. • **Required effort**: 60 trap nights. **Terrestrial hair tubes**: • 10 hair tubes per transect over 4 nights, a total of 120 trap nights. • **Required effort**: 80 trap nights. • Hair tubes are cone-shaped, allowing for a full size range of mammals to be sampled. **WPC 2024** Nocturnal surveys were completed in February 2024 across 4 nights with 2hrs of surveys each night x2 people totaling 16 person hours. Survey effort completed in 2023 and 2024 is mapped in **Figure 42**. Survey effort completed in 2012-2016 is detailed further in **Appendix 4**.
	The NSW BAM *Not Apllicable*	
	Other (best practice survey methodology) The NSW DEC *Threatened Biodiversity Survey and Assessment: Gudielines for Developments and Activities – Working Draft (DEC 2004) recommends the following survey effort for gliders:* • *Habitat Assessment* • *Arboreal Elliot Traps – 24 trap nights over 3-4 consecutive nights* • *Spotlighting on foot – 2 x 1 hour and 1 km up to 200 ha, on two separate nights* • *Call playback – conduced twice on separate nights* • *Stag-watching – observing potential roost hollows for 30 minutes prior to sunset and 60 minutes following sunset*	



Impact Area
Project Area
Spotlighting(20,21, & 22 February 2024)
Spotlighting(8 November 2023)
Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

Eagleton Rock Syndicate Pty Ltd
13 Barleigh Ranch Way
Eagleton, NSW, 2324

Fig. 42. Yellow-bellied Glider Survey Effort

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 47 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 47: Yellow-bellied Glider Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *<u>Risk of injury and mortality during native vegetation clearing</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered potential foraging habitat for the species. However, the species was not recorded within the Project Area during targeted surveys and habitat assessments indicate no sign of foraging or suitable large hollow-bearing trees (DBH >1 m). While it is unlikely that the species is denning within the Project Area the risk that vegetation clearing will directly impact the species will be minimised through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 49** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered potential foraging habitat for the species. The proposed action will impact a total of 0.5% of mapped suitable habitat for the species within 5km of the Project Area, as such the proposed action is unlikely to have a significant impact on the extent of suitable foraging habitat for the species. Areas of similar quality foraging habitat within the Project Area will be retained and managed as an offset site. *<u>Loss of breeding habitat</u>* Breeding habitat for Yellow-bellied Glider was not identified within the Project Area. Similar habitat will be retained within the Project Area. *<u>Impacts to population connectivity and movement corridors</u>* The proposed action minimises direct impacts to potential movement corridors associated with Seven Mile Creek and its tributaries. Maintaining riparian vegetation corridors within the Project Area will retain these movement corridors, supporting long-term population dispersal within the locality.
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and adhere to the implementation of mitigation measures outlined in **Table 49**
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. The majority of the

Item	Detail
ready for haulage to the processing area via the haul roads established during the construction phase.	vegetation to be retained in the Project Area is proposed to be secured under a stewardship site. Implementation of a vertebrate pest/weeds management plan as part of the stewardship site agreement, which would ensure potential impacts from vertebrate pests/weeds in the Project Area are managed. *Noise and vibration disturbance* The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that any potential noise and vibration disturbances are restricted to daylight times, reducing indirect impacts to surrounding habitat for the species. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 49** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of 33.02ha of broadly suitable foraging habitat for the Yellow-bellied Glider will be impacted. These impacts represent an impact to 0.5% of mapped suitable habitat within 5km of the Project Area.
Indirect Impact Area	Through the implementation of mitigation measures in **Table 49** the area of indirect impacts will be minimal. Buffers accounting for indirect impacts have been detailed within the proposal plans (see **Figure 2**).
Impacts and the long-term viability of the species/community	

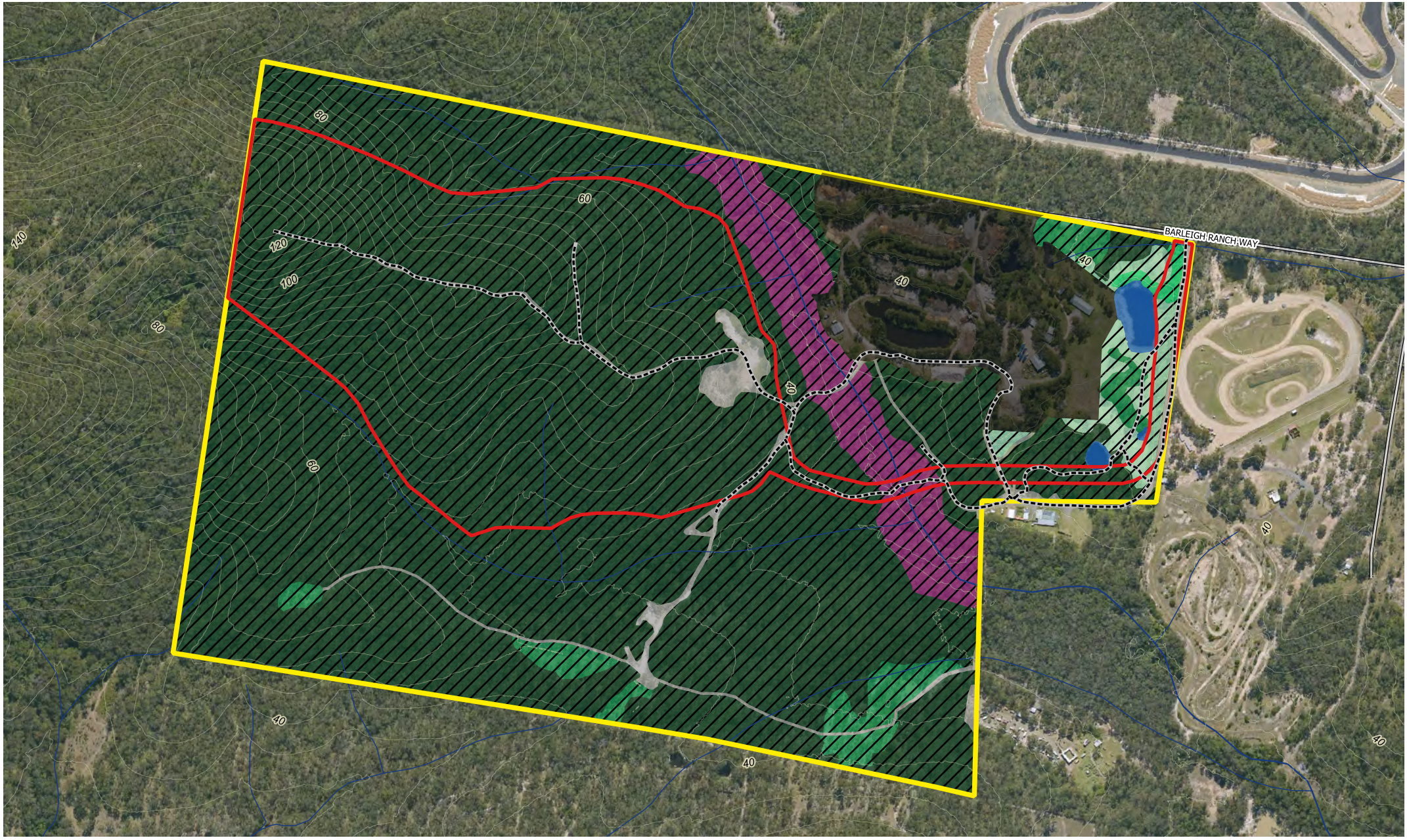
Item	Detail
Local (site level) scale	The proposed action will not result in a significant impact to foraging or breeding habitat locally. Avoidance of vegetated movement corridors along Seven Mile Creek and its tributaries minimises impacts to connectivity within the locality. Broadly suitable foraging habitat will be retained and managed within the Project Area.
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale, with the vegetation within the Disturbance Footprint representing 0.5% of suitable habitat within 5 km of the Project Area. Considering the large area of suitable habitat within the locality the proposed action is considered unlikely to lead to a significant increase in habitat fragmentation/isolation within the locality.
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of broadly-suitable foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of alternative foraging areas, and the implementation of targeted mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 48: Yellow-bellied Glider – Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** The Project Area includes a range of *Eucalyptus* species that may provide suitable foraging habitat for the YBG. *Eucalyptus tereticornis* and *E. punctata* which are species that YBG can utilise for tapping sap. *E. acmenoides* and *E.crebra* flower through the winter months, ensuring nectar and pollen are available year-round. Eucalypts with shedding bark for foraging insect prey are less abundant. There are 138 hollow-bearing trees and dead stags that have large hollows (greater than 20 cm), across the Project Area, and 80 of these occur within the impact area and surrounding buffer. However, hollow-bearing trees within the Project Area where DBH was measured showed an average DBH of 35 cm, with a range from 16 cm to 60 cm. YBG has been found to shelter in hollows within trees where diameter is greater than 1 m (DAWE, 2022b). Therefore, the Disturbance Footprint is not considered to provide breeding habitat for these species. Surveys conducted within the locality (Stone Ridge Quarry) in 2018 and 2022 did not detect this species. Surveys conducted on site in 2013 did not detect this species. All past surveys conducted adhere to current EPBC guidelines. As the habitat was assessed as unsuitable and the

Criteria	Response
	species was not detected on-site, the Project Area is not considered to be breeding habitat for the species. The project will impact on 32.03 ha of potential foraging habitat for the species (0.5% within the locality). Similar habitat occurs to the north, south and west of the proposed development, and throughout the locality. Higher quality habitat (mature growth trees) occurs along the Seven Mile Creek within the Project Area, and this will be set aside as a Stewardship Site and will remain protected. As such, the proposed action is unlikely to lead to a long-term decrease in the size of the population of YBG.
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The area of occupancy for the species is 12,724 km2 (1,272,400 ha). The proposed action will impact a total of 32.03 ha of native vegetation considered potential habitat for this species, representing <0.01% of suitable habitat for the species (nationally). As such, the level of impacts associated with the proposed action is unlikely to significantly reduce the area of occupancy of the species.
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The proposed action will only impact a total of 32.03 ha of native vegetation considered habitat for the species. Extensive areas providing similar habitat for this species occur within native vegetation to the west, south and north of the site, as well as within the wider locality. As such, the proposed action is not expected to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species due to the small area of impact, lack of suitable breeding hollows, and the wider area of suitable habitat surrounding the development.
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove foraging habitat for the species this will not lead to the decline in the species.** The loss of habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of more suitable foraging habitat occur within the locality, to the south of the Disturbance Footprint and surrounding the Project Area. The proposed action is unlikely to destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established	**No, the proposed action will not result in the establishment of a harmful invasive species.**

Criteria	Response
in the endangered or critically endangered species' habitat?	The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a biodiversity offset agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the Project Area are managed.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disesase.** Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** There is no recovery plan for the species. However, Conservation Advice for the species identifies habitat degradation, and fragmentation, habitat loss and invasive weeds as key threats to the species. The proposed action will result in impacts to 32.03 ha of suitable foraging and potentially suitable breeding habitat for the species. However, the proposed development is not likely to significantly interfere with the recovery of the species due to the small scale of impact, the large area of similar habitat available within the locality, and the establishment of the Conservation Areas within the Project Area.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



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- Impact Area
- Project Area
- Yellow-bellied Glider Potential Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig.43. Yellow-bellied glider Impact

50 100 150 200 250 m

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Map Produced: 26/08/2025
Produced By: Keryn Dowling
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Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 49: Yellow-bellied Glider Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of suitable foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area. The proposed offset site will provide long-term protection of foraging habitat for the species under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	Retained areas of broadly suitable Yellow-bellied Glider foraging habitat will be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement.
Avoidance of indirect noise impacts	Operating times detailed in **Table 1** restrict the timing of construction, operations, lading, and blasting to daylight hours minimizing indirect impacts from operational noise to the species.
Mitigation Measure Proposed	
Mitigation Measure:	**Construction Environmental Management Plan**
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all measures detailed within the CEMP and OEMP and ensuring compliance with statutory conditions.
Mitigation Measure:	**Biodiversity Management Plan**
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**).

Item	Detail
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	**Landscape and Rehabilitation Management**
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the LRM will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.

Item	Detail
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS*).*

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 50: Yellow-bellied Glider Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of Yellow-bellied Glider foraging habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits are required for the Yellow-bellied Glider (south-eastern). • However the species will be offset through Ecosystem credits created from the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

2.1.8 New Holland Mouse, Pookila (*Pseudomys novaehollandiae*)

Threatened Species Occurrence

For each threatened species, provide information about the species' occurrence within the proposed action area and surrounds, including;

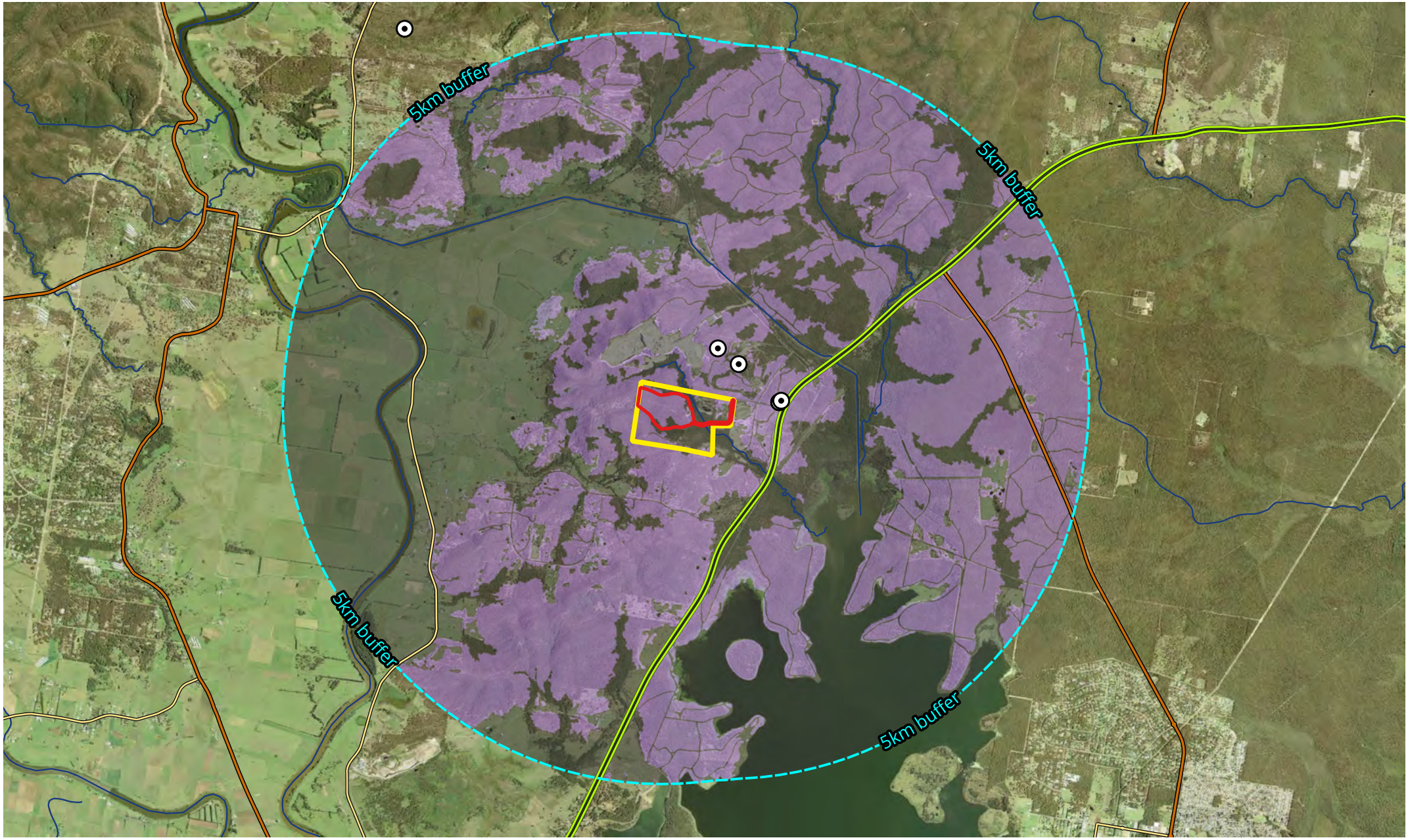
- *Provide the known records of the species within and adjacent to the proposed action area, presented as a map, including;*
    - *Records from surveys undertaken for this proposed action*
    - *Any historical database records in and around the proposed action area*
- *Provide the number of individuals of the species occurring in the proposed action area*
- *Detail the survey methodology used for each species (see below for more detail).*
- *Provide data on likely population size and extent (including populations that extend beyond the proposed action area), where available.*
- *If relevant, provide information that identifies important populations*
- *Provide information on the extent of habitat for the species in the proposed action area:*
    - *Refer to habitat requirements detailed in the species' listing advice, conservation advice, and/or recovery plan.*
    - *Specify the type(s) of habitat available (e.g., whether the habitat value is related to foraging, breeding, dispersal, etc.).*
    - *Describe the quality of the habitat.*
    - *Describe key habitat features (e.g., hollow bearing trees).*
    - *any other relevant information describing the species habitat (for example, whether the habitat is considered critical to the survival of the species).*
- *Consider occupancy trends relating to season and time of day. Longer term trends including climate change may also be relevant*

Table 51: New Holland Mouse, Pookila Occurrence

Item	Details
Species Records	
Records from Surveys Completed	The species was not recorded within the Disturbance Footprint during targeted surveys by WPC in 2013 or 2024 surveys.
Historical Records	There are five (5) records of the species within the locality, and suitable habitat occurs across parts of the Project Area. Two (2) records exist to the north of the Project Area from 2005 and three records exist to the east along the Pacific Motorway from 2018.
Individuals within the proposed action area	
Number of individuals within the proposed action area	No individuals were recorded within the Project Area.
Survey Methodology	
Detail the survey methodology used	Targeted surveys were undertaken by both KLF (2012-2016) and WPC (2023-2024) see **Table 52** for detailed survey methodology.
Population size and extent	
Provide data on likely population size and extent	**Unlikely to inhabit** The species has not been recorded within the Project Area and there is only five historical records of the species within the Locality. If present, the species may use the vegetation within the Project Area as part of a broader range including large areas of comparable habitat in the Locality. The likely population size of the species is estimated to by around 10,000 individuals within its range.
Important populations	
Provide information that identifies important populations	The Conservation Advice for the New-Holland Mouse (DCCEEW 2024a) describes important populations as they relate to the species as: "*all populations of the New Holland mouse are important for the long-term recovery and survival of this species due to the patchiness and isolated nature of the species' populations along with evidence of declines*".
Habitat Extent	
Habitat requirements	**Habitat** The New Holland mouse is known to occur in open heathlands, open woodlands with a heathland understorey, tall open forest with a grassy understorey, woodland with a grassy understorey, and vegetated sand dunes (DCCEEW 2024a). The heathland element of the species' habitat is represented by dry heathlands that are floristically diverse and even (i.e., a high number of plants that are all relatively abundant compared to each other) that grow on sandy soils with a high percentage of bare ground. It thrives in habitats that undergo early vegetation succession, often triggered by fire. The species' population is strongly influenced by rainfall, with higher abundance linked to above-average rainfall, which increases breeding and food availability. Peaks in abundance have been observed during the early to mid-stages of vegetation succession, which is typically induced by fire.

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td>Type(s) of habitat available</td><td>Habitat
The Project Area contains native vegetation broadly representing potential habitat for the species.
<u>Associated PCTs</u>
One (1) PCT within the Project Area is associated with the species in the NSW Bionet Threatened Biodiversity Database System (TBDC): PCT 3244: Lower North Spotted Gum- Mahogany- Ironbark Sheltered Forest.
The total area of potential habitat for the species within the Disturbance Footprint (32.83 ha) represents 0.7% of suitable habitat within 5km of the Project Area (based on cover of PCTs associated with the species in the TBDC. Total native vegetation: 9577.90ha, Total associated PCT area: 4,392.52ha).</td></tr>
<tr><td></td><td>
<table>
<tr><th>Plant Community Type (PCT)</th><th>Vegetation Zone</th><th>Associated with GBC</th><th>Disturbance Footprint (ha)</th></tr>
<tr><td rowspan="4">PCT 3244: Lower North Spotted Gum- Mahogany- Ironbark Sheltered Forest</td><td>Veg Zone 1: PCT 3244 (Mod - Good Condition)</td><td>YES</td><td>31.8</td></tr>
<tr><td>Veg Zone 2: PCT 3244 (Mod – Good [medium] Condition)</td><td>YES</td><td>0</td></tr>
<tr><td>Veg Zone 3: PCT 3244 (Mod – Good [poor] Condition)</td><td>YES</td><td>0.19</td></tr>
<tr><td>Veg Zone 4: PCT 3244 (Low Condition)</td><td>YES</td><td>0.61</td></tr>
<tr><td>PCT 3236: Hunter Valley Hills Wet Vine Forest</td><td>Veg Zone 5: PCT 3236 (Mod Condition)</td><td>NO</td><td>0</td></tr>
<tr><td colspan="3">Total Habitat</td><td>32.6</td></tr>
</table>
</td></tr>
<tr><td>Quality of the habitat</td><td>A total of 32.83 ha of native vegetation (including PCT 3236) is likely to represent potential foraging habitat for the New Holland Mouse. However, no individuals were identified within the Project Area, indicating the habitat is likely vacant or containing insufficient resources to support a population of the species. There are records within the locality and the vegetation within the Project Area is contiguous with similar quality foraging habitat within the locality.</td></tr>
<tr><td>Key habitat features</td><td>Key habitat requirements for the species are detailed above under the item “Habitat requirements”, the extent and occurrence of these habitat features within the Project Area are outlined in the item “Type(s) of habitat available””</td></tr>
</table>

Item	Details
Habitat critical to the survival of the species	Habitat critical to the survival of the species is defined in the species' Conservation Advice (DCCEEW 2024a): • For activities such as foraging, breeding, shelter, or dispersal; • For the long-term maintenance of the species (including the maintenance of species/subspecies essential to the survival of the species); • To maintain genetic diversity and long-term evolutionary development; or • For the reintroduction of populations or recovery of the species. *Habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:* ***For activities such as foraging, breeding, roosting, or dispersal;*** The site represents potential habitat for the species however the species is not present within the Project Area. ***For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*** The Disturbance Footprint is not key to the long-term maintenance of the species with larger areas of suitable habitat for the species in the area and region. ***To maintain genetic diversity and long-term evolutionary development; or*** The proposed Disturbance Footprint will not effect the genetic diversity or long-term development of the species with no evidence of the species using the Project Area for breeding, roosting or dispersal. A total of 57.53ha of habitat will be retained within the Retention Area with higher quality foraging and breeding habitat for the species. ***For the reintroduction of populations or recovery of the species or ecological community.*** The Disturbance Footprint represents potential habitat for the species only and is not critical habitat for the species.
Occupancy trends	
Short-term (time of day) or long-term occupancy (i.e. climate change) trends	**Short-term:** As the species has not been identified within the Project Area, the vegetation may represent supplementary habitat for the species as part of a broader range including larger areas of suitable habitat within the locality. The nocturnal species is known to move up to 206 m in one night, with home ranges ranging from 0.44ha to 1.4ha (DCCEEW 2024a). **Long-term:** The species may utilise the vegetation within the Project Area as part of a larger range, taking advantage of patches and changes in habitat suitability from disturbances such as fire. The abundance of the species is known to peak during the early to mid-stages of vegetation succession (typically induced by fire) (DCCEEW 2024a). Climate change may change habitat suitability over the long term.



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Impact Area
Project Area
New Holland Mouse(ATLAS)

New Hollland Mouse Habitat
Associated PCTs (Habitat)
Non-associated PCTs (Not Habitat)

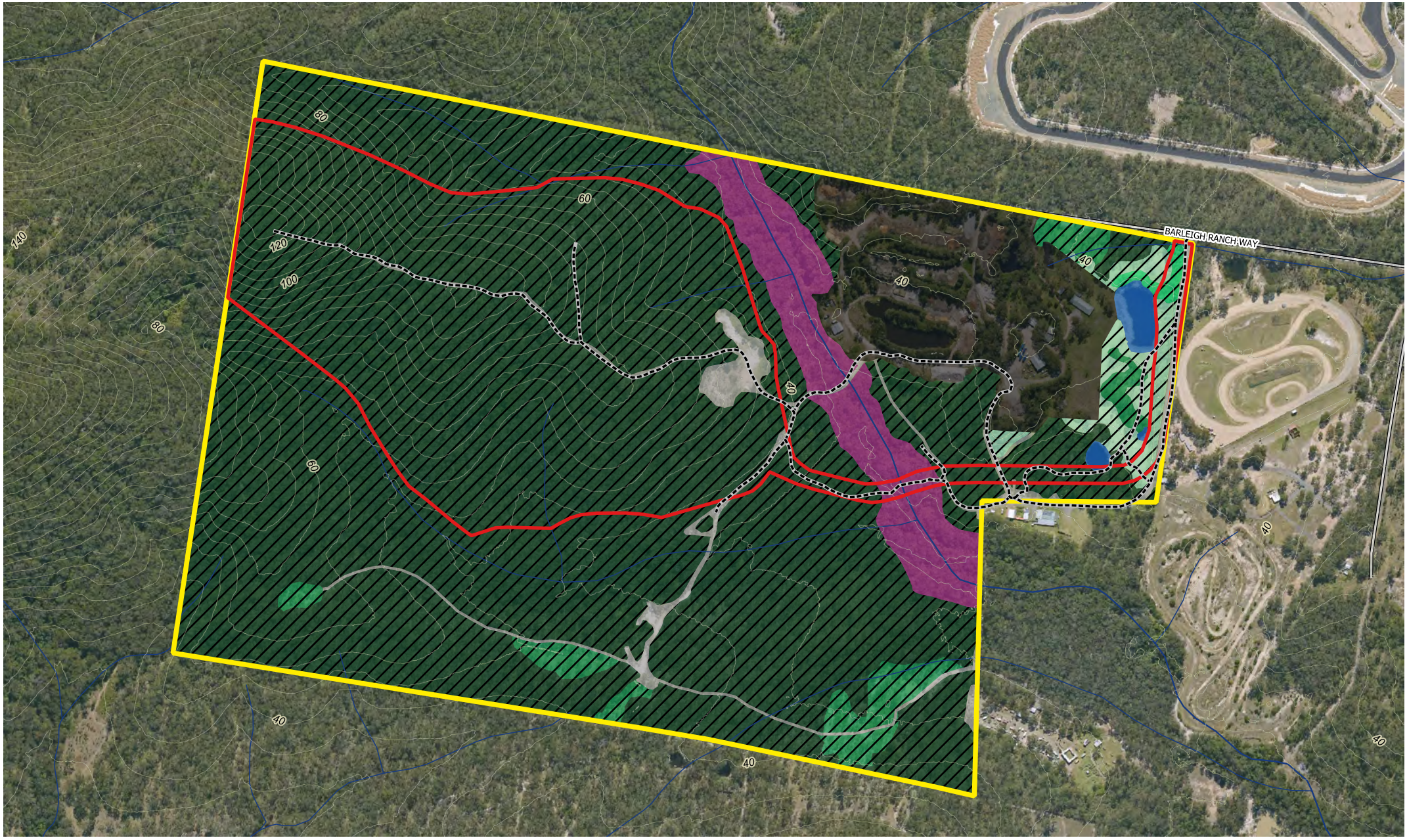
Named Watercourse
Primary Road
Arterial Road
Sub-Arterial Road

Fig. 44. New Holland Mouse Context

1 2 3 4 km

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- Impact Area
- Project Area
- New Holland Mouse Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Avoidance Area
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 45. New Holland Mouse Habitat

50 100 150 200 250 m

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Threatened Species Surveys

Describe the survey methodology in detail.

Surveys should follow appropriate survey standards, e.g.:

- *The department's survey guidelines, if available for the species*
- *The NSW BAM, endorsed by the department*
- *Best practice survey methodology for the species detailed in scientific literature, where the above are not available for the species*

Identify which methodology has been used for each species and provide justification where methodology differs from the standard.

Maps displaying the survey outcomes overlaid with the proposed development footprint.

Identify where Commonwealth methodologies differ from those required or recommended by State government agencies. Ensuring that Commonwealth survey and identification requirements are incorporated into surveys at the earliest opportunity will reduce the likelihood of additional surveys being required.

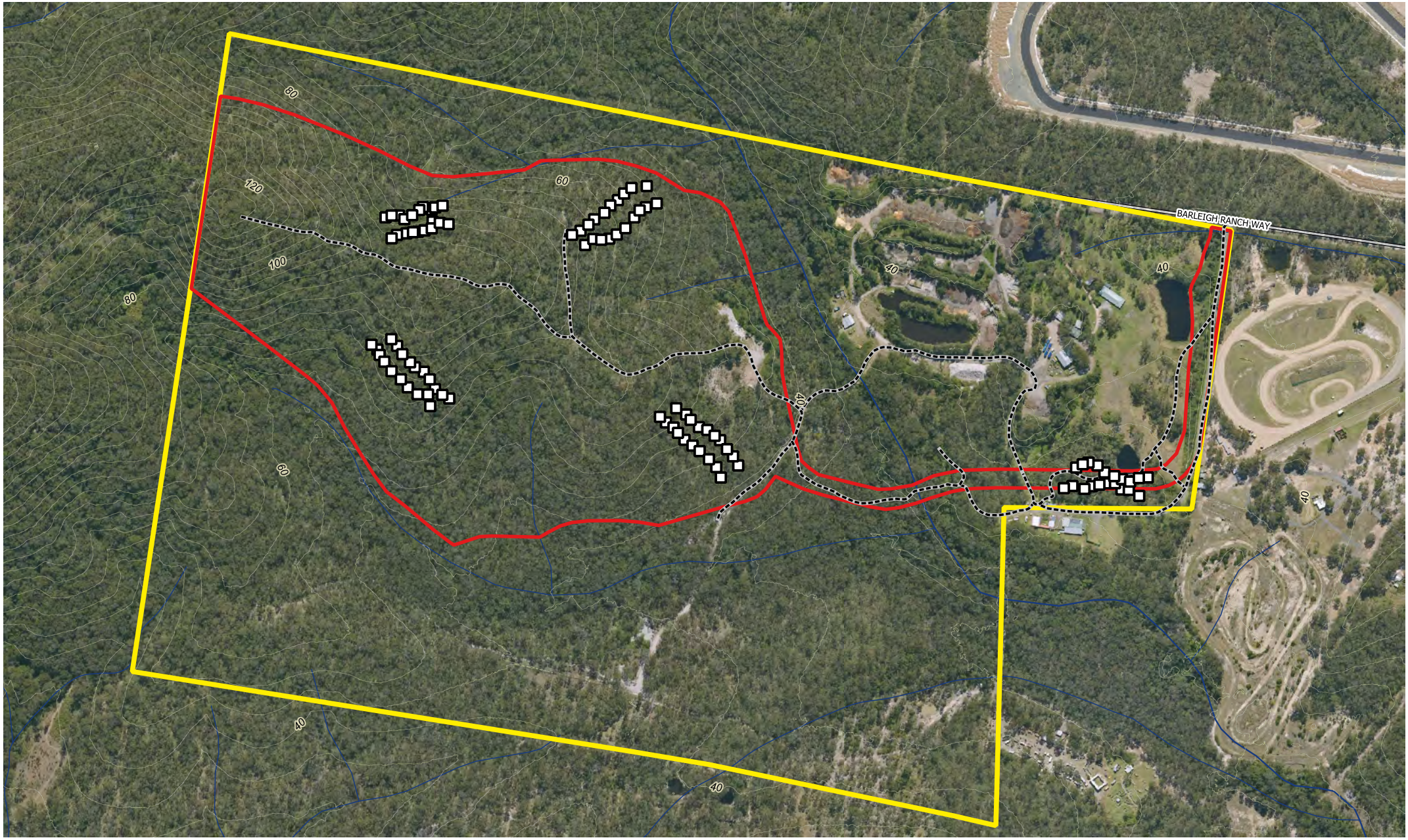
If no surveys were undertaken for a species, provide justification

Append survey results to main document

If the proposed action is being assessed under the NSW BAM, append all relevant BAM documentation to the preliminary documentation (i.e., the BAR).

Table 52: New Holland Mouse Survey Effort

Survey Type	Survey Requirements	Surveys Completed
Terrestrial Elliot A and B traps	**Department Survey Guidelines** *The Elliott trap survey effort used by Catling and colleagues (1997) is as follows:* • *20 Elliott A traps placed in two parallel transects 10 metres apart per site • traps spaced at 7 metre intervals* • *traps baited with peanut butter and rolled oats* • *transects placed at right angles to forest tracks and commenced 20 metres from the track edge* • *traps were set for three consecutive nights* • *trapping sites selected according to habitat (vegetation types and climatic environments)*	**Kleinfelder 2013** **Terrestrial Elliot A traps**: • 25 traps per transect over 4 nights, total 300 trap nights. • **Required effort**: 200 trap nights. **Arboreal hair tubes**: • 10 hair tubes per transect over 4 nights, a total of 120 trap nights. • **Required effort**: 60 trap nights. **Terrestrial hair tubes**: • 10 hair tubes per transect over 4 nights, a total of 120 trap nights. • **Required effort**: 80 trap nights. • Hair tubes are cone-shaped, allowing for a full size range of mammals to be sampled. **WPC (2023/2024)** The terrestrial Elliot A trapping method involves deploying 20 traps per transect across five transects over four nights, resulting in a total of 400 trap nights. (**Figure 46**) Survey effort completed in 2023 and 2024 is mapped in **Figure 46**. Survey effort completed in 2017 is detailed further in **Appendix 4**.
	The NSW BAM *Not available.*	
	Other (best practice survey methodology) *Small Elliot traps for 100 trap nights over three to four consecutive nights per 50ha plus an additional effort for every additional 100ha.*	



Impact Area
Project Area
Elliot A- Terrestrial- 08 April 2024
Named Watercourse
Minor Watercourse
Contours (5m)
Local Road
Tracks

Fig. 46. New Holland Mouse Survey Effort

50 100 150 200 250 m

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Impact Assessment

The preliminary documentation must include an assessment of all potential impacts (including direct, indirect, facilitated, and cumulative impacts) that may occur as a result of all project phases and elements of the proposed action on each threatened species listed in section 4.1 above. You must also consider the potential of the proposed action to impact on adjacent areas likely to contain threatened species and ecological communities.

The department has identified the following impacts as being particularly relevant to the proposed action, which should be considered when preparing the preliminary documentation:

- *Vegetation clearance and habitat loss/degradation*
- *Injury / mortality:*
- *Introduction and/or spread of invasive weeds and pests:*
- *Artificial light, noise and vibration disturbance:*
- *Dust:*
- *Water:*

Table 53 below details the following information required by the department;

- ***Identify the nature and extent of the likely short-term and long-term impacts*** *from the activities, elements, or stages of the proposed action. When identifying impacts, refer to the significant impact criteria for threatened species and ecological communities in the MNES Significant impact guidelines 1.1, noting that the impact criteria differ among threatened ecological communities and threatened species with different listing statuses.*
- ***Quantify the area of direct and indirect impacts*** *for each species and community including the total area of impact in hectares, and the number of individuals impacted, if known (most likely to be relevant for threatened plants identified during survey),*
- *Provide an analysis of the likely* ***impacts and the long-term viability of the species/community*** *if the proposed action was to proceed, at a:*
    - *Local (site level) scale – discuss impacts to connectivity,*
    - *Regional scale – discuss impacts to connectivity, potential cumulative impacts within the broader region*
- *Provide details on whether* ***any impacts are likely to be unknown, unpredictable or irreversible*** *and what confidence is placed on the predictions or relevant impacts.*
- *Provide* ***justification for any conclusions*** *regarding potential impacts in relation to specific needs and characteristics of each species and/or community, including references to conservation advices, listing advices, recovery plans, and any other technical data or information. If these are not applicable, a brief statement to this effect must be included.*

Table 53: New Holland Mouse Impact Assessment

Item	Detail
Nature and extent of the likely short-term and long-term impacts	
<u>Preconstruction Phase</u> The establishment of management plans, baseline monitoring, and completion of required preconstruction assessments (i.e. pre-clearance and clearing supervision in accordance with management plans).	**Short Term Impacts** *<u>Risk of injury and mortality during native vegetation clearing</u>* The proposed action will result in the removal of 32.03 ha of native vegetation, considered potential habitat for the species. However, the species was not recorded within the Project Area. It is unlikely that the species will be directly impacted by vegetation clearing activities during the preconstruction phase, however impacts to the species will be minimised through the completion of pre-clearance surveys and clearing supervision as per management plans. The mitigation measures in **Table 55** will be implemented to reduce impacts during construction and operation activities.
	Long Term Impacts *<u>Loss of foraging habitat</u>* The proposed action will result in the removal of 32.83 ha of native vegetation, considered potential habitat for the species. The proposed action will impact a total of 0.7% of mapped suitable habitat for the species within 5km of the Project Area, as such the proposed action is unlikely to have a significant impact on the extent of suitable foraging habitat for the species. Areas of similar quality foraging habitat within the Project Area will be retained and managed as an offset site. *<u>Impacts to population connectivity and movement corridors</u>* The proposed action minimises direct impacts to potential movement corridors associated with Seven Mile Creek and its tributaries. Maintaining riparian vegetation corridors within the Project Area will retain these movement corridors, supporting long-term population dispersal within the locality.
	Vegetation clearing and habitat loss/degradation associated with the proposed action **will not result in a significant impact on the species**.
	Injury/mortality associated with the preconstruction phase of the proposed action **will not result in a significant impact on the species**.
<u>Construction Phase</u> Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.	**Short Term Impacts** *<u>Risk of injury and mortality during construction activities</u>* The proposed development is unlikely to injure or kill any individuals of the species. All activities will be conducted throughout daylight hours and adhere to the implementation of mitigation measures outlined in **Table 55**.
	Injury/mortality associated with the proposed action **will not result in a significant impact on the species**.
<u>Operation</u> Establishment and expansion of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase.	**Long Term Impacts** *<u>Introduction and/or spread of invasive weeds and pests</u>* Introduced predators are recognized as a key threat to the New Holland Mouse (DCCEEW 2024a). The proposed action is not anticipated to result in any invasive species becoming established in areas of potential habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a stewardship site. Implementation of a vertebrate pest/weeds management plan as part of the stewardship site agreement, which would minimise potential impacts from vertebrate pests/weeds within the Project Area. *<u>Noise and vibration disturbance</u>*

Item	Detail
	The method of extraction is constrained by the nature of hard rock resources, which require blasting and excavation. However, extraction sequencing has been strategically designed to maintain a protective noise barrier to the south, reducing potential noise impacts on nearby properties. Operation times (shown in **Table 1**) illustrate that any potential noise and vibration disturbances are restricted to daylight times, reducing indirect impacts to surrounding habitat for the species. As such, it is unlikely that the proposed action will have an impact on the species through noise and vibration. *Artificial light disturbance* Inappropriate lighting can lead to behavioural changes or displacement from areas of habitat adjacent to the proposed action. Operation times provided in **Table 1** show that operation of the proposed quarry will occur during daylight hours. Operating times along with the implementation of mitigation measures in **Table 55** allow us to conclude that artificial lighting impacts will be effectively mitigated and will not have a significant impact on the species. *Impacts of dust on surrounding vegetation/habitat* Blasting and other quarrying activities may increase dust which may affect plant photosynthesis and transpiration, as well as cause respiratory and/or olfactory perception issues in fauna. Dust will be managed under a site-specific management plan. Buffers have also been detailed within the proposal plans (see **Figure 2**). *Water quality* Changes to nearby ground or surface water availability and/or quality could impact native vegetation used as habitat for listed threatened species. Water quality will be managed under a site-specific management plan.
	Introduction and/or spread of invasive weeds and pests associated with the proposed action **will not result in a significant impact on the species**.
	Artificial light, noise and vibration disturbance associated with the proposed action **will not result in a significant impact on the species**.
	Dust associated with the proposed action **will not result in a significant impact on the species**.
	Water associated with the proposed action **will not result in a significant impact on the species**.
Quantify the area of direct and indirect impacts	
Direct Impact Area	A total of 32.83 ha of broadly suitable foraging habitat for the New Holland Mouse will be impacted. These impacts represent an impact to 0.7% of mapped suitable habitat within 5km of the Project Area.
Indirect Impact Area	Through the implementation of mitigation measures in **Table 55** the area of indirect impacts will be minimal. Buffers accounting for indirect impacts have been detailed within the proposal plans (see **Figure 2**).
Impacts and the long-term viability of the species/community	
Local (site level) scale	The proposed action will not result in a significant impact to the species or habitat for the species locally. Avoidance of vegetated corridors along Seven Mile Creek and its tributaries minimises impacts to connectivity within the locality. Broadly suitable habitat will be retained and managed within the Project Area.

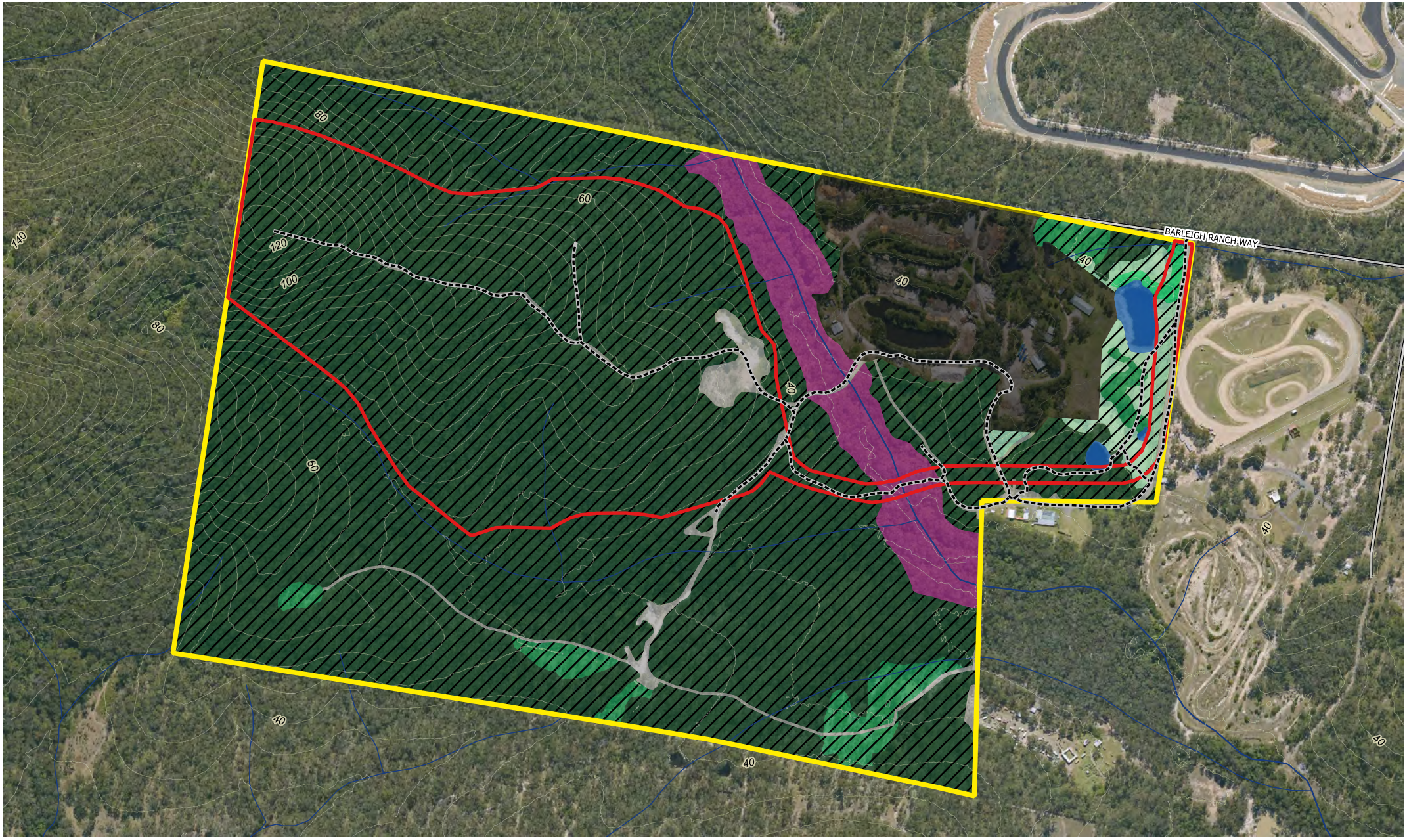
Item	Detail
Regional scale	The proposed action will not have a significant impact on the extent of foraging habitat for the species at a regional scale, with the vegetation within the Disturbance Footprint representing 0.7% of suitable habitat within 5 km of the Project Area. Considering the large area of suitable habitat within the locality the proposed action is considered unlikely to lead to a significant increase in habitat fragmentation/isolation within the locality.
Unknown, unpredictable or irreversible Impacts	
Details on whether any impacts are likely to be unknown, unpredictable or irreversible	The effectiveness of impact mitigation and management measures detailed within this report will be expanded upon within site specific management plans. Each plan will provide opportunities for review and amendment of management actions throughout their implementation periods.
Justification for any conclusions	
The proposed action is unlikely to result in a significant impact on the species. The proposed action will result in the loss of 32.03 ha of broadly-suitable foraging habitat; however, this impact is not considered critical to the survival of the species. The proposed action will not impact breeding habitat, introduce artificial light, or contribute to an increase in threats such as invasive species. Given the small scale of the impact, the availability of alternative foraging areas, and the implementation of targeted mitigation measures, the proposed action is not expected to significantly interfere with species recovery or reduce its area of occupancy. Indirect impacts to the species associated with the proposed action will be further minimised through the implementation of measures detailed in site-specific management plans. A significant impact assessment has been completed below.	

Table 54: New Holland Mouse – Significant Impact Assessment

Criteria	Response
Is the action likely to lead to a long-term decrease in the size of a population?	**No, the action is unlikely to result in a long-term decrease in the size of a population.** Suitable habitat for the NHM occurs within the Project Area. However, no individuals were recorded within the Project Area. Given the relatively small area of suitable habitat proposed to be impacted it is unlikely that the action would lead to a long-term decrease in the size of local population.
Will the action reduce the area of occupancy of the species?	**Yes, the action will reduce the area of occupancy of the species.** The proposed action will impact a total of 32.03ha of foraging habitat for the species. However, this represents <0.01% of the known area of occupancy for the species and 0.7% of vegetation communities associated with the species within 5km of the Project Area. Impacts associated with the proposed action will be progressively rehabilitated, as such there is potential for these species to utilise the area as habitat once the rehabilitation reaches a suitable age.
Will the action fragment an existing population into two or more populations?	**No, the action will not fragment an existing population into two or more populations** Given the mobility of the species and the availability of habitat in proximity to the Disturbance Footprint and lack of records within the Project Area, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	**No, the action is not likely to adversely affect habitat critical to the survival of the species.** Under the Significant Impact Guidelines, habitat critical to the survival of a species is defined as areas that are necessary: for breeding or

Criteria	Response
	dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. Both the Disturbance Footprint and the Retention Area represent potential suitable habitat for the New Holland Mouse. The species habitat is generic (self-constructed burrows) and would not be restricted to the Disturbance Footprint. Expanses of similar habitat, including softer substrates preferred for burrowing (DCCEEW, 2024a), is available within areas to be retained within the Retention Area and the locality. As such, the proposed action is not expected to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of a population?	**No, the proposed action will not disrupt the breeding cycle of a population.** The proposed action will not impact on the breeding cycle of the species as no individuals were recorded within the Disturbance Footprint or Project Area.
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No, while the action will remove potentially suitable habitat for the species this will not lead to the decline in the species.** The loss of potential suitable habitat within the Disturbance Footprint is not considered critical to the survival of the species. Extensive areas of similar vegetation representative of the region occur to the north of the Proposed Development and within the Project Area. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	**No, the proposed action will not result in the establishment of a harmful invasive species.** The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the Project Area is proposed to be secured under a biodiversity offset agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the Project Area are managed.
Will the action introduce disease that may cause the species to decline?	**No, the proposed action will not result in the introduction of a harmful disease.** Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.
Will the action interfere with the recovery of the species?	**No, the action is not expected to interfere with the recovery of the species.** There is no adopted or made Recovery Plan for this species. The Approved Conservation Advice for Pseudomys novaehollandiae (New Holland Mouse) (Department of the Environment, Water, Heritage and the Arts, 2010) lists a number of priority actions for this species. The action would be inconsistent with the following priority action listed in this plan, given the three individuals recorded within the Action Area: • Ensure there is no disturbance in areas where the New Holland Mouse occurs, excluding necessary actions to manage the conservation of the species. The proposed development will not result in impacts to or near breeding habitat for the species. The development will impact potential habitat for

Criteria	Response
	the species. However, the proposed development is not likely to significantly interfere with the recovery of the species due to the small scale of impacts to habitat resources, the large area of potential habitat within the locality, and the establishment of a stewardship site within the Project Area.
Conclusion	**The proposed action is not expected to have a significant impact on the species.**



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13 Barleigh Ranch Way
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- Impact Area
- Project Area
- New Holland Mouse Habitat

Vegetation

- PCT 3236: Hunter Valley Hills Wet Vine Forest
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Medium)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Mod-Good-Poor)
- PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest (Low)
- Dams
- Excluded
- Named Watercourse
- Minor Watercourse
- Contours (5m)
- Local Road
- Tracks

Fig. 47. New Holland Mouse Impact

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 26/08/2025
Produced By: Keryn Dowling
GDA94 / MGA zone 56

Avoidance, mitigation, and management measures

The preliminary documentation must provide information on specific measures proposed to avoid, mitigate and manage each identified impact from the proposed action on the relevant threatened species or community. The measures must address all project phases (pre-construction, construction and operation) of the proposed action.

If it is necessary to rely on any confidential material, you should consult the department on the handling of that material before submitting your preliminary documentation for publication.

- *Provide a consolidated list of all avoidance/mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.*
- *For each of the mitigation measures proposed:*
    - *Discuss the likely cost effectiveness of proposed measures*
    - *Provide an assessment of the predictive effectiveness for each protected matter*
    - *Discuss any statutory or policy basis for the measures*
    - *Discuss the relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans*
    - *Discuss the relationship, if any, with measures proposed by state and/or local governments relevant to minimising the impacts of the action on protected matters*
    - *Identify the roles and responsibilities associated with implementation*
- *Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered*
- *Clearly state and discuss and variables or assumptions made in the assessment.*
- *Discuss the extent to which limited availability of relevant information has the potential to influence the conclusions of the assessment.*
- *Please provide the following plans where avoidance, mitigation and management methods are discussed in relation to the impacted species:*
    - *Environmental Management Strategy and associated management plans, including:*
        - *Biodiversity Management Plan*
        - *Water Management Plan*
        - *Rehabilitation Management Plan*
- *If not available, at minimum set out the framework for ongoing mitigation, management and monitoring programs for the relevant impacts of the action.*

Table 55: New Holland Mouse Avoidance, Mitigation and Management Measures

Item	Detail
Avoidance Measures Proposed	
Avoidance of foraging habitat	The proposed action will impact a total of 32.03 ha of suitable foraging habitat for the species. However, the proposed action minimises direct impacts to a large area of suitable foraging habitat within the Project Area. The proposed offset site will provide long-term protection of foraging habitat for the species under a stewardship site agreement.
Retention and management of suitable habitat in-perpetuity	Retained areas of broadly suitable New Holland Mouse habitat will be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement.
Mitigation Measure Proposed	
Mitigation Measure:	***Construction Environmental Management Plan***
Summary	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads (see **Section 3.3**). An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities including operation timing (see **Section 3.3**
Cost effectiveness of the proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the CEMP and OEMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	Required under Conditions of Consent
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species (i.e. noise, dust, and traffic).
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all measures detailed within the CEMP and OEMP and ensuring compliance with statutory conditions.
Mitigation Measure:	***Biodiversity Management Plan***
Summary	Provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control (see **Section 3.3**).
Cost-effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the BMP will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The proposed measures align with statutory requirements in accordance with the relevant Development Consent (8 July 2024) which outlines specific biodiversity conditions that must be met, including the establishment of a Biodiversity Stewardship Site and

Item	Detail
	the preparation of a BMP. Additionally, compliance with the Guidelines for Controlled Activities on Waterfront Land (*DPI Water 2012*) ensures that riparian corridors are maintained to protect aquatic and terrestrial ecosystems. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species
Roles and responsibilities in implementation	The Applicant – Responsible for implementing all biodiversity measures and ensuring compliance with statutory conditions.
Mitigation Measure:	***Landscape and Rehabilitation Management***
Summary	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**
Cost effectiveness of proposed measure	Appropriate management plans are a cost-effective means to manage and minimise short-term and long-term impacts associated with a proposed action.
Predictive effectiveness for species	Measures in the LRM will outline measures to reduce direct and indirect impacts to the species and include monitoring to ensure effectiveness.
Statutory or policy basis for the measures	The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6 (of consent conditions). The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. See relevant conditions of consent in **Appendix 2**.
Relationship, if any, with measures identified in the department's conservation advices, recovery plans and threat abatement plans	This mitigation measure aims to reduce key threats to the species recognised within relevant conservation advice, recovery plans and threat abatement plans including direct impacts to habitat resources and indirect impacts to the species.
Roles and responsibilities in implementation	The Landscape and Rehabilitation Management is detailed further in **Section 3.3**

Compensation Measures (Offsets)

Significant residual impacts are impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Significant residual impacts must be offset in accordance with the department's EPBC Act Environmental Offsets Policy 20125 and OAG 6, or other endorsed offset framework (for example, the NSW BOS*).*

The preliminary documentation must describe the proposed offset strategy, outlining how the offsets will be achieved for each protected matter, demonstrating that the offset liability can be satisfied by the mechanisms, and specifying the expected timeframe for legal security of the offsets. Offsets will generally need to be underway prior to commencement of the proposed action.

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below:

The offset strategy must:

- Meet the principles specified in the EPBC Act Environmental Offsets Policy;
- Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place; and
- Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).

The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation. For more information see Appendix B: Endorsed offsetting frameworks.

The NSW BAM and BOS have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a BDAR.

Table 56: New Holland Mouse Compensatory Measures (Offsets)

Item	Detail
Residual Impacts	
Provide conclusions about the likely residual significant impacts to each threatened species and/or community after proposed avoidance and/or mitigation measures are considered	The proposed action is not anticipated to result in a significant impact to the species. Residual impacts to the species after the implementation of proposed avoidance and mitigation measures include the following: • Direct impacts to 32.03 ha of potential New Holland Mouse habitat
EPBC Act Environmental Offsets	
Offset Strategy Summary	Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. See "Other Endorsed Offset Frameworks" below.
Relevant Documentation	Not Applicable
Other Endorsed Offset Frameworks	
Offset Strategy Summary	Offsetting outcomes for this species will be achieved through the NSW BAM and BOS endorsed by the Commonwealth. "Like-for-like" offsetting requirements under the scheme for the species include: • No Species Credits are required for the New Holland Mouse. • However, the species will be offset through Ecosystem credits created from the BOS.
Relevant Documentation	See appended BAR (**Appendix 4**)

3. OTHER CONSIDERATIONS

3.1 ECONOMIC AND SOCIAL MATTERS

The preliminary documentation must provide information about the expected long- and short-term economic and social impacts of the proposed action, both positive and negative. This must include, but not necessarily be limited to, the points outlined below.

- *Consideration of negative impacts (e.g., disruption to existing community infrastructure, environmental features, and/or cultural and traditional activities)*
- *Consideration of positive impacts (e.g., increased housing, employment, or social amenity)*
- *Consideration of different scales of impact (e.g., local, regional, and national)*
- *Estimated capital value and ongoing economic value, using specific dollar or other numerical values where relevant*
- *Discussion of relevant public consultation undertaken, including any issues raised in objection or support of the proposed action*
- *Discussion of any contributions (for example, government funding, or 'gifting' of land to the NSW Government under a voluntary planning agreement, as discussed in the referral information)*

These matters are detailed in **Table 57.**

Table 57: Economic and Social Matters Considered

Item	Detail
Negative impacts (e.g., disruption to existing community infrastructure, environmental features, and/or cultural and traditional activities). Include different scales of impact (e.g., local, regional, and national)	**Disruption to existing community infrastructure** Minor short-term impact on existing community infrastructure due to upgrades to local roads and Pacific Highway where construction may cause temporary disruption to traffic and access. Mitigation measures in place through recommended by the traffic assessment in construction and operation, throughout the life of the project.
	Disruption to existing environmental features, and/or cultural and traditional activities Containment, removal, and maintenance of non-native species on-site, including extensive Lantana removal, an activity that may temporarily affect local flora and fauna but predicts improvement in the land condition in long term.
Positive impacts (e.g., increased housing, employment, or social amenity) Include different scales of impact (e.g., local, regional, and national)	**Road Safety** A developer-funded intersection will enhance traffic flow and reduce congestion.
	Increased housing With 100% of the materials produced used for housing, road construction, community, and commercial buildings, the impact is supporting infrastructure development and urban growth. Additionally, increased efficiency in material supply will reduce construction costs and timelines.
	Employment

Item	Detail
	The direct employment of approximately 20–30 staff and an additional 20–30 contractors for construction and maintenance in the construction and operational phases of the development which could lead to the indirect potential for increased affordable housing and infrastructure projects or at a minimum boost the local employment and stimulate the local economy.
	Community We have an agreed arrangement with Eagleton Respite Care to organise day trips for the first year to experience the potential noise and vibration to demonstrate our modelling that shows no impact to residents.
Scale of the Project	**Local** The quarry operations will be relatively small in comparison to other quarry operations in Newcastle, but the local impact is critical in maintaining the supply market given closures and scaled-back production in the Newcastle/Sydney region, supporting the increasing demand for the local area.
	Regional Supports regional infrastructure projects in the Newcastle and Lower Hunter regions, including roads, rail, and construction developments.
	National Consideration of national impact by possible contribution to major projects such as the Newcastle Airport/RAAF expansion and the M1 to Raymond Terrace upgrade.
Estimated capital value and ongoing economic value	**Estimated Capital Value** Over a 24-year period, the quarry is projected to extract approximately 12.87 million tonnes of hard rock, generating substantial revenue and economic benefits. The quarry is expected to have a total capital investment of approximately $11.6 million, covering initial construction, site preparation, and infrastructure development. Over its 24-year operational life, the quarry will incur an operational expenditure of around $88.6 million, bringing the total project investment to $100.2 million with significant capital expenditure of approximately $5 million allocated for roadworks. This investment will support local employment, infrastructure upgrades, and material supply for regional construction projects. The is projected to generate a cumulative economic impact of $174.6 million, significantly contributing to the Hunter Region's economy through job creation, business growth, and supply chain demand.
	Ongoing Economic Value These investments are projected to generate significant economic activity within the Hunter Region, with an estimated cumulative economic impact of $174.6 million over the 24-year period. The long-term economic benefits through employment, business supply chain opportunities, and improved infrastructure.
Relevant public consultation undertaken	**Discussion of relevant public consultation undertaken, including any issues raised in objection or support of the proposed action** In the preparation of the approval process there has been extensive community consultation over 11 years, including face-to-face meetings, community meetings, briefings, and direct engagement with adjoining property owners. Approximately 47% of respondents in initial surveys expressed reservations about the quarry and its benefits, highlighting the concerns related to environmental impacts, traffic, and land use compatibility.

Item	Detail
	The community groups opposing the quarry also highlighted the need for ongoing dialogue and responsive planning. The consultation process reflects the quarry's ongoing commitment to engage with the community and stakeholders, addressing concerns, and incorporating feedback into planning and implementation of management and mitigation measures relating to the quarry.
Contributions	**Discussion of any contributions (for example, government funding, or 'gifting' of land to the NSW Government under a voluntary planning agreement, as discussed in the referral information)** Approximately $5 million allocated for roadworks, contributing to safer transport infrastructure. Collaboration has been proposed with local councils with land dedicated to PSC and TfNSW for public infrastructure improvements. Providing lasting benefits to the Hunter Region's transport and development sectors. While there is no formal VPA the contributions are in accordance with a VPA committing to some substantial infrastructure enhancements ultimately benefiting the community.
Ecological Sustainable Development (Section 3A of the EPBC Act)	***a) Decision - making processes should effectively integrate both long - term and short - term economic, environmental, social and equitable considerations;*** The proposed action balances long-term and short-term economic, environmental, social and equitable considerations summarized in this table above and in **Section 2** including: • Short-term disruption to community infrastructure during upgrades to local roads and the Pacific Highway • Road safety improvements as a result of intersection upgrades • Increased housing and infrastructure through the supply of materials • Increase in employment • Long-term economic benefits to the local community • Avoidance of areas of higher environmental value • Long-term conservation of areas of higher environmental value
	b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation; The proposed action does not rely on a lack of full scientific certainty to justify actions. Assessment of impacts are detailed in **Section 2** and impact mitigation and management measures are to be expanded upon in site specific management plans. Each plan will provide opportunities for review and amendment of management action throughout their implementation periods allowing the proponent to effectively manage any unforeseen management requirements.
	c) the principle of inter - generational equity--that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations; The proposed action avoids impacts to areas of higher value environmental value within the Project Area. These areas will be incorporated into a biodiversity stewardship site and managed inperpetuity ensuring that high value environmental values are maintained or enhanced for the benefit of future generations.

Item	Detail
	d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision - making; The proposed action avoids impacts to areas of higher value environmental value within the Project Area including higher condition vegetation zones and habitat for MNES.
	e) improved valuation, pricing and incentive mechanisms should be promoted. The proposed action avoids impacts to areas of higher value environmental value within the Project Area.

3.2 ENVIRONMENTAL HISTORY OF THE PERSON PROPOSING TO TAKE THE ACTION

The preliminary documentation must include details of the environmental history of the person proposing to take the action. As per section 136(4) of the EPBC Act, provide up-to-date information, for the last ten years, on the following:

- *The environmental history of the person proposing to take the action, and of its executive officers;*
- *The environmental history of the person proposing to take the action, parent body or parent bodies; that is, any body or bodies of which it is a subsidiary; and*
- *The environmental history of the executive officers of the person proposing to take the action parent body or parent bodies.*

For any contravention of national or state environmental law identified, please provide details of any penalties or other sanctions imposed, as well as information on any action taken to address the incident associated with the penalty or sanction.

These matters are detailed in **Table 58**

Table 58: Environmental History of the person proposing to take the action

Item	Detail
Environmental history of the person proposing to take the action, and of its executive officers;	The entity is a new company with no prior environmental history, aside from the approval process over the past 10 years.
The environmental history of the person proposing to take the action, parent body or parent bodies; that is, any body or bodies of which it is a subsidiary	The company has no subsidiaries or parent bodies with any recorded environmental history meaning, with no additional environmental history from associated entities.
The environmental history of the executive officers of the person proposing to take the action parent body or parent bodies	No known environmental law contraventions or penalties. No executive officers have been involved in any environmental breaches or sanctions and the proposal was subject to the EIS, including assessments on biodiversity, water resources, noise, and air quality before granting approval in July 2024.

3.3 MONITORING AND REPORTING

Provide details of the proposed maintenance, monitoring and adaptive management programs to help limit the impacts of the action on MNES. These may include, but not be limited to:

- *Management programs, including offsets, environmental management plans, erosion, sediment and runoff controls, water quality testing and other measures to maintain or enhance habitats in the vicinity of the action.*
- *Details of ongoing research and monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed mitigation measures.*

Management plans required for the proposed action include the following:

Construction Environmental Management Plan (CEMP)

A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads. The CEMP will include: Environmental Management, Traffic Management around road works, Air Quality, Water Quality, including Erosion and Sediment Control Plans, Noise, Heritage, including provision subsurface testing at the crossing of Seven Mile Creek, Waste Management, Emergency Response, including bushfire hazards, and Community Consultation.

Operational Environmental Management Plan (OEMP)

An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities. The OEMP will include: Environmental Management, Traffic Management, Air Quality, Water Quality, Noise & Vibration, Heritage, Waste Management, Emergency Response, including from bush fire hazards, and Community Consultation.

Biodiversity Management Plan (BMP)

The BMP provides protocols to minimise impacts to wildlife and protect vegetation adjacent to the Disturbance Footprint during construction, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation and weed control.

The BMP includes: Weed Management Plan and Pest Management Plan; Pre-clearing fauna surveys; Clearing protocols; Hollow-bearing tree clearing protocol; Fauna translocation protocol; and Vegetation clearing protocol.

Measures specific to the species include the following;

- Pre-clearance surveys – Koala pre-clearance surveys are to be completed prior to works in accordance with the BMP and by a qualified ecologist. The BMP provided for protocols for an exclusion zone, time for any detected koalas to self-relocate, and koala retrieval and relocation to a safe location within the biodiversity offset area if safe (otherwise tree to be left standing).
- Retention of vegetation corridors on the southern, central and northeast parts of the Project Area. Connectivity through the eastern corridor would be enhanced through revegetation of grassland areas.
- Speed limits on traffic using access roads to 40 km / hr (in accordance with CKPoM 2002) will reduce the potential for death or injury to wildlife as well as reduce noise and pollution levels.

- The development site should be delineated with permanent wildlife friendly fencing, and include signage to identify 'no-go' areas.

Landscape and Rehabilitation Management

The Landscape and Rehabilitation Management would include the following:

- Weed management within the development site during operations;
- Management of any retained vegetation within the development footprint during operations;
- Measures to protect areas of native vegetation and fauna habitats occurring adjacent to the development site;
- Details of traffic-calming measures and signage to be installed within the site to reduce the risk of vehicle strikes to Koalas and other native fauna;
- Details of proposed rehabilitation and revegetation (including timing, target species composition, rehabilitation methods, and ongoing monitoring);
- Details on appropriate soil handling processes, including topsoil management for later use in any rehabilitation areas;
- Details on the salvage, storage and redistribution of habitat features (e.g. hollows and logs) within the rehabilitation areas;
- Fire management;
- Vertebrate pest control within the development site;

Details of maintenance, monitoring and performance criteria to assess the condition and functioning of the adjoining vegetation and fauna habitats, and to evaluate progress of rehabilitation works.

Water Management Strategy

Implementing a Water Management Strategy

Prepare and implement a Water Monitoring Plan which includes.

- Surface water quality monitoring will be undertaken at upstream and downstream locations on Seven Mile Creek.
- The parameters and frequency of sampling will be a monthly sampling of pH, EC, TSS, Total Phosphorus and Total Nitrogen.
- Monitor the performance of the water management systems and associated sediment control measures monthly and after major storm events. Flow monitoring of Seven Mile Creek will be undertaken by visual observation during water quality sampling, the visual flow data observations will be used to inform the assessment of water quality data.
- Document rainfall depths, water usages, dam volumes and discharges (during extreme events) together with other data that will facilitate updating of water balances, assessment of spill risk and associated water management requirements.
- Undertake dam safety and maintenance checks biennially (every two years) on all water management dam walls to assess structural integrity and maintenance requirements,

including removal of any trees and shrubs that may impact on the integrity of the walls, and ensuring adequate erosion protection is in place.

- Report results of surface water monitoring activities in the Annual Environmental Review which will be distributed to the relevant government agencies and made available to the public. All monitoring data will be retained in an appropriate database.
- Implement a Construction Erosion and Sediment Control Plan which meets the requirements of the Blue Book Volumes 1 and 2 (Landcom, 2004 and DECC, 2008) as part of the CEMP. The performance of erosion and sediment controls at construction areas, including the creek crossing and associated water management measures will be reviewed and monitored during construction.
- Implement erosion protection at the bridge for the crossing of Seven Mile Creek.

These matters are detailed in **Table 59**

Table 59: Monitoring and Reporting

Item	Detail
Management programs proposed	
Construction Environmental Management Plan	The CEMP will include: • Environmental Management • Traffic Management around road works • Air Quality management • Water Quality, including Erosion and Sediment Control Plans • Noise management • Blast and vibration management • Heritage management • Waste management • Clearing protocols for management of wildlife • Emergency Response, including from bush fire hazards • Community Consultation
Operational Environmental Management Plan	The OEMP will include: • Environmental Management • Traffic Management • Air Quality management • Water Management Plan, including a Surface Water Management Plan, and a Groundwater Management Plan, • Noise management • Blast and vibration management • Heritage management • Waste management • Flora and fauna management • Landscaping and rehabilitation • Emergency Response, including from bush fire hazards • Community Consultation
Flora and Fauna Management Plan	The Flora and Fauna Management Plan would include the following:

Item	Detail
	• Weed Management Plan and Pest Management Plan; • Pre-clearing fauna surveys; • Clearing protocols: • Hollow-bearing tree clearing protocol; • Fauna translocation protocol; and • Vegetation clearing protocol.
Landscape and Rehabilitation Management	The Landscape and Rehabilitation Management would include the following: • Management of any retained vegetation within the development footprint during operations; • Measures to protect areas of native vegetation and fauna habitats occurring adjacent to the development site; • Details of traffic-calming measures and signage to be installed within the site to reduce the risk of vehicle strike to Koalas and other native fauna; • Details of proposed rehabilitation and revegetation (including timing, target species composition, rehabilitation methods, and ongoing monitoring); • Details on appropriate soil handling processes, including topsoil management for later use in any rehabilitation areas; • Details on the salvage, storage and redistribution of habitat features (e.g. hollows and logs) within the rehabilitation areas; • Fire management; • Details of maintenance, monitoring and performance criteria to assess the condition and functioning of the adjoining vegetation and fauna habitats retained on-site, and to evaluate progress of rehabilitation works.
Rehabilitation and Closure Plan	Implement the Rehabilitation and Closure Plan
Ongoing research and monitoring programs	
Surface Water Monitoring Plan	Prepare and implement a Water Monitoring Plan which includes. • Surface water quality monitoring will be undertaken at upstream and downstream locations on Seven Mile Creek. • The parameters and frequency of sampling will be monthly sampling of pH, EC, TSS, Total Phosphorus and Total Nitrogen. • Monitor the performance of the water management systems and associated sediment control measures monthly and after major storm events. Flow monitoring of Seven Mile Creek will be undertaken by visual observation during water quality sampling, the visual flow data observations will be used to inform the assessment of water quality data. • Document rainfall depths, water usages, dam volumes and discharges (during extreme events) together with other data that will facilitate updating of water balances, assessment of spill risk and associated water management requirements. • Undertake dam safety and maintenance checks biennially (every two years) on all water management dam walls to assess structural integrity and maintenance requirements, including removal of any trees and shrubs that may impact on the integrity of the walls, and ensuring adequate erosion protection is in place.

Item	Detail
	• Report results of surface water monitoring activities in the Annual Environmental Review which will be distributed to the relevant government agencies and made available to the public. All monitoring data will be retained in an appropriate database.
Construction Erosion Sediment Control Plan	Implement a Construction Erosion and Sediment Control Plan which meets the requirements of the Blue Book Volumes 1 and 2 (Landcom, 2004 and DECC, 2008) as part of the CEMP. The performance of erosion and sediment controls at construction areas, including the creek crossing and associated water management measures will be reviewed and monitored during construction.
Groundwater Monitoring	• All existing bores will continue to be monitored until they are disturbed or quarried through. A network of bores will be maintained through the life of the quarry. It is proposed to monitor groundwater levels at these bores quarterly and the following water quality parameters six monthly: - pH - Conductivity - Total Dissolved Solids - Chloride - Arsenic - Total Phosphorus - Total Nitrogen, NOx, Ammonia. • Groundwater level and quality results will be analysed, compared with groundwater model predictions and reported annually.
Community Consultation (Ongoing)	• Carry out additional consultation with local community during project planning and construction. • Establish a Community Liaison Group to convey the project status to community and receive feedback on matters requiring consideration, response or action. • The OEMP will outline measures for effective consultation with the local community and will include contact details for site manager or other appropriate representative and a complaints handling procedure to address and respond to issues raised by the community.
Environmental Monitoring (Offset Site)	The Retention Area within the Project area will be subject to a Biodiversity Stewardship Site. This will include Flora and Fauna monitoring for threatened species adjacent to the Quarry.

4. SUMMARY AND CONCLUSIONS

Impacts to Native Vegetation

The Project will impact approximately 32.03 ha of native vegetation. Each vegetation zone equates to the future value of each attribute (composition, structure, and function) and the vegetation integrity score for all management zones will be zero. Impact areas including the entire Disturbance Footprint (Proposed Quarry and associated access road) (**Table 60**).

Table 60: Impacts within the Disturbance Footprint

Vegetation Mapping Area	Vegetation Zone	Condition	Disturbance Footprint (ha)	Retention Area (ha)	Project Area Total (ha)
PCT 3244: Lower North Spotted Gum- Mahogany-Ironbark Sheltered Forest	1	Moderate – Good Condition	31.8	45.75	76.75
	2	Moderate – Good (medium) Condition	0	2.98	2.98
	3	Moderate – Good (poor) Condition	0.19	0.12	0.3
	4	Low Condition	0.61	1.22	1.83
PCT 3236: Hunter Valley Hills Wet Vine Forest	5	Moderate Condition	0.23	5.49	5.73
		Native Vegetation Total	**32.83**	**55.56**	**87.59**
Excluded (Tracks, cleared land and Gardenland)			1.37	1.40	12.86
Dams			0.04	0.57	0.61
Total			**34.24**	**57.53**	**101.06**

Impacts to Threatened Ecological Communities (EPBC Listed)

No threatened ecological community listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999 (EPBC Act) occurs within the Development Site.

Impacts to Fauna Habitat

A total of 557 hollow-bearing trees occur within the Project Area (including 406 Live trees and 151 dead stags). A total of 212 hollow-bearing trees (HBTs) will be removed for construction of the proposed development (**Table 61**). A total of 345 hollow-bearing trees will be retained. The majority of the retained trees lie within the proposed Biodiversity Stewardship Site.

Table 61: Habitat Trees within Study Area

Habitat Type	No. within Disturbance Footprint	No. within Retention Area	No. within Project Area	% present within Disturbance Footprint
Hollow-bearing trees	132	274	406	32%
Dead Stags (with hollows)	80	71	151	53%
Total HBT	212	345	557	38%

Impacts to EPBC Act listed Threatened Species Habitat

A total of four (4) threatened species listed under the Commonwealth's EPBC Act were recorded within the Project Area. The above assessment of threatened species for further assessment under the EBPC Act within the Disturbance Footprint include of potential habitat for four (4) threatened species, Koala (*Phascolarctos cinereus*), Brown-treecreeper (*Climacteris picumnus victoriae*), Yellow-bellied Glider (*Petaurus australis australis*) and New Holland Mouse (*Pseudomys novaehollandiae*). An additional four (4) species with potential foraging habitat include GHFF (*Pteropus poliocephalus*), GBC (*Calyptorhynchus lathami lathami*), Regent Honeyeater (*Anthochaera Phrygia*) and Swift Parrot (*Lathamus discolor*).

Impacts to these species are summarised below within **Table 62**.

Table 62: Threatened Species (EPBC Act listed) Impacts

Threatened Species	Type of Impact	Impact (Count)	Impact (Area)	Impact Avoidance / Mitigation
Koala (*Phascolarctos cinereus*) **Endangered Species**	Habitat	N/A	11.13 ha	• Retention of Habitat • Restoration of Habitat • Retention of movement corridors • Installation of koala underpass • Minimisation of indirect impacts including noise and artificial lighting
Grey-headed Flying Fox (*Pteropus poliocephalus*) **Vulnerable Species**	Foraging Habitat	N/A	32.03	• Retention of foraging habitat. • Restoration of foraging habitat • Minimisation of indirect impacts including noise and artificial lighting
Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*) **Vulnerable Species**	Foraging Habitat	N/A	32.03	• Retention of foraging habitat. • Restoration of foraging habitat • Minimisation of indirect impacts including noise and artificial lighting
Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*) **Vulnerable Species**	Habitat	N/A	32.03	• Retention of Habitat • Restoration of Habitat
Regent Honeyeater (*Anthochaera Phrygia*) **Critically Endangered Species**	Potential Foraging Habitat	N/A	32.03	• Retention of potential foraging habitat. • Restoration of potential foraging habitat

Threatened Species	Type of Impact	Impact (Count)	Impact (Area)	Impact Avoidance / Mitigation
Swift Parrot (*Lathamus discolor*) **Critically Endangered Species**	Potential Foraging Habitat	N/A	32.03	• Retention of potential foraging habitat. • Restoration of potential foraging habitat
Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) **Vulnerable Species**	Potential Foraging Habitat	N/A	32.03	• Retention of potential foraging habitat. • Restoration of potential foraging habitat
New Holland Mouse (*Pseudomys novaehollandiae*) **Vulnerable**	Potential Habitat	N/A	32.83	• Retention of Habitat • Restoration of Habitat

Summary of Impact Avoidance and Mitigation Measures

Impact avoidance and mitigation measures are outlined in detail for each MNES including Koala (**Table** 13), GHFF (**Table 19**), GBC (**Table 25**), Brown Treecreeper (**Table 31**), Regent Honeyeater (**Table 37**), Swift Parrot (**Table 43**), Yellow-bellied Glider (**Table 49**), and New Holland Mouse (**Table 55**).

A summary of avoidance and minimisation measures proposed under this activity is provided below in **Table 63**, and outline of management plan requirements is provided in **Section 3.3**.

Table 63: Summary of Impact Avoidance and Mitigation Measures

Avoidance / Mitigation Measure	MNES	Result
Avoidance of habitat The proposed activity avoids 55.56 ha of native vegetation within the Project Area including higher condition vegetation zones, 62% of Hollow-bearing Trees (HBTs), watercourses, and movement corridors associated with Seven Mile Creek and its tributaries.	**Koala** (*Phascolarctos cinereus*)	The proposed activity will avoid the majority of suitable Koala habitat within the Project Area (approximately 79%), including higher quality habitat (see **Table** 13).
	Grey-headed Flying Fox (*Pteropus poliocephalus*)	A total of 55.56 ha of broadly suitable foraging habitat for the species will be retained within the Project Area. This represents 47% of Rank 1 and 85% of the higher Rank 2 mapped foraging habitat within the Project Area. Therefore, the proposed activity avoids the majority of higher ranked foraging habitat within the Project Area (see **Table 19**).
	Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)	A total of 55.56 ha of broadly suitable foraging habitat for the species will be retained within the Project Area. Important riparian habitat for the species is largely avoided and retained under the proposal (see **Table 25**).

Avoidance / Mitigation Measure	MNES	Result
	Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*)	A total of 55.56 ha of broadly suitable foraging habitat for the species' will be retained within the Project Area.
	Regent Honeyeater (*Anthochaera Phrygia*)	
	Swift Parrot (*Lathamus discolor*)	
	Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	
	New Holland Mouse (*Pseudomys novaehollandiae*)	
Management of retained habitat The proposed activity will retain and manage the avoided 55.56ha of suitable habitat in-perpetuity under an offset agreement.	**Koala** (*Phascolarctos cinereus*)	A total of 41.40 ha of suitable Koala habitat would be protected and managed in-perpetuity under a Biodiversity Stewardship Site agreement (see **Table** 13).
	Grey-headed Flying Fox (*Pteropus poliocephalus*)	A total of 55.56 ha of broadly suitable foraging habitat for the species will be retained and managed under an offset agreement.
	Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)	
	Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*)	A total of 55.56 ha of potential habitat for the species will be retained and managed under an offset agreement.
	Regent Honeyeater (*Anthochaera Phrygia*)	A total of 55.56 ha of supplementary foraging habitat for the species will be retained and managed under an offset agreement.
	Swift Parrot (*Lathamus discolor*)	
	Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	
	New Holland Mouse (*Pseudomys novaehollandiae*)	
Avoidance of indirect impacts Operating times detailed in **Table 1** restrict the timing of construction, operations, lading, and blasting to daylight hours minimizing indirect impacts from operational noise to the species.	**Koala** (*Phascolarctos cinereus*)	Minimisation of indirect impacts associated with noise and artificial lighting that have the potential to indirectly affect the habitat quality of surrounding areas for the species. Limiting quarry activities to daylight hours reduces impacts to this nocturnal species (see **Table** 13).
	Grey-headed Flying Fox (*Pteropus poliocephalus*)	Limiting quarry activities to daylight hours reduces impacts to this nocturnal species.
	Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)	Limiting quarry activities to daylight hours reduces indirect impacts to this species.
	Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*)	

Avoidance / Mitigation Measure	MNES	Result
	Regent Honeyeater (*Anthochaera Phrygia*)	
	Swift Parrot (*Lathamus discolor*)	
	Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	
	New Holland Mouse (*Pseudomys novaehollandiae*)	
Management Plans The proposal requires the preparation and implementation of management plans including: a Construction Environmental Management Plan (CEMP), a Operational Environmental Management Plan (OEMP), Biodiversity Management Plan (BMP), and Landscape and Rehabilitation Management.	**Koala** (*Phascolarctos cinereus*)	The management plans will detail measures to be undertaken throughout the pre-construction, construction and operational phases of the proposed activity. These measures will be informed by relevant species conservation advice and recovery plans to provide a framework for the management and minimisation of direct and indirect impacts to MNES within the Project Area.
	Grey-headed Flying Fox (*Pteropus poliocephalus*)	
	Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)	
	Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*)	
	Regent Honeyeater (*Anthochaera Phrygia*)	
	Swift Parrot (*Lathamus discolor*)	
	Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	
	New Holland Mouse (*Pseudomys novaehollandiae*)	

Summary of Offsetting

Offsets for the proposed action will be secured in accordance with the NSW BOS and not in accordance with the *EPBC Act Environmental Offsets Policy*. A summary of offsetting for the proposed action is provided below in **Table 64**.

Table 64: Summary of Offsetting

MNES	Impact (Count)	Impact (Area)	BOS Species Credits	BOS Ecosystem Credits
Koala (*Phascolarctos cinereus*) **Endangered Species**	N/A	11.13 ha	**YES** 291 Species Credits for Koala	**NO** The species will be offset through Species credits in accordance with the BOS.
Grey-headed Flying Fox (*Pteropus poliocephalus*) **Vulnerable Species**	N/A	32.03	**NO** No Species Credits are required for the GHFF	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.

MNES	Impact (Count)	Impact (Area)	BOS Species Credits	BOS Ecosystem Credits
Glossy Black Cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*) **Vulnerable Species**	N/A	32.03	**NO** No Species Credits for GBC with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.
Brown-treecreeper (south-eastern) (*Climacteris picumnus victoriae*) **Vulnerable Species**	N/A	32.03	**NO** No Species Credits for Brown Treecreeper with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.
Regent Honeyeater (*Anthochaera Phrygia*) **Critically Endangered Species**	N/A	32.03	**NO** No Species Credits for regent Honeyeater with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.
Swift Parrot (*Lathamus discolor*) **Critically Endangered Species**	N/A	32.03	**NO** No Species Credits for Swift Parrot with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.
Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) **Vulnerable Species**	N/A	32.03	**NO** No Species Credits for Yellow-bellied Glider with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.
New Holland Mouse (*Pseudomys novaehollandiae*) **Vulnerable**	N/A	32.83	**NO** No Species Credits for New Holland Mouse with no breeding habitat observed within the Project Area.	**YES** The species will be offset through Ecosystem credits in accordance with the BOS.

Variables or assumptions

The following variables and assumptions were made as part of this assessment:

- The availability of suitable habitat within the locality is based on available regional vegetation mapping (SVTM) and PCT to Species Associations detailed in the TBDC. Accurate assessment of the extent of suitable habitat for MNES within the locality would require site verification, beyond the scope of this assessment.
- Limited availability of relevant information has the potential to influence the conclusions of assessments. To ensure the most accurate assessment of impacts to MNES, conclusions within this report were based on best available information on species distribution, threats and responses to management, including from MNES Conservation Advice, National Recovery Plans, and published literature.

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APPENDIX 1. PROJECT STAGING

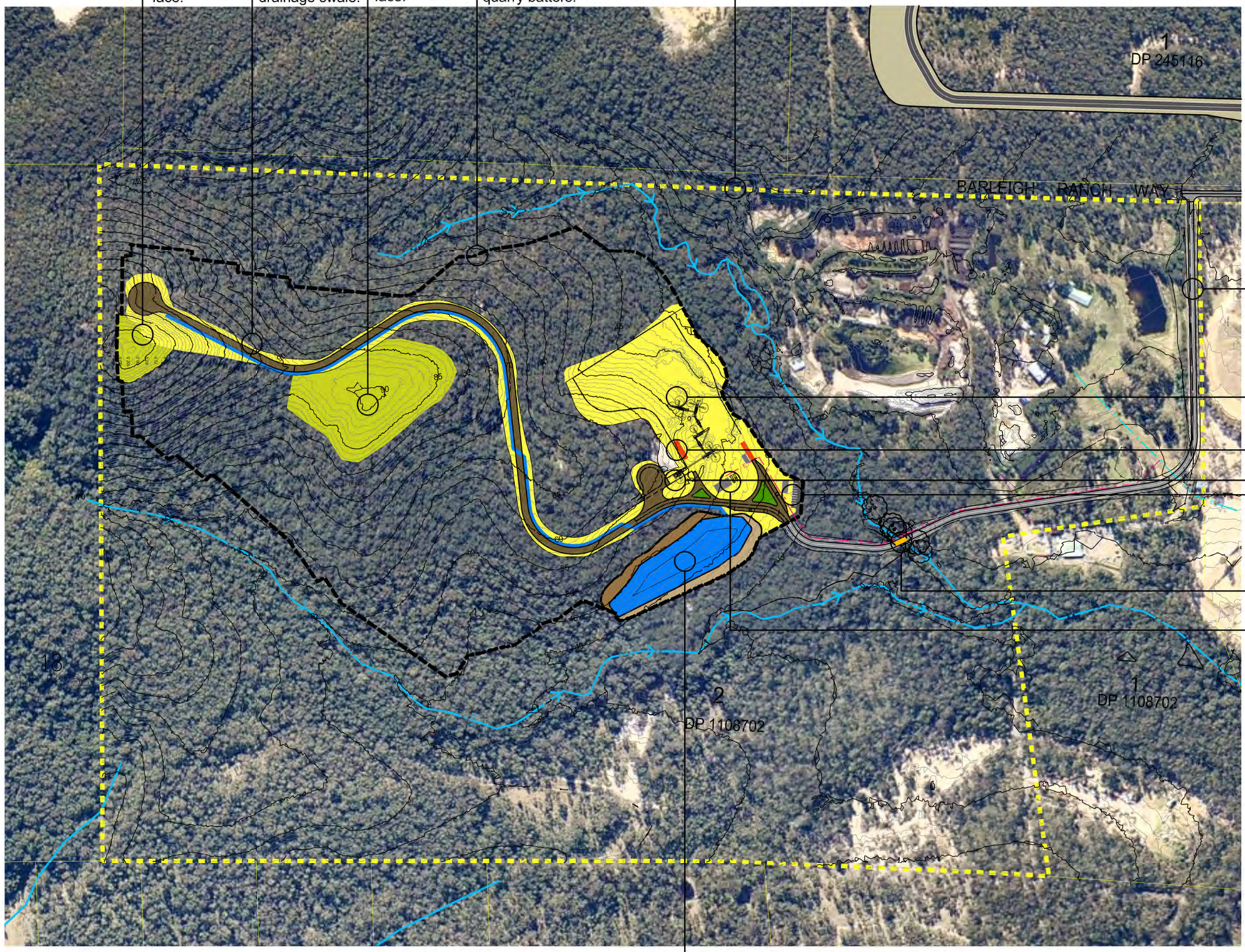
Yr 1 working face.

Haul road and drainage swale.

Yr 1 working face.

Ultimate extent of quarry batters.

Property boundary



Proposed quarry access road (sealed) refer to Fisher Engineering plans for further details.

Inital crushing plant configuration to be expanded as additional level area is developed.

Entry and exit weighbridges.

Dump station and primary crusher.

Site office, staff and visitor car parking (11 spaces).

Proposed bridge refer to detailed plan.

Proposed workshop / maintenance shed and plant parking area.

Dam 1 28.0ML
Water quality and detention.

Existing Overhead Electrical — E —

Proposed Overhead Electrical — E —

PROJECT NUMBER: Eagleton Quarry				
FILE NAME: Eagleton Plans 20161205.dwg				
DATUM: ____	15/12/2016	DoP Application	MT	A
CONTOUR INTERVAL: ____	DATE	DESCRIPTION	DRAWN	REVISION

0 50 100 150 200 250m

Scale 1:2,500 A3

Project No:	Eagleton Quarry
Suburb:	Eagleton
Street:	13 Barleigh Ranch Way
Lot & DP:	Lot 2 DP1108702

Dwg Title:	Proposed Rock Quarry
Sheet Title:	Year 1
Number of Sheets:	1
Sheet Number:	1

Eagleton
Rock Syndicate Pty ltd

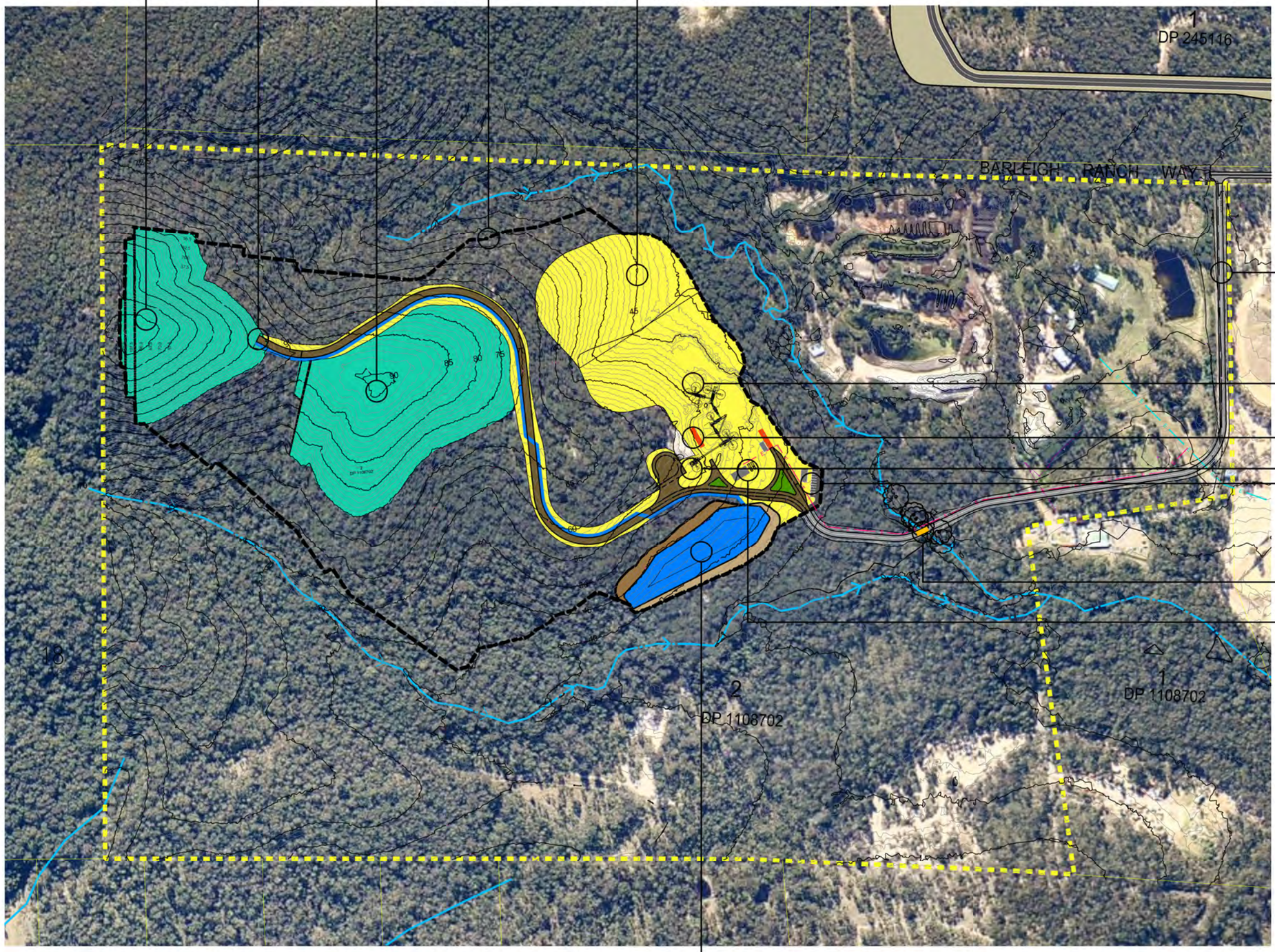
Yr 3 working face.

haul road and drainage swale.

Yr 3 working face.

Ultimate extent of quarry batters.

Expanded processing area to cater for ultimate crushing plant configuration.



Proposed quarry access road (sealed) refer to Fisher Engineering plans for further details.

Inital crushing plant configuration to be expanded as additional level area is developed.

Entry and exit weighbridges.

Dump station and primary crusher.

Site office, staff and visitor car parking (11 spaces).

Proposed bridge refer to detailed plan.

Proposed workshop / maintenance shed and plant parking area.

Dam 1 28.0ML
Water quality and detention.

Existing Overhead Electrical — E —

Proposed Overhead Electrical — E —

PROJECT NUMBER: Eagleton Quarry				
FILE NAME: Eagleton Plans 20161205.dwg				
DATUM: ____	15/12/2016	DoP Application	MT	A
CONTOUR INTERVAL: ____	DATE	DESCRIPTION	DRAWN	REVISION

0 50 100 150 200 250m

Scale 1:2,500 A3

Project No:	Eagleton Quarry
Suburb:	Eagleton
Street:	13 Barleigh Ranch Way
Lot & DP:	Lot 2 DP1108702

Dwg Title:	Proposed Rock Quarry
Sheet Title:	Year 3
Number of Sheets:	1
Sheet Number:	1

Eagleton
Rock Syndicate Pty ltd

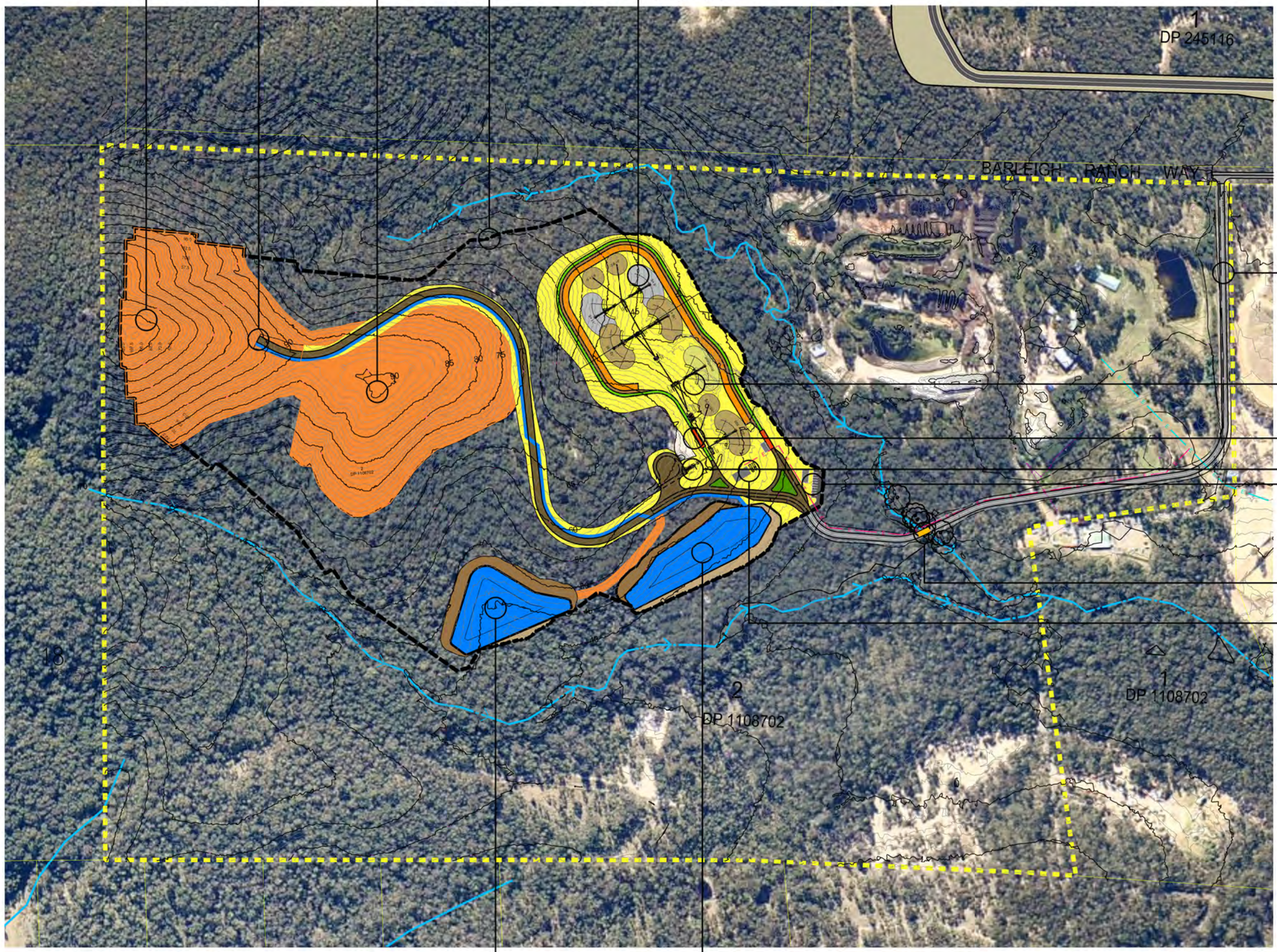
Yr 5 working face.

haul road and drainage swale.

Yr 5 working face.

Ultimate extent of quarry batters.

Expanded processing area and ultimate crushing plant configuration.



Proposed quarry access road (sealed) refer to Fisher Engineering plans for further details.

Ultimate processing plant configuration and product stockpiles.

Entry and exit weighbridges.

Dump station and primary crusher.

Site office, staff and visitor car parking (11 spaces).

Proposed bridge refer to detailed plan.

Proposed workshop / maintenance shed and plant parking area.

Dam 2 - 29.0ML
Water quality and detention.

Dam 1- 28.0ML
Water quality and detention.

Existing Overhead Electrical — E —

Proposed Overhead Electrical — E —

PROJECT NUMBER: Eagleton Quarry				
FILE NAME: Eagleton Plans 20161205.dwg				
DATUM: ____	15/12/2016	DoP Application	MT	A
CONTOUR INTERVAL: ____	DATE	DESCRIPTION	DRAWN	REVISION

0 50 100 150 200 250m

Scale 1:2,500 A3

Project No:	Eagleton Quarry
Suburb:	Eagleton
Street:	13 Barleigh Ranch Way
Lot & DP:	Lot 2 DP1108702

Dwg Title:	Proposed Rock Quarry
Sheet Title:	Year 5
Number of Sheets:	1
Sheet Number:	1

Eagleton
Rock Syndicate Pty ltd

APPENDIX 2. SURVEY RESULTS

Previous Assessments

Kleinfelder (2013). Flora, Fauna and Threatened Species Assessment: Eagleton Quarry, Barleigh Ranch Way, Eagleton. Prepared for Eagleton Rock Pty Ltd, February 2013.

PDA Services (formerly Orogen) 2012. *Flora and Fauna Impact Assessment: Eagleton Quarries, Lot 2 on DP 1108702, Balickera*. Prepared for Eagleton Quarries Pty Ltd, October 2012.

GHD (2012). *Environmental Assessment: Eagleton Quarry.* Prepared for Eagleton Quarry Pty Ltd, October 2012.

Kleinfelder (2013). *Flora, Fauna and Threatened Species Assessment: Eagleton Quarry, Barleigh Ranch Way, Eagleton.* Prepared for Eagleton Rock Pty Ltd, February 2013.

Kleinfelder 2013 Flora Survey Results

No threatened flora species were recorded in the study area during the surveys by Kleinfelder (2013, 2016) or by previous consultants (PDA Services 2012; GHD 2012). No flora species credit species were considered likely to occur in the development site following targeted surveys and habitat assessments (Appendix 5).

Kleinfelder 2013 Fauna Survey Results

Fauna surveys undertaken by Kleinfelder in 2013 identified a total of 81 native fauna species in the study area, including 50 bird, 20 mammal, six amphibian and five reptile species (Appendix 9). Of these, seven species are listed under the NSW TSC Act and/ or the EPBC Act, and one species is listed as migratory under the EPBC Act (Table 10). Previous surveys completed by PDA Services (2012) and GHD (2012) identified an additional five threatened bird species (Table 10). As such, a total of 12 threatened fauna species and one EPBC Act-listed migratory species have been recorded in the study area.

Table 65: Fauna Survey Results

Scientific name Common name	BC status	EPBC status	Species Credit Species	Source
Chalinolobus dwyeri **Large-eared Pied Bat**	V	V	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder
Circus assimilis **Spotted Harrier**	V	-	No	PDA
Climacteris picumnus victoriae **Brown Treecreeper (eastern subspecies)**	V	-	No	GHD
Falco subniger **Black Falcon**	V	-	No	GHD
Falsistrellus tasmaniensis **Eastern False Pipistrelle**	V	-	No	Kleinfelder

Scientific name Common name	BC status	EPBC status	Species Credit Species	Source
Lophoictinia isura **Square-tailed Kite**	V	-	No	GHD
Miniopterus australis **Little Bentwing-bat**	V	-	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder
Mormopterus norfolkensis **Eastern Freetail-bat**	V	-	No	Kleinfelder
Myotis macropus **Large-footed Myotis**	V	-	Yes (suitable breeding habitat identified in the development site)	Kleinfelder
Phascolarctos cinereus **Koala**	E	E	Yes (suitable habitat identified in the development site)	Kleinfelder, GHD
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)**	V	-	No	GHD
Rhipidura rufifrons **Rufous Fantail**	-	M	No	Kleinfelder
Vespadelus troughtoni **Eastern Cave Bat**	V	-	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder

Kleinfelder 2013 Spot Assessment Technique (SAT) Results

Table 66: Kleinfelder SAT Results 2013

SAT ID	Trees with Pellets	Total trees surveyed	Activity Level %
8	1	30	3%
11	1	30	3%
5	2	30	7%
13	2	30	7%
7	3	30	10%
10	4	30	13%
12	4	30	13%
		MEAN	**8%**

Kleinfelder 2013 Fauna Species Recorded

Table 67: Kleinfelder 2013 Fauna Survey Results – All Species

Scientific name Common name	BC status
Amphibians	
Limnodynastes peronii	Striped Marsh Frog
Litoria fallax	Dwarf Green Tree Frog
Litoria latopalmata	Broad Palmed Frog

Scientific name Common name	BC status
Litoria peronii	Peron's Tree Frog
Pseudophryne coriacea	Red Backed Toadlet
Uperoleia laevigata	Smooth Toadlet
Birds	
Acanthiza lineata	Striated Thornbill
Acanthiza pusilla	Brown Thornbill
Acanthorhynchus tenuirostris	Eastern Spinebill
Anas castanea	Chestnut Teal
Anas superciliosa	Pacific Black Duck
Aquila audax	Wedge- tailed Eagle
Aviceda subcristata	Pacific Baza
Chenonetta jubata	Australia Wood duck
Climacteris picumnus	Brown Treecreeper
Colluricincla harmonica	Grey Shrike- thrush
Cormobates leucophaea	White- throated Treecreeper
Corvus coronoides	Australian Raven
Cracticus tibicen	Australian Magpie
Cracticus torquatus	Grey Butcherbird
Dacelo novaeguineae	Laughing Kookaburra
Dicaeum hirundinaceum	Mistletoebird
Eopsaltria australis	Eastern Yellow Robin
Eurystomus orientalis	Dollarbird
Geopelia humeralis	Bar- shouldered Dove
Gerygone olivacea	White- throated Greygone
Grallina cyanoleuca	Magpie- lark
Greygone mouki	Brown Greygone
Leucosarcia melanoleuca	Wonga Pigeon
Lichenostomus chrysops	Yellow Faced Honeyeater
Malurus cyaneus	Superb Fairy- wren
Manorina melanocephala	Noisy Miner
Meliphaga lewinii	Lewin's Honeyeater
Melithreptus lunatus	White- naped Honeyeater
Myiagra rubecula	Leaden Flycatcher
Myzomela sanguinolenta	Scarlet Honeyeater
Neochmia temporalis	Red- browed Finch
Ocyphaps lophotes	Crested Pigeon
Oriolus sagittatus	Olive- backed Oriole
Pachycephala rufiventris	Rufous Whistler
Pardalotus punctatus	Spotted Pardalote

Scientific name Common name	BC status
Pelecanus conspicillatus	Australian Pelican
Petroica boodang	Scarlet Robin
Philemon corniculatus	Noisy Friarbird
Platycercus eximius	Eastern Rosella
Podargus strigoides	Tawny Frogmouth
Psophodes olivaceus	Eastern Whipbird
Ptilonorhynchus violaceus	Satin Bowerbird
Rhipidura albiscapa	Grey Fantail
Rhipidura leucophrys	Willie Wagtail
^Rhipidura rufifrons	^Rufous Fantail
Sericornis frontalis	White- browed Scrubwren
Strepera graculina	Pied Currawong
Trichoglossus haematodus	Rainbow Lorikeet
Vanellus miles	Masked Lapwing
Zosterops lateralis	Silvereye
Mammals	
Antechinus stuarti	Brown Antechinus
**Cervus timorensis*	*Deer
#+Chalinolobus dwyeri	#+Large-eared Pied Bat
Chalinolobus gouldii	Gould's Wattled Bat
Chalinolobus morio	Chocolate Wattled Bat
#Falsistrellus tasmaniensis	# Eastern False Pipistrelle
**Felis catus*	*Cat
Macropus rufogriseus	Red- necked Wallaby
#Miniopterus australis	# Little Bentwing-bat
#Mormopterus norfolkensis	# Eastern Freetail-bat
#Myotis macropus	# Large-footed Myotis
Nyctophilus sp.	Unidentified Long-eared Bat
Petaurus breviceps	Sugar Glider
#+Phascolarctos cinereus	#+Koala
Rattus fuscipes	Bush Rat
Rattus lutreolus	Swamp Rat
**Rattus rattus*	*Black Rat
Tadarida australis	White-striped Freetail-bat
Tarida australis	White Striped Mastif Bat
Trichosurus vulpecula	Common Brushtail Possum
Vespadelus pumilus	Eastern Forest Bat
#Vespadelus troughtoni	# Eastern Cave Bat
Vespadelus vulturnus	Little Forest Bat

Scientific name Common name	BC status
Reptiles	
Dendrelaphis punctulata	Green Tree Snake
Lampropholis delicata	Delicate Skink
Physignathus lesueurii	Eastern Water Dragon
Pseudonaja textilis	Eastern Brown Snake
Tiliqua scincoides scincoides	Blue Tongue Lizard

# denotes a threatened species listed as Vulnerable under the TSC Act

+ denotes a threatened species listed as Vulnerable under the EPBC Act

^ denotes an EPBC Act-listed migratory species

* denotes an introduced species

Wedgetail Project Consulting Additional Surveys

Table 68: Wedgetail Fauna Survey Results

Scientific Name	Common Name	BC Act	EPBC Act	Observation Type	Location
Litoria tyleri	Tyler's Tree Frog	P	-	Frog Survey	Dams Along Access Road, Access Road
Litoria fallax	Eastern Dwarf Tree Frog	P	-	Frog Survey	
Litoria peronii	Peron's Tree Frog	P	-	Frog Survey	
Litoria latopalmata	Broad-palmed Frog	P	-	Frog Survey	
Crinia signifera	Common Eastern Froglet	P	-	Frog Survey	
Pseudophryne coriacea	Red-backed Toadlet	P	-	Frog Survey	
Limnodynastes peronii	Brown-striped Frog	P	-	Frog Survey	
Trichosurus vulpecula	Common Brushtail Possum	P	-	Spotlighting	
Intellagama lesueurii	Eastern Water Dragon	P	-	Spotlighting	
Podargus strigoides	Tawny Frogmouth	P	-	Spotlighting	Access Road
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	Spotlighting	Creekline South
Psophodes olivaceus	Eastern Whipbird	P	-	Frog Survey	
Edolisoma tenuirostris	Cicadabird	P	-	Frog Survey	
Zosterops lateralis	Silvereye	P	-	Frog Survey	
Neochmia temporalis	Red-browed Finch	P	-	Frog Survey	
Cormobates leucophaea	White-throated Treecreeper	P	-	Frog Survey	
Trichoglossus haematodus	Rainbow Lorikeet	P	-	Frog Survey	
Strepera graculina	Pied Currawong	P	-	Frog Survey	
Dacelo novaeguineae	Laughing Kookaburra	P	-	Frog Survey	
Melithreptus brevirostris	Brown-headed Honeyeater	P	-	Frog Survey	
Phylidonyris niger	White-cheeked Honeyeater	P	-	Frog Survey	
Anthochaera chrysoptera	Little Wattlebird	P	-	Bird Survey	
Acanthiza pusilla	Brown Thornbill	P	-	Bird Survey	
Cracticus torquatus	Grey Butcherbird	P	-	Bird Survey	

Scientific Name	Common Name	BC Act	EPBC Act	Observation Type	Location
Gymnorhina tibicen	Australian Magpie	P	-	Bird Survey	
Grallina cyanoleuca	Magpie-lark	P	-	Bird Survey	
Pachycephala pectoralis	Golden Whistler	P	-	Bird Survey	
Cracticus nigrogularis	Pied Butcherbird	P	-	Bird Survey	
Colluricincla harmonica	Grey Shrike-thrush	P	-	Bird Survey	
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet	P	-	Bird Survey	
Rhipidura leucophrys	Willie Wagtail	P	-	Bird Survey	
Hirundo neoxena	Welcome Swallow	P	-	Bird Survey	
Caligavis chrysops	Yellow-faced Honeyeater	P	-	Bird Survey	
Rhipidura albiscapa	Grey Fantail	P	-	Bird Survey	
Fulica atra	Eurasian Coot	P	-	Bird Survey	
Tachybaptus novaehollandiae	Australasian Grebe	P	-	Bird Survey	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	P	-	Bird Survey	
Porphyrio porphyrio	Purple Swamphen	P	-	Bird Survey	
Acanthiza lineata	Striated Thornbill	P	-	Bird Survey	
Malurus cyaneus	Superb Fairy-wren	P	-	Bird Survey	
Manorina melanocephala	Noisy Miner	P	-	Bird Survey	
Anas superciliosa x platyrhynchos	Pacific Black Duck Mallard Hybrid	-	-	Bird Survey	
Leucosarcia melanoleuca	Wonga Pigeon	P	-	Bird Survey	
Meliphaga lewinii	Lewin's Honeyeater	P	-	Bird Survey	
Pardalotus punctatus	Spotted Pardalote	P	-	Bird Survey	
Acanthorhynchus tenuirostris	Eastern Spinebill	P	-	Bird Survey	
Anas castanea	Chestnut Teal	P	-	Bird Survey	
Acanthiza nana	Yellow Thornbill	P	-	Bird Survey	
Vanellus miles	Masked Lapwing	P	-	Bird Survey	
Eopsaltria australis	Eastern Yellow Robin	P	-	Bird Survey	
Entomyzon cyanotis	Blue-faced Honeyeater	P	-	Bird Survey	
Chalinolobus gouldii	Gould's Wattled Bat	P	-	Anabat	A2, A3, A4, A1
Ozimops ridei	Eastern Free-tailed Bat	P	-	Anabat	A2, A3, A4, A1
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P	-	Anabat	A2, A3, A4, A1
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	-	Anabat	A2, A3, A4
Nyctophilus sp.	long-eared bat	P	-	Anabat	A2, A3, A4, A1
Myotis macropus	Southern Myotis	V,P	-	Anabat	A2, A1
Vespadelus vulturnus	Little Forest Bat	P	-	Anabat	A2, A3, A4, A1
Vespadelus troughtoni	Eastern Cave Bat	V,P	-	Anabat	A2, A3, A1
Vespadelus pumilus	Eastern Forest Bat	P	-	Anabat	A2, A3, A4, A1

Scientific Name	Common Name	BC Act	EPBC Act	Observation Type	Location
Miniopterus australis	Little Bent-winged Bat	V,P	-	Anabat	A2, A3, A4
Rhinolophus megaphyllus	Eastern Horseshoe-bat	P	-	Anabat	A2, A4, A1
Austronomus australis	White-striped Freetail-bat	P	-	Anabat	A4
Myiagra cyanoleuca	Satin Flycatcher	P	-	Bird Survey	0
Chalinolobus morio	Chocolate Wattled Bat	P	-	Anabat	A1

APPENDIX 3. CONDITIONS OF CONSENT

Development Consent

Section 4.38 of the Environmental Planning and Assessment Act 1979

The Independent Planning Commission of NSW (the Commission), as the declared consent authority under clause 8A of the *State Environmental Planning Policy (State and Regional Development) 2011* and section 4.5(a) of the *Environmental Planning and Assessment Act 1979,* approves the development application referred to in Schedule 1, subject to the conditions in Schedule 2.

These conditions are required to:

- prevent, minimise, or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.







Adrian Pilton (Chair)	Alison McCabe	Juliet Grant
Member of the Commission	**Member of the Commission**	**Member of the Commission**

Sydney 8 July 2024

SCHEDULE 1

Application Number:	SSD-7332
Applicant:	Eagleton Rock Syndicate Pty Ltd
Consent Authority:	The Independent Planning Commission of NSW
Site:	The land defined in Appendix 1
Development:	Eagleton Quarry Project

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DEFINITIONS

Aboriginal object / Aboriginal place	Has the same meaning as the definition of the term in section 5 of the *National Parks and Wildlife Act 1974*
Access road	The quarry access road shown on the plan in Appendix 2
Annual Review	The review required by condition D9
Applicant	Eagleton Rock Syndicate Pty Ltd, or any person carrying out any development under this consent
Approved disturbance area	The area identified as such on the development layout
Approved extraction area	The area identified as such on the development layout
ARI	Average recurrence interval
BC Act	*Biodiversity Conservation Act 2016*
BCS	Biodiversity Conservation and Science Group of NSW Department of Climate Change, Energy, the Environment and Water
Blast misfire	The failure of one or more holes in a blast pattern to initiate
Calendar year	A period of 12 months from 1 January to 31 December
CCC	Community Consultative Committee required by condition A16
Conditions of this consent	Conditions contained in Schedule 2
Construction	All physical works to enable quarrying operations to be carried out, including demolition and removal of buildings or works, and erection of buildings and other infrastructure permitted by this consent
Council	Port Stephens Council
Date of commencement	The date notified to the Department by the Applicant under condition A13 for the commencement of construction or quarrying operations.
Day	The period from 7 am to 6 pm on Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
Decommission	The deconstruction or demolition and removal of works installed as part of the development
Demolition	The deconstruction and removal of buildings, sheds and other structures on the site
Department	NSW Department of Planning, Housing and Infrastructure
Development	The development described in the document/s listed in condition A2(c), as modified by the conditions of this consent.
Development Layout	The plan in Appendix 2
EIS	The Environmental Impact Statement titled "*Eagleton Quarry Environmental Impact Statement*", dated January 2017 and prepared by JBA Urban Planning Consultants Pty Limited; "*Response to Submissions*" dated October 2017 and prepared by JBA Urban Planning Consultants Pty Limited; "*Amendment Report*" dated September 2023 and prepared by Ethos Urban Pty Ltd; "*Project Amendment – Submissions Report*" dated December 2023 and prepared by Ethos Urban Pty Ltd; and the Applicant's additional information responses in support of the application and included in Appendix B of the Department's assessment report on Eagleton Quarry Project, dated April 2024.
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence under the POEO Act
Evening	The period from 6 pm to 10 pm

Feasible	Means what is possible and practical in the circumstances
GPS	Global Positioning System
Heritage NSW	Heritage NSW group of NSW Department of Climate Change, Energy, the Environment and Water
Hunter Water	Hunter Water Corporation
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Land	Has the same meaning as the definition of the term in section 1.4 the EP&A Act, except for where the term is used in the noise and air quality conditions in PART B of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent
Local roads	All public roads for which the Council of a local government area is the roads authority as prescribed under Clause 7 of the *NSW Roads Act 1993*
Material harm	Is harm that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or • results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment) This definition excludes “harm” that is authorised under either this consent or any other statutory approval’
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the development
Minister	NSW Minister for Planning and Public Spaces, or delegate
Minor	Not very large, important or serious
Morning Shoulder	The period from 5 am to 7 am Monday to Saturday
NCC	National Construction Code
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10 pm to 7 am on Monday to Saturday, and 10 pm to 8 am on Sundays and public holidays
Non-compliance	An occurrence, set of circumstances or development that is a breach of this consent
NSW DCCEEW – Water Group	NSW Department of Climate Change, Energy, the Environment and Water – Water Group
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
PCT	Plant Community Type
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by public agency or a mining, petroleum or extractive industry company (or its subsidiary or related party)
Public infrastructure	Linear and related infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc
Quarrying operations	The extraction, processing, stockpiling and transportation of extractive materials on the site and the associated removal of vegetation, topsoil and overburden
Quarry products	Includes all saleable quarry products, but excludes wastes and rehabilitation material
Reasonable	Means applying judgement in arriving at a decision, taking into account: mitigation benefits, costs of mitigation versus benefits provided, community views, and the nature and extent of potential improvements
Registered Aboriginal Parties	As described in the *National Parks and Wildlife Regulation 2019*

Rehabilitation	The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting
Residence	Existing or approved dwelling at the date of grant of this consent
RFS	NSW Rural Fire Service
Site	The Project Area shown in Appendix 2
TfNSW	Transport for NSW
Truck movement	A one-way truck trip from one point to another excluding the return journey
Waste	Has the same meaning as the definition of the term in the Dictionary to the POEO Act

SCHEDULE 2

PART A ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

A1. In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.

TERMS OF CONSENT

A2. The development may only be carried out:

(a) in compliance with the conditions of this consent;

(b) in accordance with all written directions of the Planning Secretary; and

(c) generally in accordance with the EIS and Development Layout.

A3. Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to:

(a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and

(b) the implementation of any actions or measures contained in any such document referred to in condition A3(a).

A4. The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document/s listed in condition A2(c). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition A2(c), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.

LIMITS OF CONSENT

Identification of Approved Extraction Area

A5. At least one month before the commencement of construction:

(a) a registered surveyor must be engaged to mark out the boundaries of the approved areas of extraction within the site (as set out in Appendix 2); and

(b) the Planning Secretary must be provided with a survey plan of such boundaries and their GPS coordinates.

A6. The boundaries of the approved areas of extraction within the site must be clearly marked in a manner that allows them to be easily identified at all times during the carrying out of quarrying operations.

Quarrying Operations

A7. Quarrying operations may be carried out on the site for a period of 30 years from the date of the commencement of the development.

Note: *Under this consent, the Applicant is required to decommission and rehabilitate the site and carry out other requirements in relation to quarrying operations. Consequently, this consent will continue to apply in all respects other than to permit the carrying out of quarrying operations until the rehabilitation of the site and other requirements have been carried out to the required standard.*

A8. The Applicant must not extract more than 600,000 tonnes of hard rock quarry products at the site in each calendar year.

Transport Operations

A9. The Applicant must limit total truck movements at the site (i.e. arrivals and dispatches) to a maximum of:

(a) 170 truck movements per day; and

(b) 20 truck movements per hour.

Note: *Truck movements to and from the site are also controlled by the operating hours specified in condition A11.*

A10. The Applicant must:

(a) ensure that all trucks travelling southbound from the quarry turn left (i.e. northbound) from Italia Road onto the Pacific Highway and utilise the Taren Road Interchange to perform a U-turn and do not turn right (i.e. southbound) from Italia Road onto the Pacific Highway; and

(b) ensure that at the intersection of Italia Road and the new right of carriageway:

(i) no trucks turn left from the right of carriageway onto Italia Road; and

(ii) no trucks turn right from Italia Road onto the right of carriageway.

Hours of Operation

A11. The Applicant must comply with the operating hours set out in Table 1.

Table 1: *Operating hours*

Activity	***Permissible Operating Hours***
Site establishment and construction	• 7 am to 6 pm Monday to Friday • 8 am to 1 pm Saturday • At no time on Sundays or public holidays
Quarrying operations	• 7 am to 6 pm Monday to Friday • 7 am to 4 pm Saturday • At no time on Sundays or public holidays
Loading and dispatch of product trucks	• 5 am to 6 pm Monday to Friday • 5 am to 4 pm Saturday • At no time on Sundays or public holidays
Blasting	• 9 am to 4 pm Monday to Friday • At no time on Saturdays, Sundays or public holidays
Maintenance and environmental management	• 24 hours per day, 7 days per week provided that these activities are not audible at any privately-owned residence if outside of the operational hours

A12. The following activities may be carried out outside the hours and restrictions specified in Table 1:

(a) delivery or dispatch of materials as requested by Police or other public authorities; and

(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Department and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

NOTIFICATION OF COMMENCEMENT

A13. The date of commencement of each of the following phases of the development must be notified to the Department in writing, at least one month before that date:

(a) commencement of construction under this consent;

(b) commencement of quarrying operations;

(c) cessation of quarrying operations; and

(d) any period of suspension of quarrying operations.

CONTRIBUTIONS TO COUNCIL

A14. The Applicant must make annual financial contributions to Council towards the maintenance of roads used for haulage of quarry products, where Council is the roads authority under the *Roads Act 1993*. The contributions must be determined in accordance with the Port Stephens Local Infrastructure Contributions Plan 2020 (including any updated or revised version of this plan) for local roads within the local government area.

A15. If there is a dispute over the determination of the contributions in condition A14, the Applicant or Council may refer the matter to the Planning Secretary for resolution. The decision of the Planning Secretary will be final.

COMMUNITY CONSULTATIVE COMMITTEE

A16. Within 6 months from the date of commencement of development, a CCC must be established for the development in accordance with the Department's Community *Consultative Committee Guidelines: State Significant Projects* (2023). Prior to the commencement of quarrying operations, the Applicant must consult the CCC in relation to opportunities to inform in writing the owners of any privately-owned land within 1 kilometre of any approved extraction area on the site of their right to request a property inspection under condition B10.

EVIDENCE OF CONSULTATION

A17. Where conditions of this consent require consultation with an identified party, the Applicant must:

(a) consult with the relevant party prior to submitting the subject document; and

(b) provide details of the consultation undertaken including:

(i) the outcome of that consultation, matters resolved and unresolved; and

(ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

STAGING, COMBINING AND UPDATING STRATEGIES, PLANS OR PROGRAMS

A18. With the approval of the Planning Secretary, the Applicant may:

(a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);

(b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); and

(c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development).

A19. If the Planning Secretary agrees, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.

PROTECTION OF PUBLIC INFRASTRUCTURE

A20. Unless the Applicant and the applicable authority agree otherwise, the Applicant must:

(a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by carrying out the development; and

(b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

Note: *This condition does not apply to any damage to roads or public infrastructure caused as a result of general road usage or otherwise addressed by contributions required by condition A14 of this consent.*

DEMOLITION

A21. All demolition must be carried out in accordance with *Australian Standard AS 2601-2001 The Demolition of Structures* (Standards Australia, 2001).

STRUCTURAL ADEQUACY

A22. All new buildings and structures, and any alterations or additions to existing buildings and structures, that are part of the development, must be constructed in accordance with the relevant requirements of the NCC.

Notes:

- *Under Part 6 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*

OPERATION OF PLANT AND EQUIPMENT

A23. All plant and equipment used on site, or to monitor the performance of the development, must be:

(a) maintained in a proper and efficient condition; and

(b) operated in a proper and efficient manner.

COMPLIANCE

A24. The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.

APPLICABILITY OF GUIDELINES

A25. References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this consent.

A26. However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, when issuing directions under this consent in respect of ongoing monitoring and management obligations, require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.

PRODUCTION DATA

A27. Each year, from the commencement of quarrying operations, the Applicant must provide calendar year quarry production data in the Annual Review (required under condition D9).

PART B SPECIFIC ENVIRONMENTAL CONDITIONS

NOISE

Operational Noise Criteria

B1. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Operational noise criteria dB(A)

Noise Assessment Location	***Day*** $L_{Aeq\ (15\ min)}$	***Evening and Night***	
		$L_{Aeq\ (15\ min)}$	L_{AFmax}
All privately-owned residences	40	35	52

Note: *To identify the locations referred to in Table 2, refer to the receiver locations on the figure in Appendix 3.*

B2. Noise generated by the development must be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Noise Policy for Industry* (EPA, 2017). Appendix 4 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

B3. The noise criteria in Table *2* do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Noise Operating Conditions

B4. The Applicant must:

(a) take all reasonable steps to minimise all noise from construction, operational and road transport activities, including low frequency noise and other audible characteristics;

(b) maintain the existing ridgeline along the southern boundary of the site as an acoustic barrier to the quarrying operations to a height of no less than relative level 57.5 m until the final year of quarrying operations;

(c) conduct noise monitoring and assessment prior to removal of the ridgeline in the final year of quarrying operations, to determine the appropriate temporary noise barrier location and design to ensure noise criteria in Condition B1 are met;

(d) operate a comprehensive noise management system commensurate with the risk of impact to ensure compliance with the relevant conditions of this consent;

(e) take all reasonable steps to minimise the noise impacts of the development during noise-enhancing meteorological conditions;

(f) engage a suitably qualified and experienced person(s) to carry out regular attended noise monitoring (at least quarterly, unless otherwise agreed with the Planning Secretary) to determine whether the development is complying with the relevant conditions of this consent (including, but not limited to at Lot 6 DP247953 (currently known as Eagleton Ridge Disability Services) unless otherwise agreed by the landowner);

(g) regularly assess the noise monitoring data and modify or stop operations on the site to ensure compliance with the relevant conditions of this consent; and

(h) develop and implement a protocol for identifying any noise-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of these events.

B5. Prior to the commencement of quarrying operations, the Applicant must offer to the operator of Eagleton Ridge Disability Services located at Lot 6 DP247953 to cover the reasonable and agreed to costs of transporting the residents of the property off site within the region during all blasts for the first 12 months of quarrying operations. If accepted by the operator, the Applicant must implement the offer.

BLASTING

Blasting Criteria

B6. The Applicant must ensure that blasting on the site does not cause exceedances of the criteria in Table 3.

Table 3: *Blasting criteria*

Location	***Airblast overpressure (dB(Lin Peak))***	***Ground vibration (mm/s)***	***Allowable exceedance***
	120	10	0%

Location	*Airblast overpressure (dB(Lin Peak))*	*Ground vibration (mm/s)*	*Allowable exceedance*
Any residence on privately-owned land	115	5	5% of the total number of blasts over a calendar year

B7. The blasting criteria in Table 3 do not apply if the Applicant has an agreement with the owner/s of the relevant residence to exceed the blasting criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting Frequency

B8. The Applicant may carry out a maximum of 2 blasts per day (not more than 4 per week) during construction and a maximum of 1 blast per day during quarrying operations.

B9. Condition B8 does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blast misfires or to blasts required to ensure the safety of the mine, its workers or the general public.

Notes:

- *For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry.*
- *For the avoidance of doubt, should an additional blast be required after a blast misfire, this additional blast and the blast misfire are counted as a single blast.*

Property Inspections

B10. If the Applicant receives a written request from the owner of any privately-owned land within 1 kilometre of any approved extraction area on the site for a property inspection to establish the baseline condition of any buildings and structures on their land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant must:

(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:

(i) establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and

(ii) identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; and

(b) give the landowner a copy of the new or updated property inspection report.

B11. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Planning Secretary for resolution.

Property Investigations

B12. If the owner of any privately-owned land within 2 kilometres of any approved extraction area on the site or any other landowner where the Planning Secretary is satisfied an investigation is warranted, claims in writing that buildings or structures on their land have been damaged as a result of blasting on the site, then within 2 months of receiving this written claim the Applicant must:

(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and

(b) give the landowner a copy of the property investigation report.

B13. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Planning Secretary.

B14. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Planning Secretary for resolution.

Blast Operating Conditions

B15. During blasting operations, in accordance with the Blast Management Plan, the Applicant must:

(a) take all reasonable steps to:

(i) ensure the safety of people and livestock from blasting impacts of the development;

(ii) protect public or private infrastructure and property in the vicinity of the site from blasting damage associated with the development; and

(iii) minimise blast-related dust and fume emissions;

(b) operate a suitable system to enable members of the public to get up-to-date information on the proposed blasting schedule on the site and implement a protocol for investigating and responding to blast-related complaints;

(c) identify any blast-related exceedance, incident or non-compliance and notify the Department and relevant stakeholders of these events; and

(d) carry out regular blast monitoring to determine whether the development is complying with the relevant conditions of this consent.

AIR QUALITY

Odour

B16. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Air Quality Criteria

B17. The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: *Air quality criteria*

Pollutant	***Averaging period***	***Criterion***
Particulate matter < 10 µm (PM_{10})	Annual	[a, c] 25 µg/m^3
	24 hour	[b] 50 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, c] 8 µg/m^3
	24 hour	[b] 25 µg/m^3
Total suspended particulate (TSP) matter	Annual	[a, c] 90 µg/m^3

Notes:
[a] Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
[b] Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
[c] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Planning Secretary.

B18. The air quality criteria in Table 4 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or infrastructure to exceed the air quality criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Air Quality and Greenhouse Gas Operating Conditions

B19. The Applicant must:

(a) take all reasonable steps to:

(i) minimise odour, fume, and dust (including PM_{10} and $PM_{2.5}$) emissions of the development;

(ii) minimise any visible off-site air pollution generated by the development;

(iii) minimise the extent of potential dust generating surfaces exposed on the site at any given point in time; and

(iv) improve energy efficiency and minimise Scope 1 and Scope 2 greenhouse gas emissions generated by the development;

(b) operate a comprehensive air quality management system that uses a combination of meteorological forecasting and real-time air quality monitoring data to guide the day-to-day planning of quarrying operations and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent;

(c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see Note c to Table 4 above);

(d) engage a suitably qualified and experienced person(s) to carry out routine air quality monitoring in accordance with the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* (EPA, 2022), to determine whether the development is complying with the relevant conditions in this consent; and

(e) regularly assess meteorological and air quality monitoring data and relocate, modify or stop operations on the site to ensure compliance with the relevant conditions of this consent; and

(f) develop and implement a protocol for identifying any air quality-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of these events.

Quarry-owned Land

B20. The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any occupied residence on quarry-owned land unless:

(a) the tenant has been notified of any health risks associated with such exceedances in accordance with the notification requirements under Part C of this consent; and

(b) the tenant of any land owned by the Applicant can terminate their tenancy agreement without penalty at any time, subject to giving reasonable notice,

to the satisfaction of the Planning Secretary.

METEOROLOGICAL MONITORING

B21. Prior to the commencement of construction and for the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in close proximity to the site that:

(a) complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* (EPA, 2022); and

(b) is capable of measuring meteorological conditions in accordance with the *NSW Noise Policy for Industry* (EPA, 2017),

unless a suitable alternative is approved by the Planning Secretary following consultation with the EPA.

SOIL AND WATER

Water Supply

B22. The Applicant must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of the development, within the limits of consent set out in Part A of Schedule 2, to match its available water supply.

B23. The Applicant must report on water take from the site each year (direct and indirect) in the Annual Review, including harvestable rights and water taken under each water licence.

Note: *Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain all necessary water licences for the development.*

Compensatory Water Supply

B24. The Applicant must provide a compensatory water supply to any landowner of privately-owned land whose rightful water supply is adversely and directly impacted (other than an impact that is minor or negligible) as a result of the development, in consultation with NSW DCCEEW – Water Group, and to the satisfaction of the Planning Secretary.

B25. The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent, in quality and volume, to the loss attributable to the development. Equivalent water supply should be provided (at least on an interim basis) as soon as practicable after the loss is identified, unless otherwise agreed with the landowner.

B26. If the Applicant and the landowner cannot agree on whether the loss of water is to be attributed to the development or the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.

B27. If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant must provide compensation, to the satisfaction of the Planning Secretary.

Note*: The Water Management Plan (see condition B30) is required to include trigger levels for investigating potentially adverse impacts on water supplies.*

Water Discharges

B28. The Applicant must ensure that all surface water discharges from the site comply with all relevant provisions of the POEO Act, including any discharge limits (both volume and quality) set for the development in any EPL.

Water Management System

B29. The Applicant must ensure that the on-site water management system is designed and constructed:

(a) to prevent discharges during rainfall events up to the one in 500 year ARI 24 hour storm event; and

(b) in accordance with *Managing Urban Stormwater Volume 1* (Landcom 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2E, Mines and Quarries (DECC 2008).*

Water Management Plan

B30. The Applicant must prepare a Water Management Plan for the development. This plan must:

(a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;

(b) be prepared in consultation with EPA, NSW DCCEEW – Water Group and Hunter Water; and

(c) include a:

(i) **Site Water Balance** that:

- includes details of:
  - sources and security of water supply;
  - water use and management on the site;
  - off-site discharges and water transfers;
  - metering of water volumes in all water storages and volumes of water pumped between water storages and discharged off-site;
  - reporting procedures, including the annual preparation of a site water balance; and
- minimises clean and potable water use on the site;

(ii) **Surface Water Management Plan**, that includes:

- detailed baseline data on surface water flows, water quality, riparian condition and geomorphic stability in watercourses and/or water bodies that could potentially be affected by the development including Seven Mile Creek and Grahamstown Dam;
- detailed information on predicted off-site discharges, including:
  - once constructed, baseline data on water quality in water storages on the site, including the in-pit sump(s) and treatment dams;
  - predicted controlled and uncontrolled off-site discharge volumes, frequencies and rates;
  - dirty water treatment options to ensure compliance with condition B34, including gross pollutant traps, floating wetlands, bio-retention swales and flocculation systems;
  - measures to avoid, minimise or mitigate adverse water quality and geomorphological impacts of receiving waters from controlled and uncontrolled off-site discharges;
- surface water impact assessment criteria, including trigger levels for investigating any potentially adverse impacts, and surface water management performance measures;
- a detailed description of the surface water management system on the site, including the:
  - clean water diversion system;
  - erosion and sediment controls;
  - water storages;
  - dirty water management system; and
  - maintenance program to ensure adequacy capacity to capture and store runoff from the design rainfall criteria;
- a program to monitor and report on:
  - any controlled and uncontrolled surface water discharges;
  - stream stability, riparian condition and geomorphic processes in receiving watercourses;
  - the effectiveness of the water management system, including regular independent reviews of the adequacy of the system;
  - surface water flows and quality in watercourses and/or waterbodies that could potentially be impacted by the development, including Seven Mile Creek and Grahamstown Dam;
- a protocol for identifying and investigating any exceedances of the surface water impact assessment criteria and for notifying the Department, Hunter Water and other relevant stakeholders of these events.

(iii) **Groundwater Management Plan** that includes:

- detailed baseline data of localised groundwater levels, yield and quality for groundwater resources potentially impacted by the development, including:
  - the existing groundwater bores;
  - groundwater supply for other water users; and
  - groundwater dependent ecosystems identified in the vicinity of the site;
- a detailed description of the groundwater management system;

- groundwater performance criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
- a groundwater bore replacement strategy for existing bores removed during quarrying activities;
- a program to periodically validate the groundwater model for the development in accordance with best practice methods, including an update of the model after the first 5 years of quarrying operations, and at least annual comparison of monitoring results with modelled predictions;
- a program to monitor and report on:
  - groundwater levels, yield and quality of groundwater resources potentially impacted by the development;
  - groundwater inflows into the extraction area;
  - seepage/leachate into the surrounding groundwater system;
  - impacts of the development on groundwater dependent ecosystems; and
  - impacts of the development on groundwater supply for other water users;
- a protocol for identifying and investigating any exceedances of the groundwater performance criteria and for notifying the Department and relevant stakeholders of these events; and
- a protocol to obtain appropriate water licence(s) to cover the volume of any unforeseen groundwater inflows into the extraction areas.

B31. The Applicant must not commence construction of the access road or quarrying operations until the Water Management Plan is approved by the Planning Secretary.

B32. The Applicant must implement the approved Water Management Plan.

TRANSPORT

Monitoring of Product Transport

B33. The Applicant must keep accurate records of all truck movements to and from the site (including hourly truck movements and the weight of each truck entering and exiting the site) and publish a summary of these records on its website at least every 6 months.

Transport Route

B34. Prior to transporting any quarry products from the site on public roads, the Applicant must:

(a) ensure that the intersection at the junction of The Pacific Highway and Italia Road is upgraded to the satisfaction of TfNSW;

(b) ensure that the new right-of-carriageway across Lot 1 DP245116 and Lot 2 DP1158962 between Italia Road and Barleigh Ranch Way, and the part of Barleigh Ranch Way between the new right of carriageway and the old right of carriageway, are constructed in accordance with Council Development Application 16-2021-160-1 to the satisfaction of Council;

(c) upgrade and extend Barleigh Ranch Way between the junction of the old right-of carriageway and the quarry site access point in accordance with the EIS and the latest Austroads standards to the satisfaction of Council; and

(d) design and construct the site access haul road bridge crossing over Seven Mile Creek in consultation with DPI Fisheries and in accordance with:

(i) the guidance series for "*Controlled Activities- Guidelines for Watercourse Crossings on Waterfront Land"* (DPI Water 2012);

(ii) "*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*" (DPI Fisheries 2003); and

(iii) "*Policy and Guidelines for Fish Habitat Conservation and Management"* (DPI Fisheries 2013).

Transport Operating Conditions

B35. The Applicant must:

(a) ensure that all laden trucks entering or exiting the site have their loads covered; and

(b) take all reasonable steps to minimise traffic safety issues and disruption to local road users.

Traffic Management Plan

B36. The Applicant must prepare a Traffic Management Plan for the development. This plan must:

(a) be prepared by suitably qualified and experienced person/s;

(b) be prepared in consultation with TfNSW and Council;

(c) include details of:

(i) construction related traffic management measures;

(ii) all transport routes and traffic types to be used for development-related traffic, including identification of bridge load restrictions;

(iii) processes in place for the control of truck movements entering and exiting the site;

(iv) measures to be implemented to:

- ensure compliance with the traffic operating conditions and other traffic related conditions of this consent, such as through the installation of any necessary road signage at intersections;
- manage the traffic impacts from contractors and subcontractors;
- minimise traffic safety issues and disruption to local road users, including minimising potential for conflict with school bus operations;
- minimise the transmission of dust and tracking of material onto the surface of public roads from vehicles exiting the site;
- warn users of the possibility of encountering koalas;
- monitor driver behaviour; and
- participate in transport management investigations initiated by Council;

(d) include a Drivers' Code of Conduct that includes procedures to ensure that drivers:

(i) adhere to posted speed limits or other required travelling speeds;

(ii) adhere to designated transport routes and travel times; and

(iii) implement safe and quiet driving practices, including restriction on the use of compression braking;

(e) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct, such as through the implementation of any monitoring and/or tracking measures.

B37. The Applicant must not commence construction or quarrying operations until the Traffic Management Plan is approved by the Planning Secretary.

B38. The Applicant must implement the approved Traffic Management Plan.

HERITAGE

Protection of Aboriginal Heritage

B39. The Applicant must ensure that the development does not cause any direct or indirect impact on any identified Aboriginal object or Aboriginal place located outside the approved disturbance areas, beyond those predicted in the document/s listed in condition A2(c).

B40. If suspected human remains are discovered on the site, then all work surrounding the area must cease, and the area must be secured. The Applicant must immediately notify NSW Police Force and Heritage NSW, and work must not recommence in the area until authorised by NSW Police Force and Heritage NSW.

B41. If unexpected archaeological deposits or relics not identified and considered in the supporting documents for this approval are discovered, work must cease in the affected area(s) and the Heritage Council of NSW must be notified in accordance with Section 146 of the Heritage Act 1997. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of this discovery.

B42. The Applicant must:

(a) ensure that all known Aboriginal objects or Aboriginal places on the site are properly recorded, those records are kept up to date and are reported to the Aboriginal Heritage Information Management System.

(b) ensure all workers receive suitable Aboriginal cultural heritage training/inductions prior to carrying out any activities which may cause impacts to Aboriginal objects or Aboriginal places, and that suitable records are kept of these inductions;

(c) protect, monitor and manage identified Aboriginal objects and Aboriginal places within the approved disturbance areas in accordance with the commitments made in the document/s listed in condition A2(c); and

(d) facilitate ongoing consultation and involvement of Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site.

BIODIVERSITY AND REHABILITATION

Biodiversity Offset Strategy

B43. The Applicant must retire the biodiversity credits specified in Table 5 prior to commencing vegetation clearing.

The retirement of credits must be carried out in consultation with BCS and in accordance with the Biodiversity Offset Scheme of the BC Act[1].

Table 5: *Biodiversity credit requirements*

Credit Type	***Credits Required***
Ecosystem Credits	
PCT: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	1,836
Species Credits	
Phascolarctos cinereus (Koala)	*291*
Myotis macropus (Southern Myotis)	*362*

[1] *The available credit retirement options for the development include purchase and retirement of open market available biodiversity credits, payment into the Biodiversity Conservation Fund or establishment of a Biodiversity Stewardship Site(s). Credits retired for impacts on EPBC Act listed species and associated habitat must be like-for-like.*

Note*: The credits in Table 5 were calculated in accordance with the BioBanking Assessment Methodology set out in the Framework for Biodiversity Assessment (Office of Environment and Heritage, 2014), and may need to be converted to reasonably equivalent 'biodiversity credits', within the meaning of the BC Act, to facilitate retirement. With the approval of the Planning Secretary and in consultation with BCS, the retirement of credits can be staged to align with progressive vegetation clearing.*

B44. The Applicant must ensure that:

(a) riparian corridors are maintained on either side of watercourses outside of the direct disturbance footprint in accordance with the *Guidelines for controlled Activities on Waterfront Land* (DPI Water 2012); and

(b) a Koala underpass is incorporated in the design and construction of the quarry access road bridge crossing over Seven Mile Creek.

Biodiversity Stewardship Site

B45. The Applicant must retire at least part of the biodiversity credits specified in Table 5 via the establishment of a Biodiversity Stewardship Site covering an area of 60.83 hectares of land within its land holding adjoining the southern and eastern portions of the site.

Note: *To identify the general location of the Biodiversity Stewardship Site, refer to the plan in Appendix 5.*

B46. The Applicant must make suitable arrangements to provide long-term security and management funding for the Biodiversity Stewardship Site identified in condition B45 in accordance with the Biodiversity Offset Scheme of the BC Act.

Biodiversity Management Plan

B47. The Applicant must prepare a Biodiversity Management Plan for the development. This plan must:

(a) be prepared by suitably qualified and experienced person/s;

(b) be prepared in consultation with BCS and Council;

(c) describe the short, medium, and long-term measures to be undertaken to:

(i) implement the Biodiversity Offset Strategy; and

(ii) manage the remnant vegetation and fauna habitat on the site;

(d) include a detailed description of the measures to be implemented on the site to:

(i) enhance the quality of existing vegetation, vegetation connectivity and fauna habitat, including through the assisted regeneration and/or targeted revegetation of appropriate canopy, sub-canopy, understorey and ground strata;

(ii) ensure the Koala underpass required by condition B44(b) is designed in consultation with a suitably qualified and experienced koala expert/s;

(iii) maximise the salvage of resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse on site, including fauna habitat enhancement;

(iv) minimise impacts on tree hollows where reasonable and feasible;

(v) minimise impacts on fauna, including undertaking pre-clearance surveys;

(vi) manage potential indirect impacts on threatened plant and animal species;

(vii) introduce naturally scarce fauna habitat features such as den structures, nest boxes and salvaged tree hollows, and promote the use of these introduced habitat features by threatened fauna species;

(viii) monitor and protect vegetation and fauna habitat outside the approved disturbance area, including within riparian corridors and downstream aquatic environments;

(ix) establish and/or retain vegetation screening to minimise the visual impacts of the development on surrounding receivers;

(x) control weeds and feral pests, with consideration of actions identified in relevant threat abatement plans;

(xi) manage the collection and propagation of seed;

(xii) control unrestricted access; and

(xiii) manage bushfire hazards;

(e) include a seasonally-based program to monitor and report on the effectiveness of biodiversity measures, and any progressive improvements that could be implemented to improve biodiversity outcomes;

(f) include an adaptive management plan for groundwater dependent ecosystems that:

(i) is based on a Before After Control Impact (BACI) design to determine baseline conditions and identify any quarrying-related impacts in the vicinity of the site;

(ii) provides details of the baseline plot data for groundwater dependent ecosystems, including vegetation composition, structure and health, and any candidate threatened species associated with the community;

(iii) provides for the collection of groundwater level monitoring data (monthly) to detect any shallow groundwater drawdown during quarrying operations;

(iv) provides details of the offsetting regime that would be implemented in accordance with the Biodiversity Offsets Scheme of the BC Act if a change (partial or full direct impacts) in vegetation is detected and found to be caused by groundwater drawdown associated with the development; and

(g) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

B48. The Applicant must not commence construction of the access road or quarrying operations until the Biodiversity Management Plan is approved by the Planning Secretary.

B49. The Applicant must implement the approved Biodiversity Management Plan.

Rehabilitation Objectives

B50. The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must be consistent with the rehabilitation strategy set out in the EIS and the conceptual rehabilitation plan in Appendix 6 and must comply with the objectives in Table 6.

Table 6: *Rehabilitation objectives*

Feature	Objective
All areas of the site affected by the development	• Safe • Hydraulically and geotechnically stable • Non-polluting • Fit for the intended post-quarrying operations land use(s) • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land
Surface infrastructure areas	• All infrastructure decommissioned and removed, unless otherwise agreed by the Planning Secretary • Landscaped and vegetated using native grassland and woodland species • Tree species to include Koala feed species
Quarry benches and pit floor	• Landscaped and vegetated using native grassland and woodland species • Free draining pit floor
Riparian corridors along Deep Creek and its tributaries	• Stabilised and revegetated
Final void	• Minimise the size, depth and slope of the batters of the final void • Minimise the drainage catchment of the final void

Note: *The rehabilitation objectives related to the establishment of native vegetation communities do not constitute an obligation or biodiversity offset purposes. Biodiversity offsets obligations in relation to development approved under this consent are regulated by conditions B43 to B46.*

Progressive Rehabilitation

B51. The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.

Note: *It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage of the development.*

Rehabilitation Management Plan

B52. Within 12 months of commencement of development under this consent, the Applicant must prepare a Rehabilitation Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:

(a) be prepared by suitably qualified and experienced person/s;

(b) be prepared in consultation with Council;

(c) describe the short, medium, and long-term measures to be undertaken to ensure compliance with the rehabilitation objectives in this consent;

(d) describe the staging and timing of the progressive rehabilitation required by condition B51;

(e) include a conceptual closure plan that considers the hydrological and hydraulic impacts of the final landform;

(f) include detailed performance and completion criteria for evaluating the performance of rehabilitation of the site, including triggers for remedial action, where these performance or completion criteria are not met;

(g) include a seasonally-based program to monitor and report on the effectiveness of rehabilitation measures, progress against the detailed performance and completion criteria, and any progressive improvements that could be implemented to improve rehabilitation outcomes;

(h) monitor and report on the impacts of the development on groundwater dependent ecosystems and riparian vegetation, and identify trigger levels for the remediation of any material impacts to these ecosystems;

(i) identify the potential risks to the successful implementation of the final rehabilitation, and include a description of the contingency measures to be implemented to mitigate against these risks; and

(j) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

B53. The Applicant must implement the approved Rehabilitation Management Plan.

Rehabilitation Bond

B54. Within 6 months of the approval of the Rehabilitation Management Plan, the Applicant must lodge a Rehabilitation Bond with the Department to ensure that the rehabilitation of the site is undertaken in accordance with the performance and completion criteria set out in the plan and the relevant conditions of this consent. The sum of the bond must be an amount agreed to by the Planning Secretary and determined by:

(a) calculating the cost of rehabilitating all existing and immediately proposed disturbed areas of the site (taking into account likely surface disturbance over the next 3 years of quarrying operations); and

(b) employing a suitably qualified, independent and experienced person to verify the calculated costs.

B55. The calculation of the Rehabilitation Bond must be submitted to the Department for approval at least 1 month prior to the proposed lodgement of the bond.

B56. The Rehabilitation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following:

(a) any update or revision to the Rehabilitation Management Plan;

(b) completion of an Independent Environmental Audit in which recommendations relating to rehabilitation have been made; or

(c) a request by the Planning Secretary,

B57. If rehabilitation of this site is completed generally in accordance with the relevant performance and completion criteria, to the satisfaction of the Planning Secretary, the Planning Secretary will release the bond.

B58. If rehabilitation of the site is not completed generally in accordance with the relevant performance and completion criteria, the Planning Secretary will call in all, or part of, the bond, and arrange for the completion of the relevant works.

VISUAL

B59. The Applicant must:

(a) take all reasonable steps to minimise the visual and off-site lighting impacts of the development;

(b) ensure that all external lighting associated with the development complies with relevant Australian Standards including *Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting*;

(c) ensure that the visual appearance of all buildings, structures, facilities or works (including paint colours and specifications) is aimed at blending as far as possible with the surrounding landscape; and

(d) take all reasonable steps to shield views of quarrying operations and associated equipment from users of public roads and privately-owned residences.

WASTE

B60. The Applicant must:

(a) manage on-site sewage treatment and disposal in accordance with the requirements of an applicable EPL, and to the satisfaction of EPA;

(b) classify all waste in accordance with the *Waste Classification Guidelines* (EPA, 2014);

(c) minimise the waste generated by the development;

(d) ensure that the waste generated by the development is appropriately stored, handled, and disposed of; and

(e) monitor and report on waste minimisation and management in the Annual Review referred to in condition D9.

B61. Except as expressly permitted in an applicable EPL, specific resource recovery order or exemption under the *Protection of the Environment Operations (Waste) Regulation 2014,* the Applicant must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.

LIQUID STORAGE

B62. The Applicant must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.

DANGEROUS GOODS

B63. The Applicant must ensure that the storage, handling, and transport of dangerous goods is done in accordance with the latest version of the Australian Standards, particularly *AS 1940-2004 The storage and handling of flammable and combustible liquids (*Standards Australia, 2004) and *AS/NZS 1596:2014 The storage and handling of LP Gas* (Standards Australia, 2014), and the *Australian Dangerous Goods Code*.

BUSHFIRE MANAGEMENT

B64. The Applicant must:

(a) ensure that the development:

(i) provides for asset protection in accordance with the relevant requirements in *the Planning for Bushfire Protection* (RFS, 2019) guideline; and

(ii) ensure that there is suitable equipment to respond to any fires on the site; and

(b) assist the RFS and emergency services to the extent practicable if there is a fire in the vicinity of the site.

PART C ADDITIONAL PROCEDURES

NOTIFICATION OF EXCEEDANCES

C1. As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of any noise, blasting or air quality criterion in PART B of this consent, the Applicant must:

(a) provide to any affected landowners and tenants; and

(b) publish on its website

the full details of the exceedance.

C2. For any exceedance of any air quality criterion in PART B of this consent, the Applicant must also provide to any affected landowners and tenants a copy of the fact sheet entitled "*Mine Dust and You"* (NSW Minerals Council, 2011).

INDEPENDENT REVIEW

C3. If a landowner considers the development to be exceeding any noise, blasting or air quality criterion in PART B of this consent, they may ask the Planning Secretary in writing for an independent review of the impacts of the development on their land.

C4. If the Planning Secretary is not satisfied that an independent review is warranted, the Planning Secretary will notify the landowner in writing of that decision, and the reasons for that decision, within 21 days of the request for a review.

C5. If the Planning Secretary is satisfied that an independent review is warranted, within 3 months of the Planning Secretary's decision, or as otherwise agreed by the Planning Secretary and the landowner, the Applicant must:

(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Planning Secretary, to:

(i) consult with the landowner to determine their concerns;

(ii) conduct monitoring to determine whether the development is complying with the relevant criteria in PART B of this consent; and

(iii) if the development is not complying with any relevant criterion, identify measures that could be implemented to ensure compliance with that criterion;

(b) give the Planning Secretary and landowner a copy of the independent review; and

(c) comply with any written requests made by the Planning Secretary to implement any findings of the review.

PART D ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

D1. An Environmental Management Strategy must be prepared for the development. This strategy must:

(a) provide the strategic framework for environmental management of the development;

(b) identify the statutory approvals that apply to the development;

(c) set out the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;

(d) set out the procedures to be implemented to:

(i) keep the local community and relevant agencies informed about the operation and environmental performance of the development;

(ii) receive record, handle and respond to complaints;

(iii) resolve any disputes that may arise during the course of the development;

(iv) respond to any non-compliance and any incident;

(v) respond to emergencies; and

(e) include:

(i) references to any strategies, plans and programs approved under the conditions of this consent; and

(ii) a clear plan depicting all the monitoring to be carried out under the conditions of this consent.

D2. The Applicant must not commence construction or quarrying operations until the Environmental Management Strategy is approved by the Planning Secretary.

D3. The Applicant must implement the approved Environmental Management Strategy.

Management Plan Requirements

D4. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

(a) a summary of relevant background or baseline data;

(b) details of:

(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);

(ii) any relevant limits or performance measures and criteria; and

(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;

(d) a program to monitor and report on the:

(i) impacts and environmental performance of the development; and

(ii) effectiveness of the management measures set out pursuant to condition D4(c);

(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;

(f) a program to investigate and implement ways to improve the environmental performance of the development over time;

(g) a protocol for managing and reporting any:

(i) incident, non-compliance or exceedance of the impact assessment criteria or performance criteria;

(ii) complaint; or

(iii) failure to comply with statutory requirements; and

(h) a protocol for periodic review of the plan.

Note: *The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*

REVISION OF STRATEGIES, PLANS AND PROGRAMS

D5. Within three months of:

(a) the submission of an incident report under condition D7;

(b) the submission of an Annual Review under condition D9;

(c) the submission of an Independent Environmental Audit under condition D11;

(d) the approval of any modification of the conditions of this consent;

(e) notification of a change in development stage under condition A19; or

(f) the issue of a direction of the Planning Secretary under condition A2(b) which requires a review,

the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.

D6. If necessary, to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary and submitted to the Planning Secretary for approval within six weeks of the review.

Note: *This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.*

REPORTING AND AUDITING

Incident Notification

D7. The Planning Secretary must be notified in writing via the Major Projects Portal immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the application number and the name of the development if it has one) and set out the location and nature of the incident. Subsequent notification requirements must be given, and reports submitted in accordance with the requirements set out in Appendix 7.

Non-Compliance Notification

D8. The Planning Secretary must be notified in writing via the Major Projects Portal within seven days after the Applicant becomes aware of any non-compliance. A non-compliance notification must identify the development and the application number for it, set out the condition of the consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note*: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.*

Annual Review

D9. By the end of March in each year after the commencement of development, or other timeframe agreed by the Planning Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary. This review must:

(a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;

(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, including a comparison of these results against the:

(i) relevant statutory requirements, limits or performance measures/criteria;

(ii) requirements of any plan or program required under this consent;

(iii) monitoring results of previous years; and

(iv) relevant predictions in the documents listed condition A2(c).

(c) identify any non-compliance or incident which occurred in the previous calendar year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence;

(d) evaluate and report on:

(i) the effectiveness of the noise and air quality management systems; and

(ii) compliance with the performance measures, criteria and operating conditions in this consent;

(e) identify any trends in the monitoring data over the life of the development;

(f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(g) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.

D10. Copies of the Annual Review must be submitted to Council and made available to the CCC and any interested person upon request.

Independent Environmental Audit

D11. Within one year of the commencement any development under this consent, and every three years after, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must:

(a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary;

(b) be carried out in consultation with the relevant agencies and the CCC;

(c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and EPL for the development (including any assessment, strategy, plan or program required under these approvals);

(d) review the adequacy of any approved strategy, plan or program required under this consent and the other abovementioned approvals;

(e) recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under this consent and the other abovementioned approvals; and

(f) be conducted and reported to the satisfaction of the Planning Secretary.

D12. Within three months of commencing an Independent Environmental Audit, or within another timeframe agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Planning Secretary.

Note: *The audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Planning Secretary.*

Monitoring and Environmental Audits

D13. Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit.

For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.

D14. Noise, blast and/or air quality monitoring under this consent may be undertaken at suitable representative monitoring locations instead of at privately-owned residences or other locations listed in PART B of this consent, providing that these representative monitoring locations are set out in the respective management plan/s.

ACCESS TO INFORMATION

D15. Before the commencement of construction until the completion of all rehabilitation required under this consent, the Applicant must:

(a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website:

(i) the document/s listed in condition A2(c);

(ii) all current statutory approvals for the development;

(iii) all approved strategies, plans and programs required under the conditions of this consent;

(iv) minutes of CCC meetings;

(v) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;

(vi) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;

(vii) a summary of the current stage and progress of the development;

(viii) contact details to enquire about the development or to make a complaint;

(ix) a complaints register, updated monthly;

(x) the Annual Reviews of the development;

(xi) audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report;

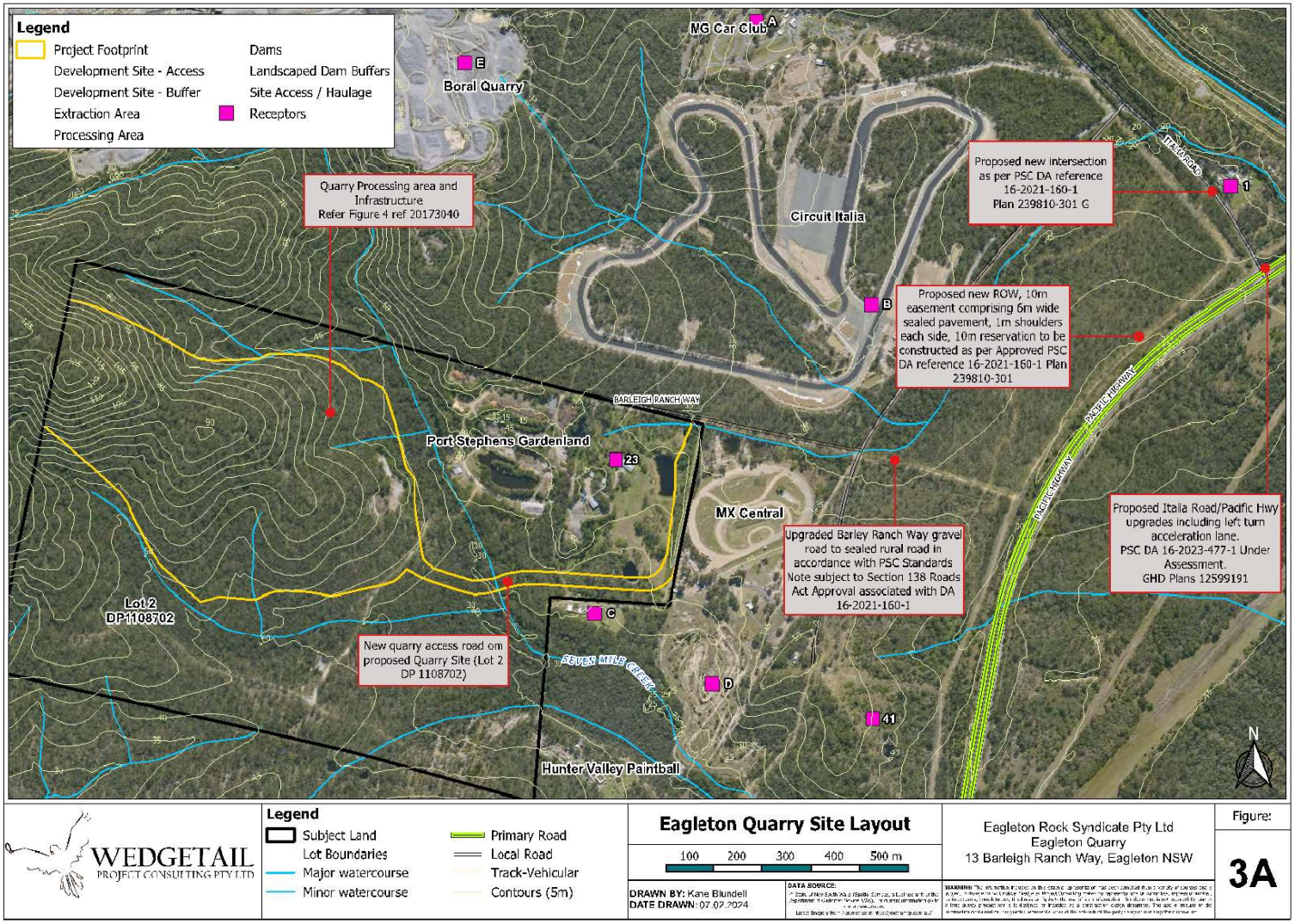
(xii) any other matter required by the Planning Secretary; and

(b) keep such information up to date, to the satisfaction of the Planning Secretary.

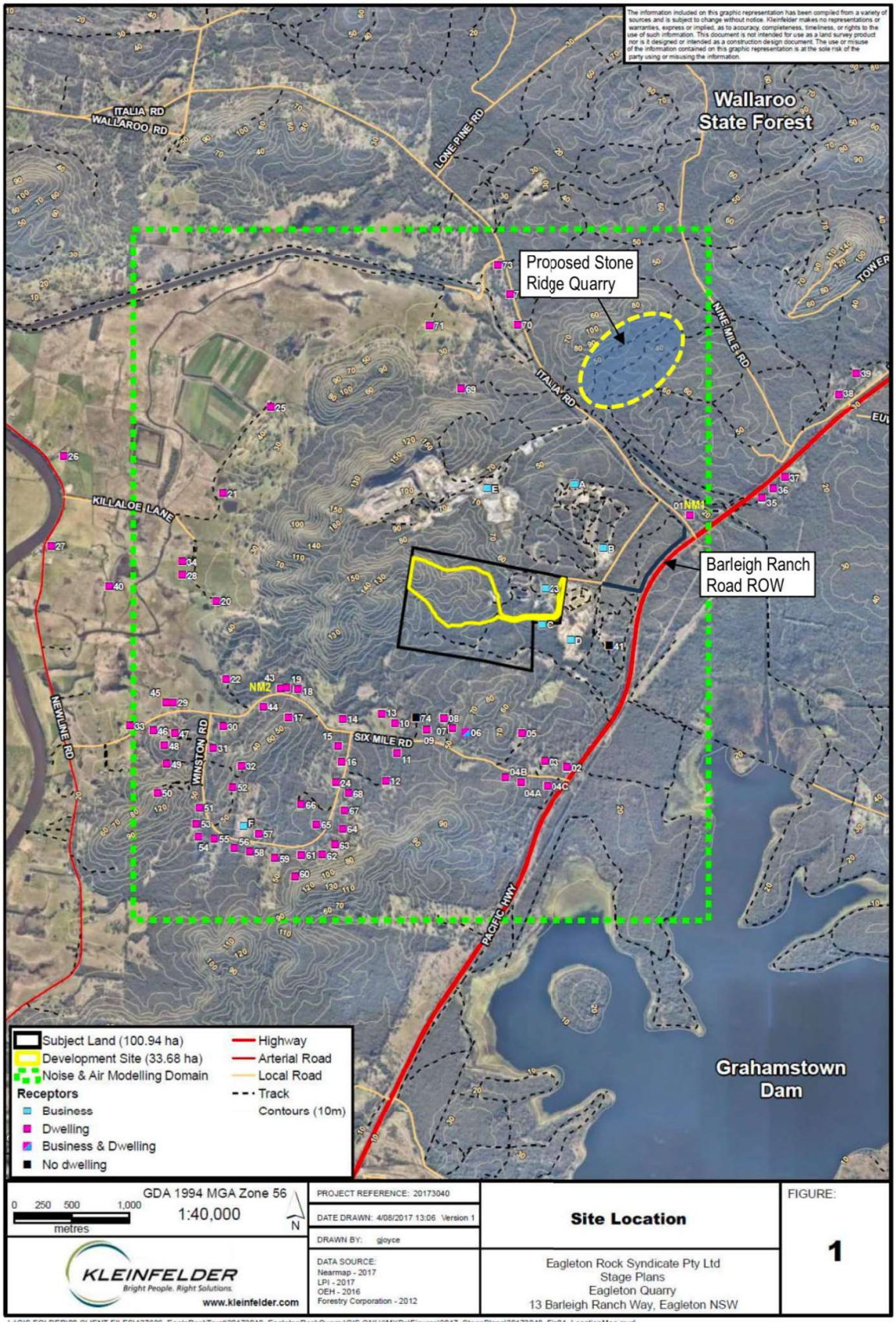
APPENDIX 1: SCHEDULE OF LAND

Part of Lot 2 in Deposited Plan 1108702, located on Barleigh Ranch Way (or Killaloe Lane)

APPENDIX 2: DEVELOPMENT LAYOUT PLAN



APPENDIX 3: RECEIVER LOCATIONS



APPENDIX 4: NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in *Table 2* of the conditions are to apply under all meteorological conditions except the following:

   (a) where 3°C/100 metres (m) lapse rates have been assessed, then:

      (i) wind speeds greater than 3 metres/second (m/s) measured at 10m above ground level;

      (ii) temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2m/s measured at 10m above ground level; or

      (iii) temperature inversion conditions greater than 3°C/100m.

   (b) where Pasquill Stability Classes have been assessed, then:

      (i) wind speeds greater than 3m/s at 10m above ground level;

      (ii) stability category E or F and wind speeds greater than 2m/s at 10m above ground level; or

      (iii) stability category G temperature inversion conditions.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station required under condition B21.

Compliance Monitoring

3. A noise compliance assessment must be undertaken within two months of commencement of the road transportation of quarry products. The assessment must be conducted by a suitably qualified and experienced acoustical practitioner and must assess compliance with noise criteria presented above. A report must be provided to the Department and EPA within 1 month of the assessment.

4. Unless otherwise agreed by the Planning Secretary, attended compliance monitoring must be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Noise Policy for Industry* (EPA, 2017), in particular the requirements relating to:

   (a) monitoring locations for the collection of representative noise data;

   (b) meteorological conditions during which collection of noise data is not appropriate;

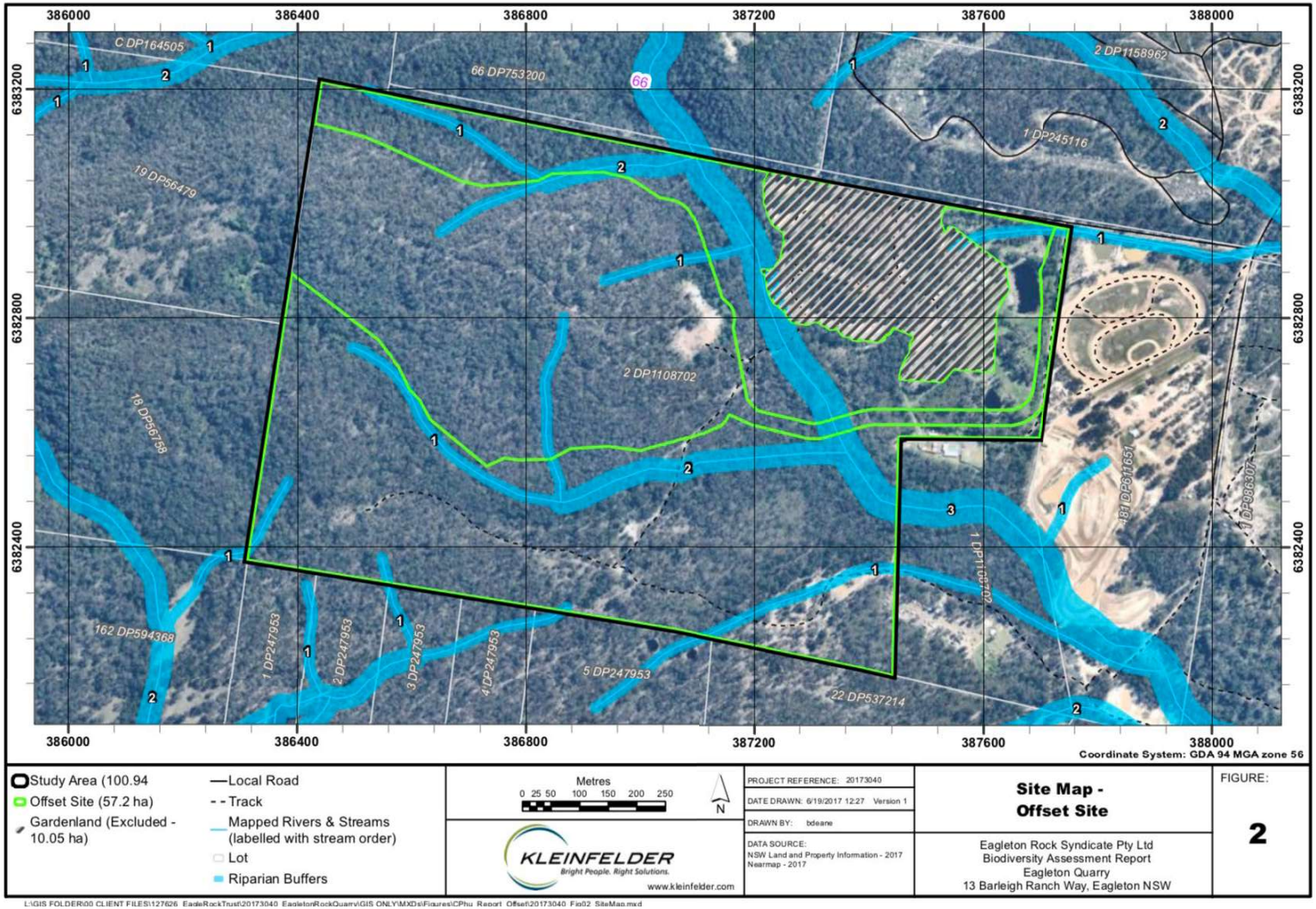
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and

   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration,

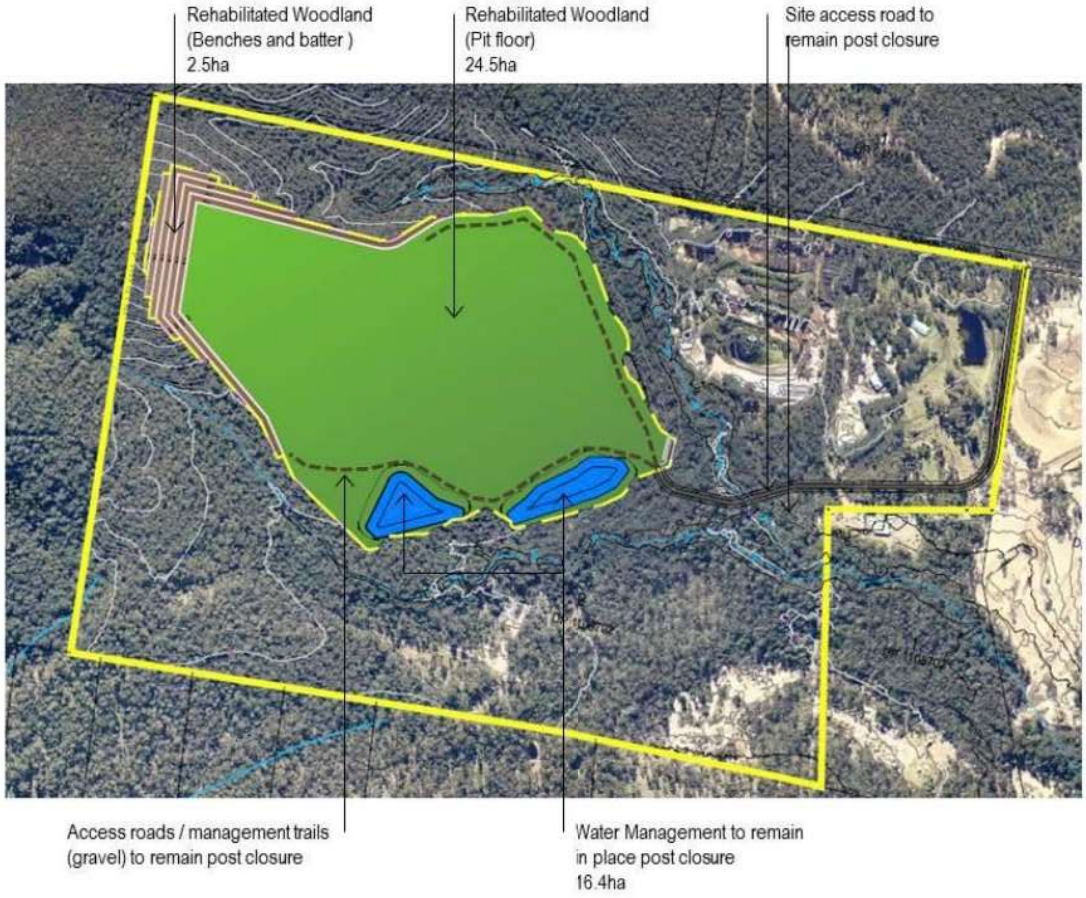
   (e) modifying factors apart from adjustments for duration,

   with the exception of applying appropriate modifying factors for low frequency noise during compliance testing. This should be undertaken in accordance with *Fact Sheet C* of the *NSW Noise Policy for Industry (EPA, 2017)*.

APPENDIX 5: BIODIVERSITY STEWARDSHIP SITE



APPENDIX 6: CONCEPTUAL REHABILITATION PLAN



APPENDIX 7: INCIDENT NOTIFICATION AND REPORTING REQUIREMENTS

Written Incident Notification Requirements

1. A written incident notification addressing the requirements set out below must be submitted to the Planning Secretary via the Major Projects website within seven days after the Applicant becomes aware of an incident. Notification is required to be given under this condition even if the Applicant fails to give the notification required under condition D7 of this consent or, having given such notification, subsequently forms the view that an incident has not occurred.

2. Written notification of an incident must:
   a) identify the development and application number;
   b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
   c) identify how the incident was detected;
   d) identify when the applicant became aware of the incident;
   e) identify any actual or potential non-compliance with conditions of consent;
   f) describe what immediate steps were taken in relation to the incident;
   g) identify further action(s) that will be taken in relation to the incident; and
   h) identify a project contact for further communication regarding the incident.

3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Applicant must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.

4. The Incident Report must include:
   a) a summary of the incident;
   b) outcomes of an incident investigation, including identification of the cause of the incident;
   c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
   d) details of any communication with other stakeholders regarding the incident.

APPENDIX 4. BIODIVERISTY ASSESSMENT REPORT 2017

KLEINFELDER
Bright People. Right Solutions.

Biodiversity Assessment Report



Eagleton Rock Syndicate Pty Ltd

Eagleton Quarry

13 Barleigh Ranch Way, Eagleton NSW

17 July 2017

Biodiversity Assessment Report

Eagleton Quarry

13 Barleigh Ranch Way, Eagleton NSW

Kleinfelder Document Number: NCA16R50548
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Prepared for:

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Document Control:

Version	Description	Date	Author(s)	Reviewer(s)
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2.0	Final	17 July 2017	K. Peters (report update)	S. Schulz J. Berry

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EXECUTIVE SUMMARY

Kleinfelder were commissioned by Eagleton Rock Syndicate Pty Ltd to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) for a proposed hard rock quarry at Lot 2 DP1108702, 13 Barleigh Ranch Way, Eagleton NSW. This report (BAR) and the BOS (included in Appendix 2) have been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD 7332, dated 6 November 2015). The BAR provides an assessment of the biodiversity values on the proposed development site and the potential impacts of the proposal on these values in accordance with the Framework for Biodiversity Assessment. This updated version has been prepared to incorporate the results of additional fieldwork and GIS mapping that was conducted in response to submissions to the exhibited Environmental Impact Statement.

The study area is approximately 100.94 ha and consists of a single lot (Lot 2 DP 1108702). The development site (33.7 ha) is located on the northern part of the study area. The majority of the development site occurs on the north-west part of the study area where the hard rock resource is situated. The development site would also include a haul road which would extend from the north-east corner of the study area and connect to the south-east end of the main part of the development site.

Survey Results

Key findings of the field surveys conducted across the study area between 2011 and 2016 are summarised below:

- *Two plant community types (PCT) were identified in the study area: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest and HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley. The assessment determined that these communities do not constitute any listed threatened ecological communities under the TSC Act 1995 and/or EPBC Act 1999.*
- *No threatened flora species were detected in the study area during the surveys.*
- *A total of 12 threatened fauna species listed under the TSC Act 1995 and/or EPBC Act were detected in the study area during the surveys: Spotted Harrier, Brown Treecreeper (eastern subspecies), Black Falcon, Square-tailed Kite, Grey-crowned Babbler (eastern subspecies), Large-eared Pied Bat, Eastern False Pipistrelle, Little Bentwing-bat, Eastern Freetail-bat, Southern Myotis, Eastern Cave Bat and the Koala.*
- *One EPBC Act-listed migratory bird species was also recorded in the study area during the surveys: Rufous Fantail.*
- *The study area contains a number of 1st, 2nd and 3rd order streams with associated riparian vegetation (i.e. variation within HU804).*

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Avoidance and Minimisation

Measures to avoid and minimise impacts on biodiversity values within the study area were considered as part of the project design, and additional minimisation measures to be implemented during the construction and operation phases of the project are detailed in Section 2.1.3. The extent and layout of the proposed development site has been selected to avoid and retain the following biodiversity values:

- *The proposal would retain 57.2 ha of land for conservation within the study area. This retained vegetation is proposed to be secured under a biobanking agreement as part of the offset to provide in-perpetuity protection and management of this native vegetation and threatened species habitat.*
- *The proposed development has been positioned to avoid the 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. A new bridge crossing is proposed to be constructed over Seven Mile Creek.*
- *The proposed development would avoid and retain the majority of suitable Koala and Southern Myotis habitat in the study area (approximately 78.7% and 66.7%, respectively).*

Proposed impact minimisation measures are summarised as follows:

- *Preparation and implementation of a Flora and Fauna Management Plan, which will detail measures and protocols to minimise potential impacts upon wildlife and ensure protection of vegetation immediately adjacent to the development footprint during the construction phase of the project. The plan would include the following chapters: Pre-clearing fauna surveys; Clearing protocols; Hollow-bearing tree clearing protocol; Fauna translocation protocol; and Vegetation clearing protocol. Refer to Section 2.1.3.1 for details.*
- *Preparation and implementation of a Landscape and Rehabilitation Management Plan, which will detail the short and long term measures that would be implemented during the construction and operation phases of the project to minimise impacts on native vegetation and fauna on the site, and ensure the development site is progressively rehabilitated with self-sustaining native vegetation. Refer to Section 2.1.3.2 for details.*
- *The proposed onsite offset site will include revegetation of small areas of cleared grassland on the north-east part of the site to ensure habitat connectivity is maintained and improved within the study area.*

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Impact Summary

The proposed development would impact on 32.03 ha of native forest vegetation consisting of one PCT (HU804). The vegetation within the development site also represents suitable habitat for a number of threatened fauna species which would be impacted by the proposal. This includes two fauna species credit species: Koala and Southern Myotis. The proposed development would not impact on any threatened ecological communities (TECs), critical habitat, riparian areas of 4th order or higher, important wetlands, estuaries, or state significant biodiversity links.

An assessment of likelihood of occurrence of the threatened species, populations and ecological communities previously recorded and/or modelled to occur within a 10 km radius of the study area was also undertaken (Appendix 5). This assessment determined that a total of 26 threatened fauna species and eight EPBC Act-listed migratory species were likely to, or could potentially, be impacted by the proposed development.

Application of the Assessment of Significance (TSC Act) and EPBC Act Significant Impact Criteria revealed that the proposal is unlikely to have a significant impact upon any of these threatened or migratory species. The proportion of habitat that would be removed is relatively small when considering the large areas of similar habitat that are contiguous with the study area. Additionally, the proposed development would not isolate or substantially fragment areas of suitable habitat for the affected threatened species within the study area or the locality. These conclusions are contingent upon implementation of mitigation measures detailed in Section 2.1.3 of the BAR to ensure potential indirect impacts on adjacent vegetation and fauna habitats are effectively managed.

Biodiversity Offset Strategy

It is proposed that the majority of the land in the study area not subject to development would be secured as a biobank site (57.2 ha) as part of the proposed offsets. The proposed onsite offset site would satisfy a large proportion of the biodiversity credits required at the development site. At this stage, it is intended that the remaining biodiversity credits would be purchased from existing biobank sites with suitable credits (e.g. biobanking agreement [BA] no. 96). However, if the required credits are unavailable at existing biobank sites at the time, the proponent may also secure an offsite offset site under a biobanking agreement to satisfy the credit requirements. All ecosystem and species credits required for the development will be retired at the offset sites in accordance with the FBA prior to commencement of clearing and construction. A summary of the biodiversity credit requirements is provided in the table below.

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Ecosystem / Species	Credits Required at Development Site	Credits Generated at Onsite Offset Site	Credit Balance
HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	1,836	533	-1,303
HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	0	63	+63
Southern Myotis (*Myotis macropus*)	362	235	-127
Koala (*Phascolarctos cinereus*)	291	294	+3

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Abbreviations

BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology (2014)
BOS	Biodiversity Offset Strategy
ECs	Ecosystem Credits
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
FBA	Framework for Biodiversity Assessment
GIS	Geographic Information System
ha	hectares
IBRA	Interim Biogeographic Regionalisation of Australia
OEH	Office of Environment and Heritage (NSW)
RDP	Rapid Point Data
SCs	Species Credits
TEC	Threatened Ecological Community (as defined under Commonwealth and NSW Legislation)
TSC Act	*Threatened Species Conservation Act* 1995 (NSW)

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STAGE 1: BIODIVERSITY ASSESSMENT

1.1 INTRODUCTION

Kleinfelder were commissioned by Eagleton Rock Syndicate Pty Ltd to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) for a proposed hard rock quarry at Lot 2 DP1108702, 13 Barleigh Ranch Way, Eagleton NSW (hereafter referred to as the 'study area'). The BAR and BOS have been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD 7332, dated 6 November 2015). The relevant SEARs relating to these reports include:

- *"Accurate predictions of any vegetation clearing on site;*
- *A detailed assessment of the potential biodiversity impacts, paying particular attention to threatened species, populations and ecological communities, having regard to the requirements of OEH (see Attachment 2); and*
- *A detailed description of the proposed measures to maintain or improve the biodiversity values of the region in the medium to long term"* (p.2).

Points 1 and 2 are addressed in the BAR (this report), and point 3 is addressed in the BOS (included as an appendix to the BAR). This updated version has been prepared to incorporate the results of additional fieldwork and GIS mapping that was conducted in response to submissions to the exhibited Environmental Impact Statement.

This project has been assessed under the NSW Biodiversity Offsets Policy for Major Projects using the Framework for Biodiversity Assessment (FBA) (OEH 2014) in accordance with OEH's requirements in the SEARs. The assessment has been undertaken and reviewed by persons accredited in accordance with Section 142B(1)(c) of the *NSW Threatened Species Conservation Act 1995* (TSC Act) (Aaron Mulcahy and Adam Blundell), and both the BAR and BOS have been prepared to comply with the FBA requirements. This report provides an assessment of the biodiversity values on the proposed development site and the potential impacts of the proposal on these values in accordance with the FBA.

1.1.1 Report Structure

This report has been structured to comply with the reporting requirements of the FBA, as detailed in Appendix 7 of the FBA. The BOS (i.e. Stage 3 of the FBA) has been included as an appendix to this report and has also been structured in accordance with Appendix 7 of the FBA. Additionally, a number of other biodiversity assessment requirements under the SEARs and in response to submissions from the exhibited EIS have also been included as appendices

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to this report, including Additional Survey Information (Appendix 4), Assessments of Significance (TSC Act) and EPBC Act Assessments of Significance (Appendix 6), Groundwater Dependent Ecosystem (GDE) Assessment (Appendix 7), Aquatic Habitat Assessment (Appendix 8) and a Brush-tailed Phascogale Habitat Assessment (Appendix 10).

1.1.2 Study Area and Project Description

The study area is approximately 100.94 ha and consists of a single lot (Lot 2 DP 1108702). The study area is located at 13 Barleigh Ranch Way, Eagleton approximately 800 m to the west of the Pacific Highway within the Port Stephens Council Local Government Area (LGA).

The proposed hard rock quarry (hereafter referred to as the 'development site') is located on the north-west part of the study area. The proposed development would involve the extraction and processing of up to 600,000 tonnes per year for a 30-year period. The proposed quarry meets the criteria listed in Schedule 1 clause 7(1)(a) of *State Environmental Planning Policy - State and Regional Development 2011* for assessment as 'State Significant Development' (SSD) under Section 89C of the *Environmental Planning and Assessment* (EP&A) *Act 1979*.

The proposed development site includes a hard rock reserve occurring within the study area. The hard rock proposed for extraction and processing is a mixture of igneous and sedimentary formations and is suited to local and regional construction markets. The proposed development would include construction of on-site infrastructure and facilities to support quarry activities, and transporting material off-site by truck. A detailed description and layout of the proposed development is provided in the main Response to Submissions document.

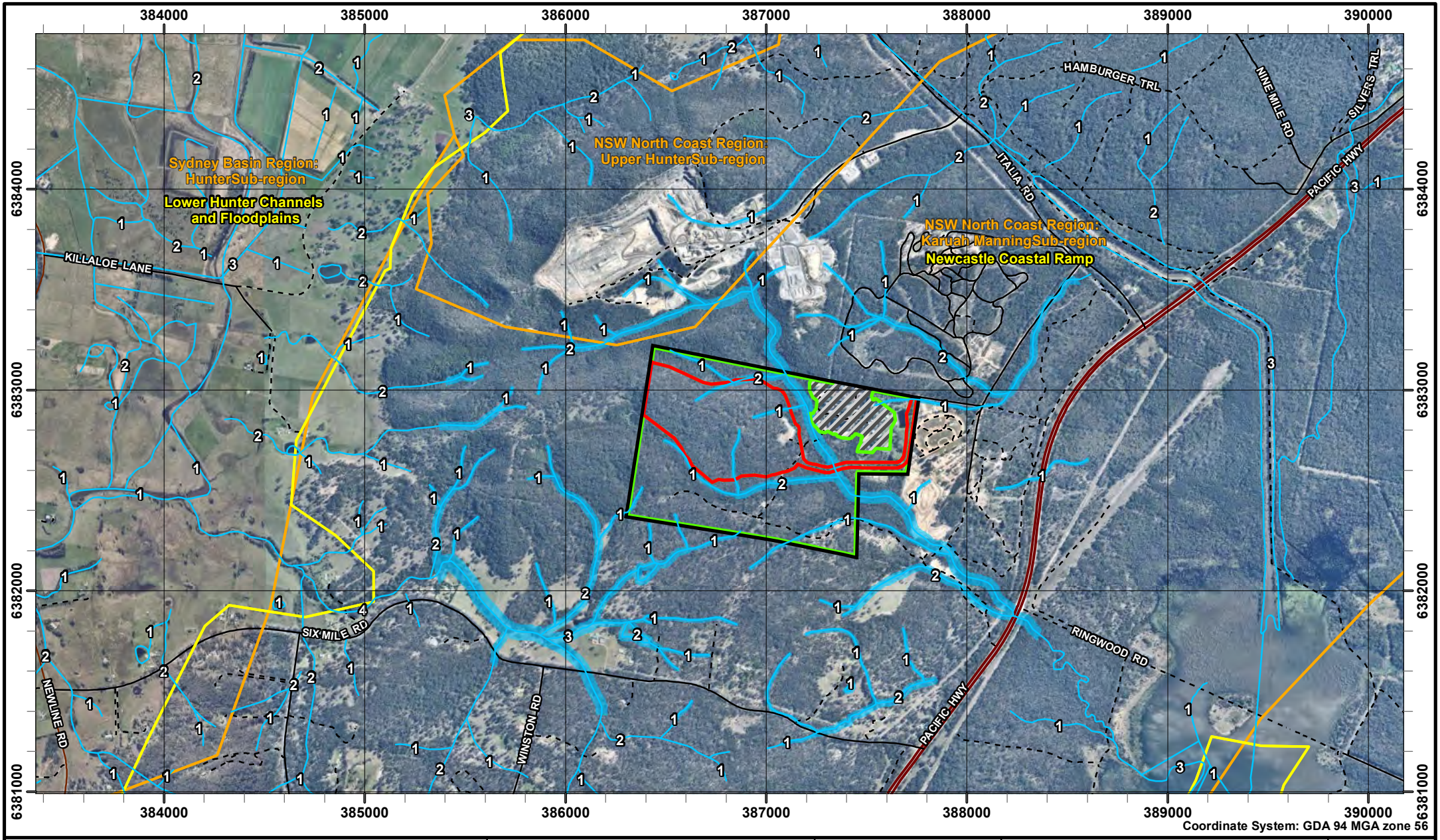
The study area is zoned RU2 Rural Landscape under Port Stephens Council Local Environmental Plan (LEP) 2013 which permits development for extractive industries. The study area is owned by Port Stephens Gardenland, which currently operates a landscape supplies business on the site. The operations and facilities associated within Port Stephens Gardenland are located on the north-east part of the study area. The remainder of the study area primarily consists of remnant native forest vegetation, with several smaller cleared and regenerating areas in the central, south-east and north-east parts of the study area as a result of past disturbance and management. Evidence of past logging activities was also observed in the study area (e.g. cut stumps).

All lands adjoining the study area are also zoned RU2 under the Port Stephens Council LEP 2013. The adjoining lands contain a mixture of land uses, including the Boral Quarry to the north, MX Central Motocross Riding Complex to the east, Hunter Valley Paintball to the south-east, and other private landholdings to the south and west. The study area has high vegetation connectivity with adjoining lands to the north, south and west, and forms part of a large expanse of remnant forest vegetation extending from north of Raymond Terrace to Wallaroo State Forest and Wallaroo National Park.

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A Location Map is provided in **Figure 1**.

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Riparian Buffers
- Mapped Rivers & Streams (labelled with stream order)
- Mitchell Landscapes Boundary (V3)
- IBRA Subregion Boundary (V7)
- PrimaryRoad
- Sub-arterial Road
- Local Road
- Track

Metres
0 100 200 400 600 800 1,000

N

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DATA SOURCE:	NSW Land and Property Information - 2017 Nearmap - 2017

Location Map

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
1

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1.1.3 Development Site

The development site (33.7 ha) is located on the northern part of the study area, entirely within Lot 2 DP 1108702. The majority of the development site occurs on the north-west part of the study area where the hard rock resource is situated. This part of the development site would be subject to extraction of rock material and would include all infrastructure required for processing and stockpiling. The development site would also include a haul road which would extend from the north-east corner of the study area and connect to the south-east end of the main part of the development site. The proposed haul road would bisect Seven Mile Creek which runs north-west to south-east through the study area.

The development site is predominately vegetated with dry sclerophyll forest vegetation (32.03 ha). A small portion of the development site consists of disturbed un-vegetated areas, non-native vegetation, and access tracks (1.66 ha).

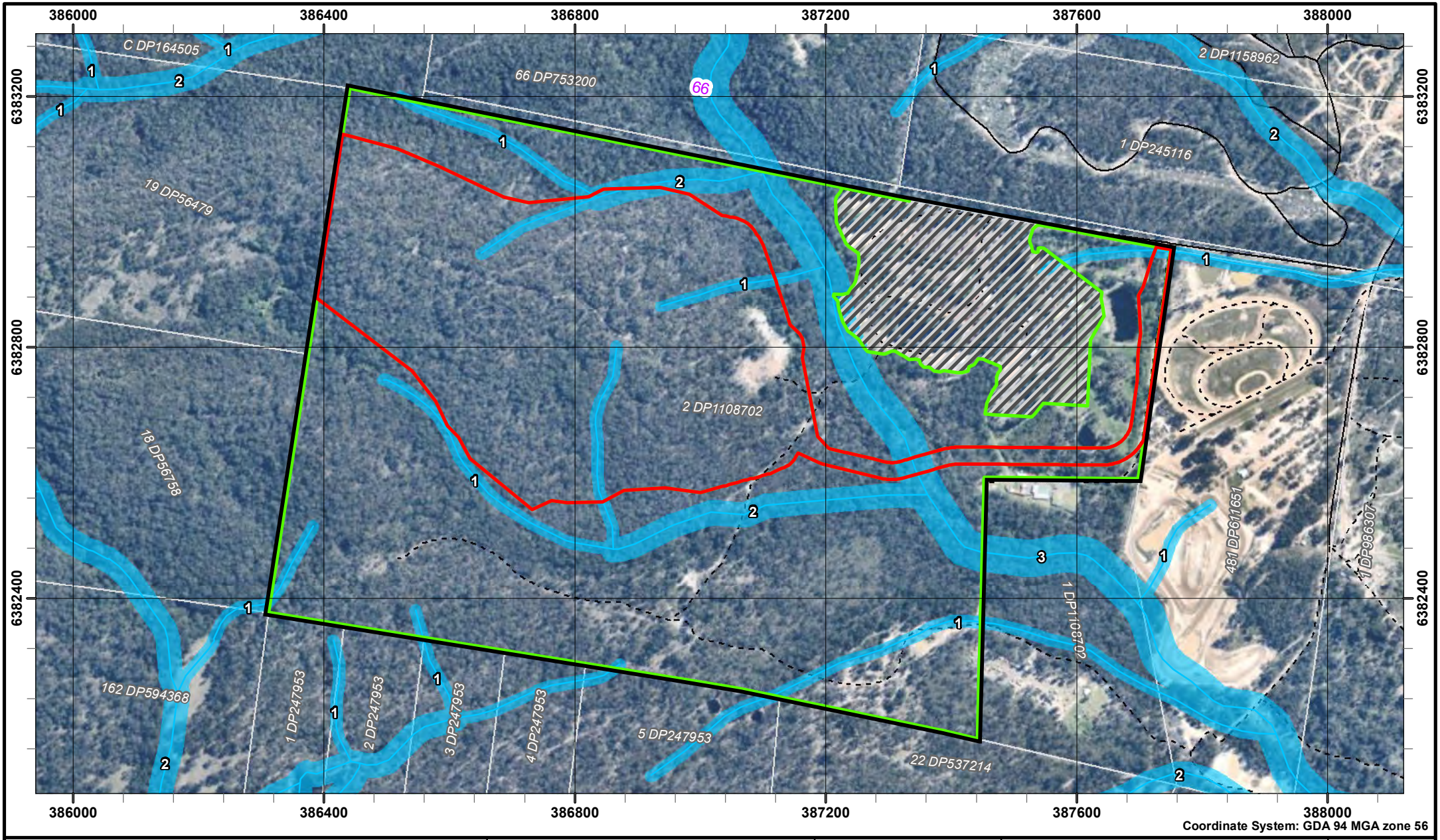
A Site Map showing the extent of the development site in accordance with Section 3.2.1.2 of the FBA is provided in **Figure 2**. The study area, proposed onsite offset site (refer to the BOS for further details), and the existing Port Stephens Gardenland facilities and operations area are also shown on **Figure 2**.

1.1.4 Assessment Guidelines

This BAR has been prepared in accordance with the FBA (as required under the SEARs), and in consideration of the following legislation, policies and assessment guidelines:

- *NSW Environmental Planning and Assessment Act 1999* (EP&A Act);
- *NSW Threatened Species Conservation Act 1995* (TSC Act);
- *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014);
- *State Environmental Planning Policy* (SEPP) *44 – Koala Habitat Protection*;
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);*
- *Commonwealth Matters of National Environmental Significance: EPBC Act Significant Impact Guidelines 1.1* (Department of the Environment 2013);
- *Fisheries Management Act 1994* (FM Act); and
- *NSW Groundwater Dependent Ecosystem Policy 2002.*

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- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Local Road
- Track
- Mapped Rivers & Streams (labelled with stream order)
- Lot
- Riparian Buffers

Metres
0 25 50 100 150 200 250

N

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Nearmap - 2017

Site Map

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
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1.1.5 Previous Studies and Data Sources

A number of ecological surveys and assessments have been undertaken within the study area since 2011 by different consultants. A list of the previous assessment reports that were reviewed in preparation of this report is provided below. The survey data and results from these reports have been included in this assessment where appropriate.

In addition to the results and data sourced from the reports listed below, Kleinfelder have undertaken additional ecological surveys in 2015 and 2016 to address relevant SEARs that were issued in 2015.

- Stephen Debus (2011). *Eagleton Quarry Biobank Assessment: Survey for Target Threatened Birds*. Report to Orogen Pty Ltd, November 2011.
- PDA Services (formerly Orogen) 2012. *Flora and Fauna Impact Assessment: Eagleton Quarries, Lot 2 on DP 1108702, Balickera*. Prepared for Eagleton Quarries Pty Ltd, October 2012.
- GHD (2012). *Environmental Assessment: Eagleton Quarry.* Prepared for Eagleton Quarry Pty Ltd, October 2012.
- Kleinfelder (2013). *Flora, Fauna and Threatened Species Assessment: Eagleton Quarry, Barleigh Ranch Way, Eagleton.* Prepared for Eagleton Rock Pty Ltd, February 2013.

1.2 LANDSCAPE FEATURES

1.2.1 Identification of Landscape Features

The landscape features detailed in Section 4.1 of the FBA including IBRA bioregion, IBRA subregion, Mitchell landscape, rivers and streams, wetlands, and the extent of native vegetation in the outer assessment circle for the development site are described in **Table 1**. These landscape features are also shown in **Figure 1, Section 1.1.1**.

Table 1: Landscape features of the development site

Landscape Feature	Development Site
IBRA bioregion	NSW North Coast
IBRA subregion	Karuah Manning
Mitchell landscape	Newcastle Coastal Ramp
River, streams and estuaries	Three 1st order streams occur within the development site. The proposed haul road would also bisect one 3rd order stream (i.e. Seven Mile Creek).
Wetlands	No important or local wetlands occur within the development site.
Native vegetation extent	See Section 1.2.2
State or regionally significant biodiversity links	None identified

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1.2.2 Determining Landscape Values

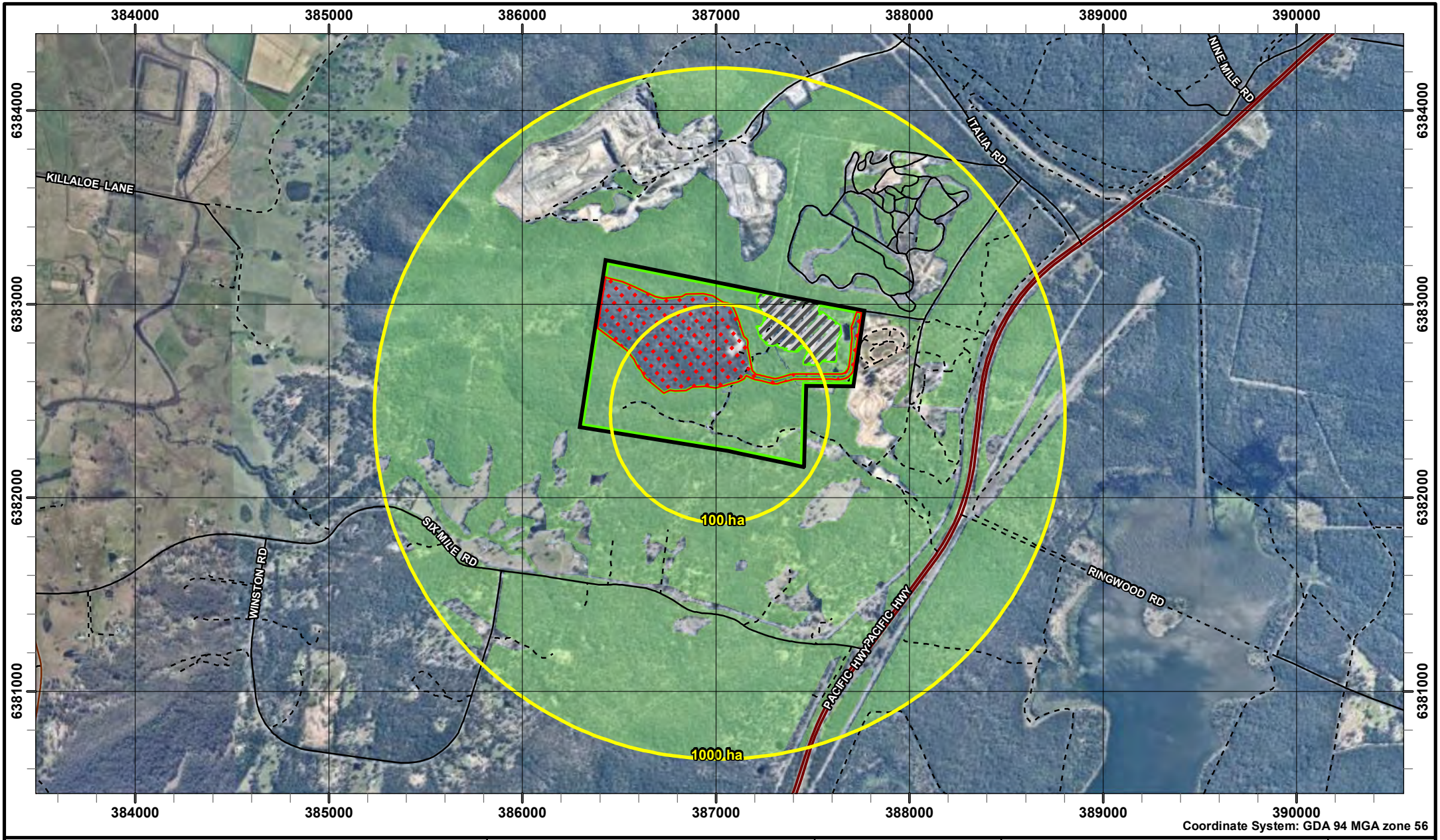
The landscape assessment for the development site was undertaken in accordance with Section 4.2 and Appendix 4 of the FBA through a combination of GIS analysis and ground-truthing. The current and future linkage width classes for the development site were determined to be between >100 m – 500 m through aerial photo analysis; the narrowest point of the corridor was assessed between Port Stephens Gardenland and the Boral Quarry to the north (185 m). The current and future linkage condition classes for overstorey and midstorey/ground cover were determined to be within benchmark through a combination of aerial photo analysis and ground-truthing. The patch size was determined to be >1,000 ha through aerial photo analysis.

Details of the landscape assessment are provided in **Table 2** and **Figure 3**.

Table 2: Development site landscape assessment

Assessment Circle	Vegetation cover before development	Vegetation cover after development
100 ha circle	92% (91-95)	64% (61-65)
1000 ha circle	78% (76-80)	76% (76-80)
Patch Size	**Landscape Value Score**	
>1000 ha	13.60	

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Assessment Circles
- Native Vegetation
- Primary Road
- Sub-arterial Road
- Local Road
- Track

Metres
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Landscape Assessment

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1.3 NATIVE VEGETATION

1.3.1 Methodology

Native vegetation within the study area was assessed in accordance with Section 5 of the FBA. Further detail on the specific methods used to undertake the assessment of the native vegetation is provided in the following subsections.

1.3.1.1 Review of Existing Vegetation Studies

In addition to the site-specific ecological assessments undertaken within the study area (refer to Section 1.1.4), regional vegetation mapping studies that encompass and/or adjoin the study area were also reviewed prior to undertaking the vegetation assessment:

- *Vegetation Survey Classification and Mapping Lower Hunter and Central Coast Region* (LHCCREMS; NPWS 2000); and
- *Hunter, Central and Lower North Coast Vegetation Classification and Mapping Project* (Somerville, 2009).

1.3.1.2 Vegetation Survey and Mapping

Vegetation surveys and mapping of the study area was conducted by Kleinfelder in 2013. It is noted that these vegetation surveys (and previous surveys undertaken by PDA Services [2012]) were undertaken in accordance with the Biobanking Assessment Methodology (BBAM) 2008), which was replaced by a revised version of the BBAM and the FBA (for major projects) in 2014. While there are some differences in the vegetation assessment methodologies between the BBAM (2008) and FBA (e.g. cover/abundance data, and vegetation classification databases) the methods for collecting site value data that are used to undertake the credit calculations have remained the same. As such, the plot/transect data collected by PDA Services (2012) and Kleinfelder (2013) have been used to undertake credit calculations for the development and offset sites.

The vegetation assessment methodologies used are described in the following sections.

Vegetation Mapping Review (2016)

The previous vegetation mapping (Kleinfelder 2013) was reviewed in 2016 through aerial photo interpretation (API) and ground-truthing using recent high resolution imagery for the site to identify any changes during this period (e.g. natural regeneration) and to ensure stratification of vegetation zones is consistent with Section 5.1 of the FBA. The API was undertaken at a scale of approximately 1:1,500 using a Geographic Information System (ArcGIS) and spatial datasets listed in **Table 3**.

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Table 3: Input datasets used in vegetation mapping

Dataset	Application
High resolution aerial photo – 2016	Primary basis for all linework and attribution. This dataset was produced in 2016 by Nearmap © and sourced under licence.
Aerial photo – 2012	Secondary informer of linework. Areas obscured in the primary image by shadows or exposures were double-checked in this image. Dataset sourced from Land and Property Information (© LPI 2012).
Contours (10 m)	10 metre contours were used to assist in the delineation of boundaries between different vegetation communities through examination of slope and aspect. Data sourced from Land and Property Information (© LPI 2016).

Vegetation Classification

The identification of vegetation communities was based on dominant species present in the overstorey, midstorey, shrub and ground layers as recorded in 0.04 ha (20 m x 20 m) floristic plots. The species composition of each vegetation community was compared to the vegetation descriptions in the *Hunter, Central and Lower North Coast Vegetation Classification and Mapping Project* (Somerville 2009) and the *Vegetation Survey Classification and Mapping Lower Hunter and Central Coast Region* (NPWS 2000) in order to determine an equivalent vegetation community.

Plant Community Type Determination

Each vegetation community identified in the study area was assigned to the closest equivalent PCT from those listed in the Vegetation Information System (VIS) Classification Database. The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the plot / transect data collected. In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the site were also compared to the descriptions in the database in order to determine the most suitable PCT.

Vegetation Mapping and Surveys

Vegetation surveys were conducted across the study area by Kleinfelder on 7, 15 and 17 December 2012, 17 January 2013, 4 February 2013, 18-19 October 2016 and 30 November 2016. The boundaries of each of the identified vegetation communities within the study area were mapped using a combination of rapid data points (RDP) and walking transects. RDPs involved collecting waypoints over the study area using a hand held GPS unit and recording dominant species, structure and condition. Walking transects involved verifying polygons were homogenous in floristic composition and condition, as well as walking vegetation ecotones and using the recorded tracks to define vegetation community boundaries. The RDPs and survey tracks were then overlaid on an aerial photograph and used to delineate and/or clarify vegetation boundaries (**Figure 4**).

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Linework and Attribution

RDPs and floristic plots were classified and tagged with a PCT by field surveyors. Polygons produced from the API work adopted the PCT of the sample point that they intersected. Field surveyors undertook a desktop inspection of linework, aerial photos and other GIS data to attribute any remaining polygons.

Vegetation Zones

Vegetation zones were identified and delineated on the development and offset sites in accordance with Section 5.2.2 of the FBA. A vegetation zone is defined in the FBA as a relatively homogenous area that is the same vegetation type and broad condition.

Assessing Site Value

Following stratification of the sites into vegetation zones, plots / transects were undertaken to collect site condition value data for each of the 10 attributes listed in Table 2, Section 5.3 of the FBA. The location of the plots / transects were selected through stratified random sampling to provide a representative sample of the variation in vegetation composition and condition within each vegetation zone.

The number of plots / transects undertaken across the study area meets or exceeds the minimum number of transects required for each vegetation zone area as detailed in Section 5.3.2, Table 3 of the FBA. A total of 20 plots / transects undertaken within the study area were used in the credit calculations (nine plots conducted by PDA Services in 2011; 11 plots conducted by Kleinfelder in 2013-2016). It is noted that only a subset of the plots undertaken by PDA Services were used in the calculations following a data review by Kleinfelder. The locations of the plots / transects undertaken on the study area are shown in **Figure 4**.

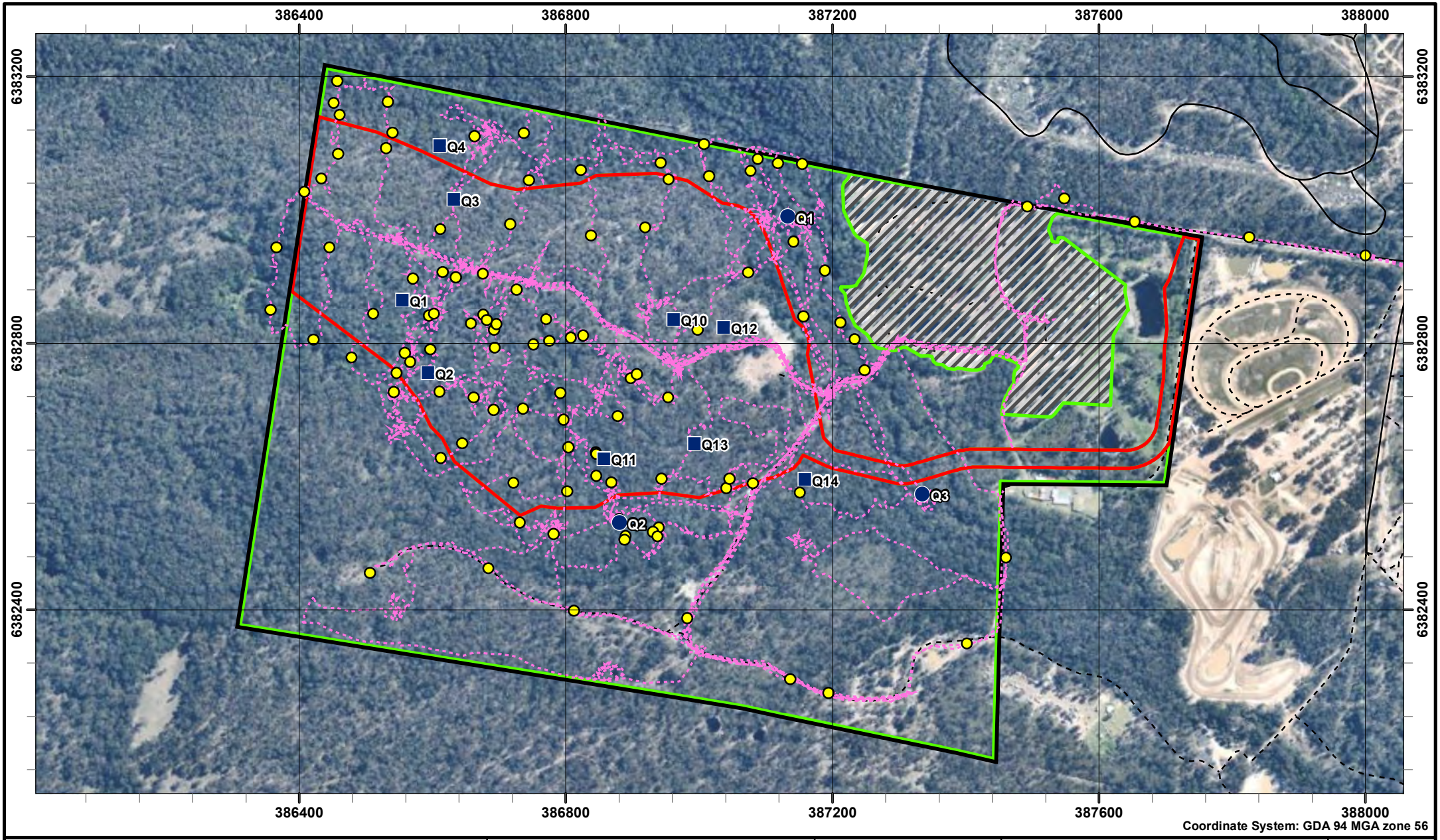
It is noted that as the majority of the plots / transects undertaken by Kleinfelder (2013) were conducted prior to the release of the BBAM 2014 and FBA, the methodology for estimating cover/abundance was in accordance with the modified Braun-Blanquet cover-abundance scale (Poore 1955):

1. <5% cover, less than 5 individuals
2. <5% cover, more than 5 individuals
3. 5 – 25% cover
4. 26 – 50% cover
5. 51 – 75% cover
6. 76 – 100% cover.

Floristic Identification and Nomenclature

Floristic identification and nomenclature was based on Harden (1992, 1993, 2000 and 2002) with subsequent revisions as published on PlantNet (http://plantnet.rbgsyd.nsw.gov.au).

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Local Road
- Track
- Plot Locations (PDA Services, 2011)
- Plot Locations (Kleinfelder, 2012/13)
- Rapid Data Point (Kleinfelder, 2012/13)
- Flora Survey Tracks (Kleinfelder, Dec 2012 - Feb 2013)

Metres
0 25 50 100 150 200 250

N

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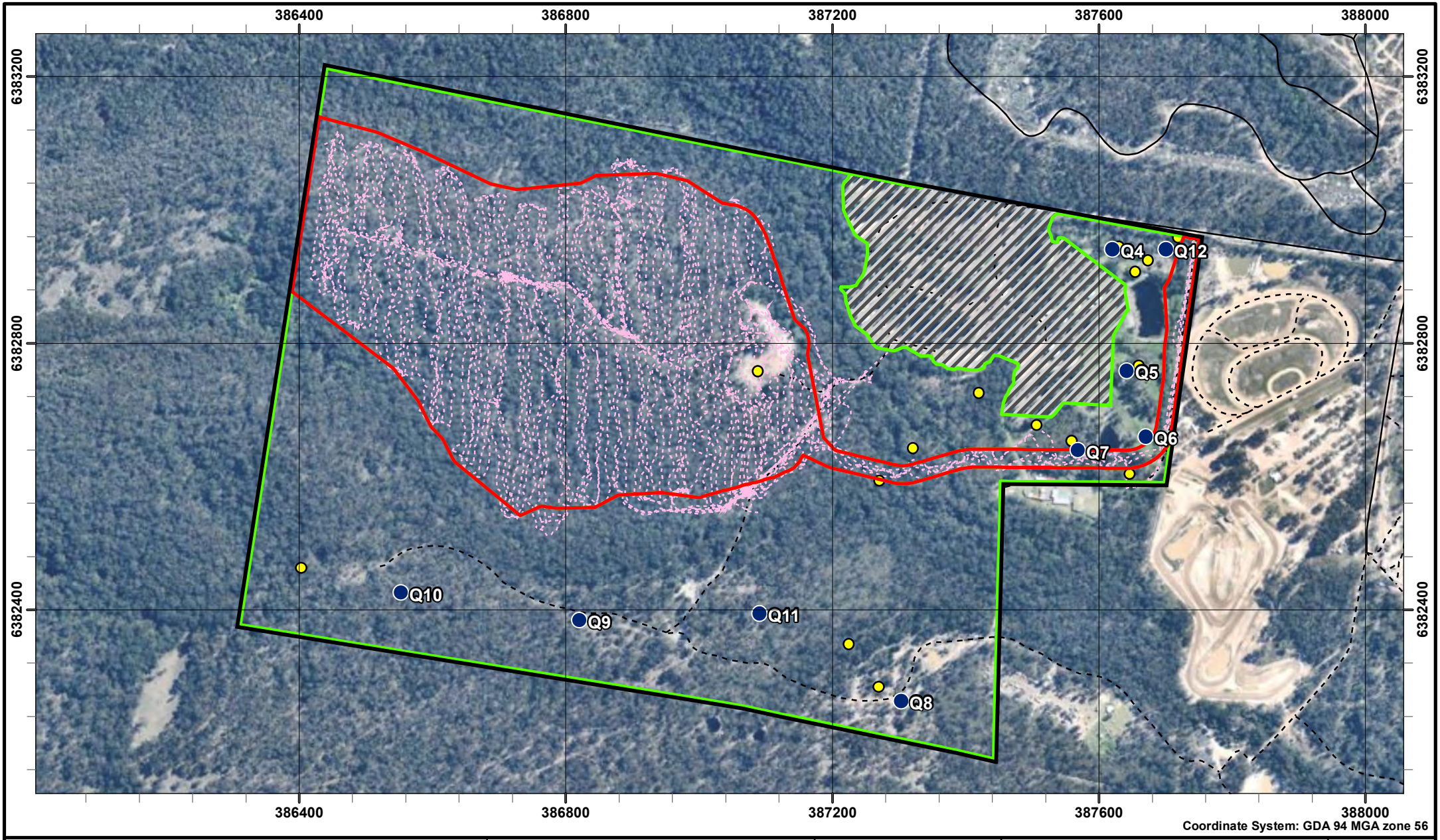
DATA SOURCE:
NSW Land and Property Information - 2011
nearmap - 2016

Flora Survey Effort (2011/13) - Development & Offset Sites

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
4A

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Plot Locations
- Rapid Data Point
- Targeted Flora Survey Tracks
- Local Road
- Track

Metres
0 25 50 100 150 200 250

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nearmap - 2016

Flora Survey Effort (2016) - Development & Offset Sites

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Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
4B

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1.3.2 Assessment Results

Kleinfelder (2013) identified two native vegetation communities within the study area based on the NPWS (2000) classification:

- MU16 Seaham Spotted Gum – Ironbark Forest; and
- MU12 Hunter Valley Moist Forest.

Both of these vegetation communities within the study area were determined to comprise one equivalent vegetation community described by Somerville (2009): MU65 Spotted Gum/ Broad-leaved Mahogany/ Red Ironbark moist shrubby open forest. Both of these vegetation communities were also determined to comprise one plant community type (PCT) as defined in the VIS database: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest.

It is noted that the study area includes several drainage lines, and the native vegetation in close proximity to these drainage lines have a higher abundance of mesic understorey species than the adjacent hills and slopes. With the exception of Seven Mile Creek, these areas are considered to be variation within HU804 and contain a number of dominant species which have been described for MU65 (Somerville 2009) from which this PCT is derived.

The vegetation along Seven Mile Creek has been determined (in consultation with OEH) to correspond to the PCT as defined in the VIS database: HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley. This PCT was assigned to the riparian vegetation along Seven Mile Creek on the basis of a moderate floristic similarity between the PCT and the riparian habitat, and vegetation formation (wet sclerophyll forest).

HU804 was determined to comprise one vegetation zone (i.e. moderate-good condition) within the development site. A very small area of another vegetation zone (HU804_moderate-good_poor) occurs in the north-east corner of the development site (haul road). However, as this small area of vegetation is <0.1 ha in size, it has not been identified as a separate vegetation zone for the credit calculations, and has been included within the zone 1 (HU804_moderate-good). Small areas of non-native vegetation (i.e. exotic vegetation) and several un-vegetated areas (i.e. access tracks and bare ground) also occur within the development site. No areas of HU798 greater than 0.25 ha occur within the development site.

The vegetation within the study area is not consistent with any threatened ecological communities (TECs) listed under the TSC Act 1995 and/or EPBC Act. The Spotted Gum-Ironbark Forest vegetation community in the study area was assessed against the *Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion* endangered ecological community (EEC) final determination (NSW Scientific Committee 2010). The vegetation within

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the study area is not considered to form part of the *Lower Hunter Spotted Gum – Ironbark Forest* EEC based on location, geology and floristics. The final determination describes the EEC as occurring within the Sydney Basin bioregion; the study area is located within the NSW North Coast bioregion.

The study area is also inconsistent with the geology of the *Lower Hunter Spotted Gum – Ironbark Forest* EEC, as the study area occurs on the Ten Mile Road soil landscape (Matthei 1995) which consists of undulating low hills on Carboniferous sediments and acid volcanics. This EEC is primarily associated with Permian substrates of the Lower Hunter soil landscapes of Aberdare, Branxton and Neath. The NSW Scientific Committee (2010) states that the "*Seaham Spotted Gum – Ironbark Forest typically occurs on sediments of Carboniferous age, in contrast to the younger Permian sediments that support Lower Hunter Spotted Gum-Ironbark Forest".* The floristic composition of the vegetation in the study area also has a higher similarity to the Seaham Spotted Gum-Ironbark Forest community than the Lower Hunter Spotted Gum-Ironbark Forest described in *Vegetation Survey Classification and Mapping Lower Hunter and Central Coast Region* (NPWS 2000) as it typically contains a number of other dominant or co-dominant eucalypt species in addition to *Corymbia maculata* and *Eucalyptus fibrosa*.

The SEARs also indicate that based on existing regional vegetation mapping, vegetation consistent with the *Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions* may be present on the site. No vegetation consistent with the structure or floristic composition of dry rainforest was identified in the study area during the surveys.

Table 4 provides a detailed description of each PCT, including the vegetation class, floristic description, and justification of evidence used to determine PCTs. **Figure 5** shows the distribution of PCTs / vegetation zones on the development site. Plot and transect data are provided in **Appendix 3**.

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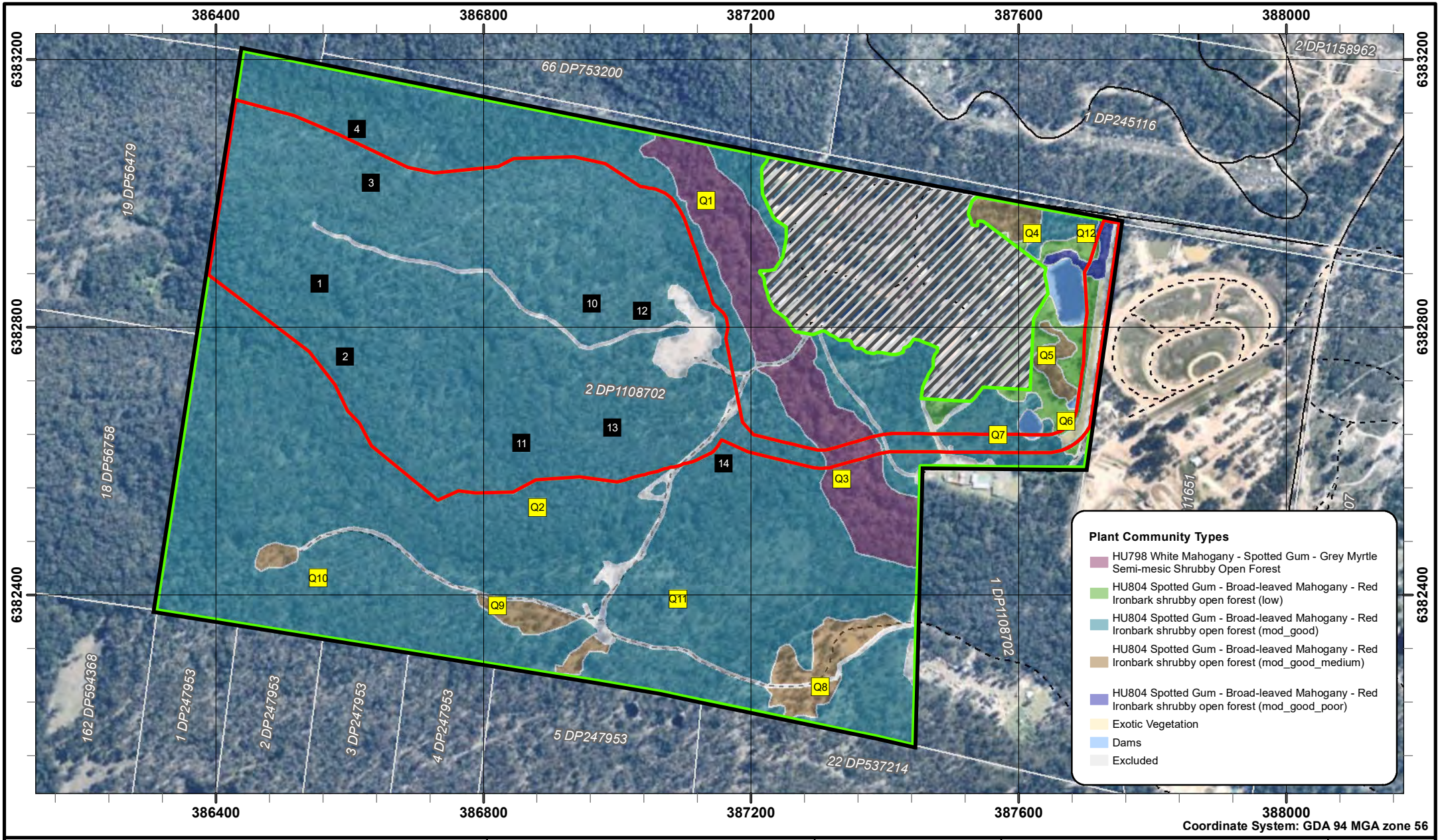
Table 4: Descriptions of PCTs within the development site

Veg Zone	Plant Community Type	Vegetation Class	Floristic description	Justification for PCT selection	Area (ha)
1	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (moderate-good) **Equivalent Somerville (2009) map unit:** MU65 Spotted Gum/ Broad-leaved Mahogany/ Red Ironbark moist shrubby open forest	Hunter-Macleay Dry Sclerophyll Forests	The canopy layer of this community on the site is typically dominated by *Corymbia maculata* with a range of co-dominant species across the site including *Eucalyptus punctata, E. acmenoides, E. fibrosa, E. crebra, E. canaliculata* and *E. globoidea*. Within the drainage lines, the relative abundance of *E. punctata* and *E. acmenoides* is higher, and other co-dominants such as *E. siderophloia, C. gummifera* and *Angophora costata* also occur. The midstorey is sparse across most of the site, with a higher midstorey cover typically occurring in the drainage lines. Common midstorey species include *Dodonaea triquetra*, *Allocasuarina torulosa, Acacia falcata*, *Persoonia linearis, Melaleuca nodosa, Myrsine variabilis, Glochidion ferdinandi, Acacia irrorata* and *Melaleuca styphelioides*. The shrub layer ranges from moderately sparse to dense, with common species including *Leucopogon juniperinus*, *Breynia oblongifolia*, *Bursaria spinosa, Pultenaea villosa, Leptospermum polygalifolium, Zieria smithii, Acacia ulicifolia, Acrotriche divaricata* and *Notelaea ovata*. Common native species in the ground layer include *Imperata cylindrica*, *Microlaena stipoides, Themeda australis, Entolasia stricta, Oplismenus aemulus, Lepidosperma laterale*, *Dianella caerulea*, *Lomandra longifolia, Lomandra multiflora, Pratia purpurascens, Desmodium rhytidophyllum* and *Cheilanthes sieberi*. This majority of this vegetation zone has a relatively low abundance of exotic species. The most abundant exotic species in this vegetation zone is *Lantana camara*, which occurs most frequently in the drainage lines and lower slopes.	HU804 was determined as the closest equivalent PCT for this community on the site. Comparison of floristic data indicates a very high similarity between this PCT and the community onsite, with the majority of species listed in the VIS for HU804 recorded consistently across this vegetation zone. The following key species that have been relied upon for identification of this vegetation type were consistently present and/or recorded at relatively high abundance within the plots conducted: *Corymbia maculata, Eucalyptus fibrosa, Allocasuarina torulosa, Persoonia linearis, Leucopogon juniperinus, Breynia oblongifolia, Bursaria spinosa, Pultenaea villosa, Microlaena stipoides, Themeda australis, Lepidosperma laterale, Dianella caerulea, Lomandra multiflora, Pratia purpurascens,* and *Cheilanthes sieberi.* The structure of this vegetation on the site is consistent with the description for HU804, comprising an open eucalypt forest with a grass understorey. The description for HU804 is also consistent with the location and landscape position (i.e. low ranges of the lower Hunter Valley) of this community on the site. All PCTs in the dry sclerophyll forest (shrub/grass) subformation, and the wet sclerophyll forest formations (i.e. for assessing vegetation in the drainage lines) listed for the Hunter-Central Rivers CMA were considered in undertaking the above determination. Four other potentially suitable PCTs were identified (HU803, HU806, HU814 and HU798). HU803 was considered the next closest equivalent PCT as it has a relatively high similarity in all strata for this community onsite; however, this PCT was excluded as it is described as occurring on the Central Coast, and does not list the Mitchell landscape of the site. HU806 and HU814 also have a moderate floristic similarity with the vegetation onsite but were excluded due to an overall lower floristic similarity compared to HU804. HU798 was also considered for the areas of this vegetation community within the drainage lines which have a higher abundance of mesic species. While this PCT has a moderate floristic similarity to the drainage lines areas, the vegetation is not consistent with a wet sclerophyll forest formation.	32.03

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Veg Zone	Plant Community Type	Vegetation Class	Floristic description	Justification for PCT selection	Area (ha)
-	Exotic Vegetation	-	The north-eastern part of the development site includes areas dominated by exotic vegetation. These include modified grasslands that are routinely slashed, and an exotic shrubland occurring on a constructed bund which extends along the north-east boundary. The modified grasslands are dominated by a variety of exotic grass and herb species including *Stenotaphrum secundatum, Axonopus fissifolius, Paspalum dilatatum, Sporobolus africanus, Hypochaeris radicata, Richardia stellaris* and *Lotus subbiflorus*. A very low abundance of native ground cover species occur in these areas, such as *Cynodon dactylon, Lachnagrostis filiformis* and *Dichondra repens*. The exotic shrubland occurring as a thin strip on the constructed bund is dominated by *Lantana camara* and includes a variety of other exotic species. Scattered planted and regenerating juvenile trees also occur on this constructed bund, such as *Corymbia maculata* and *Eucalyptus grandis*.	The exotic grassland areas were verified as being in low condition and having a site value score of <17 at Q6 (2016). While the exotic shrubland area was too narrow to sample with a plot/transect, this area does not have any native understorey, and only contains occasional planted and regenerating trees (i.e. overall canopy cover of <5%). As such, these areas do not require further assessment in accordance with Section 9 of the FBA.	0.27
-	Excluded	-		The excluded areas include all un-vegetated areas consisting of access tracks and bare ground from previous disturbance.	1.39
				Total	**33.7**

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Coordinate System: GDA 94 MGA zone 56

Study Area (100.94 ha)
Development Site (33.68 ha)
Offset Site (57.2 ha)
Gardenland (Excluded - 10.05 ha)
Lot
Local Road
Track
Plot Locations (KLF)
Plot Locations (PDA Services)

Metres
0 25 50 100 150 200 250

N

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DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Plant Community Types and Vegetation Zones

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FIGURE:
5

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1.4 THREATENED SPECIES

1.4.1 Ecosystem Credit Species

Predicted ecosystem credit species for the development site were identified and assessed in accordance with Section 6.3 of the FBA. No ecosystem credit species were excluded from the predicted species list for the purpose of the assessment, and no species had their offset multiplier modified for the assessment.

1.4.2 Species Credit Species

Species credit species requiring targeted surveys were determined in accordance within Section 6.5 of the FBA. Subsequent surveys were undertaken in accordance with Section 6.6 of the FBA.

1.4.2.1 Methodology: Flora Surveys

Targeted searches for threatened flora species were undertaken by Kleinfelder in December 2012 and January – February 2013 in accordance with the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). Targeted searches were undertaken along numerous walking/meandering transects within suitable habitat for target species.

Additional targeted searches were undertaken for threatened flora species within the development site in October 2016. The surveys consisted of traversing areas of potential habitat across the development site through systematic parallel transects at approximately 10 m apart in accordance with the *NSW Guide to Surveying Threatened Plants* (OEH 2016).

The survey tracks from the targeted searches are shown on **Figure 4, Section 1.3.1**.

Table 5 provides a list of flora species credit species identified as having potential habitat in the study area (i.e. targeted threatened flora species), and the required survey period for each species as detailed in the calculator or Threatened Species Profile Database (TSPD). Following completion of database searches (refer to **Appendix 5**), several other flora species credit species were also added to the candidate species list in **Table 5** in addition to those automatically generated by the calculator.

An assessment of the likelihood of threatened flora species recorded or modelled to occur in the locality (i.e. 5 km radius) occurring in the development site is provided in **Appendix 5**. This includes the methods for the threatened species database searches, and justification for the exclusion of other threatened flora species from further assessment.

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Table 5: Survey details summary for targeted threatened flora species

Species	Survey Period (TSPD)	Survey Adequacy (Kleinfelder)
Angophora inopina Charmhaven Apple	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species. Low habitat suitability (Appendix 5).
Asperula asthenes Trailing Woodruff	All year but best when flowering (spring)	Targeted surveys undertaken in October 2016 are considered adequate for this species.
Callistemon linearifolius Netted Bottle Brush	September - March	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species.
Cryptostylis hunteriana Leafless Tongue Orchid	November – February	Surveys undertaken in December 2012, January/February 2013 are considered adequate for this species.
Cynanchum elegans White-flowered Wax Plant	All year (easiest when flowering in August - May)	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species.
Diuris pedunculata Small Snake Orchid	September - November	Targeted surveys undertaken in October 2016 are considered adequate for this species. Unsuitable distribution (Appendix 5).
Eucalyptus glaucina Slaty Red Gum	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species.
Grevillea guthrieana Guthrie's Grevillea	All year (best when flowering in spring)	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species.
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea	All year (best when flowering between July-December)	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species.
Maundia triglochinoides	All year (best during warmer months when flowering)	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species. Low habitat suitability (Appendix 5).
Melaleuca biconvexa Biconvex Paperbark	All year	Surveys undertaken in December 2012, January/February 2013 and October 2016 are considered adequate for this species. Low habitat suitability (Appendix 5).
Persicaria elatior Knotweed	Summer-autumn	Surveys undertaken in December 2012, January/February 2013 are considered adequate for this species.
Pterostylis chaetophora	September - November	Targeted surveys undertaken in October 2016 using a known reference population to identify and coordinate optimum survey timing are considered adequate for this species (see 'matters for further consideration' in the following section).
Rhizanthella slateri Eastern Underground Orchid	September - November	Targeted surveys undertaken in October 2016 are considered adequate for this species.
Tetratheca juncea Black-eyed Susan	July - December	Targeted surveys undertaken in October 2016 are considered adequate for this species.

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Matters for Further Consideration

One threatened flora species (*Pterostylis chaetophora*) is listed in the SEARs by OEH as a matter for further consideration under the FBA. This species has been recorded to the east of the proposed development site (approximately 1.5 km) in the Grahamstown Dam area, which contains the largest known population of this species and represents the eastern most limit of its known geographic range.

The study area contains potential habitat for this species. Targeted searches were undertaken across the development site on 18-19 October 2016. The known reference population located 1.5 km to the east of the study area (location provided by OEH) was surveyed immediately prior to undertaking the searches (i.e. on 18 October 2016), which confirmed that the species was flowering in the locality at the time of the survey as requested in the SEARs.

1.4.2.2 Methodology: Fauna Surveys and Habitat Mapping

Candidate Fauna Species Credit Species

Table 6 provides a list of the candidate fauna species credit species identified as having potential habitat in the study area as per Section 6.5.1.2 of the FBA. **Table 6** also details the required survey period for each species as detailed in the calculator or TSPD, and the field method(s) used to survey for each species. Following completion of database searches (refer to **Appendix 5**), a number of other species credit species were also added to the candidate species list in **Table 6** in addition to those automatically generated by the calculator.

An assessment of the likelihood of all threatened fauna species (i.e. both ecosystem and species credit species) recorded or modelled to occur in the locality (i.e. 5 km radius) occurring in the development site is provided in **Appendix 5**. This includes the methods for the threatened species database searches, and justification for the exclusion of other threatened fauna species from further assessment. **Appendix 6** provides Assessments of Significance as required under Section 5A of the EP&A Act and/or under the EPBC Act for threatened and migratory fauna species considered likely to be affected by the proposed development.

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Table 6: Survey details summary for candidate fauna species credit species

Species	Source	Survey Period (TSPD)	Survey and Assessment Method(s) Conducted
Anthochaera phrygia Regent Honeyeater	BC	All year (coastal visitor mostly March – August)	Bird surveys
Cercartetus nanus Eastern Pygmy-possum	BC	Mid-spring to mid-autumn	Terrestrial and arboreal Elliot trapping Hair tubes Habitat assessment
Dromaius novaehollandiae - endangered population Emu population, NSW North Coast Bioregion and Port Stephens Local Government Area	BC	All year	Bird surveys
Hoplocephalus bitorquatus Pale-headed Snake	BC	October - April	Spotlighting Habitat assessment
Kerivoula papuensis Golden-tipped Bat	BC	October - March	Anabat recording Harp traps
Litoria aurea Green and Golden Bell Frog	BC	August - March; during or immediately following substantial rain in this period	Spotlighting Habitat assessment
Litoria brevipalmata Green-thighed Frog	BC	October to March within 3 days of heavy rains (5 cm plus in 24 hours)	Spotlighting Habitat assessment
Myotis macropus Large-footed Myotis	Atlas	October - March	Anabat recording Harp traps
Phascogale tapoatafa Brush-tailed Phascogale	BC	All year	Terrestrial and arboreal Elliot trapping Hair tubes Spotlighting
Phascolarctos cinereus Koala	BC	All year	Spotlighting Call playback SAT tests Habitat assessment
Planigale maculata Common Planigale	BC	All year	Terrestrial and arboreal Elliot trapping Hair tubes
Turnix maculosus Red-backed Button-quail	BC	All year	Bird surveys Spotlighting Habitat assessment

Sources for identifying candidate species: BC = Biobanking Calculator; Atlas = PMST = EPBC Protected Matters Search; Atlas = NSW Wildlife Atlas

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Survey Weather Conditions

Fauna surveys were undertaken across the study area on 14 - 18 January 2013 and on 4 February 2013. Weather conditions during the survey period are provided in **Table 7**. This information was sourced from the weather observation database compiled by the Bureau of Meteorology from the Williamtown weather station (ID: 061078).

Table 7: Weather conditions during the survey period

Date	Temps		Rain	9:00 AM					3:00 PM				
	Min	Max		Temp	RH	Cld	Dir	Spd	Temp	RH	Cld	Dir	Spd
	°C	°C	mm	°C	%	8th	km/h		°C	%	8th	km/h	
Jan (2013)													
14th	18.6	23.8	7.4	19.4	74	7	S	30	22.4	46	2	S	43
15th	14.9	25.5	5.2	20.2	79	7	NW	11	23.5	59	7	ESE	24
16th	13.4	31.1	0.2	22.6	69	4	WNW	11	30.1	48	5	E	24
17th	18.3	31.8	0	24.1	78	6	WSW	7	30.9	52	0	E	20
18th	20.4	44.8	0	29.5	60	-	NW	13	44.2	15	-	NW	31
Feb (2013)													
4th	16.3	25.3	0.2	20.2	81	7	WSW	13	24.1	61	3	SSE	33

Survey Effort Summary

Field surveys and habitat mapping for fauna species credit species were conducted by Kleinfelder in January and February 2013 in accordance with the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). A total of three fauna survey transects were undertaken on 14-18 January 2013 across the study area within one stratification unit (dry sclerophyll forest shrub/grass subformation). Two of the transects were undertaken within the drier parts of the Spotted Gum – Ironbark Forest, and one transect was completed in the riparian areas (3rd order drainage line) of this community.

A summary of the fauna survey effort is provided in **Table 8.** The fauna survey locations across the study area are shown in **Figure 6**. A description of the survey methodologies for each fauna group is provided in the following sections.

Table 8: Fauna survey effort summary

Survey Method	Hours / Trap Nights	Effort required for stratification unit between 50-150 hectares (DEC 2004)	Compliance with DEC (2004) guidelines
Terrestrial Elliot A traps	25 traps per transect over 4 nights (total 300 trap nights)	200 trap nights	Yes – exceeds guidelines
Terrestrial Elliot B traps	10 traps / transect over 4 nights (total 120 trap nights)	200 trap nights	Partial*
Arboreal Elliot B traps	10 traps / transect over 4 nights (total 120 trap nights)	48 trap nights	Yes – exceeds guidelines
Terrestrial cage traps	Three traps / transect over 4 nights (total 36 trap nights)	48 trap nights	Partial*

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Survey Method	Hours / Trap Nights	Effort required for stratification unit between 50-150 hectares (DEC 2004)	Compliance with DEC (2004) guidelines
Arboreal hair tubes	10 hair tubes / transect over 4 nights (120 trap nights)	60 trap nights	Yes – exceeds guidelines
Terrestrial hair tubes	10 hair tubes / transect over 4 nights (120 trap nights). Hair tubes used by Kleinfelder are cone shaped and narrow towards the bait, allowing for the full size range of mammals to be sampled.	80 trap nights	Yes – exceeds guidelines
Harp traps	1 harp trap / transect over 4 nights (total 12 trap nights)	4 trap nights	Yes – exceeds guidelines
Anabat recording	One Anabat recording overnight for 2 nights / transect (total 72 hours or 6 Anabat nights)	Two Anabats recording overnight for two nights (4 Anabat nights)	Yes – exceeds guidelines
Bird surveys	One 2 ha plot for 20 mins on two occasions per transect (total of 6 x 20 min surveys)	No specific methodology detailed – however, states that the Loyn 2ha/20 min area search is an accepted methodology per stratification unit	Yes – meets guidelines
Spotlighting (targeting nocturnal mammals, amphibians and reptiles)	One person hour per transect per night over on two separate nights (total of 6 hours spotlighting)	Mammals: 2 x 1 hour on 2 separate nights (up to 200 ha stratification unit) Amphibians: 30 mins on two separate nights targeting suitable habitat.	Yes – exceeds guidelines
Owl call playback	20 mins at each transect on two nights	At least 5 visits for the Powerful Owl and up to 8 visits for the Masked Owl	Partial*
Targeted Koala surveys	Two nights call playback Diurnal searches 14 SAT tests	N/A	N/A

**Terrestrial Elliot B trapping and terrestrial cage trapping are the main shortfall in fauna survey effort. However, this shortfall was compensated for by undertaking additional spotlighting and hair tubes.*

Terrestrial Mammals

Terrestrial trapping was undertaken using Elliott A, Elliott B, hair tubes and cage traps which were placed along each of the transects at regular intervals. The numbers of each type of trap setup at each transect is detailed in **Table 8**. All traps were baited using a mixture of peanut butter, honey, oats and vanilla essence. Cages were also baited with a mixture of canned chicken and canned tuna in order to attract carnivores. All baits were changed twice during surveys.

Spotlighting for terrestrial mammals (and other fauna groups) was undertaken for a total of six person hours across all survey events (**Table 8**) on 15-16 January 2013. Spotlighting surveys were conducted on foot around each transect.

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Arboreal Mammals

Elliott B traps and hair tubes were placed in trees at a height of approximately 3 m. Arboreal traps were baited with a mixture of oats, honey, peanut butter and vanilla essence. The trunks of trees containing the traps were sprayed with a honey and water mixture to act as an additional attractant. All Elliott B traps were checked daily and re-sprayed with the honey-water mix for four consecutive nights. All baits were changed twice during the surveys. Hair tube wafers were collected at the end of each respective trapping period. Hair identification methods followed those of Brunner *et al*. (2002).

Spotlighting was undertaken for a total of six person hours across all survey events (**Table 8**) on 15-16 January 2013. Spotlighting surveys were conducted on foot around each transect. Trees were inspected during daylight hours for the presence of habitat hollows and, if present, these were watched at dusk to see if any nocturnal birds or mammals emerged. The calls of several nocturnal arboreal mammals were broadcast at each transect on two nights. Species targeted during call playback included the Koala (*Phascolarctos cinereus*), Squirrel Glider (*Petaurus norfolcensis*) and the Yellow-bellied Glider (*Petaurus australis*).

Bats

Anabat II bat-call recorders (Titley Electronics, Ballina) were used to record the calls of any Microchiropteran bats feeding in the area. One anabat was positioned at each transect overnight for two nights, with a total of approximately 72 hours of anabat recording across the three transects.

One harp trap was also setup at each transect for four consecutive nights. Harp traps were placed on bat 'flyways' in order to capture and identify any additional bat species. 'Flyways' are areas where bats are likely or forced to travel within an area i.e. along tracks, canopy gaps etc. Spotlighting searches of blossoming trees were also undertaken to identify any Megachiropteran bat species.

Birds

An area search was carried out to survey for diurnal birds. In total, three two hectare survey plots were conducted at each transect. Each plot was surveyed for 20 minutes and repeated over two mornings (16-17 January 2013). Birds were identified either visually, with the aid of binoculars, or by call interpretation. Surveys were conducted in the morning when bird activity is maximised (Bibby *et al.* 2000). The broadcasting of owl calls was undertaken at each transect for approximately 20 minutes per night for two nights (15-16 January 2013). Calls were broadcast for five minutes, followed by a listening period. Species targeted in surveys included the Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*), Barking Owl (*Ninox connivens*) and Masked Owl (*Tyto novaehollandiae*).

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Amphibians and Reptiles

Standardised nocturnal amphibian and reptile survey techniques were employed during spotlighting on two nights (15-16 January 2013). Searches for amphibians were primarily restricted to the vicinity of the transect on the eastern part of the study area with suitable habitat (i.e. riparian vegetation and dams). Spotlight searches were conducted by walking lengths/perimeter of suitable habitat and using head torches. Frogs were identified by sight or by their distinct advertisement calls. It is also noted that the surveys were preceded by rainfall on 14 and 15 January 2013 (7.4 mm and 5.4 mm, respectively), increasing the detectability of frogs including targeted threatened species.

Koala Habitat Mapping and Targeted Surveys

The *Port Stephens Council Comprehensive Koala Plan of Management* (CKPoM) (Port Stephens Council [PSC] 2002) applies to all development applications on land within the Port Stephens LGA. The CPKoM Guidelines for Koala Habitat Assessments were used to determine the extent of Koala habitat within the study area and development site based on a four step process:

1. **Preliminary Assessment:** examination of the Koala Habitat Planning Map of the Port Stephens LGA was undertaken to determine mapped Koala Habitat in the study area, and an inspection of the site was then conducted to determine if the site contains individuals of preferred Koala feed trees (**Table 9**) outside areas mapped as Preferred Koala Habitat.

2. **Vegetation Mapping**: vegetation types were mapped across the study area using aerial photography and detailed ground-truthing (refer to **Section 1.3.1**). Floristic and structural characteristics of each vegetation community were determined using quadrat and transect based survey methods.

3. **Koala Habitat Identification:** If the LGA-wide vegetation map produced by PSC is inaccurate for the study area, a revised Koala Habitat Planning Map in accordance with the vegetation community definitions of the CKPoM must be produced.

   The Port Stephens LGA Koala Habitat Mapping was determined to be inaccurate following the vegetation mapping. As such, Kleinfelder conducted additional field surveys on 4 February 2013 to determine the extent of preferred Koala feed trees (including those listed under the CKPoM and SEPP 44) across the study area. It is noted that the CKPoM does not list *Eucalyptus punctata* as a preferred feed tree species, which is a co-dominant species in most areas of the site. However, the assessment of suitable Koala habitat in the study area included *E. punctata* as it is listed as a preferred tree species under SEPP 44. A total of 40 point estimates were conducted across the study area to assess the percentage cover of preferred Koala feed trees species. These data was then used to estimate a percentage of core feed trees within the development footprint. When the trees of the types listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of

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trees in the upper or lower strata of the tree component, then SEPP 44 considers those areas as Potential Koala Habitat.

Targeted field surveys were then undertaken using the Spot Assessment Technique (SAT) to quantify the level of use by Koalas (Phillips and Callaghan, 2011) across the site. This technique involves the selection of a centre tree (survey point) which is chosen according to the following criteria:

- A tree of any species beneath which one or more Koala faecal pellets have been observed; and/or
- A tree in which a Koala is observed; and/or
- Any other tree known or considered to be potentially important for Koalas, or for other assessment purposes.

A minimum of 30 trees (including the centre tree) with a diameter at breast height (DBH) of 100 mm or greater must be surveyed. Surveys involve the inspection of the ground surface within 100 centimetres from the base of the tree. If faecal scats are identified, the survey concludes.

Diurnal searches for Koalas were also undertaken across the study area on 4 February 2013 by Kleinfelder ecologists experienced in Koala surveys and identification.

4. **Assessment of Proposal:** a revised Koala habitat map was produced showing information gathered in Steps 1, 2 and 3 to assist in evaluating the potential impacts of the proposal on Koala habitat.

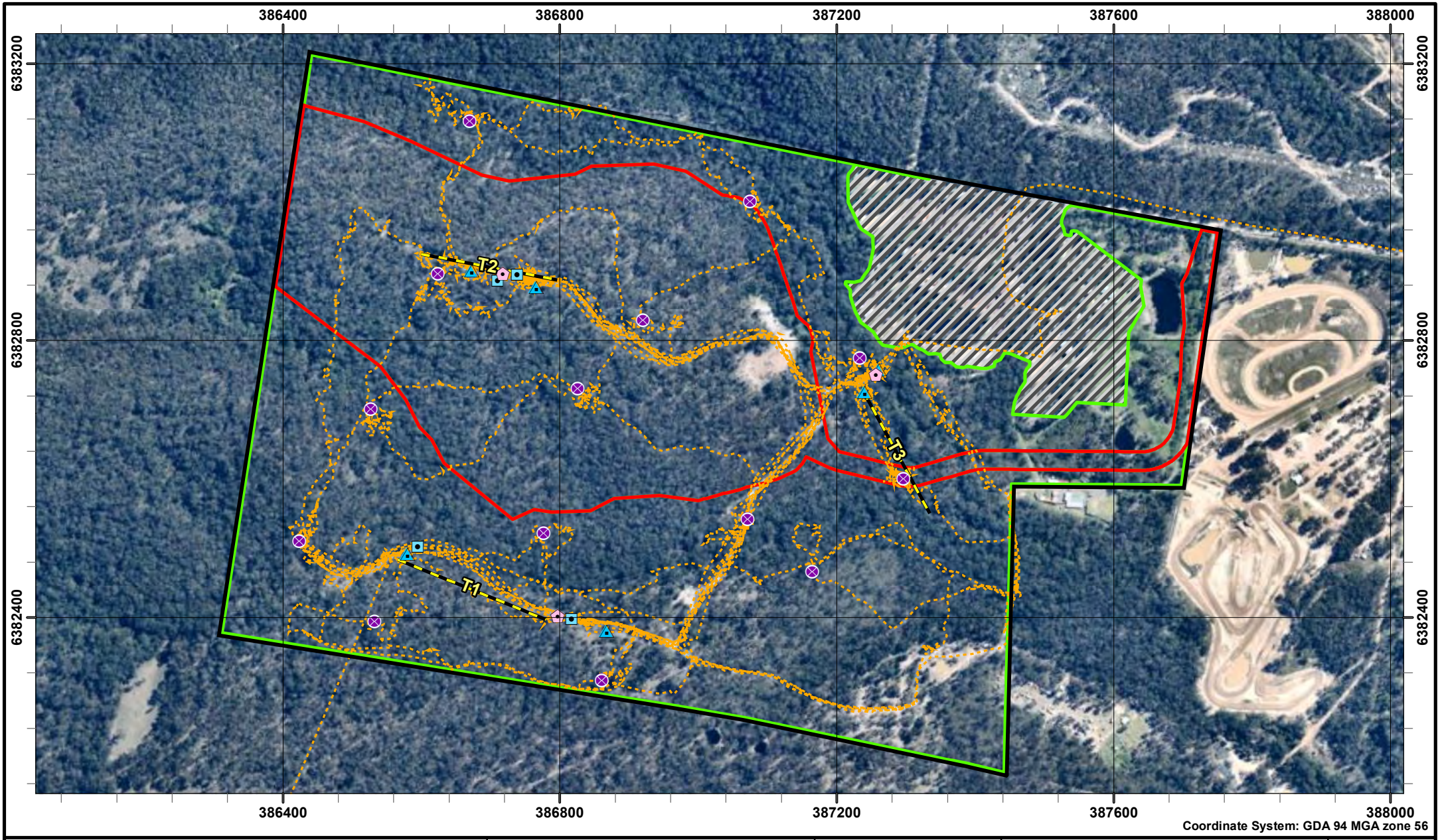
Table 9: List of Preferred Koala Feed Trees in the Port Stephens LGA.

Scientific Name	Common Name
Eucalyptus robusta	Swamp Mahogany
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus parramattensis	Earp's Gum

Assessment of Geographic / Habitat Features

The FBA requires assessment of a number of questions relating to the presence of geographic and habitat features associated with specific species credit species. Questions relating to habitat features associated with four species credit species (Pale-headed Snake, Common Planigale, Green and Golden Bell Frog and Green-thighed Frog) were generated in the FBA. All questions were answered 'Yes', and as such these species are retained for further consideration in Section 1.4.2.3 of the BAR.

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Anabat
- Harp Trap
- Owl Call Playback
- SAT Test
- Trapping Transect
- Fauna Meander

Metres
0 25 50 100 150 200 250

N

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DRAWN BY: amarshall
DATA SOURCE:
NSW Land and Property Information - 2011
nearmap - 2016

Fauna Survey Effort - Development and Offset Sites

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
6

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1.4.2.3 Assessment Results

Flora

No threatened flora species were recorded in the study area during the surveys by Kleinfelder (2013, 2016) or by previous consultants (PDA Services 2012; GHD 2012). No flora species credit species were considered likely to occur in the development site following targeted surveys and habitat assessments (**Appendix 5**). As such, no flora species credit requirements have been identified.

Fauna

Survey Results Summary

Fauna surveys undertaken by Kleinfelder in 2013 identified a total of 81 native fauna species in the study area, including 50 bird, 20 mammal, six amphibian and five reptile species (**Appendix 9**). Of these, seven species are listed under the NSW TSC Act and/ or the EPBC Act, and one species is listed as migratory under the EPBC Act (**Table 10**). Previous surveys completed by PDA Services (2012) and GHD (2012) identified an additional five threatened bird species (**Table 10**). As such, a total of 12 threatened fauna species and one EPBC Act-listed migratory species have been recorded in the study area.

Table 10: Threatened and migratory species recorded in the study area

Scientific name Common name	TSC status	EPBC status	Species Credit Species	Source
Chalinolobus dwyeri Large-eared Pied Bat	V	V	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder
Circus assimilis Spotted Harrier	V	-	No	PDA
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V	-	No	GHD
Falco subniger Black Falcon	V	-	No	GHD
Falsistrellus tasmaniensis Eastern False Pipistrelle	V	-	No	Kleinfelder
Lophoictinia isura Square-tailed Kite	V	-	No	GHD
Miniopterus australis Little Bentwing-bat	V	-	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder
Mormopterus norfolkensis Eastern Freetail-bat	V	-	No	Kleinfelder
Myotis macropus Large-footed Myotis	V	-	Yes (suitable breeding habitat identified in the development site)	Kleinfelder
Phascolarctos cinereus Koala	V	V	Yes (suitable habitat identified in the development site)	Kleinfelder, GHD
Pomatostomus temporalis temporalis	V	-	No	GHD

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Scientific name Common name	TSC status	EPBC status	Species Credit Species	Source
Grey-crowned Babbler (eastern subspecies)				
Rhipidura rufifrons Rufous Fantail	-	M	No	Kleinfelder
Vespadelus troughtoni Eastern Cave Bat	V	-	No (breeding habitat only; no breeding habitat identified on the development site)	Kleinfelder

Assessment of Candidate Fauna Species Credit Species

Table 11 provides an assessment of candidate fauna species credit species identified in **Section 1.4.2.2** based on a literature review, database searches, and results of the fauna surveys and habitat assessments. This assessment provides justification for whether each candidate species is considered to be present or not present (or unlikely to be present) as required in Section 6.5 of the FBA. All species credit species confirmed or considered to be present on the development site are subject to further assessment in the following section to identify the extent of habitat within the development site.

Table 11: Assessment of Candidate Fauna Species Credit Species

Species	Present / Not Present	Justification
Anthochaera phrygia Regent Honeyeater	Not present	The development site contains potential foraging habitat for this species, as suitable feed tree species are present (e.g. Spotted Gum). However, habitat usage in the study area is likely to be infrequent as the site is not within a known breeding area and as there are no records of the species in the locality. Additionally, there are only two records of this species in the last 20 years in the Port Stephens LGA. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Cercartetus nanus Eastern Pygmy-possum	Not present	There is one record for this species within 2 km to the north of the study area from 2005. This is also the only record of this species within the Port Stephens LGA. This species is found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred. The species is typically associated with an understorey containing heath, banksias or myrtaceous shrubs including Leptospermum spp. As such, the habitat within the development site is considered to be marginally suitable for this species, as the vegetation predominately consists of a grassy understorey with a relatively low abundance of shrubs and midstorey trees. This species was not detected in the study area during the surveys, which used a range of suitable methods including terrestrial and arboreal trapping, hair tubes, and spotlighting. This species is considered unlikely to be present on the development site.

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Species	Present / Not Present	Justification
Dromaius novaehollandiae - endangered population Emu population, NSW North Coast Bioregion and Port Stephens LGA	Not present	This species occupies a range of predominantly open habitats, including plains, grasslands, woodlands and shrubs, and may occur occasionally in forest. The forest vegetation across the development site is considered to be unsuitable for this species. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Hoplocephalus bitorquatus Pale-headed Snake	Not present	While the study area occurs within the known distribution of this species, no records for this species occur within the Port Stephens LGA (nearest records approximately 15 km to north-west near Paterson from 1994). This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Kerivoula papuensis Golden-tipped Bat	Not present	The study area contains potential habitat for this species. However, there are no records of this species in the locality, with only one record in the Port Stephens LGA approximately 7 km to the north-west of the study area. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Litoria aurea Green and Golden Bell Frog	Not present	The dams and riparian areas in the study area represent potential marginal habitat for this species. However, there are no records of this species in the locality. There is only one record of this species in the last 20 years in the Port Stephens LGA from 2000 near Tomago, >15 km to the south-west of the study area. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Litoria brevipalmata Green-thighed Frog	Not present	The riparian areas in the study area represent potential marginal habitat for this species. However, there are no records of this species in the locality, or the Port Stephens LGA. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Myotis macropus Large-footed Myotis	**Present**	This species was recorded in the study area during the surveys and suitable breeding habitat was identified in the study area and development site. This species is subject to further assessment in the following section.
Phascogale tapoatafa Brush-tailed Phascogale	Not present	The study area and the development site contain suitable habitat for this species. The species prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter, which is consistent with the Spotted Gum-Ironbark Forest in the study area. There are nine records of this species in the locality, including several within one kilometre to the north of the study area from 2005. However, this species was not detected in the study area during the surveys, which used a range of suitable methods including terrestrial and arboreal trapping, hair tubes, and spotlighting. This species is considered unlikely to be present on the development site.
Phascolarctos cinereus Koala	**Present**	The species was recorded in the study area during the surveys and suitable habitat was identified in the study area and development site. This species is subject to further assessment in the following section.

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Species	Present / Not Present	Justification
Planigale maculata Common Planigale	Not present	This species inhabits a broad range of habitats and the study area contains potential habitat for this species. However, there are no records of this species in the locality or the Port Stephens LGA. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.
Turnix maculosus Red-backed Button-quail	Not present	This species typically inhabits grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas. The vegetation in the study area (forest) is considered to be suboptimal for this species. Additionally, there are no records of this species in the locality or the Port Stephens LGA. This species was not detected in the study area during the surveys. This species is considered unlikely to be present on the development site.

Species Credit Species – Habitat Mapping

Koala

Two Koalas were sighted in the south-western part of the study area during the surveys by Kleinfelder (2013) (**Figure 7**). SAT tests also detected Koala activity on the south-west, central, and north-east parts of the study area (**Figure 7**). Fifty percent of the SAT tests (N=14) showed some sign of Koala activity (range 3%-13%). According to Phillips and Callaghan (2011), this level of activity is considered to be low use range (<22.52% activity levels) and therefore the use by Koalas is "likely to be transitory" (p.776). **Table 12** summarises the results of the SAT tests that showed signs of activity.

SAT tests and sightings determined that Koalas were using a range of tree species throughout the study area including Grey Gum (*E. punctata*), White Mahogany (*E. acmenoides*), Grey Ironbark (*E. siderophloia*), Forest Red Gum (*E. tereticornis*) and Spotted Gum (*Corymbia maculata*). Of these, Forest Red Gum and Grey Gum are the only species listed as Koala feed trees under SEPP 44. Grey Gum, White Mahogany and Spotted Gum are listed as tree species that may be important to Koalas in the Port Stephens LGA under the CKPoM (PSC 2002).

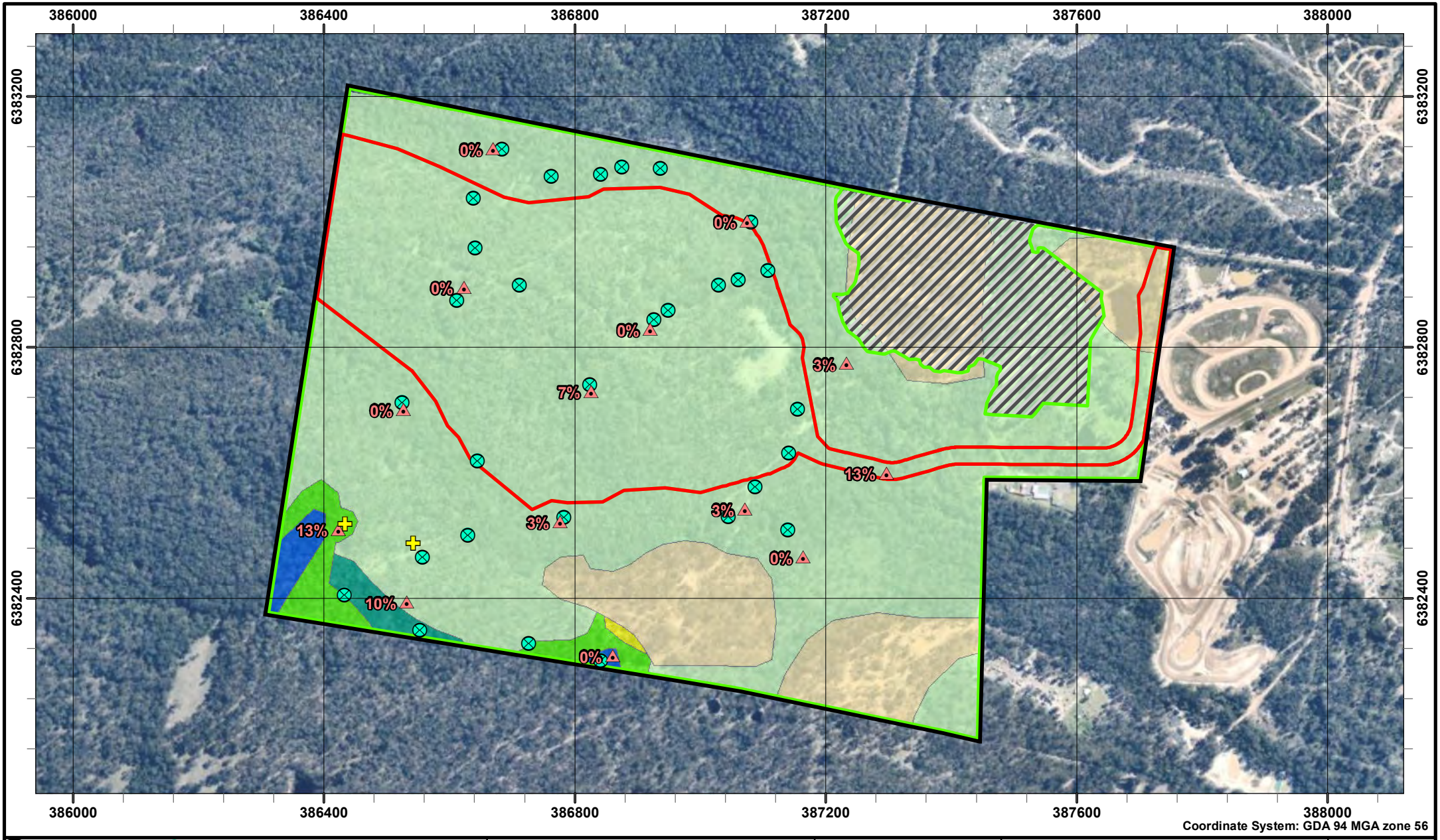
The CKPoM Koala habitat mapping for the study area shows only a very small area of preferred Koala habitat in the south-west, with the remainder of the site mapped as marginal habitat (**Figure 7**). Detailed assessment of Koala feed tree density across the study area identified a total of 52.59 ha of suitable Koala habitat as defined under SEPP 44 (i.e. trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component) (**Figure 8**). Of this, 11.19 ha of suitable Koala habitat occurs within the development site.

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Table 12: SAT test results

SAT ID	Trees with pellets	Total trees surveyed	Activity level %
8	1	30	3%
11	1	30	3%
5	2	30	7%
13	2	30	7%
7	3	30	10%
10	4	30	13%
12	4	30	13%
		MEAN	**8%**

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Assessment Points
- SAT Test Location (Label indicates activity level)
- Koala Sighting

CKPoM Habitat Mapping (PSC 2007)

- Preferred Koala Habitat
- Marginal Koala Habitat
- Link Over Marginal
- 50m Buffer Over Marginal
- 50m Buffer Over Cleared
- Mainly Cleared

Metres
0 25 50 100 150 200 250

N

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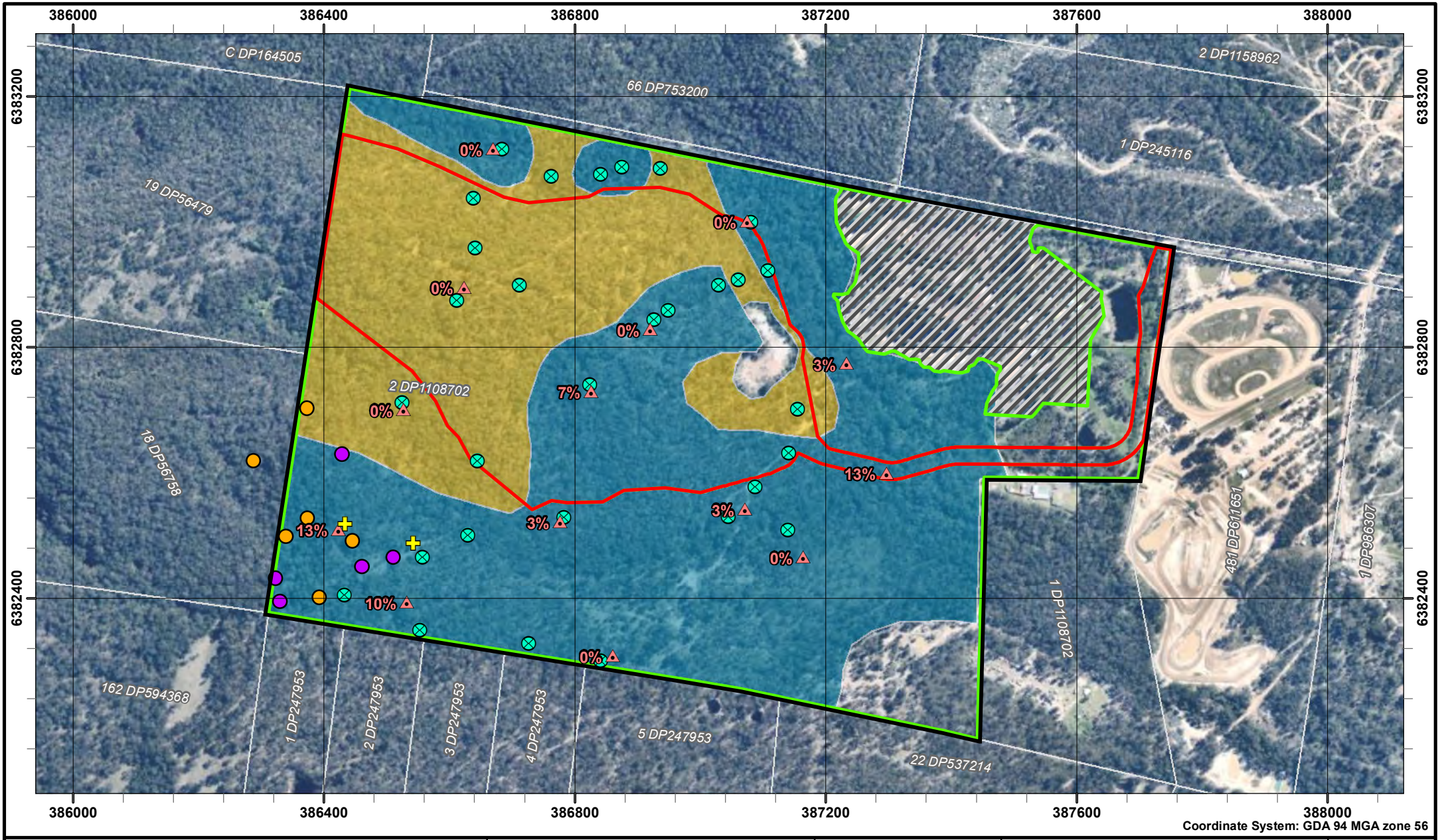
PROJECT REFERENCE:	20173040
DATE DRAWN:	21-Jun-17 15:05 Version 1
DRAWN BY:	amarshall
DATA SOURCE:	NSW Land and Property Information - 2017 Nearmap - 2017

CKPoM Koala Habitat Mapping

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Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE: 7

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- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Lot
- less than 15% *Eucalyptus Punctata*
- greater than 15% *Eucalyptus Punctata*
- Assessment Points
- SAT Test Location (Label indicates activity level)
- Koala Sighting

SEPP 44 Koala Habitat Mapping

- <15% SEPP 44 Koala Feed Trees
- >15% SEPP 44 Koala Feed Trees

Metres
0 25 50 100 150 200 250

N

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SEPP 44 Koala Habitat Mapping

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FIGURE: 8

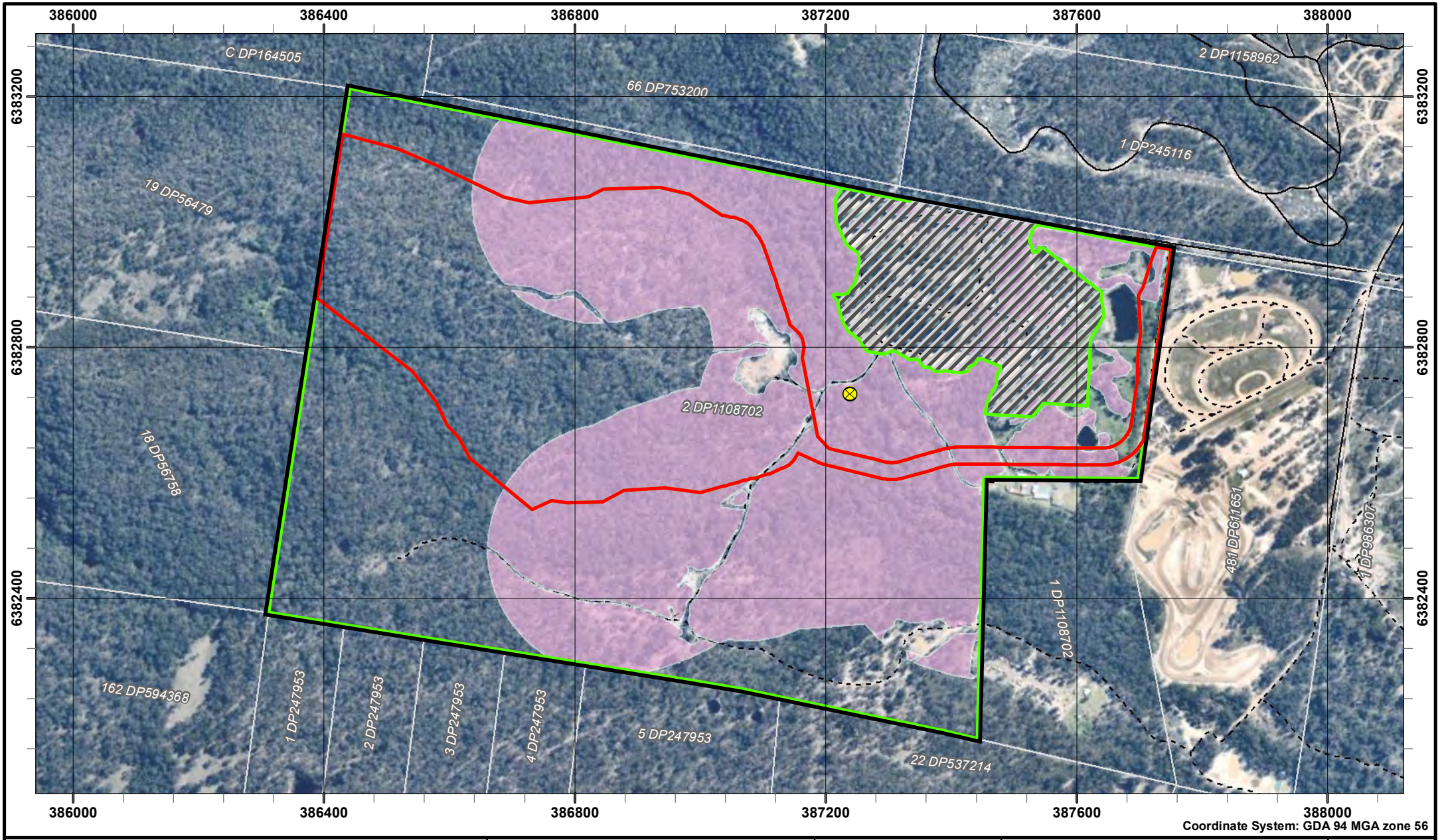
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Southern Myotis

The Southern Myotis was recorded at one location along Seven Mile Creek in the eastern part of the study area (**Figure 9**). The TSPD indicates that breeding habitat for the Southern Myotis includes hollow-bearing trees, bridges, caves or artificial structures within 200 m of riparian zone. Hollow-bearing trees are present (albeit in low to moderate abundance) throughout the forest vegetation in the study area. All areas of HU804 (moderate-good) within 200 m of the dams and the 2nd and 3rd order streams on the eastern part of the site were mapped as suitable breeding habitat for this species (**Figure 9**). The remaining 1st order drainage lines in the study area are highly ephemeral and do not contain suitable foraging habitat (i.e. streams and pools).

A total of 49.49 ha of Southern Myotis habitat occurs in the study area. Of this, 16.36 ha of Southern Myotis habitat occurs in the development site.

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- Study Area (100.94 ha)
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Lot
- Local Road
- Track
- Southern Myotis Location
- Southern Myotis Habitat

Metres
0 25 50 100 150 200 250

N

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DRAWN BY: amarshall

DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Southern Myotis Habitat Mapping

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FIGURE:
9

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STAGE 2: IMPACT ASSESSMENT

2.1 AVOID AND MINIMISE IMPACTS

2.1.1 Summary of Avoidance and Minimisation Measures

The direct and potential indirect impacts of the proposed development on biodiversity values, and the proposed avoidance and minimisation measures relating to each impact are summarised in **Table 13**. Further details on site selection, avoidance, and minimisation measures are provided in the following sections.

Table 13: Summary of potential impacts and proposed avoidance and minimisation measures

Type and phase of impact	Biodiversity values potentially affected	Proposed avoidance and minimisation measures
Direct Impacts		
Clearing of native vegetation during the construction phase – total of 32.03 ha of HU804 to be removed.	All threatened species known or likely to occur in the study area as assessed in Appendix 5.	Avoidance and retention of 57.2 ha of native vegetation within the study area. This retained vegetation is proposed to be secured under a biobanking agreement as part of the offset. Avoidance of 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. Preparation of Flora and Fauna Management Plan (F&FMP), including pre-clearing fauna surveys, and clearing protocols. Preparation and implementation of a Landscape and Rehabilitation Management Plan (L&RMP).
Loss of hollow-bearing trees during the construction phase.	All hollow-dependent threatened fauna species assessed in Appendix 5.	Avoidance and retention of 57.2 ha of vegetation within the study area. The majority of this vegetation contains hollow-bearing trees that will be retained. Preparation of F&FMP, including pre-clearing fauna surveys, and clearing protocols.
Removal of dead wood and dead trees during the construction phase.	All hollow-dependent threatened fauna species assessed in Appendix 5.	Preparation of F&FMP, including pre-clearing fauna surveys, and clearing protocols.
Reduction in habitat connectivity in the study area.	Native fauna	Retention of vegetation corridors on the southern, central and north-east parts of the study area. Connectivity through the eastern corridor would be enhanced through revegetation of grassland areas. The retained vegetation within the study area would be protected and managed in-perpetuity under a biobanking agreement. The development site would be cleared in stages and progressively rehabilitated with native vegetation to provide connectivity through the north-west part of the site during operations.
Potential Indirect Impacts		

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Type and phase of impact	Biodiversity values potentially affected	Proposed avoidance and minimisation measures
Loss of individuals through: Starvation / exposure Predation by domestic and/or feral animals Loss of breeding opportunities Loss of sheltering habitat Alteration to hydrological regimes	All threatened species known or likely to occur in the study area as assessed in Appendix 5.	Avoidance and retention of 57.2 ha of vegetation within the study area. Haul road design and construction to ensure existing hydrological regimes for Seven Mile Creek are maintained. Preparation of F&FMP, including pre-clearing fauna surveys, and clearing protocols. Preparation and implementation of a Water Management Plan.
Erosion and sedimentation Construction and operation phases.	All flora and fauna species, vegetation, and fauna habitats adjoining the development site.	Preparation and implementation of a Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP). These plans would include measures to prevent and manage potential erosion and sedimentation from the site. Refer to the EIS for further details. Preparation and implementation of a Water Management Plan. This plan has been prepared and submitted as part of the EIS.
Increased nutrients, contaminants and pollutants (e.g. petrochemicals, herbicides, pesticides, fertilisers etc.) Construction and operation phases.	All flora and fauna species, vegetation, and fauna habitats adjoining the development site.	Preparation and implementation of a CEMP and OEMP. Preparation and implementation of a Water Management Plan. These plans must include measures to restrict use of pollutants on the site, and to prevent and minimise stormwater run-off containing contaminants.
Introduced species (animals and weeds). Weeds may be introduced and/or spread into native vegetation adjoining the development site. Proposed development may facilitate movement of vertebrate pest species. Construction and operation phases.	All flora and fauna species, vegetation, and fauna habitats adjoining the development site.	Implementation of management plans within the offset site as part of a biobanking agreement. This would include a weed management plan, and vertebrate pest management plan. Preparation and implementation of a Landscape and Rehabilitation Management Plan (L&RMP) for the development site.
Noise, vibration, lighting, dust and air pollution. Increased human activity directly adjacent to sensitive vegetation and habitats. This may disturb flora and fauna in adjoining habitat. Ongoing human-induced impacts such as damage to vegetation from vehicles or trampling, death and injury to fauna from vehicle impact, increased rubbish and alteration to normal behaviour patterns are also possible. Construction and operation phases.	All flora and fauna species, vegetation, and fauna habitats adjoining the development site.	Preparation and implementation of a CEMP and OEMP. These plans must consider measures to mitigate impacts on flora and fauna from noise, vibration, dust, light, and air pollution. Preparation and implementation of a L&RMP. Preparation and implementation of a waste management plan, traffic management plan, and dust management plan. Refer to the EIS for details. The development site should be delineated with permanent wildlife-friendly fencing, and include signage to identify 'no-go' areas. Speed limits on traffic using access roads to 40 km / hr (in accordance with CKPoM 2002) will reduce potential for death or injury to wildlife as well as reduce noise and pollution levels.

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2.1.2 Site Selection, Planning and Avoidance

The proposed quarry location and layout was determined in consideration of a variety of site values and constraints, including biodiversity. Alternative locations for the proposed quarry within Lot 2 DP1108702 are limited due to the lack of suitable rock reserves in other areas. For example, the north-east part of the study area contains the areas of lowest biodiversity value, but does not contain suitable rock reserves for extraction (as well as a number of other constraints). Further detail on the project justification and alternatives is provided in Section 3.0 of the EIS (JBA Urban Planning Consultants Pty Ltd 2016).

The extent and layout of the proposed development site has been selected to avoid and retain the following biodiversity values:

- The proposal would retain 57.2 ha of native vegetation (approximately 63%) within the study area. This retained vegetation is proposed to be secured under a biobanking agreement as part of the offset to provide in-perpetuity protection and management of this native vegetation and threatened species habitat.
- The proposed development has been positioned to avoid the 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. A new bridge or culvert crossing is proposed to be constructed over Seven Mile Creek.
- The proposed development would avoid the majority of suitable Koala habitat in the study area (approximately 79%). These retained areas of suitable Koala habitat (41.40 ha) would be protected and managed in-perpetuity under a biobanking agreement.
- The proposed development would avoid the majority of Southern Myotis breeding habitat in the study area (approximately 67%). These retained areas of Southern Myotis habitat (33.03 ha) would be protected and managed in-perpetuity under a biobanking agreement.

The proposed development would not impact on any threatened ecological communities (TECs), critical habitat, riparian areas of 4th order or higher, important wetlands, estuaries, or state significant biodiversity links.

2.1.3 Impact Minimisation

A range of management plans are proposed to be prepared and implemented to minimise impacts of the proposed development and ensure the long term protection of the retained native vegetation and threatened species habitats in the study area. An overview of the scope and content of the proposed management plans are provided in the following sections.

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2.1.3.1 Flora and Fauna Management Plan

This plan is intended to provide detailed measures and protocols to minimise potential impacts upon wildlife and ensure protection of vegetation immediately adjacent to the development site during the *construction phase* of the project. The Flora and Fauna Management Plan should include the following:

- Pre-clearing fauna surveys;
- Clearing protocols;
- Hollow-bearing tree clearing protocol;
- Fauna translocation protocol; and
- Vegetation clearing protocol.

Further details of these items are provided below.

Pre-clearing Surveys

The following pre-clearing protocols and recommendations shall be included as a minimum in the Flora and Fauna Management Plan:

- Approximately one week prior to any vegetation clearing a survey of habitat trees should be conducted in the planned clearing area. These trees should be marked with flagging tape and subsequently watched at dusk during the week prior to clearing to determine whether any of the hollows are in use by fauna.
- Within 24 hours prior to vegetation clearing, pre-clearing surveys must be undertaken by a suitably qualified ecologist to ensure the absence of Koalas within each planned clearing area. Any trees identified as containing Koalas will be clearly marked to indicate occupation so that this can be communicated to the clearing contractor and supervising ecologist. If prior to clearing commencing the Koala(s) have not self-relocated from the planned clearing area the following procedure will be followed:
    - A 30 m exclusion zone around occupied trees will be maintained during clearing. To encourage self-relocation all other surrounding vegetation, apart from that within 30 m of the occupied tree, will be cleared. No vegetation will be felled onto the occupied tree and where possible vegetation links to adjacent retained vegetation will be maintained;
    - The occupied tree (and vegetation within the 30 m exclusion zone) will be left standing for a minimum of two nights to encourage self-relocation to vegetation outside the development site;

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- If after this period the Koala(s) have not self-relocated, they may be retrieved from the tree by a suitably qualified ecologist prior to felling and relocated to a safe location within the adjacent biodiversity offset area. If it is not considered safe or practical to retrieve the Koala(s) from the tree, the occupied tree will be left standing until self-relocation occurs.

- Temporarily fence off and clearly mark out all vegetation which will not be cleared adjacent to the development site so that they are clearly visible as “no-go areas” to construction staff and vehicles.

- A survey of all noxious weed infestations (primarily Lantana and Bitou Bush) should be conducted in the planned clearing area at least one month prior to any vegetation clearing. Each weed infestation should be clearly marked and subsequently treated to minimise spread of weed propagules in the development site and adjacent native vegetation. Topsoil from these areas which are likely to contain weed propagules should also be stockpiled separately and not used in any rehabilitation works.

Clearing Protocols

Hollow-bearing Tree Clearing Protocol

The felling of all habitat trees should be attended by a suitably trained fauna ecologist experienced in fauna handling in order to ensure the safety of any fauna found to be in the hollows. On all occasions, trees having potential habitat hollows should be ‘soft felled’ by an experienced machine operator in accordance with ‘soft-felling’ procedures. Hollows should be inspected by the supervising ecologist immediately post-felling. All fauna found to occupy any hollows should be assessed for injury, and if healthy and uninjured, subsequently be released at a suitable nearby location (in accordance with the Fauna Translocation Protocol described below). If any fauna are injured during the felling process, they are to be taken to a nearby veterinarian or wildlife care group for treatment.

Fauna Translocation Protocol

Any translocation of wildlife required during the clearing process must be conducted in consideration of the Policy for the Translocation of Threatened Fauna in NSW (NPWS 2001). Fully qualified, experienced and licensed Ecologists should be contracted to undertake any fauna translocation to outside of the development area. It is envisaged that captured fauna and/or displaced fauna would be relocated to adjacent habitat or on-site retained habitats by an experienced Ecologist. During the tree removal process or any other construction activity, the following protocol should be followed in case of an injured animal:

- If possible any fauna fleeing the clearing area should be directed to a safe area outside the development site, or captured and relocated if necessary. All fauna are to be handled in such a way as to prevent injury to the animal or the handler.

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- Once the animal has been safely captured, it should be relocated or caged in a hessian bag or box and released at an appropriate time of day;
- All fauna that are captured during the clearing operations that are uninjured will be relocated to a safe and appropriate location within the adjacent offset area on the same day as capture if possible;
- Any microbats or other nocturnal species captured during the tree removal process should be held in cotton or hessian bags and released at dusk if possible;
- If any animal is injured during the vegetation clearing works, a veterinarian should be contacted immediately for professional advice on the best course of action; and
- If any native animal is injured during other construction or operational processes while an ecologist, environmental representative or animal handler is not present, they must be contacted immediately. The procedure and relevant contacts for wildlife injuries will be communicated to all staff during the site induction.

Vegetation Clearing Protocol

Project Ecologists shall work in consultation with the construction contractor during vegetation clearing to provide assessment and direction to ensure that the process allows retention of the site's habitat and ecological values where possible. Key vegetation clearing protocols include:

- An Ecologist should be present on site during all clearing operations.
- Trees should be cleared in a way that will allow fauna living in or near the development site enough time to move out of the area without additional human intervention.
- When clearing areas greater than three hectares in size, clearing must be undertaken in separate stages. Each stage must be separated by at least one 12-hour period that occurs between 6 pm and 6 am on the following day.
- Habitat links must be maintained during clearing to allow fauna species to move safely from the site to adjacent areas.
- Clearing should begin in the area that is furthest from habitat adjacent to the area being cleared. The direction of clearing should also ensure that fauna species are directed away from threats such as roads and developed or disturbed areas (e.g. residential areas or cleared spaces > 100 m).
- Sequential clearing should not create an 'island' of habitat that is isolated from adjoining habitat by roads or cleared and disturbed areas.

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- Habitat features such as rocks, logs and hollows should be salvaged and retained where possible and either used in any rehabilitation areas or carefully placed in areas of retained vegetation under the supervision of an Ecologist.

2.1.3.2 Landscape and Rehabilitation Management Plan

This plan is intended to detail the short and long term measures that would be implemented during the *construction and operation phases* of the project to minimise impacts on native vegetation and fauna on the site, and ensure the development site is progressively rehabilitated with self-sustaining native vegetation. The Landscape and Rehabilitation Management Plan should include the following as a minimum:

- Weed management within the development site during operations;
- Management of any retained vegetation within the development footprint during operations;
- Measures to protect areas of native vegetation and fauna habitats occurring adjacent to the development site;
- Details of traffic-calming measures and signage to be installed within the site to reduce the risk of vehicle strike to Koalas and other native fauna;
- Details of proposed rehabilitation and revegetation (including timing, target species composition, rehabilitation methods, and ongoing monitoring);
- Details on appropriate soil handling processes, including topsoil management for later use in any rehabilitation areas;
- Details on the salvage, storage and redistribution of habitat features (e.g. hollows and logs) within the rehabilitation areas;
- Fire management (including management of APZs);
- Vertebrate pest control within the development site;
- Details of maintenance, monitoring and performance criteria to assess the condition and functioning of the adjoining vegetation and fauna habitats, and to evaluate progress of rehabilitation works.

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2.2 IMPACT SUMMARY

2.2.1 Ecosystem Credits Required

A total of 1,836 ecosystem credits are required for the proposed development. **Table 14** outlines the biometric vegetation types that would require offsetting for the proposed development and the number of ecosystem credits required to compensate for the proposed impacts at the development site. The credit report for the development site is included in **Appendix 1**.

Table 14: Summary of ecosystems credits required at the development site

Veg Zone #	Biometric Vegetation Type	% Cleared in Major Catchment Area	Area of Zone	Current Site Value	Future Site Value	Credits
1	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (mod-good)	48	32.03	71.88	0.00	1,836
Total Credit Requirements for HU804						**1,836**

2.2.2 Species Credits Required

The number of species credits required to compensate for the impacts of the proposed development is outlined in **Table 15**. The credit report for the development site is included in **Appendix 1**.

Table 15: Summary of species credits required at the development site

Scientific Name	Common Name	Area (ha) of Habitat Impacted	Species Credits
Myotis macropus	Southern Myotis	16.46 ha	362
Phascolarctos cinereus	Koala	11.19 ha	291

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APPENDIX 1: CREDIT REPORT – DEVELOPMENT SITE

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Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 16/06/2017 Time: 3:21:38PM Calculator version: v4.0

Major Project details

Proposal ID:	167/2016/3995MP
Proposal name:	Eagleton Hard Rock Quarry Development
Proposal address:	Barleigh Ranch Way Eagleton NSW 2324
Proponent name:	Eagleton Rock Quarry Pty. Ltd
Proponent address:	PO Box 826 Newcastle NSW 2300
Proponent phone:	0429 877 704
Assessor name:	Samara Schulz
Assessor address:	64 Medcalf Street Warners Bay NSW 2282
Assessor phone:	02 4949 5200
Assessor accreditation:	167

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	32.03	1,836.00
Total	32.03	1,836

Credit profiles

1. Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest, (HU804)

Number of ecosystem credits created 1,836

IBRA sub-region Karuah Manning

Offset options - Plant Community types	Offset options - IBRA sub-regions
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest, (HU804) Melaleuca decora low forest of the central Hunter Valley, Sydney Basin Bioregion, (HU564) Slaty Red Gum grassy woodland on hinterland foothills of the southern North Coast, (HU619) Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast, (HU802) Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast, (HU803) Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter, (HU806) Red Ironbark - Spotted Gum - Prickly-leaved Paperbark shrubby open forest of the Lower Hunter, (HU807) Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter, (HU814) Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter, (HU815) Spotted Gum - Narrow-leaved Ironbark shrub - grass open forest of the central and lower Hunter, (HU816) Grey Box - Grey Gum - Rough-barked Apple - Blakely's Red Gum grassy open forest of the central Hunter, (HU822)	Karuah Manning and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Koala	Phascolarctos cinereus	11.19	291
Southern Myotis	Myotis macropus	16.46	362

APPENDIX 2: BIODIVERSITY OFFSET STRATEGY

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APPENDIX 3: PLOT AND TRANSECT DATA

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Quadrat Number: Q1 **Waypoint:** 001 **Date:** 17/1/3 **Recorder:** AM

Vegetation Type: Hunter valley Moist Forest **Photos:** YES (1679 - 1680) / NO **Sub-zone Title:**

Over-Storey Species	Regen	CA	Mid-Storey Species	CA	Ground Cover (Shrubs)	CA	Ground Cover (Grasses)	CA	Ground Cover (Other)	CA	Exotic	CA
E. germanoides		4	M. styphelioides	3	Notelaea ovata	2	Oplismenus aemu	3	D. repens	3	Lantana	2
E. punctata		3	Acmena sm. thi	3	Maytenus silvestris	2	E. micrantha	3	Tylophora barbata	2	Cestrum parqui	1
C. maculata		2	Cryptocarya micran	3	Breynia oblongifolia	2	M. stipoides	3	Morinda jasminoides	2	Setaria sphacelata	2
E. siderophloia		3	Glochidion ferdi	2	Myrsine variabilis	2	Poa affinis	2	Doodia aspera	4		
			Cleistanthus cunn	1	Cayratia verr	4			Parsonsia straminea	2		
					Phyllanthus gunnii	1			Dioscorea transversa	2		
			or Hymenosporum flavum		Abutilon hut	2			Carex longebrac	2		
					Acacia maidenii	1			Pastel flower	2		
					Zieria smithii	2			Sethlens flex	2		
					Rapanea ?	2			Gahnia clarkei	2		
					Pittosporum rev	1			Smilax australis	2		
									Clematis glycin	1		
					Rhodamnia rubescens				Cissus viti	3		
									Celtis ehrlia	2		
									Stephania jap	2		
									Pratia purpur	2		
									Veronica plebeia	1		
									Hydrocotyle tri	1		
									Adiantum aeth	2		
									Hydrocotyle pedi	2		
									Scrophularia her	1		
Total Species =		4	Total Species =	5	Total Species =	11	Total Species =	4	Total Species =	21	Total Species =	3

(48)

General Comments: (43) NPS

173-1193

Quadrat Number: Q1 **Waypoint:** 001 **Date:** 17/1/13 **Recorder:** SS

	Number of Hits (Tally)										% Foliage Cover
O/S Cover	20	75	40 60	56	25	80	75	70	60	30	
MS Cover	75	46	90	30	75	25	25	60	10	—	
GC grasses	5	1	3	3	4	3	3	6	6	5	
GC shrubs	0	0	0	0	0	0	0	2	2	0	
GC other	5	1	1	3	3	4	2	1	2	4	
Exotic	0	0	0	1	3	0	0	0	2	1	

Native over-storey cover (*): 10 29 30 40

Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:

Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):

Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured .

Exotic plant cover:

If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
1	6, 10, 7, 5, 10	Caves/mines/tunnels	Yes		(No)
		Presence Wet areas/water bodies	(Yes)		No
	3, 2, 3, 4	Abundance of rocks/escarpments	High	Medium	(Low)
		Abundance of nectar resources	High	(Medium)	Low
		Abundance of fruit resources	High	(Medium)	Low
		Community part of wildlife corridor	(Regional)	Local	None
		Structural complexity of habitat	(High)	(Medium)	Low
		Dense shrub or ground cover	High	(Medium)	(Low)
Total Number =	Total Length =	Abundance of dead trees/stags	High	Medium	(Low)

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

173-1145

Quadrat Number: Q2 **Waypoint:** 002 **Date:** 17/1/13 **Recorder:** SS

Vegetation Type: HVMF **Photos:** YES / NO **Sub-zone Title:**

Aaron

Over Storey Species	Regen	CA	Mid Storey Species	CA	Ground Cover (Shrubs)	CA	Ground Cover (Grasses)	CA	Ground Cover (Other)	CA	Exotic	CA
B. acmin	5		Glochidion	3	Zieria	3	Bladygrass	5	BV. lat/fol.	2	Lantana	4
A. costata	3		Dod. tri	3	Leuc. jon	3	aplis. elem	4	D.C.P.	2		
C. mac	3		Per. lin	2	May. Silv	2	B. stricta	4	M. jasminoid	2		
B. punc	3		Mel. lin	2	B. spinulosa	2	Panicum sm	2	P. pandor	2		
B. Sp1	3		Sannantha	2	N. ovata	2			Adiantum fae	2		
C. gum	3		Acacia linifolia	2	B. oblonga	2			Bracken	2		
			A. torulosa	3	Lepto. poly	3			P. Stram	2		
					Clerodendrum	1			Cayratia sp	1		
									Sarcopetalum	2		
									Des. gunn	2		
									Lom obliq	2		
									Good. hed	2		
									D. brachy	1		
									D. rhytidophyllum			
Total Species =	6		Total Species =	7	Total Species =	8	Total Species =	4	Total Species =	13	Total Species =	1

General Comments:

59

Quadrat Number: Q2 **Waypoint:** 002 **Date:** 17/1/13 **Recorder:** AM - phot 1081

| | Number of Hits (Tally) | | |

Quadrat Number: Q7 **Waypoint:** 007 **Date:** 17/1/13 **Recorder:** AM

Vegetation Type: HUMF **Photos:** (YES) / NO (1092-1083) **Sub-zone Title:**

Over-Storey Species	Regen	CA	Mid-Storey Species	CA	Ground Cover (Shrubs)	CA	Ground Cover (Grasses)	CA	Ground Cover (Other)	CA	Exotic	CA
E. punctata		3	Cryptocarya mico	2	Clerodendrum tom	1	E. stricta	4	Cchnus sieberianus	3	Lantana	2
E. sideroph loia		4	C. terd.-end.i	3	Notelaea ovata	2	I. cylindrica	2	Dianella caerulea	2		
E. acmenoides		3	Acmena smith.i	2	Zieria smithii	4	O. caerulea	3	Aminella gesnia	3		
C. gummifera		2	Alloxylon flavus	2	Acacia irr/pen	1			Cissus hypoglauca	2		
C. maculata		2	Alphitonia excelsa	3	Rubus moluccanus	2			V. stricta	2		
A. costata		2	Callistemon salig	1	Cabbage palm	2			Hibbertia dentata	2		
					Breynia oblong	2			Dichondra repens	2		
					Hibbertia aspera	2			Goodenia hed	2		
					Maytenus s.lv	2			Einstrophes elatior	2		
					Myrsine variabilis	2			Pratia purp	2		
					Polyscias sambu	2			Ripogonum album	2		
					Bursaria spinosa	1			Carex longebrac	1		
					Pittosporum rev	1			Gethyllis ayer	2		
									Pandorea pand	1		
									Sellers flex	1		
									Dianella caerulea	1		
									Legenhera stipetata	1		
									Sarcopetalum harv	1		
Total Species =		6	Total Species =	6	Total Species =	13	Total Species =	3	Total Species =	18	Total Species =	1

General Comments:

173-1193

Quadrat Number: Q3 **Waypoint:** 009 **Date:** 17/1/13 **Recorder:** SS

	Number of Hits (Tally)									% Foliage Cover
O/S Cover	15	20	5	5	—	10	40	70	60	30	
MS Cover	60	65	70	75	30	20	60	70	70	60	
GC grasses	1	1	1	1	1	1	1	1	1	1	
GC shrub	1	1	1	1	1	1	1	1	1	1	
GC other	1	1	1	1	1	1	1	1	1	1	
Exotic											

Native over-storey cover (*): 10 20 50 40

Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:

Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):

Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured .

Exotic plant cover:

If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
1	7, 5, 5, 8, 5, 8	Caves/mines/tunnels	Yes		(No)
		Presence Wet areas/water bodies	(Yes)		No
	7, 5, 1, 1	Abundance of rocks/escarpments	High	Medium	(Low)
		Abundance of nectar resources	High	(Medium)	Low
		Abundance of fruit resources	High	(Medium)	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	(Medium)	Low
		Dense shrub or ground cover	High	(Medium)	(Low)
Total Number =	Total Length =	Abundance of dead trees/stags	High	Medium	(Low)

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q4 **Waypoint:** Q4 **Date:** 30/11/16 **Recorder:** PF

Vegetation Type: **Photo(s) ID and direction:** W

Overstorey Species	R	F	Ab
E. moluccana	✓	3	68
C. maculata		1	1
E. punctata		2	2
E. tereticornis	✓	3	6
[illegible]		[illegible]	[illegible]
E. eugeniodes		1	1
E. fibrosa		1	1

Midstorey Species	F	Ab
Melaleuca [illegible]	2	6
Glochid. dionifo	1	3
[illegible]	[illegible]	[illegible]

Ground Cover (Shrubs)	F	Ab
A. falcata	1	1
Dodo. tri.	1	5
Lepto. poly	1	3
Lewis junip	1	1
Acrotriche d.	1	1

Ground Cover (Grasses)	F	Ab
Bothriochloa decip.	1	3
M. woollsiana	2	50
Echinopogon caes.	1	10
E. brownii	1	5
Dichelachne micr.	1	10
Lachnagrostis fil.	1	5
Cymbopogon refract	1	5
E. stricta	1	10
E. marginata	1	5
Cynodon dactylon	1	10

Ground Cover (Other)	F	Ab
Centella asiat	2	100
Dichondra rep	2	100
Patia pro	1	50
Sowerbaea juncea	1	10
G. homeanum	2	100
Hydrocotyle bon	1	50
[illegible]	[illegible]	[illegible]
Dianella long.	1	5
Glycine tab.	1	10
Parsonsia str.	1	5
V. plebeia	1	5
Cheilanthes sieb.	1	5
Cyp. gracilis	1	10
Lom. multi	1	2
Lom. glauca	1	1
Hibb. [illegible]	1	2
Commel. [illegible]	1	5
[illegible]	[illegible]	[illegible]
Rumex brownii	1	5
Schoenus apo.	1	20
Solanum prinophyll	1	1

Exotic	F	Ab
Axonopus fis.	75	100
Richardia sch	5	50
[illegible]	1	10
Dandelion	1	10
Setaria sp.	1	10
B. diens pilosa	1	10
Plantago	1	10
[illegible]	[illegible]	[illegible]
Whisky Grass	1	5
[illegible]	[illegible]	[illegible]
[illegible]	1	5
Solanum mauritianum	1	2
Scotch thistle	1	5
Vinca Grass	1	5
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Lambs Tongue	1	15
[illegible]	[illegible]	[illegible]
Parra. grassi.	1	5
Slender celery	1	5
[illegible]	[illegible]	[illegible]
Modiola cas.	1	5
Scarlet pimp.	1	10
Paspalum d.	1	10
Purple Top.	1	5
Vulpia sp.	1	5
Bromus cath	1	20

Euphorbia peplus
Taraxacum officinale
viridens
Conyza bon
phytolacca octandra
sonchus oleraceus
Cirsium vulgare
Poa annua
pinus
Plantago lanceolata
Sporobolus africanus

verbena bonariensis

R = Regeneration (for entire zone) F = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

6 3 5 10 19

General Comments:

(43) NPS

Solanum nigrum 1|10
Heliotropum amplex 1|20
Cyp. brevi 1|10

Quadrat Number: Q4 **Date:** 30.11.16. **Recorder:** STEVE L

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover	20 43 — 40 — — — 20 —	~~12.5%~~
MS Cover	— — — — — — — — —	
GC grasses	45	4.5%
GC shrub		40%
GC other		2%
Exotic (Ground)		~~36~~
Exotic (Mid)		90%
Exotic (Canopy)		—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
		Caves/mines/tunnels	Yes		No
	10 - TIMBER STACK	Presence Wet areas/water bodies	Yes		No
		Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	**Total Length =** 10m	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q5 Waypoint: Q5 Date: 30/11/16 Recorder: PF

Vegetation Type:

Photo(s) ID and direction: E

Overstorey Species	R	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
C. maculata	✓	5	67	M. nodosa	3	10	Lave. juniper.	1	1	Cymbopogon ref	1	5	Parsonsia stra	1	5	Vulpia myur	85	1000
E. crebra		10	1	M. linariifolia	1	1	Breynia oblo	1	1	Dichelachne micr	1	10	Glycine tab.	1	10	F. weed	10	100
E. [illegible]				A. [illegible]	[illegible]		Notelaea long	1	1	Lachnagrostis	2	20	Juncus usit	2	20	Briza (M) max	1	20
E. caniculata		5	1	Glochidion ferd		1	M Bursaria spin	1	2	Ento. marg.	2	20	Dichondra repe	1	50	Bidens pilosa	1	10
				Acacia irrorata	1	3				E. striata	2	20	Hardenbergia vi	1	10	Slender celery	1	10
										Paspal. distans	1	20	Pratia pur	1	20	Moth Vine	1	1
										Era. brownii	1	10	Dianella long.	1	10	Lantana cam	1	10
							Bolboschlo			Pentag macra	1	10	Pseudoanthomun	1	5	Whisky Grass	1	10 5
							fulv (?)			Rhytidosperma	1	10	Eustrephus lat	1	2	[illegible]	1	20 - Toronion officin
										[illegible]			Oplismenus ha			Plantago [illegible]		
										Poa labill (M)	1	20	Hibb. (?) pedunc	1		[illegible]	1	10 - E. curvula
										Sporobolus creber	1	20	Centella asiat	1	50	Spear thistle	1	10 - Cirsium vulgare
													Polymeria calyc	1	3	[illegible]		
													[illegible]	[illegible]		Ehrharta long	1	10
													Hem. multi	1	10	Asp. d/bt	1	10
													Opercularia dip	1	2	Axonopus fur	1	20
													Lagenophora stip.	1	3	Plantago lanc	1	20
													Dichella rev.	1	5	Sc. pimpernel	1	10
													Schoenus apo.	1	20	[illegible]	1	10 - H. radicata
																Digitaria (?)		
														calycina		Gamochaeta	2	100
																Spor. ujr.	1	20
																Briza minor	1	20
																Aira sp	1	100

R = Regeneration (for entire zone) F = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

3 4 4 11 17

General Comments:

(39) NPS

Quadrat Number: Q5 **Date:** 30.11.2016 **Recorder:** STEVE W

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover	75 — 15 — 50 — — 30 — —	
MS Cover	30 30 — 65 — — — — —	17%
GC grasses		12.5%
GC shrub		80%
GC other		4%
Exotic (Ground)		20%
Exotic (Mid)		32%
Exotic (Canopy)		—
		—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
		Caves/mines/tunnels	Yes		No
11	3, 1, 2	Presence Wet areas/water bodies	Yes		No
		Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
	[illegible]	Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number = 2	**Total Length =** 6m	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q6 **Waypoint:** Q6 **Date:** 30/11/16 **Recorder:** AM

Vegetation Type: Exotic grassland-managed **Photo(s) ID and direction:** NW

Overstorey Species	R	F	Ab

Midstorey Species	F	Ab

Ground Cover (Shrubs)	F	Ab

Ground Cover (Grasses)	F	Ab
Cynodon dactylon	20	500
Lachnagrostis filiformis	1	20
Eragrostis brownii	2	50
Imperata cylindrica	1	20

Ground Cover (Other)	F	Ab
Dichondra repens	1	20

Exotic	F	Ab
H. radiata	3	100
Richardia stellaris	2	100
Paspalum dil	50	1000
Modiola cor	1	20
Vulpia myuros	25	1000
Eragrostis bon	1	20
Axonopus fissif	20	500
Sporobolus elon	2	50
Angelis anon	1	20
Lotus subbiflor	3	500
Stem secundum		
Verbena bonar	1	5
Briz. minor	1	10
Andropogon virg	1	20

R = Regeneration (for entire zone) F = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

General Comments:

(5) NPS

Quadrat Number: 26 **Date:** 30/11/16 **Recorder:** AA

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover		—
MS Cover		—
GC grasses		—
GC shrub		44%
GC other		—
Exotic (Ground)		2%
Exotic (Mid)		82%
Exotic (Canopy)		—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
		Caves/mines/tunnels	Yes		No
		Presence Wet areas/water bodies	Yes		No
		Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	Total Length =	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q67 **Waypoint:** **Date:** 30/11/16 **Recorder:** PF

Vegetation Type:

Photo(s) ID and direction: N

Overstorey Species				Midstorey Species			Ground Cover (Shrubs)			Ground Cover (Grasses)			Ground Cover (Other)			Exotic			
	R	F	Ab		F	Ab		F	Ab		F	Ab		F	Ab		F	Ab	
C. maculata		10	8	M. nodosa	40	50	Notelaea long.	1	1	Themeda trian	10	50	Hibb. aspera	2	20	Lantana	1	5	
Eucalyptus			1	Glochidion ferdinandi	1	10	A. falcata	5	20	Rhytido. fulv.	10	50	Lomandra multi	1	10	Fireweed	1	10	senecio med
E. resinifera		3	1				Pittosporum			Imperata cyl	20	100	Lom. long.	1	10	Cyp. eragrostis	1	10	
E. fibrosa		15	3				Breynia oblo	1	2	E. stricta	20	100	Lepido. lat.	20	100	Crofton weed	1	10	A. adenophora
							Dodo tri.	20	100	M. colaena sti	1	10	Phyll. hirtellus	1	10	Pasp. dilat. vari	1	10	
							A. Boronia (?)			Aristida ram	10		Hibb. (Hedyotis)	1	10	Ehrharta longiflora	1	10	
							Leuc. junip	1	10	Eragrostis lepto.	1	10	Gonio. tenc.	1	10				
							Alphitonia exc	1	1	Dicte lachne mic.	1	10	Dianella long.	1	10	pedunculata			
							Lepto. poly.	1	10	E. marg.	1	10	Pseuderanthemum	1	1				
							Acrotriche du	1	10	Panicum simile	1	10	Parsonsia stra	1	2				
							Pers. linear.	1	1	Echino. caesp.	1	10	Bill. scandens	1	2				
				Denhamia silvestris			Maytenus (?) silv	1	5	Cymbopogon ref	2	20	Pratia purpu	1	10				
							Dav. ul. (?)	1	1	Aristida jag.	1	10	Elaeocarpus						
				exchila			Pultenaea (?)	1	5				Cheilanthes. sieb	1	10				
							A. ulicifolia	1	10				Good. hetero.	1	10				
													Pittosporum						
													Tricoryne el.	1	10				
													Junc. cont.	1	10				
													lepto weesii	2	50				
													Dianella revolu	1	10				
													Glycine tabac	1	10				
													Geitonoplesium cym	1	5				
													Opercularia di.	1	5				
													Eustrephus lat	1	5				
													Lom filiformis	1	10				

R = Regeneration (for entire zone) **F** = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

3 2 13 12 23

General Comments:

(53) NPS

Quadrat Number: 9B7 Date: 30.11.16 Recorder: STEVE W

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover	70 20 — — — — 40 — — —	13%
MS Cover	40 10 50 — — — 15 10 — — —	14.3%
GC grasses	20	80%
GC shrub	1	2%
GC other		14%
Exotic (Ground)		—
Exotic (Mid)		18%
Exotic (Canopy)		—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
	2, 1, 5, 2, 2, 1	Caves/mines/tunnels	Yes		No
1		Presence Wet areas/water bodies	Yes		No
	3, 2·5, 3, 5, 1·5, 1, 1	Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
	1·5 3·5 6, 6, 1, 3, 2	Abundance of fruit resources	High	Medium	Low
	3, 2, 2·5, 5, 10, 5,	Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	Total Length = 81.5	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q8 **Waypoint:** Q8 **Date:** 30/11/16 **Recorder:** PF

Vegetation Type:

Photo(s) ID and direction:

Overstorey Species	R	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
E. fibrosa	✓	25	84	M. nodosa	1	1	Dodo. [illegible]	35	30	Themeda trian	1	20	Lep. lateale	2	50	Gamochaeta	1	5
E. [illegible]		[illegible]		Glochidion (Kg) ferdinandi	1	1	Leuc. juniy	1	10	A. vagans	1	20	Hibb. (Rg)	1	10	Paspalum dil.	1	5
E. [illegible]			~				Ozo. diosm	1	10	Ento. stricta	2	100	Bill. scandens	1	5	Whiskey G.	1	2
E. crebra		3	-				A. falcata	2	20	Paricum sim.	1	20	Phyll. hist.	1	10			
C. maculata		5	-				Ac. irroratal (Kg)	1	1	Era. brownii	1	10	Lom. multi.	1	10	pedunculata		
E. [illegible]		20	[illegible]				Polt. euch.	1	5	Microlaena st	1	10	Cheilanthes. sieb	1	10			
E. punctata →							Dav. ulicic	1	5	Cymbopogon ref	1	10	Mirb. rubifol.	1	10			
							Polt. villosa	1	5	Rhytidosperm fil	1	10	Tricoryne simp.	1	5			
							Lepto. [illegible] polyanthum	1	10				Glycine tab.	1	10			
							Ac. ulicifolia	1	10				Diarella long.	1	10			
							Jacksonia (Kg)	2	2				Schoenus apo.	1	10			
							Rhyncharrhena						Laxmunia grac.	1	10			
							Ros. capucedi (Kg)						Stackhousia (Kg)	1	5	viminea		
													Lom long	1	2			
													D. vittelinda	1	10			

R = Regeneration (for entire zone) F = Foliage Projective Cover (1-5%, then to nearest 5%)

Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

4 2 11 8 15

General Comments:

(40) NPS

Quadrat Number: Q8 **Date:** 30.11.16 **Recorder:** STEVE W

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover	15 — — 65 30 — — — 40 —	17%
MS Cover	— — — — — — — — — —	4%
GC grasses	40 —	28%
GC shrub		16%
GC other		4%
Exotic (Ground)		-
Exotic (Mid)		—
Exotic (Canopy)		—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
		Caves/mines/tunnels	Yes		No
	2, 5, 4	Presence Wet areas/water bodies	Yes		No
		Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	Total Length = 11 m	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q9 **Waypoint:** Q9 **Date:** 30/11/16 **Recorder:** PF

Vegetation Type: **Photo(s) ID and direction:** S

Overstorey Species	R	F	Ab
E. ~~conferta~~ ~~(dominant)~~	✓	10	4
E. fibrosa	✓	5	4
~~E. sugen~~	✓	20	2
E. globoidea			

Midstorey Species	F	Ab
M. nodosa ~~sapling~~	2	1

Ground Cover (Shrubs)	F	Ab
Dodo. tri.	5	50
Leuc. junip.	2	20
Lepto. poly.	1	10
Exocarpos cup	1	1
Pers. linearis	1	1
Dav. ulicifolia	1	5
Pult. palacea	1	5
A. ulicif.	1	2

Ground Cover (Grasses)	F	Ab
Echinopogon Cae.	1	20
Ento. stricta	2	50
Cymbopogon 20 ~~500~~		500
Microlaena st	1	20
Panicum sim.	2	50
Dichelachne mic.	25	500
Era. brownii	35	100
Pasp. distans	1	20
Aristida warb.	15	100
Cynodon dactyla	15	50

Ground Cover (Other)	F	Ab
Hibbertia aspera	1	10
Hom. multi	1	10
Bill-scandens	1	10
Cheilanthes sie	1	10
Pratia purp	1	20
Lepido- lat.	1	20
Mirbelia rub.	1	10
Centella asiat	1	20
Dampiera stricta	1	5
Schoenus ap.	1	10
Tricoryne simp.	1	10
Junc. usit	1	10
Laxmannia gra.	1	5
Glycine tab	1	10
Hypericum gram	1	10
Epilles Aust.	1	10

Exotic	F	Ab
Whisky G.	10	100
Fireweed	1	20
~~Cotula~~	~~10~~	~~100~~
Asparagus ~~asp~~	5	50
Pasp. dil. var	1	10
~~Hypericum~~	~~50~~	~~1000~~
~~Cotula~~	~~10~~	~~100~~
Sc. pimpenel	1	10
Plantago lance.	1	10
R. chardia stel	1	10

Senecio mad

R = Regeneration (for entire zone) **F** = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

3 1 8 9 16

General Comments:

(37) NPS

Quadrat Number: Q9 Date: 30.11.16 Recorder: STEVE. L

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover		
MS Cover	20	2%
GC grasses	5 45	5%
GC shrub		82%
GC other		4%
Exotic (Ground)		12%
Exotic (Mid)		62%
Exotic (Canopy)		

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50mx20m plot	Total Length of fallen timber within the 20mx50m plot	Fauna habitat values (High, Medium, Low):			
		Caves/mines/tunnels	Yes		No
	1, 1.5, DEB	Presence Wet areas/water bodies	Yes		No
	2.5, 2, 2, 1.5 - ROCK PILE	Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	Total Length = 9,5	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.
Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.
Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q10 **Waypoint:** Q10 **Date:** 30/11/16 **Recorder:** AM

Vegetation Type: Spotted Gum - Ironbark Forest **Photo(s) ID and direction:** West

Overstorey Species	R	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
Corymbia mac	✓	20	9	Dod triquetra	5	50	Dennesia thuiifolia	2	20	Themeda triandra	40	500	Lom longifolium	1	20	Lantana camara	5	10
E. Fergusonii		5	2	Callistemon salignus	2	3	Persoonia linearis	1	5	A. virgatum	2	100	Eustrephus latifolius	1	20	Senecio madagascariensis	1	3
E. crebra	✓	10	43	Bursaria spinosa	10	100	Acrotriche divaricata	1	20	Poa labillardieri	5	100	Pandorea pandorana	1	20			
E. punctata	✓	5	3	Brachychiton populneus	1	1	Hibbertia scandens	1	20	Entolasia stricta	2	100	Arthropodium milleflorum	1	2			
E. tenuicornis	✓	1	1				Bursaria spinosa	1	5	Cymbopogon refractus	2	50	Opercularia diphylla	1	10			
							Leucopogon juniperinus	1	10	Eriochloa brownii	1	20	Pentarrhinum propinquum	1	50			
							Acacia ulicifolia	1	5	L. cylindrica	2	100	Hardenbergia violacea	1	5			
							Acacia falcata	1	20	Echinopogon caespitosus	1	20	Dichondra repens	3	500			
							Zieria smithii	1	20	Microlaena stipoides	1	10	Desmodium gunnii	1	20			
										Dichelachne micrantha	2	50	Lom filiformis	1	20			
										Rytidosperma fulvum	1	20	Desmodium rhytidophyllum	1	10			
													Dianella caerulea	1	20			
													Brunoniella australis	1	20			
													Trachymene ellipticifolia	1	10			
													Polymeria calycina	1	10			
													Chamaesyce drummondii	1	20			
													Lom multiflorum	1	20			
													B.4 secondleaves	1	10			
													Glycine clandestina	1	20			
													Vernonia cinerea	1	20			

Quadrat Number: Q10 **Date:** 30/11/16 **Recorder:** AM

	Number of Hits (Tally)										Foliage Cover (%)
O/S Cover	20	40	30	35	30	40	40	15	50	35	33.5%
MS Cover	–	–	10	–	–	20	5	10	10	15	7%
GC grasses	11	11	11	1	11	1111	1	1111	1111	1111	54%
GC shrub	111	1111	111	11	111	1111	1	1111	1111	1111	22%
GC other	1	1	1	1	1	1	111	1	1	1	20%
Exotic (Ground)				1				1	1	1	2%
Exotic (Mid)				1							–
Exotic (Canopy)				1							–

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
	4, 7, 1, 3, 2,	Caves/mines/tunnels	Yes		No
		Presence Wet areas/water bodies	Yes		No
		Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number =	Total Length = 17m	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number: Q11 **Waypoint:** Q11 **Date:** 30/11/16 **Recorder:** PF

Vegetation Type: **Photo(s) ID and direction:** 5

Overstorey Species	R	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
C. maculata		30	20	M. sodoma	10	10	Daviesia ulicifolia	1	10	A. virgen	2	100	lom. long.	1	5	Andropogon virg	1	5
E. fibrosa		50	4	G. faedmeadi	1	5	Hibbertia aspera	1	10	E. stricta	25	500	lep. lat.	5	100	Lantana	1	5
E. globoidea		5	3				Acrotriche	1	10	Dichelachne mic.	1	50	Cheilanthes sieb.					
E. cannulata		2	-				Leuc. jun.	1	10	[illegible]			[illegible]					
							[illegible]			[illegible]			Eustrephus lat	1	5			
							Ac. falcata	1	10	Panicum sim.	2	100	Opercularia di.	1	5			
							Breynia ob	1	5	A. warburgii	1	50	Dianella caer.	1	5			
							Pultn. pelaea	1	10	Echinopogon ces	1	50	Gono. teuc.	1	5			
							[illegible]			Imperata cyl	5	50	Hardenbergia viol	1	5			
							Acrotricle div	1	5	Rhytidopall. d.	5	50	Pratia pur	1	10			
							Pult. euchila	1	5	Microlaena st	1	50	Hibb. (?)	1	10	-pedunculata		
							Notelaea long.	1	2	Rhytido. pulv.	1	50	Brunoniella aus	1	5			
							Pers. lin.	1	2	Themeda trian	5	50	Phyll. hirsellus	1	10			
							Jacksonia	1	1	Poa. lab.	1	50	Goodenia let.	1	5			
													Lom. obliqua	1	10			
													Lagenophora stip.	1	5			
													Schoenus ap.	1	10			
													Lom. glauca	1	2			

R = Regeneration (for entire zone) **F** = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

4 2 12 12 17

General Comments:

(47) WPS

Quadrat Number: Q11 **Date:** 30.11.16 **Recorder:** STEVE.L

	Number of Hits (Tally)										Foliage Cover (%)
O/S Cover	—	50	60	60	50	30	45	55	60	50	46%
MS Cover	—	—	—	—	—	—	30	—	45	20	9.5%
GC grasses											70%
GC shrub											8%
GC other											14%
Exotic (Ground)											—
Exotic (Mid)											4%
Exotic (Canopy)											—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
		Caves/mines/tunnels	Yes		No
1,1	1.5, 1, 2.5, 7, 1	Presence Wet areas/water bodies	Yes		No
	1.5, 14, 1, 1, 2.5	Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
	1, 5, 1, 2, 4	Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
Total Number = 2	**Total Length =** 32.5m	Dense shrub or ground cover	High	Medium	Low
		Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Quadrat Number Q12 Waypoint: Q12 Date: 30/11/16 Recorder: RF

Vegetation Type: Photo(s) ID and direction:

Overstorey Species	R	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
E. fibrosa		2	1	M. nodosa	5	10	Dav. ulici	1	1	Era. brownii	1	10	Mirbelia rub.	1	10	Paniwm repens	85	1000
C. maculata		2	3	Ac. irrorata	2	1	Ac. ulici.	1	2	A. vagans	1	10	Glycine tab.	1	10	Briza max.	1	20
E. punctata	✓	5	2				Breynia obl	1	1	Rhytido. fulv.	1	10	Opercularia di	1	10	Fireweed	1	20
E. teret.		1	1				Callistema lin	1	1	Dichel. mic.	1	10	Lom. multi	1	10	Gramxhaeton (col	1	10
										E. stricta	1	10	Hibb. (Ar)	1	5	[illegible]		
										Pasp. distans	1	5	Juncus usi. (Ar)	1	5	Bidens pilosa	1	5
													Rumex brownii	1	5	Sc. pimpernel	1	10
													Dianella car.	1	5	Solanum nigrum	1	10
													Pratia purp	1	5	[illegible]	1	10
													Cheilanthes sieb	1	5	Plantago lance.	1	20
													Epilles aust.	1	5	Moth vine	1	5
													Poranthera micro.	1	5	Pampas Grass	1	1
													Hypericum gram.	1	5	Whisky G.	1	10
													[illegible]	[illegible]		Briza minor	1	10
													Pomax umb.	1	5	Vulpia myuros	1	10
																Verbena bon.	1	5
																Asclepias cur.	1	5
																Centurium eryth.	1	5

R = Regeneration (for entire zone) **F** = Foliage Projective Cover (1-5%, then to nearest 5%)
Ab = Abundance Rating (no. of individuals or shoots. 1-10, 20, 50, 100, 500, 1000 (or specify a number greater than 100 if required; numbers > 20 are estimates only)

4 2 4 6 14

General Comments:

(30) NPS

Quadrat Number: Q12 Date: 30.11.16 Recorder: SSGVS LJ

	Number of Hits (Tally)	Foliage Cover (%)
O/S Cover	—	—
MS Cover	—	4%
GC grasses	40	—
GC shrub	—	14%
GC other	—	—
Exotic (Ground)	—	4%
Exotic (Mid)	—	56%
Exotic (Canopy)	—	22%
	—	—

Native over-storey cover (*):
Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover directly overhead using the images provided in Appendix 7. Divide the total by the number of points (i.e. 10) measured along transect

Native mid-storey cover:
Percent foliage cover of the mid-storey is estimated as follows:

- At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10)

Native ground cover (grasses, shrubs and other):
Percent foliage cover of the ground stratum (grasses, shrubs and other) is estimated as follow:

- At 50 points along the 50m transect (i.e. every 1m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured.

Exotic plant cover:
If the exotics are in the over-storey then measure using the same method as native over-storey cover (see above), if exotics are in the mid-storey then measure using the same method as native mid-storey cover (see above) and if exotics are in the ground stratum then measure using the same method as described for native ground cover (grasses)

Number of Hollow Bearing Trees within the 50m x 20m plot	Total Length of fallen timber within the 20mx 50m plot	Fauna habitat values (High, Medium, Low)			
	2, 5, 3, 2, 6, 5, 5, 2	Caves/mines/tunnels	Yes		No
		Presence Wet areas/water bodies	Yes		No
	2,	Abundance of rocks/escarpments	High	Medium	Low
		Abundance of nectar resources	High	Medium	Low
		Abundance of fruit resources	High	Medium	Low
		Community part of wildlife corridor	Regional	Local	None
		Structural complexity of habitat	High	Medium	Low
		Dense shrub or ground cover	High	Medium	Low
Total Number =	Total Length = 32m	Abundance of dead trees/stags	High	Medium	Low

Total length of fallen logs (50mx20m plot): This is the total length of logs at least 10cm diameter and at least 0.5m long. Only those parts of logs lying within the plot are measured.

Number of trees with hollows (50mx20m plot): This is a count of the number of living and dead trees within a 50mx20m plot with at least one hollow (note that the hollows do not have to be within the plot). A hollow is only recorded if: the entrance can be seen; the minimum entrance width is at least 5cm across; the hollow is at least 1m above the ground and the centre of the tree is within the plot. Tree should be examined from all angles.

Fauna Habitat Values: Subjective estimates of habitat value abundance used to assess habitat significance according to observed habitat attributes.

Site value:
Transect tally table

BioBanking
Biodiversity Banking and Offsets Scheme

CMA area	CMA subregion	Recorder	Date
HCR		IMarriott	30.3.11

Proposal ID	Proposal name	Zone ID
410060	Eagleton Quarry	1

Vegetation formation

Vegetation class

Vegetation type Spotted Gum-Ironbark-Grey Gum-~~White~~ Stringybark-White Mahogany DSF.

Condition (low or mod/good)	**Zone descriptor** (optional)	**Geographic/habitat features** (tick after printing step 2 of Credit Calculator)
good.		

Transect number Eag Q1	Number of hits (tally)	%
Native over-storey cover (%)	40 40 50 40 50 40 40 50 50 50	45
Native mid-storey cover (%)	15 20 20 30 15 15 20 30 20 20	20.5
Native ground cover (grasses) (%)	11 111 1111 111 11 1 ~~1111~~ 111 11 11	54 (0.54)
Native ground cover (shrubs) (%)	11 11 111 11 1 111 11 1 111 11	42 (0.42)
Native ground cover (other) (%)	~~1111~~ 1111 1111 ~~1111~~ ~~1111~~ ~~1111~~ 111 111 ~~1111~~	88 (0.88)
Exotic plant cover (%)	1 11 1 1 11	14 (0.14)

Transect number Eag Q2	Number of hits (tally)	%
Native over-storey cover (%)	30 40 40 40 40 50 40 40 30 40	39
Native mid-storey cover (%)	30 40 30 30 30 30 40 50 40 40	36
Native ground cover (grasses) (%)	~~1111~~ 111 11 1111 ~~1111~~ 111 11 111 11 111	60
Native ground cover (shrubs) (%)	11 11 11 1 1 111 11 111 ~~1111~~ 111	50
Native ground cover (other) (%)	~~1111~~ ~~1111~~ ~~1111~~ ~~1111~~ ~~1111~~ 111 11 ~~1111~~ 111 ~~1111~~	84
Exotic plant cover (%)	1 11 11 1 11 1	18

Transect number Eag Q3	Number of hits (tally)	%
Native over-storey cover (%)	40 40 40 40 50 30 40 40 40 30	39
Native mid-storey cover (%)	30 30 40 40 40 30 30 20 30 40	33
Native ground cover (grasses) (%)	1111 111 11 111 11 111 11 1 ~~1111~~ 111	56
Native ground cover (shrub) (%)	111 11 1 11 1 11 11 11 111	36.
Native ground cover (other) (%)	1111 1111 111 1111 ~~1111~~ ~~1111~~ 1111 ~~1111~~ 111 ~~1111~~	88
Exotic plant cover (%)	1 11 1 1 1	12

Transect number Eag Q4	Number of hits (tally)	%
Native over-storey cover (%)	40 40 40 30 40 40 40 30 50 40	39
Native mid-storey cover (%)	20 30 30 30 20 20 15 30 20 20	23.5
Native ground cover grasses (%)	1 11 11 111 11 111 11 111 1111	42
Native ground cover shrubs (%)	1 11 1 11 1 1 11	20
Native ground cover other (%)	11 111 11 1111 11 11 1 1 111	40
Exotic plant cover (%)	111 1111 111 1111 11 111 11 111 111	54

Transcect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transcect number Tsq Q11	Number of hits (tally)	%
Native over-storey cover (%)	50 50 50 40 40 50 50 50 50 50	
Native mid-storey cover (%)	20 15 30 30 40 30 20 20 30 20	
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number T4 Q12	Number of hits (tally)	%
Native over-storey cover (%)	15 20 20 15 15 15 20 20 20 20	
Native mid-storey cover (%)	30 20 30 30 40 30 30 30 30 35	
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number T4 Q13	Number of hits (tally)	%
Native over-storey cover (%)	30 40 40 40 40 50 50 40 40 30	
Native mid-storey cover (%)	15 30 30 40 40 50 50 30 60 60	
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number T4 Q14	Number of hits (tally)	%
Native over-storey cover (%)	40 50 30 40 40 30 40 40 40 40	
Native mid-storey cover (%)	30 20 30 30 30 20 30 30 40 40	
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: (Development) / BioBank **Proposal ID:** [illegible] **Date:** 30 · 3 · 11. **Recorder(s):** T.Hamott

Vegetation type: Spotted Gum - Grey Gum - White Stringybark DSF. **AMG Zone** 56 **Easting/Northing:** 386555; 6382865 (72.8 alt.) **Photos:** Eag Ex 1

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
Corymbia maculata	D ✓	Dodonaea viscosa	Oplismenus imbecillis.	Breynia oblongifolia.	Lepidosperma laterale	Lantana camara.	
Eucalyptus propinqua	D ✓	Acacia fimbriata	Imperata cylindrica var major	Cissus antarctica	Adiantum aethiopicum.		
Eucalyptus globoidea	D ✓	Nicholeia longifolia.	Dianella ??	~~Dodonaea viscosa~~	Selaginella uliginosa		
E. piperita	MS ✓	Allocasuarina littoralis.	Microlaena stipoides.	Goodenia heterophylla	Desmodium varians		
E. acmenoides	MS. ✓	Notelaea sp. (ID) –	Austrodanthonia sp. (no Secateurs)	ssp. e-glandulosa	Viola hederacea.		
		Persoonia linearis.	Panicum simile	Leucopogon juniperinus	Pratia purpurascens		
			Echinopogon caespitosus	Pultenaea villosa	Dianella sp.		
				Pultenaea ret-sp.	Pandorea pandorana.		
				Hibbertia linearis.	Eustrephus latifolius.		
				Tetratheca thymifolia.	Goodenia ovata		
				Acacia ulicifolia.	Hemarthria uncinata		
	5			Bursaria sp. (ID)	Lomandra multiflora ssp. multiflora		
Total number of species = 47				Hibbertia obtusifolia	Lomandra ~~longifolia~~ ssp. ~~longifolia~~		
Foliage cover (%) =					Lomandra sp. (ID)		
Benchmark value (%FC) =					Dianella revoluta ssp.		
Average crown diameter =					Xanthorrhoea johnsonii (20.1 scape spike)		
Average foliage cover (%) =					Cheilanthes sieberi		
Number of trees =					Lepidosperma neesii? (ID)		
Sample area = 400 m²							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha							
Benchmark value =		Total no of species = 6	Total no of species = 7	Total no of species = 11	Total no of species = 18	Total no of species = 1	Total (m) = 90
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES: Eag Q1 South-facing upper/mid hillslope. Extensive rock outcropping.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** _____ **Date:** 30.3.11 **Recorder(s):** Hamish

Vegetation type: Spotted Gum - Grey Ironbark - White Stringybark / Grey Gum DSF. **AMG Zone** 56 **Easting/Northing:** 386593 ; 6382756 (56J 82) 76.9. alt. **Photos:** _____

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. paniculata	D ✓	Allocasuarina torulosa.	Aristida vagans.	Acrotriche divaricata.	Lepidosperma laterale	Lantana camara *	
E. punctata	D ✓	Dodonaea triquetra.	Entolasia stricta.	Zieria smithii.	Dianella caerulea sensu lato.		
E. globoidea	D ✓	Leptospermum polygalifolium	Aristida vagans	Leucopogon juniperinus.	Lomandra confertifolia pallida		
Corymbia maculata	D ✓	Eucalyptus sieberi.	Panicum simile.	Hakea sericea	Lomandra sp. (ID)		
E. acmenoides	D ✓	Syncarpia glomulifera.	Eragrostis brownei.	(Sapp)	Pteridium esculentum		
		Melaleuca linariifolia.	Imperata cylindrica var major.	Acacia ulicifolia.	Goodenia bellidifolia bellidifolia.		
		Persoonia linearis.	Poa affinis ? (ID)	Banksia sp. (ID)	Pandorea pandorana		
		Hakea sericea.		Grevillea juniperina	Pseudoraphis variabilis		
				Pultenaea retusa	Lomandra obliqua		
					Eustrephus latifolius		
					Glycine clandestina.		
	5				Adiantum aethiopicum.		
Total number of species = 42					Cissus hypoglauca		
Foliage cover (%) =					Asplenium flabellifolium.		
Benchmark value (%FC) =					Cheilanthes sieberi		
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area =							
Whole zone							
Number of trees with hollows = 1							
Sample area = 0.01 ha.							
Benchmark value =		Total no of species = 7	Total no of species = 7	Total no of species = 8	Total no of species = 15	Total no of species = 1	Total (m) = 110
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

Mod. steep, S facing lower hillslope. Ext rock outcropping. Grey clay soils. Eag 82

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: (Development) / BioBank **Proposal ID:** 41006 **Date:** 30.3.11 **Recorder(s):** MarcH

Vegetation type: Spotted Gum - Grey Ironbark - Large-fruited Grey Gum DSF **AMG Zone** 56 **Easting/Northing:** 386632 ; 6583016 75.6 m **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. paniculata paniculata	D ✓	Allocasuarina torulosa	Echinopogon caespitosus	Bursaria spinosa	Lepidosperma laterale	Lolium perenne	
E. punctata	✓	Dodonaea triquetra	Entolasia stricta	Genoscopus teucrioides	Lomandra longifolia longifolia		
Corymbia maculata	D ✓	Leptospermum polygalifolium	Cymbopogon refractus	Daviesia ulicifolia	Pomax umbellata		
E. globoidea	D ✓	cismontanum	Panicum effusum	Acacia ulicifolia	Cheilanthes sieberi		
E. crebra	mS ✓	Persoonia linearis	Poa sieberiana ? (D)	Acrotriche divaricata	Dianella revoluta ssp		
			Imperata cylindrica var major	Leucopogon juniperinus	Pandorea pandorana		
			Cyperus sphaeroides		Eustrephus latifolius		
					Pseudoraphis spinescens		
					Pteridium esculentum		
					Commelina cyanea		
					Cheilanthes sieberi cymosa-m		
					Haloragis heterophylla		
					Lomandra confertifolia pallida		
					Goodenia heterophylla eglandulosa		
					Desmodium rhytidophyllum		
Total number of species = 5 (37)		Total no of species = 4	Total no of species = 7	Total no of species = 6	Total no of species = 15	Total no of species = 1	Total (m) = 94
Foliage cover (%) =		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area = 400 m²							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							

SITE AND OTHER NOTES:

Euc Q3 Mod slope NE facing hillslope - Ext. outcropping.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 410060 **Date:** 30.3.11 **Recorder(s):** IMamott

Vegetation type: Spotted Gum - Grey Ironbark - Large fruited Grey Gum - White Mahogany DSF. **AMG Zone** 56 **Easting/Northing:** 386611 ; 6383097 89.9 9H± Eag Q4. **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. paniculata peniculata ✓		Pittosporum undulatum	Imperata cylindrica var. major	Leucopogon juniperinus	Opercularia diphylla	Lantana camara.	
E. punctata.		Allocasuarina torulosa.	Digitaria ramularis (ID)		Lomandra multiflora multiflora.		
Corymbia maculata.	✓	Dodonaea triquetra.	Entolasia stricta	Bursaria spinosa sp. (ID)	Cheilanthes sieberi sieberi.		
E. acmenoides.	✓	Breynia oblongifolia.	Oplismenus imbecillis.		Pratia purpurascens.		
		Notelaea longifolia.	Cymbopogon refractus.		Desmodium varians.		
		Persoonia linearis.			Selaginella uliginosa.		
					Pandorea pandorana.		
					Smilax glycyphylla		
					Viola hederacea.		
	5						
Total number of species = 27							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees = 400 m².							
Sample area =							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							
		Total no of species = 6	Total no of species = 5	Total no of species = 2	Total no of species = 9	Total no of species = 1	Total (m) = 78
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER ~~NOTES~~: Eag Q4 mod-steep NE facing hillslope (lower hillslope). Lantana infestation > 30% cover in plot, sparse in the u/s.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 410060 **Date:** 31.3.11 **Recorder(s):** MamoH

Vegetation type: Spotted Gum-Ironbark - Grey Gum - White Stringybark DSF. **AMG Zone** 56 **Easting/Northing:** 386962; 6382836 Eag Q10. 72.7. **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. punctata		Dodonea triquetra	Entolasia stricta.	Hibbertia aspera.	Eustrephus latifolius	Lantana camara,	
E. crebra.		Melaleuca styphelioides.	Cymbopogon refractus.	Acrotriche divaricata	Digitella caerulea var	prodvcta/aspera.	
E. globoidea		Persoonia linearis.	Echinopogon caespitosus	Leucopogon juniperinus.	lepidosperm neesii		
E. fibrosa.		Acacia falcata	Imperata cylindrica var	Breynia oblongifolia (ssp).	Oxalis perennans.		
Eupaniculata paniculata.		Acacia longifolia longifolia.	major.	Acacia longissima (ssp).	Lomandra multiflora multiflora.		
Corymbia maculata.		Notelaea longifolia.	Themeda australis.	Glochidion ferdinandi (ssp).	Geitonoplesium cymosum		
			Aristida vagans		Glycine clandestina		
			Oplismenus imbecillis.		Pratia purpurascens.		
			Microlaena stipoides.		Veronica plebeia.		
				Bossiaea heterophylla.	Pseudoraphis variabilis		
					Lomandra confertifolia pallida		
					Rytidosperm (basal aperte) sp.		
					forb (ID) small elliptic leaf elg stem.		
					Dichondra repens.		
					Chailanthes sieberi sieberi.		
Total number of species =							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area = 400 m²,							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							
		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 28
		Foliage cover (%) =	Foliage cover (%) = Eag Q10	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

N facing upper hillslope - just 10m. downslope from central ridgeline. Just east of a minor gully headwater. Lantana > 10% cover.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 410060 **Date:** 31.3.11 **Recorder(s):** MamoH

Vegetation type: Spotted Gum-Ironbark - Grey Gum - White Stringybark DSF. **AMG Zone** 56 **Easting/Northing:** 386962; 6382836 EagQ10. 72.7. **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. punctata		Dodonea triquetra	Entolasia stricta.	Hibbertia aspera.	Eustrephus latifolius	Lantana camara,	
E. crebra.		Melaleuca styphelioides.	Cymbopogon refractus.	Acrotiche divaricata	Dianella caerulea var	producta/aspera.	
E. globoidea		Persoonia linearis.	Echinopogon caespitosus	Leucopogon juniperinus.	lepidosperm neesii		
E. fibrosa.		Acacia falcata	Imperata cylindrica var	Breynia oblongifolia(ssp)	Oxalis perennans.		
Eucalyptus paniculata.		Acacia longifolia longifolia.	major.	Acacia longissima (ssp).	Lomandra multiflora multiflora.		
Corymbia maculata.		Notelaea longifolia.	Themeda australis.	Glochidion ferdinandi (ssp).	Geitonoplesium cymosum		
			Aristida vagans		Glycine clandestina		
			Oplismenus imbecillis.		Pratia purpurascens.		
			Microlaena stipoides.		Veronica cheeseana.		
				Bossiaea heterophylla.	Pseudoranthemum variabile		
					Lomandra confertifolia pallida		
					Rhytidosporum (basal rosette) sp.		
					forb (ID) small elliptic leaf clay sp.		
					Dichondra repens.		
					Cheilanthes sieberi sieberi.		
Total number of species =							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area = 400 m².							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							
		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 28
		Foliage cover (%) =	Foliage cover (%) = EagQ10	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

N facing upper hillslope - just 10m. downslope from central ridgeline. Just east of a minor gully headwater. Lantana > 10% cover.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** _____ **Date:** 31.3.11 **Recorder(s):** Mamott

Vegetation type: Spotted Gum - Ironbark - Grey Gum - White Stringybark - White Mahogany DSF. **AMG Zone** 56. **Easting/Northing:** 386857 / 6382627 Egg Q11 70.5q1f. **Photos:** _____

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
Corymbia maculata.		Allocasuarina torulosa	Entolasia marginata.	Leucopogon juniperinus	Pratia purpurascens		
E. punctata.		Dodonea viscosa.	Oplismenus imbecillis.	Maytenus silvestris (sap).	Dianella caerulea var. producta / assera (ID)		
E. fibrosa.		Persoonia linearis	Entolasia stricta.		Lomandra multiflora multiflora		
E. globoidea.			Echinopogon caespitosus	Bursaria (spinosa?)	Cheilanthes sieberi sieberi		
E. acmenoides.			Cymbopogon refractus.	Goodenia heterophylla	Pandorea pandorana.		
			Imperata cylindrica var. major.	eglandulosa.	Brunoniella australis.	Lantana camara	
			Panicum simile.	Breynia oblongifolia (sap).	Hypericum gramineum.		
					Eustephus latifolius		
				Acacia ulicifolia.	Centella asiatica		
				Acrotriche divaricata.	Glycine clandestina.		
				Hibbertia linearis	Harmsiomia (Plectorus?)	Eaten (Rictis).	
				Goodenia heterophylla	Hardenbergia violacea		
				eglandulosa.	Lepidosperma (neesii?)		
				Phyllanthus hirtellus.	Tetrastigma nitens?		
				Notelaea longifolia.			
				longifolia.			
Total number of species =		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 54
Foliage cover (%) =		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

Benchmark value (%FC) =
Average crown diameter =
Average foliage cover (%) =
Number of trees =
Sample area = 400m²

Whole zone
Number of trees with hollows = 0
Sample area = 0.1 ha.
Benchmark value =

SITE AND OTHER NOTES:
Egg Q11 Headwater gully - just upslope.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 410060 **Date:** 1.4.11 **Recorder(s):** MMamott 65.9mAHt.

Vegetation type: _____ **AMG Zone** 56 **Easting/Northing:** 387037; 6382824 EagQ12 **Photos:** _____

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
Corymbia maculata	–	Dodonea triquetra.	Cymbopogon refractus.	Leucopogon juniperinus	Geitonoplesium cymosum.	Lantana camara.	
E. globoidea.	–	Acacia falcata.	Eragrostis brownii	Breynia oblongifolia (sap).	Bonamiella australis.	Taraxacum	
E. punctata.	–	Bursaria spinosa.	Aristida vagans		Pratia purpurascens.		
E. bosistoana (1)		Xerochrysa linearis.	Imperata cylindrica var major.		Dianella revoluta var producta/laevis.		
E. paniculata paniculata –		Jacksonia scoparia.		Acacia ulicifolia.	Cheilanthes sieberi sieberi.		
E. crebra			Panicum simile	Acronychia oblongifolia	Glycine clandestina		
E. fibrosa.			Entolasia stricta.	Notelaea longifolia.	Billardiera scandens.		
			Themeda australis.	longifolia.	Desmodium rhytidophyllum		
			Microlaena stipoides.		Dichondra repens.		
			Dichelachne micrantha		Oxalis perennans.		
			Eulalia marginata.		Eustrephus latifolius.		
			Echinopogon chaetophorus		Lomandra multiflora multiflora		
			Austrodanthonia (seedhead unidentifiable) sp. (too dried/decomposed).		Lomandra obliqua.		
					Lepidosperma laterale.		
					Pterostylis sp. (rosette).		
					Aspenia (asteraceae?) (ID) tightly wound leaf shoots. (2 tangled seen).		
					Viola hederacea		
					Lomandra confertifolia pallida.		
Total number of species =							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area =							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1ha							
Benchmark value =							
		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 40
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

Eag Q12. NE facing lower hillslope - upslope from 'circular' cleared patch. Rock outcropping.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 41060 **Date:** 10 4 11 **Recorder(s):** IMamott

Vegetation type: Spotted Gum - Grey Gum - White Mahogany DSF. **AMG Zone** 56 **Easting/Northing:** 386993; 6382650 62.194. EagQ13 **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
Corymbia maculata	D	~~Leptospermum polygalifolium~~	Aristida vagans.	Blechidium fluitans (ssp)	Pratia purpurascens.	Lantana camara.	
E. punctata.	D	Cremnophorum (Tunica?) DD	Odyssneurus imbecillis	Bryaxis oblongifolia (ssp).	Pseudoraphis variabilis		
E. paniculata paniculata.		Notelaea longifolia	Cymbopogon refractus.		Rumex pseudonatus		
E. umbra	D	~~Persoonia linearis~~	Fragaria brownii		Cynoglossum suaveolens.		
Eucalyptoides		Dodonaea triquetra.	Microlaena stipoides	Leucopogon juniperinus.	Glycine (tomentella?)		
		Allocasuarina torulosa.	Entolasia stricta.	Bursaria spinosa.	Veronica plebeia.		
		Melaleuca styphelioides.	Echinopogon caespitosus	Acacia ulicifolia.	Geranium homeanum		
		Zieria smithii	caespitosus.	Hibbertia dentata.	Cheilanthes sieberi sieberi		
			Digitaria (ramulosa?		Centaurea (cyanus?		
			Imperata cylindrica var major.		Dianella caerulea (var assera?)		
			Austrodanthonia sp.				
Total number of species =							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area = 400m².							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							
		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 52
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:
EagQ13. Feral deer. Age cohorts = 3. Middle = 65cm (TC) 45% oldest = 1.96m (TC) 10%. Youngest = 34cm (TC) 45%.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Transect plot worksheet

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: Development / BioBank **Proposal ID:** 40060 **Date:** 1.4.11 **Recorder(s):**

Vegetation type: **AMG Zone** 56 **Easting/Northing:** Egg Q14 387159; 6382596 42.9 alt. **Photos:**

Native over-storey species list At 10 points along the 50-m transect	Regeneration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E. fibrosa.		Kunzea ambigua	Imperata cylindrica var major	Hibbertia aspera	Eustrephus latifolius.	Lantana camara	
E. punctata.		Breynia oblongifolia	Entolasia stricta.	Leucopogon juniperinus.	Tricoryne elatior.		
Corymbia gummifera.		Glochidion ferdinandi	Eragrostis brownii		Cheilanthes sieberi		
Eucalyptoides.		Allocasuarina torulosa.	Panicum simile.		Opercularia varia.		
E. capitellata.		Zieria smithii	Aristida vagans.		Lomandra multiflora multiflora.		
E. moluccana.	(1)	Acacia irrorata.	Microlaena stipoides.		Gonocarpus tetragynus.		
		Leptospermum polygalifolium			Goodenia heterophylla eglandulosa.		
		Cissus hypoglauca.			Gonocarpus teucrioides.		
		Melaleuca nodosa.			Pteridium esculentum.		
		Notelaea longifolia.					
Total number of species =							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area = 400m²							
Whole zone							
Number of trees with hollows = 0							
Sample area = 0.1 ha.							
Benchmark value =							
		Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total no of species =	Total (m) = 46
		Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

Egg Q14 lower E/SE facing hillslope (120°). 5~~10~~° slope. Lantana (1 mature plant). Upslope from gully.

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

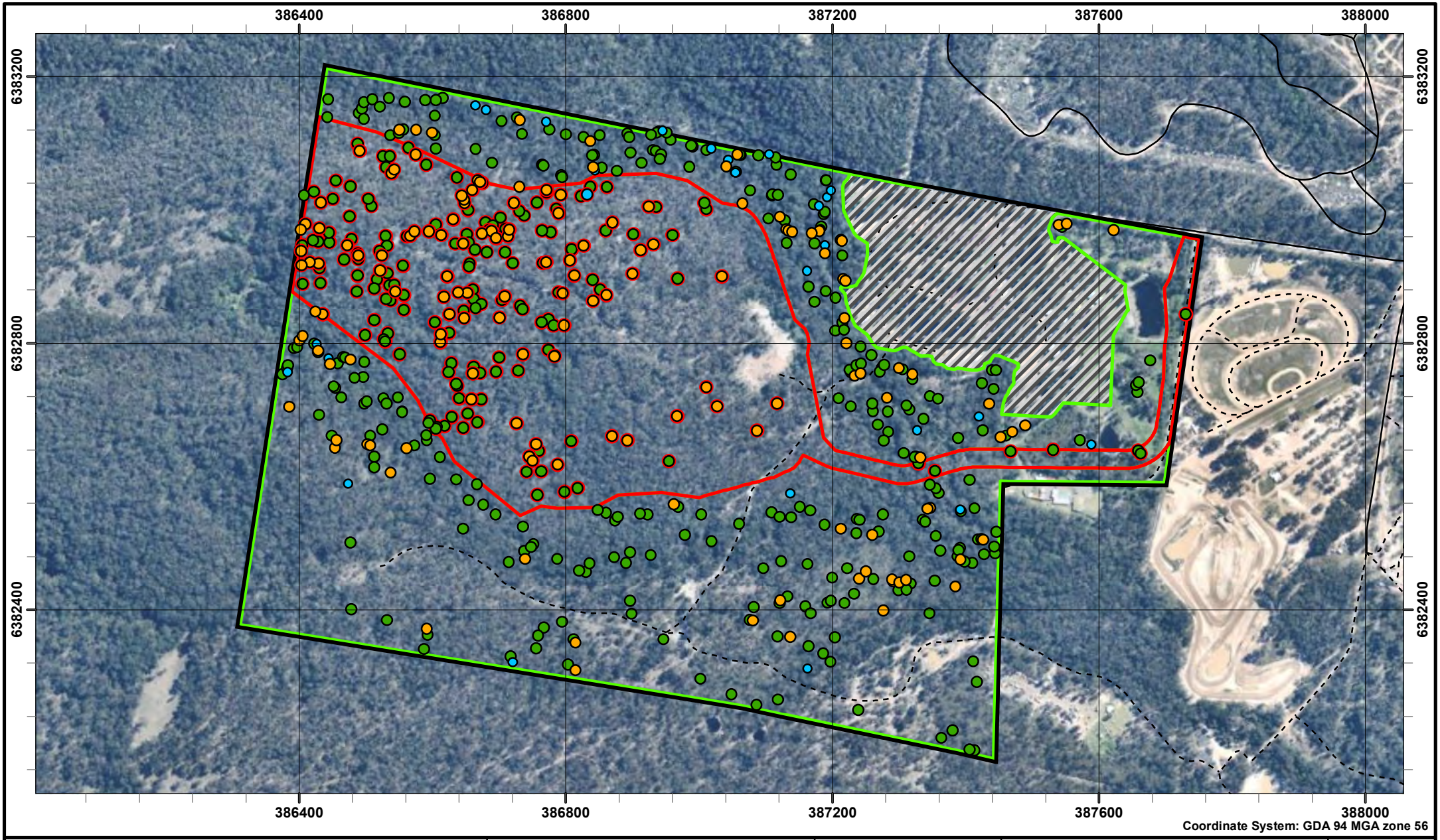
APPENDIX 4: ADDITIONAL SURVEY INFORMATION

The proponent commissioned additional field surveys to collect further information on the density and location of hollow-bearing and habitat trees within the study area. The field survey was conducted on 18, 19, 29 and 30 May 2017 and was undertaken over 47.5 person hours via meander traverses of the study area.

A map showing the location of hollow-bearing and habitat trees recorded during the survey is provided in **Figure 10**.

The Assessment of Significance for the hollow-dependent threatened species known, or having the potential to occur, on site has been reviewed in the context of this new information and is presented in Appendix 6, Threatened Fauna, Hollow-dependent Arboreal Mammals.

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Study Area (100.94 ha)
Development Site (33.68 ha)
Offset Site (57.2 ha)
Gardenland (Excluded - 10.05 ha)
Dead Stag
Dead Stag - Impacted
Hollow Log (on ground) - Not Impacted
Hollow Log (on ground) - Impacted
Hollow Bearing Tree - Not Impacted
Hollow Bearing Tree - Impacted

Metres
0 25 50 100 150 200 250

N

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PROJECT REFERENCE: 20173040
DATE DRAWN: 21-Jun-17 15:41 Version 1
DRAWN BY: amarshall

DATA SOURCE:
NSW Land and Property Information - 2011
nearmap - 2016

Habitat Tree Mapping

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
10

\\newcastle.kleinfelder.com\Newcastle-Data\Company\GIS FOLDER\00 CLIENT FILES\127626_EagleRockTrust\20173040_EagletonRockQuarry\GIS ONLY\MXDs\Figures\BAR\20173040_Fig10_HabTrees.mxd

APPENDIX 5: LIKELIHOOD OF OCCURRENCE

A list of threatened species, populations and ecological communities, and EPBC Act listed migratory species that have been reported or modelled to occur within the locality (i.e. five kilometre radius of the study area) was compiled from the following databases (updated searches undertaken in November 2016):

- NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife: (www.wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp);
- Department of the Environment's (DotE) Protected Matters search tool: (www.environment.gov.au/erin/ert/epbc/index.html);
- Predicted threatened species generated in the biobanking calculator: (ID: 167/2016/3995MP); and
- Threatened species and ecological communities listed in the SEARs.

An assessment was then made of the likelihood of the threatened species, populations, ecological communities, and EPBC Act listed migratory species reported or modelled to occur in the locality occurring within the site or using the habitat within the site as part of a foraging range. EPBC Act-listed marine species were omitted from the results due to lack of suitable habitat and proximity to the coastline. This assessment was based on available habitat requirement data for each threatened species, populations, and ecological communities using the following sources:

- Harden, G.J. (ed) (1992, 1993, 2000, 2002). Flora of New South Wales Volume 1-4. NSW University Press: Sydney;
- James, T., McDougall, L. and Benson, D. (1999). Rare Bushland Plants of Western Sydney. Royal Botanic Gardens Sydney;
- The Office of Environment and Heritage's threatened species website database http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx;
- Van Dyke, S. and Strahan, R. (eds) (2008). The Complete Book of Australian Mammals. Reed New Holland Publishers, Australia;
- Cogger, H.A (ed) (2000). Reptiles and Amphibians of Australia. Reed New Holland Publishers, Australia; and
- Higgins, P. J. *et al*. (1990-2007). Handbook of Australian, New Zealand & Antarctic Birds. Volumes 1 to 7. Oxford University Press Publishers, Melbourne.

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Table 16 summarises the likelihood of threatened species, populations and ecological communities, and EPBC Act listed migratory species occurring within the site based on the habitat requirements of each species. A brief definition of the likelihood of occurrence criteria is provided below:

- Known – species identified within the site during surveys;
- High – species known from the area (NPWS Wildlife Atlas records in close proximity to the site), suitable habitat (such as roosting and foraging habitat) present within the site;
- Moderate – species may be known from the area, potential habitat is present within the site;
- Low – species not known from the area and/or marginal habitat is present within the site;
- Nil – habitat requirements not met for this species within the site.

An Assessment of Significance under section 5A of the EP&A was applied to all threatened species and ecological communities assessed as having a moderate, high or known likelihood of occurrence in the development site and which have the potential to be impacted by the proposal in **Appendix 5**. An assessment of species listed as threatened, migratory and/or marine under the EPBC Act 1999 is also provided in **Appendix 5**.

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Table 16: Assessment of the likelihood of threatened species, populations, and ecological communities occurring within the study area

Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Flora								
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	-	PMST	Typically grows in tall heath on sand, but can also occur on clay soils and sandstone. The known distribution of this species is from north-west of Forster, to Byron Bay on the NSW north coast. **Unsuitable habitat and distribution. No records in the locality. Not detected during the surveys (species is detectable all year).**	Nil	No
Angophora inopina	Charmhaven Apple	V	V	-	PMST	Occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia–Banksia oblongifolia* wet heath; (iii) *E. resinifera–Melaleuca sieberi–A. inopina* sedge woodland; (iv) *E. capitellata–C. gummifera–A. inopina* woodland/forest. This species is endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. **Marginal potential habitat in the study area. No records in the locality. Not detected during the surveys (detectable all year).**	Low	No
Asperula asthenes	Trailing Woodruff	V	V	1	Atlas, PMST	Typically occurs in damp sites, often along river banks. Found in scattered locations from Bulahdelah north to near Kempsey, with several records from the Port Stephens/Wallis Lakes area. **Potential habitat within the drainage lines and damp areas of the Spotted Gum – Ironbark Forest. Not detected during the targeted surveys which were conducted within the flowering period of this species (Sept-Nov).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Asterolasia elegans	-	E	E	-	PMST	Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys (i.e. in or adjacent to gullies which support sheltered forest). Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. **The study area does not contain suitable habitat for this species, and is well outside the known distribution of this species (no records from HCRCMA). Not detected during the surveys.**	Nil	No
Callistemon linearifolius	Netted Bottle Brush	V	-	-	BC	Grows in dry sclerophyll forest on the coast and adjacent ranges. Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. **Potential habitat within the study area. No records of this species in the locality. Not detected during the targeted searches which were undertaken within the flowering period of this species (Sept-Mar).**	Low	No
Commersonia prostrata	Dwarf Kerrawang	E	E	-	PMST	Occurs on sandy, sometimes peaty soils in a wide variety of habitats. In the lower hunter region, this species is found in Scribbly Gum / Swamp Mahogany Ecotonal Forest on the Tomago Sandbeds. **The study area does not contain suitable habitat for this species. Not detected during the surveys.**	Low	No
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	-	PMST, BC	This species does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. **Marginal habitat in the Spotted Gum-Ironbark Forest. No records of this species in the locality. Not detected during 2013 surveys which were conducted within the flowering period of this species (Nov-Feb).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Cynanchum elegans	White-flowered Wax Plant	E	E	-	BC	Usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree *Leptospermum laevigatum –Banksia integrifolia* subsp. *integrifolia* coastal scrub; *Eucalyptus tereticornis* aligned open forest and woodland; *Corymbia maculata* aligned open forest and woodland; and *Melaleuca armillaris* scrub to open scrub. **Potential marginal habitat within the study area, primarily within the wetter drainage lines. No records in the locality. Not detected during the surveys which were undertaken within the flowering period of this species (Aug-May).**	Low	No
Diuris pedunculata	Small Snake Orchid	E	E	-	BC	Grows on grassy slopes or flats, often on peaty soils in moist areas. Also occurs on shale and trap soils, on fine granite, and among boulders. Confined to north east NSW. It was originally found scattered from Tenterfield south to the Hawkesbury River, but is now mainly found on the New England Tablelands, around Armidale, Uralla, Guyra and Ebor. **Unsuitable distribution. No records in the locality. Not detected during the surveys which were undertaken within the flowering period of this species (Sept-Nov).**	Low	No
Diuris praecox	Sand Doubletail	V	V	-	GHD (2012)	Grows on hills and slopes of near-coastal districts, in open heathy forests which have a grassy to fairly dense understorey between Ourimbah and Nelson Bay in NSW. **While the study area contains potentially suitable habitat, there are no records of this species in the locality. The nearest records occur > 10km to the east of the study area. All records of this species in the Port Stephens LGA occur within approximately 2km of the coastline. Similarly, all records of this species on the central coast occur within 5km of the coastline. As such, it is considered unlikely that the species would occur in the study area. Surveys were undertaken outside the flowering period of this species (Jul-Aug).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Eucalyptus camfieldii	Camfield's Stringybark	V	V	-	PMST	Occurs on poor coastal country in shallow sandy soils overlying Hawkesbury sandstone typically in coastal heath, mostly on exposed sandy ridges. The species has a restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. **The study area does not contain suitable habitat for this species. Not detected during the surveys (detectable all year).**	Low	No
Eucalyptus glaucina	Slaty Red Gum	V	V	-	BC	Grows in grassy woodland and dry eucalypt forest on deep, moderately fertile and well-watered soils. **Potential habitat within the study area. No records of this species in the locality. Not detected during the surveys (species is detectable all year).**	Low	No
Eucalyptus parramattensis subsp. decadens	Earp's Gum	V	V	-	PMST	The species occurs in dry sclerophyll woodland with a dry heath understory. Essential habitat identified as deep, low-nutrient sands. **The study area does not contain suitable habitat for this species. No records of this species in the locality. Not detected during the surveys (species is detectable all year).**	Low	No
Grevillea guthrieana	Guthrie's Grevillea	E	E	-	BC	Grows along creeks and cliff lines in eucalypt forest, on granitic or sedimentary soil. **Potential marginal habitat within the study area, primarily within the drainage lines. No records in the locality. Not detected during the surveys which were undertaken within the flowering period of this species (Sept-Nov).**	Low	No
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	6	Atlas, PMST, BC	Grows in sandy or light clay soils usually over thin shales where it occurs in a range of vegetation types from heath and shrubby woodland to open forest. **Potential habitat across the study area. Not detected during the targeted surveys which were conducted within the flowering period of this species (Jul-Dec).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Maundia triglochinoides	-	V	-	2	Atlas	Grows in swamps or shallow freshwater on heavy clay; north from southern Sydney. **Marginal habitat in the 3rd order drainage line in the study area. Not detected during the targeted surveys which were conducted within the flowering period of this species (Nov-Jan).**	Low	No
Melaleuca biconvexa	Biconvex Paperbark	V	V	-	PMST	Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. This species is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. **Potential marginal habitat within the wetter drainage lines in the study area. No records in the locality. Not detected during the surveys (species is detectable all year).**	Low	No
Persicaria elatior	Knotweed	V	V	-	PMST	Rare with very scattered occurrences along coastal NSW and in SE Qld. In damp places, usually on the margin of standing water. **Potential marginal habitat within the drainage lines in the study area. No records in the locality. Not detected during the surveys which were conducted within the flowering period of this species (Dec-Feb).**	Low	No
Phaius australis	Lesser Swamp-orchid	E	E	-	PMST	Occurs in swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas. Occurs in Qld and north-east NSW as far south as Coffs Harbour. **While potential habitat may occur in the study area within the drainage lines and damp areas of the Spotted Gum-Ironbark Forest, the site is well outside the known distribution of this species (no records from HCRCMA). Not detected during the 2016 surveys which were undertaken within the flowering period of this species (Sept-Oct).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Pterostylis chaetophora	-	V	-	1	Atlas, SEARs	Specific details on its habitat and distribution are poorly known, though it is known to occur in seasonally moist, dry sclerophyll forest with a grass and shrub understorey. The species is known from scattered records between Taree and Kurri Kurri, extending west into the Upper Hunter. **The study area contains potential habitat for this species. Targeted searches were undertaken in October 2016. A known reference population located within approximately 2 km of the study area (location provided by OEH) was surveyed immediately prior to undertaking the searches, which confirmed that the species was flowering in the locality at the time of the survey. The species was not detected during the targeted searches.**	Low	No
Rhizanthella slateri	Eastern Underground Orchid	V	E	-	BC	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. **Potential habitat across the study area. No records of this species in the locality. Not detected during the 2016 surveys which were undertaken within the flowering period of this species (Sept-Nov).**	Low	No
Tetratheca juncea	Black-eyed Susan	V	V	-	PMST, BC	Usually found in low open forest/woodland with a mixed shrub understory and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral. **Marginal potential habitat in the Spotted Gum-Ironbark Forest in the study area. No records of this species in the locality. Not detected during the 2016 targeted searches undertaken within the peak flowering period of this species (Sept-Oct).**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Thesium australe	Austral Toadflax	V	V	-	PMST	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. **Marginal potential habitat in the study area. No records in the locality. Not detected during the 2013 surveys which were undertaken within the flowering period of this species (mid-summer).**	Low	No
Threatened Ecological Communities								
Central Hunter Valley eucalypt woodland forest (EPBC Act)		-	CE	-	PMST	This ecological community is a eucalypt woodland/open forest. It occurs in the Hunter Region—in north-eastern New South Wales, mainly in the Central Hunter Valley—in the Muswellbrook, Singleton and Cessnock LGAs. It typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from finer grained sedimentary rocks. The woodland or forest canopy is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra*, *Corymbia maculata*, *Eucalyptus dawsonii* and *Eucalyptus moluccana*. **The Spotted Gum-Ironbark Forest community in the study area is not consistent with the key diagnostic characteristics of this CEEC as described in the Approved Conservation Advice (Threatened Species Scientific Committee (2015). The relatively consistent distribution of *Eucalyptus fibrosa, E. acmenoides* and *Allocasuarina torulosa* throughout the site is inconsistent with this CEEC. Additionally, the study area occurs on Carboniferous sediments, whereas this CEEC is associated with Permian geology.**	Nil	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / *Lowland Rainforest of Subtropical Australia* (EPBC Act)		E	CE	-	PMST	This ecological community is a subtropical rainforest and some related, structurally complex forms of dry rainforest, excluding Littoral Rainforest. Lowland Rainforest may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateau, foot slopes and foothills. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergent including; *Eucalyptus grandis* and *E. saligna* may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines. **No vegetation in the study area is consistent with this EEC/CEEC.**	Nil	No
Amphibians								
Litoria aurea	Green and Golden Bell Frog	E	V	-	PMST, BC	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. **The dams and riparian areas in the study area represent potential marginal habitat for this species. However, there are no records of this species in the locality. There is only one record of this species in the last 20 years in the Port Stephens LGA from 2000 near Tomago, >15km to the south-west of the study area. This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Litoria brevipalmata	Green-thighed Frog	V	-	-	BC	Breeding typically takes place after heavy summer rains in rainforest and wet sclerophyll forest but also around temporary and semi-permanent ponds, flooded ditches and swamps. In a study by Lemckert *et al.* (2006) it was found that over 90% of breeding sites consisted of ephemeral pools, partly or wholly within rainforest or wet sclerophyll forest. There are however some records from around permanent, artificial ponds within dry sclerophyll forest, and a small number from coastal forests and swamps. Natural depressions adjacent to streams (e.g. old billabongs) are the most commonly used calling sites. The species occurs in isolated localities along the coast and ranges from just north of Wollongong to SE Qld. **The riparian areas in the study area represent potential marginal habitat for this species. However, there are no records of this species in the locality, or the Port Stephens LGA. This species was not detected in the study area during the surveys.**	Low	No
Mixophyes balbus	Stuttering Frog	E	V	-	PMST	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Breed in streams during summer after heavy rain. Outside the breeding season adults live in deep leaf litter and thick understory vegetation on the forest floor. **No suitable habitat in the study area. No records of the species in the locality. This species was not detected during the surveys.**	Low	No
Reptiles								
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	-	BC	Found mainly in dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. Shelters during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees. The species has a patchy distribution from north-east Queensland to the north-eastern quarter of NSW. **While the study area occurs within the known distribution of this species, no records for this species occur within the Port Stephens LGA (nearest records approximately 15 km to north-west near Paterson from 1994). This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Hoplocephalus bungaroides	Broad-headed Snake	E	V	-	PMST	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer. **No suitable habitat for this species identified in the study area (i.e. sandstone rocks and cliffs). No records of this species in the locality.**	Low	No
Aves								
Anthochaera phrygia	Regent Honeyeater	CE	CE, M	-	PMST, BC	Mostly recorded in box-ironbark eucalypt associations. At times of food shortage, the species also uses other woodland types and wet lowland coastal forest dominated by Swamp Mahogany or Spotted Gum. **Potential foraging habitat in the Spotted Gum-Ironbark Forest. Not recorded during the surveys. Habitat usage in the study area is likely to be infrequent as the site is not within a known breeding area and as there are no records of the species in the locality, and only two records in the last 20 years of this species in the Port Stephens LGA.**	**Low-moderate**	**Yes**
Botaurus poiciloptilus	Australasian Bittern	E	E	-	PMST	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night. In NSW they may be found over most of the state except for the far north-west. **No preferred habitat in the study area. Marginal potential habitat in the dams within the study area, although these lack key habitat requirements (i.e. dense aquatic vegetation). No records of this species in the locality.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Calidris ferruginea	Curlew Sandpiper	E	CE	-	PMST	Generally occupies littoral and estuarine habitats, and in NSW is mainly found on intertidal mudflats of sheltered coasts. **The study area does not contain suitable habitat for this species (estuarine vegetation or mudflats) and is therefore considered unlikely to occur in the study area. No records of this species in the locality.**	Low	No
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	16	Atlas	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak, Forest She-oak, or Drooping She-oak occur. Uncommon although widespread in suitable forest and woodland habitats, from the central Qld coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW. **The study area contains suitable habitat for this species. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	2	Atlas	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey. The species is sedentary and considered to be resident in many locations throughout its range. **Suitable habitat in the study area. Species detected in the study area during the surveys (GHD 2012).**	**Known**	**Yes**
Circus assimilis	Spotted Harrier	V	-	-	PDA (2012)	Occurs in grassy open woodland, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. The species occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges. **Suitable foraging habitat in the study area. Species detected near the study area during the surveys (Debus 2011).**	**High**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Daphoenositta chrysoptera	Varied Sittella	V	-	1	Atlas	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. **The study area contains suitable habitat for this species. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Dasyornis brachypterus	Eastern Bristlebird	E	E	-	PMST	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-east Australia: (1) Northern (southern Qld/northern NSW, (2) Central (Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula) and (3) Southern (Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border). In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone. **Unsuitable habitat and distribution. No records of the species in the locality. Not detected in the study area during the surveys.**	Low	No
Dromaius novaehollandiae - endangered population	Emu population, NSW North Coast Bioregion and Port Stephens LGA	EP	-	-	BC	This species occupies a range of predominantly open habitats, including plains, grasslands, woodlands and shrubs, and may occur occasionally in forest. **The forest vegetation across the study area is considered to be unsuitable for this species. This species was not detected in the study area during the surveys.**	Low	No
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	9	Atlas	Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW. Inhabits wetlands and vicinity, prefers open freshwater environs, including margins of billabongs, swamps, shallow floodwaters over grassland, dams, adjacent grassland and savannah woodlands. **The dams in the study area are largely unsuitable for these species due to surrounding forest vegetation and small size. No records in close proximity (<2km) to the study area. Species not detected during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Erythrotriorchis radiatus	Red Goshawk	V	V	-	PMST	Inhabits open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water. Often found in riparian habitats. In NSW, preferred habitats include mixed subtropical rainforest, *Melaleuca* swamp forest and riparian *Eucalyptus* forest of coastal rivers. The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. **While potential habitat is present, the study area occurs outside the current known distribution of the species (north from around Nambucca Heads). No records of the species in the locality. No detected during the surveys.**	Low	No
Falco subniger	Black Falcon	V	-	-	GHD (2012)	Typically inhabits woodland, shrubland and grassland in the arid and semi-arid zones. Nests in riparian woodland remnants. The Black Falcon is widely, but sparsely, distributed in NSW, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of NSW are likely to be referable to the Brown Falcon. In NSW there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. **Suitable foraging habitat in the study area. Species detected in the study area during the surveys (GHD 2012).**	**Known**	**Yes**
Glossopsitta pusilla	Little Lorikeet	V	-	1	Atlas	Inhabits forests, woodlands, trees along watercourses and paddock trees. **The study area contains suitable habitat for this species. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Grantiella picta	Painted Honeyeater	V	V	-	PMST	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. The greatest concentrations of the species and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. **The study area contains potential marginal habitat for this species. However, there are no records for this species in the locality or the Port Stephens LGA.**	Low	No
Lathamus discolor	Swift Parrot	E	E	-	PMST	This species has been recorded on the mainland from a variety of habitat types including dry and wet sclerophyll forest, forested wetlands, coastal swamp forests and heathlands. **Potential foraging habitat in the study area. No records in the locality. Species not detected during the surveys.**	**Low-moderate**	**Yes**
Lophoictinia isura	Square-tailed Kite	V	-	-	GHD (2012)	Found in a variety of timbered habitats including dry woodlands and open forests, showing a particular preference for timbered watercourses. **Suitable habitat in the study area. Species detected in the study area during the surveys (GHD 2012).**	**Known**	**Yes**
Neophema pulchella	Turquoise Parrot	V	-	1	Atlas	Inhabits the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers eucalypt and cypress-pine open forests and woodlands (commonly box or box-ironbark) with native grasses, sometimes with a low shrubby understorey, often in undulating or rugged country, or on footslopes. The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. **The study area contains potential habitat for this species. However, there are no records of this species within the last 20 years in the Port Stephens LGA. This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Ninox strenua	Powerful Owl	V	-	2	Atlas	Preferred habitat is tall, moist, productive eucalypt forests with a tall shrub layer and abundant hollows supporting high densities of arboreal mammals. **The study area contains suitable habitat for this species. The species was not detected in the study area during the surveys.**	**Moderate**	**Yes**
Numenius madagascariensis	Eastern Curlew	-	CE, M	-	PMST	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. **No suitable habitat in the study area. No records of this species in the locality.**	Low	No
Pandion cristatus	Eastern Osprey	V	M	-	PMST	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. **No suitable habitat in the study area. No records of this species in the locality.**	Low	No
Petroica boodang	Scarlet Robin	V	-	1	Atlas	Inhabits forests, woodlands, denser vegetation when breeding, more open and cleared habitat in Autumn and Winter. **Potential habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	7	Atlas	Inhabits open forests, woodlands, road verges with grassy groundcover, sparse shrubs. Typically occurs in open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. In NSW, the species occurs on the western slopes of the Great Dividing Range, and on the western plains. It also occurs in woodlands in the Hunter Valley and in several locations on the NSW north coast. **Suitable habitat in the study area. Species detected in the study area during the surveys (GHD 2012).**	**Known**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Rostratula australis	Australian Painted Snipe	E	E	-	PMST	Inhabits shallow, vegetated, temporary or infrequently filled wetlands. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. **No suitable habitat in the study area for this species. No records of the species in the locality. Species not detected during the surveys.**	Low	No
Turnix maculosus	Red-backed Button-quail	V	-	-	BC	This species typically inhabits grasslands, open and savannah woodlands with grassy ground layer, pastures and crops of warm temperate areas. **The vegetation in the study area is considered to be suboptimal for this species. Additionally, there are no records of this species in the locality or the Port Stephens LGA. This species was not detected in the study area during the surveys.**	Low	No
Mammals								
Cercartetus nanus	Eastern Pygmy-possum	V	-	1	Atlas	Found in a broad range of habitats from rainforest through sclerophyll forest and woodland to heath, but in most areas woodlands and heath appear to be preferred. **There is one record for this species within 2km to the north of the study area from 2005. This is also the only record of this species within the Port Stephens LGA. The species is typically associated with an understorey containing heath, banksias or myrtaceous shrubs including Leptospermum spp. As such, the habitat within the development site is considered to be marginally suitable for this species, as the vegetation predominately consists of a grassy understorey with a relatively low abundance of shrubs and midstorey trees. This species was not detected in the study area during the surveys, which used a range of suitable methods including terrestrial and arboreal trapping, hair tubes, and spotlighting.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	1	Atlas, PMST	Prefers dry forest close to sandstone ridgelines. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands **Suitable foraging habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**
Dasyurus maculatus	Spotted-tailed Quoll	V	E	9	Atlas, PMST	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. **Potential habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	5	Atlas	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. **Suitable habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**
Kerivoula papuensis	Golden-tipped Bat	V	-	-	BC	Found in rainforest and adjacent sclerophyll forest up to 1000 m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests. Roost mainly in rainforest gullies on small first- and second-order streams, and will forage within two kilometres of roost sites. **The study area contains potential habitat for this species. However, there are no records of this species in the locality, with only one record in the Port Stephens LGA approximately 7km to the north-west of the study area. This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Miniopterus australis	Little Bentwing-bat	V	-	68	Atlas	Inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings. **Suitable foraging habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	6	Atlas	Forages in forested habitats. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. **Potential foraging habitat in the study area. Records of the species in the locality. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	5	Atlas	Inhabits dry sclerophyll forest and woodland, where it hunts for insects above the canopy or within clearings at forest edges. This species normally roosts in tree hollows or under loose bark on a variety of tree species. **Suitable habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**
Myotis macropus	Southern Myotis	V	-	6	Atlas	Generally roost close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. **Suitable habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Petauroides volans	Greater Glider	-	V	-	PMST	Largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. **Potential marginal habitat in the study area. No records of the species in the locality. Species not detected in the study area during the surveys.**	Low	No
Petaurus australis	Yellow-bellied Glider	V	-	1	Atlas	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Den, often in family groups, in hollows of large trees. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources. **Potential habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Petaurus norfolcensis	Squirrel Glider	V	-	18	Atlas	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or *Acacia* mid-storey. **Potential habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Planigale maculata	Common Planigale	V	-	-	BC	Inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. **As this species inhabits a broad range of habitats, the study area contains potential habitat for this species. However, there are no records of this species in the locality or the Port Stephens LGA. This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Potorous tridactylus	Long-nosed Potoroo	V	V	-	PMST	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. **The vegetation in the study area is largely unsuitable for this species as it prefers a dense understorey. No records of the species in the locality. Species not detected in the study area.**	Low	No
Petrogale penicillata	Brush-tailed Rock Wallaby	-	V	-	PMST	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. **No suitable habitat in the study area. No records of the species in the locality. Species not detected in the study area during the surveys.**	Low	No
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	9	Atlas, BC	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. **The study area contains suitable habitat for this species. There are nine records of this species in the locality, including several within one kilometre to the north of the study area from 2005. This species was not detected in the study area during the surveys, which used a range of suitable methods including terrestrial and arboreal trapping, hair tubes, and spotlighting.**	**Moderate**	**Yes**
Phascolarctos cinereus	Koala	V	V	105	Atlas, PMST, BC	Inhabit eucalypt woodlands and forests with suitable feed tree species. **Suitable habitat in the study area (SEPP 44 listed feed tree species; *Eucalyptus punctata* and *E. tereticornis*). Species detected in the study area during the surveys.**	**Known**	**Yes**
Pseudomys novaehollandiae	New Holland Mouse	V	V	2	Atlas, PMST	Known from coastal dune, heaths and heathy woodlands. **No suitable habitat in the study area for this species. This species was not detected in the study area during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	2	Atlas, PMST	Occurs across a wide range of habitat types along the eastern seaboard of Australia, depending on food availability. Nectar and fruit from myrtaceous and rainforest trees form the major components of their diet. **Suitable foraging habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	3	Atlas	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. **Potential habitat in the study area. Species not detected in the study area during the surveys.**	**Moderate**	**Yes**
Vespadelus troughtoni	Eastern Cave Bat	V	-	3	Atlas	A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings. **Suitable foraging habitat in the study area. Species detected in the study area during the surveys (Kleinfelder 2013).**	**Known**	**Yes**
Migratory								
Anthochaera phrygia	Regent Honeyeater	CE	CE, M	-	PMST	Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The range of this species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria, and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. **Potential foraging habitat in the Spotted Gum-Ironbark Forest. Not recorded during the surveys. Habitat usage in the study area is likely to be infrequent as the site is not within a known breeding area and as there are no records of the species in the locality, and only two records in the last 20 years of this species in the Port Stephens LGA.**	**Low-moderate**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Apus pacificus	Fork-tailed Swift	-	M	-	PMST	Forages in low to very high airspace over varied habitat types. **May aerially forage over the study area. Species not detected in the study area during the surveys. No records of the species in the locality.**	Low	No
Ardea ibis	Cattle Egret	-	M	4	Atlas	Inhabits moist pastures, shallow open wetlands. **Potential marginal habitat in the exotic grassland areas and dams in the north-east of the study area. Species not detected in the study area during the surveys.**	Low	No
Cuculus optatus	Oriental Cuckoo	-	M	-	PMST	The species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. **Potential foraging habitat in the study area. Not detected in the study area.**	**Low-moderate**	**Yes**
Gallinago hardwickii	Latham's Snipe	-	M	-	PMST	Inhabits a variety of freshwater wetland types. **Potential marginal habitat in the dams in the north-east of the study area. Species not detected in the study area during the surveys.**	Low	No
Hirundapus caudacutus	White-throated Needletail	-	M	-	Atlas, PMST	Forages in high open spaces over varied habitat types. **May aerially forage over the study area. Species not detected in the study area during the surveys. No records of the species in the locality.**	Low	No
Merops ornatus	Rainbow Bee-eater	-	M	-	PMST	Most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels. **Potential foraging habitat in the study area. Not detected in the study area.**	**Low-moderate**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Lathamus discolour	Swift Parrot	-	M	-	PMST	The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW, this species mostly occurs on the coast and south west slopes. **Potential foraging habitat in the study area. No records in the locality. Species not detected during the surveys.**	**Low - moderate**	**Yes**
Monarcha melanopsis	Black-faced Monarch	-	M	-	PMST	Found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. **Potential foraging habitat in the study area. Not detected in the study area.**	**Low-moderate**	**Yes**
Monarcha trivirgatus	Spectacled Monarch	-	M	-	PMST	The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves. **Potential marginal habitat in the study area. No records in the locality. Species not detected during the surveys.**	Low	No
Motacilla flava	Yellow Wagtail	-	M	-	PMST	Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves. **Potential foraging habitat in the study area. Not detected in the study area.**	**Low-moderate**	**Yes**
Myiagra cyanoleuca	Satin Flycatcher	-	M	-	PMST	Found in tall forests, preferring wetter habitats such as heavily forested gullies. **Potential foraging habitat in the study area. Not detected in the study area.**	**Low-moderate**	**Yes**

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Numenius madagascariensis	Eastern Curlew	-	CE, M	-	PMST	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. **No suitable habitat in the study area. No records of this species in the locality. Not detected during the surveys.**	Low	No
Pandion cristatus	Eastern Osprey	V	M	-	PMST	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. **No suitable habitat in the study area. No records of this species in the locality. Not detected during the surveys.**	Low	No
Rhipidura rufifrons	Rufous Fantail	-	M	-	PMST	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. **Suitable habitat in the study area. Species recorded in the study area during the surveys.**	**Known**	**Yes**
Rostratula benghalensis s. lat.	Painted Snipe	-	M	-	PMST	The Australian Painted Snipe's distribution is restricted to Australia. Most records are from the south east, particularly the Murray-Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and Lower Hunter Valleys. **No suitable habitat in the study area. No records of this species in the locality. Not detected during the surveys.**	Low	No

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Scientific Name	Common Name	Legal Status		No. of records	Source	Habitat Preferences	Likelihood of Occurrence	Potential for Impact?
		TSC Act	EPBC Act					
Tringa nebularia	Common Greenshank	-	M	-	PMST	The species occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. **No suitable habitat in the study area. No records of this species in the locality. Not detected during the surveys.**	Low	No

CE = Critically Endangered; E = Endangered; EP = Endangered Population; V = Vulnerable (NSW TSC & Commonwealth EPBC Acts). PMST = EPBC Protected Matters Search; Atlas = NSW Wildlife Atlas; BC = Biobanking Calculator

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APPENDIX 6: ASSESSMENTS OF SIGNIFICANCE

Assessments of Significance (TSC Act)

Factors of Assessment

The seven factors considered in the assessment of significance (s5A of EP&A Act) are shown in **Table 17**. The assessments of significance for all threatened species, populations and ecological communities known or considered likely to occur within the study area are provided in the following sub-sections.

Table 17: Factors addressed in the assessment of significance

Factor		Species	Population	Ecological Community
(a)	*in the case of a threatened species, whether the action proposed 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.*	X		
(b)	*in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*		X	
(c)	*in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:* *(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*			X
(d)	*in relation to the habitat of a threatened species, population or ecological community:* *(iii) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and* *(iv) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and* *(v) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality*	X	X	X
(e)	*whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.*	NA	NA	NA
(f)	*whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan*	X	X	X
(g)	*whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process*	X	X	X

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Threatened Fauna

Woodland Birds

- Regent Honeyeater (*Anthochaera phrygia*)
- Glossy Black Cockatoo (*Calyptorhynchus lathami*)
- Brown Treecreeper - eastern subspecies (*Climacteris picumnus victoriae*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Swift Parrot (*Lathamus discolor*)
- Scarlet Robin (*Petroica boodang*)
- Grey-crowned Babbler – eastern subspecies (*Pomatostomus temporalis temporalis*)

The Regent Honeyeater was once widespread throughout southeast Australia. Now it is mainly found in limited areas of northeast Victoria and central-east NSW. It has been observed breeding in several areas in north-eastern Victoria (Chiltern district, Killawarra State Forest, Benalla district), and along the western slopes of the Great Dividing Range in NSW (Bundarra-Barraba district, Capertee Valley). Regent Honeyeaters are nomadic feeders and can be found elsewhere throughout its previous range where there is suitable blossom occurring (Franklin *et al.* 1989). This species is mostly recorded in box-ironbark eucalypt associations. They prefer the wettest, most fertile sites within these associations, such as along creek flats, broad river valleys and foothills. In NSW, riparian forests of River Oak (*Casuarina cunninghamiana*), those with Needle-leaf Mistletoe (*Amyema cambagei*), are also important for feeding and breeding. At times of food shortage the birds also use other woodland types and wet lowland coastal forest dominated by Swamp Mahogany (*E. robusta*) or Spotted Gum (*E. maculata*) (Franklin *et al.* 1989; Ley and Williams 1992; Geering and French 1998; Oliver *et al.* 1999). Nectar is the principal food, but sugary exudates from insects are also used (Oliver 1998, 2000).

The Glossy Black-cockatoo is an obligate granivore, feeding exclusively on the seeds of *Allocasuarina* (Clout 1989; Pepper 1996, Pepper *et al.* 2000). The breeding season is through the cooler months of February to July with one egg only being laid (Garnett & Crowley 2000). Habitat includes woodlands dominated by *Allocasuarina*, open sclerophyll forests and woodlands with a midstorey of *Allocasuarina* that are dominated by Eucalyptus or Angophora species (Higgins 1999). Consequently this bird requires a forest habitat containing these trees in sufficient numbers (NPWS 1999; Garnett & Crowley 2000) along with old-growth trees having suitable nesting hollows.

The Brown Treecreeper is a temperate forest and woodland bird species occupying Eucalypt woodland and adjoining vegetation in subcoastal environments and the slopes of the Great Dividing Range (Garnett & Crowley 2000). It is sedentary within permanent territories, breeding in pairs or communally in small groups (Noske 1991). The Brown Treecreeper is an obligate insectivore and forages for insects on the trunks of live trees as well as fallen logs. The species nests most often in hollows (Noske 1991; Blakers *et al.* 1984). The Brown Treecreeper requires mature Eucalypt vegetation with the presence of fallen logs (for foraging) and hollows (for nesting) in dry open forest comprised of fairly sparsely distributed native understorey grasses. The species is generally absent from sites with a dense understorey (Noske 1991; Ekert 2004).

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Higgins and Peter 2002; Barrett *et al.* 2003). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and

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often re-uses the same fork or tree in successive years. Generation length is estimated as 5 years (Debus and Soderquist 2008).

Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands and have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes (Higgins, 1999).

The Swift Parrot is small migratory parrot (25cm) that breeds in Tasmania and migrates to south-eastern Australia for the winter months. In Tasmania, the species is dependent on Blue Gums (*Eucalyptus globulus*) for both flower nectar and for nesting hollows, of which there has been large scale clearing of these trees in Tasmania over many years (Brereton 1997). On the mainland, the Swift Parrot feed trees include winter flowering species such as Swamp Mahogany (*E. robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*). Commonly used lerp infested trees include Grey Box (*E. macrocarpa*), Grey Box (*E. moluccana*) and Blackbutt (*E. pilularis*) (Brown 1989). Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum (Barrett *et al.* 2003).

The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. The Scarlet Robin inhabits dry eucalypt forests and woodlands of which the understorey is usually open and grassy with few scattered shrubs. This species may also occasionally occur in mallee or wet forest communities, or in wetlands and tea-tree swamps (OEH, 2016).

The Grey-crowned Babbler is a temperate forest and woodland and tropical woodland bird species (Garnett & Crowley 2000). The Grey-crowned Babbler inhabits open forests and woodlands, requiring an open shrub layer with sparse ground cover and fallen timber and leaf litter (Blakers *et al.* 1984). The species builds and maintain several conspicuous, dome-shaped stick nests. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year (OEH 2016).

(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area is suitable foraging and/or nesting habitat for these species. The study area also contains hollow-bearing trees with small to medium sized hollows, which would provide potential nesting habitat for the Little Lorikeet and Brown Treecreeper. Two threatened woodland bird species (Brown Treecreeper and Grey-crowned Babbler) were recorded in the study area by GHD (2012). The remaining species (Varied Sittella, Little Lorikeet, Swift Parrot, Regent Honeyeater, Glossy Black-cockatoo and Scarlet Robin) were not detected during the surveys. The proposal would remove approximately 32.03 ha of suitable habitat for these species. The proposal has the potential to reduce the viability of these species in the locality through loss of suitable foraging and/or breeding habitat, particularly the Brown Treecreeper and Grey-crowned Babbler which were both recorded in the study area and are sedentary species. However, considering these species inhabit a variety of vegetation types, and the relatively large areas of similar habitat for these species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of suitable forest habitat for these species that is contiguous with the study area.

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(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable habitat for these species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for these species such that their local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for these species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering these woodland bird species are highly mobile, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for these species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for these species. In relation to the Brown Treecreeper and Grey-crowned Babbler which were previously recorded in the study area (GHD 2012), the habitat in the development site is not considered critical to the survival of these species in the locality considering the large areas of similar habitat adjoining the site, and given widespread distribution of records for these species in the lower hunter region.
(f) Recovery Plan	In respect of the objectives of the National Recovery Plan for the Regent Honeyeater (Geering and Ingwersen 2009), the proposed development is inconsistent as it involves further reduction in the availability of potential foraging habitat. For the remaining threatened woodland bird species, there was no draft or final recovery plan in place at the time of survey and none of the threat abatement plans are relevant to these species.
(g) KTP	The proposal would contribute to three key threatening processes relevant to these species: 'Clearing of native vegetation', 'Removal of dead wood and dead trees', and 'Loss of hollow-bearing trees'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of these species as: • Approximately 63% of habitat in the study area for these species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate or substantially fragment habitat for these species in the study area or locality.

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Forest Owls

- Powerful Owl (*Ninox strenua*)

The Powerful Owl is a large (60 cm) forest owl that inhabits forest and woodlands of the coastal, escarpment, tablelands and western slopes in NSW (Kavanagh 2002). Habitat for the Powerful Owl comprises tall, moist productive eucalypt forests and a mosaic of wet and dry sclerophyll occurring on undulating, gentles terrain near the coast. Optimal habitat includes a tall, shrub layer and abundant hollows supporting high densities of arboreal mammals (DEC 2006). The Powerful Owl roosts in dense mid-canopy trees or tall shrubs in sheltered gullies, while nesting occurs in hollows of old eucalypts in unlogged, unburnt gullies and lower slopes within 100m of streams or minor drainage lines (DEC 2006). The home range of the Powerful Owl is variable, depending on habitat productivity, however, is generally between 300 and 1500 ha (Kavanagh 1997).

(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable foraging and roosting habitat for this species. The study area also contains a low abundance of hollow-bearing trees with large-sized hollows which would provide potential nesting habitat for this species. The proposal would remove approximately 32.03 ha of suitable habitat for this species. Considering this species was not recorded in the study area during the surveys, and as there are relatively large areas of similar habitat for this species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of similar forest habitat for this species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable habitat for this species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for this species such that its local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for this species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering this species is highly mobile and occupies a large home range, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for this species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for this species.
(f) Recovery Plan	In respect of the objectives of the recovery plan for the Powerful Owl (DEC 2006), the proposed development would further contribute to the loss of foraging habitat for this species. No threat abatement plan is relevant to this species.
(g) KTP	The proposal would contribute to three key threatening processes relevant to this species: 'Clearing of native vegetation', 'Removal of dead wood and dead trees', and 'Loss of hollow-bearing trees'.

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Conclusion	The proposal is considered unlikely to have a significant impact on a local population of this species as: • The species was not recorded in the study area during the surveys. • Approximately 63% of forest habitat in the study area for this species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not fragment or isolate habitat for this species in the study area or locality.

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Raptors

- Spotted Harrier (*Circus assimilis*)
- Black Falcon (*Falco subniger*)
- Square-tailed Kite (*Lophoictinia isura*)

The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania (Barrett *et al.* 2003). Individuals disperse widely in NSW and comprise a single population. The Spotted Harrier occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe (e.g. chenopods) (Marchant and Higgins 1993; Aumann 2001). It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. The species builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Generation length is estimated as 10 years (Debus and Soderquist 2008).

The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.

The Square-tailed Kite is a large raptor that occurs in temperate and tropical forest and woodlands including the coastal regions across Australia. This species has been recorded in most parts of Australia

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with the exception of the extremely arid centre (Barrett *et al.* 2003). The species prefers ridge and gully forests dominated by *Eucalyptus*, *Angophora* and *Acacia* scrub and patches of low open eucalypt woodland and coastal heath. The Square-tailed Kite usually nests along or near watercourses or in forest gullies. Nests are large platforms of sticks usually situated in the fork or limb of a large tree. The species prefers to hunt singly in *Eucalypt* open forest and woodland (Debus and Czechura 1989), where it feeds on small birds, foliage insects and sometimes on small mammals and lizards.

(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable habitat for these species. Both the Black Falcon and Square-tailed Kite were recorded in the study area by GHD (2012). The Spotted Harrier was observed nearby the study area by Debus (2011). No nests of these species were observed in the study area during the surveys. The proposal would remove approximately 32.03 ha of suitable foraging and potential nesting habitat for these species. Considering these species are highly mobile, and the relatively large areas of similar habitat for these species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of similar forest habitat for these species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable foraging habitat and potential nesting habitat for these species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for these species such that their local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for these species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering these species are highly mobile, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for these species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for these species.
(f) Recovery Plan	No recovery plans had been prepared for these species at the time of reporting. No threat abatement plans are relevant to these species.
(g) KTP	The proposal would contribute to one key threatening process relevant to these species: 'Clearing of native vegetation'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of this species as: • Approximately 63% of forest habitat in the study area for these species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar forest habitat that is contiguous with the development site (estimated <5%). • The proposal would not fragment or isolate habitat for these species in the study area or locality.

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Tree-roosting Insectivorous Bats

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Southern Myotis (*Myotis macropus*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Preferred habitat for the Eastern False Pipistrelle appears to be moist habitats, with trees taller than 20 m (Churchill 1998). Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. It hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. It is a bat that hibernates in the colder winter period of the southern part of its range (Phillips 1995). Females are pregnant in late spring to early summer.

The Eastern Freetail Bat occurs in a thin coastal band between the Sydney district and Brisbane. Little is known of the habits or the preferred habitat of this species, although it is apparent that it does inhabit dry sclerophyll forest and woodland, where it hunts for insects above the canopy or within clearings at forest edges. This species normally roosts in tree hollows or under loose bark on a variety of tree species (Churchill 1998; Allison & Hoye 1995).

The Southern Myotis (also known as the Fishing Bat) can be found within 100 km of the coast from the Kimberly in Western Australia to south-eastern South Australia. Foraging is commonly over water with the bats skimming the surface and using their large hind feet to scoop aquatic insects and even small fish. They can be found roosting in a variety of locations that include caves, bridges, tree hollows, and even dense foliage (Churchill 1998, Richards 1995). This species particularly favours large, moving streams at low altitudes (Anderson *et al.* 2006).

The Greater Broad-nosed Bat occurs along the coast and ranges of eastern Australia, from northern Queensland to the New South Wales/Victorian border. This bat appears to be most frequent in the river systems draining the Great Dividing Range. Tree-lined creeks, and the junctions of woodland and cleared paddocks, are favoured hunting areas for the Greater Broad-nosed Bat, although it may also forage in rainforest environments, flying as low as one metre above the surface of a creek. The species normally roosts in tree hollows, but roosting records in the ceilings of old buildings also exist (Churchill 1998; Hoye & Richards 1995).

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(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable foraging and/or roosting habitat (i.e. hollow-bearing trees) for these species. Three of these species, Eastern False Pipistrelle, Eastern Freetail-bat and Southern Myotis, were recorded in the study area during the surveys. The Greater Broad-nosed Bat was not detected in the study area during the surveys. The proposal would remove approximately 32.03 ha of suitable habitat for the Eastern False Pipistrelle, Eastern Freetail-bat and Greater Broad-nosed Bat, and 16.46 ha of suitable habitat for the Southern Myotis (see Section 1.4.2.3 for details). Considering these species inhabit a variety of vegetation types, are highly mobile, and the relatively large areas of similar habitat for these species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of suitable forest habitat for these species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable habitat for these species (16.46 ha of the Southern Myotis). The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for these species such that their local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for these species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering these species are highly mobile, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for these species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, and the widespread distribution of records for these species in the lower hunter, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for these species.
(f) Recovery Plan	No recovery plans had been prepared for these species at the time of reporting. No threat abatement plans are relevant to these species.
(g) KTP	The proposal would contribute to three key threatening processes relevant to these species: 'Clearing of native vegetation', 'Removal of dead wood and dead trees', and 'Loss of hollow-bearing trees'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of these species as: • Approximately 63% of habitat in the study area for the Eastern False Pipistrelle, Eastern Freetail-bat and Greater Broad-nosed Bat would be retained. • Approximately 69% of habitat in the study area for the Southern Myotis would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate or substantially fragment habitat for these species in the study area or locality.

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Cave-dwelling Microchiropteran Bats

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Little Bentwing-bat (*Miniopterus australis*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Eastern Cave Bat (*Vespadelus troughtoni*)

The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands (Hoye and Dwyer 1995; Parnaby 1992). It is generally rare with a very patchy distribution in NSW. This species inhabits moderately well-wooded habitats, where daytime roosts have been recorded in caves, mine tunnels and the abandoned mud nests of Fairy Martins (*Petrochelidon ariel*) (Hoye & Dwyer 1995; Pennay 2008).

The Little Bentwing-bat occurs along the east coast of Australia from Cape York south to coastal northern NSW. The species also occurs in New Caledonia, New Guinea, the Philippines, and the Indo-Malayan archipelago. The Little Bent-wing Bat generally occupies well-wooded habitats throughout its range, roosting during the day in caves and similar locations. As with other Bentwing-bats, this species depends on specific nursery sites in which to raise its young, and only five of these sites were known of in 1983. In central Queensland one of these nursery colonies numbers 100,000 adult bats. They forage for insects in generally well-wooded habitat of a variety of forms from swamp forest, dry forest to rain forest (Churchill 1998, Dwyer 1995a).

The Eastern Bentwing-bat is widely distributed on the coast and ranges of eastern Australia, from Cape York Peninsula, south to Victoria and eastern South Australia. The species is also present in northern Western Australia and the Northern Territory. Within New South Wales, it extends from the coast to the western slopes of the Great Dividing Range. These bats roost in caves and man-made structures such as culverts, mine shafts and farm sheds. They are territorial, moving within a 300 km radius of a maternity cave. They forage for insects in generally well-wooded habitat of a variety of forms from swamp forest, dry forest to rain forest (Churchill 1998, Dwyer 1995b).

The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW (Parnaby 1995; Menkhorst & Knight 2001; Churchill). It is a cave-dwelling species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs but is occasionally found along cliff-lines in wet eucalypt forest and rainforest. The Eastern Cave Bat has been recorded roosting near the entrances of relatively well-lit sandstone overhangs, caves, disused mine workings and infrequently in buildings. It is usually recorded roosting in small groups but occasionally occurs in colonies of up to 500 individuals (Parnaby 1995; Churchill 1998).

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(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable foraging habitat for these species. Three of these species, Large-eared Pied Bat, Little Bentwing-bat and Eastern Cave Bat, were recorded in the study area during the surveys. The Eastern Bentwing-bat was not detected in the study area during the surveys. The proposal would remove approximately 32.03 ha of suitable foraging habitat for these species. Considering these species inhabit a variety of vegetation types, are highly mobile, and the relatively large areas of similar foraging habitat for these species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of suitable forest habitat for these species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable foraging habitat for these species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for these species such that their local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for these species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering these species are highly mobile, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for these species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, and the widespread distribution of records for these species in the lower hunter, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for these species.
(f) Recovery Plan	In respect of the national recovery plan for the Large-eared Pied Bat (DERM 2011), the proposed development would not contravene the objectives of this plan. For the remaining species, no recovery plans had been prepared for these species at the time of reporting. No threat abatement plans are relevant to these species.
(g) KTP	The proposal would contribute to one key threatening process relevant to these species: 'Clearing of native vegetation'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of these species as: • No roosting or breeding habitat for these species is present in the development site. • Approximately 63% of foraging habitat in the study area for these species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate or substantially fragment habitat for these species in the study area or locality.

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Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox occurs along the eastern seaboard of Australia roosting in large communal aggregations known as 'camps'. These camps are used permanently, annually, or occasionally, varying in size from hundreds to many thousands of individuals, fluctuating according to food resources (Ebby and Law, 2008; Parry-Jones & Augee, 1991; Tidemann, 1995). This species forages on nectar and pollen from flowers of canopy trees (particularly *Eucalyptus, Melaleuca* and *Banksia*) and fleshy fruits from rainforest trees and vines. This species is highly mobile, dispersing to sites as far as 40 km to forage and returning to the camp in one night, and seasonally they may move hundreds of kilometres in response to variation in food resource productivity which largely explains the extensive migration movement of this species (Ebby and Law, 2008).

(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable foraging habitat for this species. This species was not detected in the study area during the surveys, and no Grey-headed Flying-fox camps were identified. The proposal would remove approximately 32.03 ha of suitable foraging habitat for this species. Considering this species inhabits a variety of vegetation types, is highly mobile, and the relatively large areas of similar foraging habitat for this species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle of suitable forest habitat for this species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable foraging habitat for this species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for this species such that its local occurrence would be placed at risk of extinction.

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(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for this species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering this species is highly mobile, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for this species.
(d) (iii) Habitat importance	Considering the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, and the widespread distribution of records for this species in the lower hunter, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for this species.
(f) Recovery Plan	A Draft National Recovery Plan (DECCW 2008) has been prepared for this species. The proposed removal of foraging habitat is not consistent with Objective 2; "*To protect and increase the extent of key winter and spring foraging habitat of Grey-headed Flying-foxes*". No threat abatement plans are relevant to this species.
(g) KTP	The proposal would contribute to one key threatening process relevant to this species: 'Clearing of native vegetation'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of this species as: • This species was not detected in the study area. • Approximately 63% of foraging habitat in the study area for this species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate or substantially fragment habitat for this species in the study area or locality.

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Spotted-tailed Quoll (*Dasyurus maculatus*)

The Spotted-tailed Quoll has been reported from a wide range of habitat types, including rainforest, wet and dry sclerophyll forest, woodland, coastal heathland, as well as along riparian forests in the inland. Spotted-tailed Quolls are generally solitary, nocturnal, and semi-arboreal species, occupying home-ranges of between 750 and 3,500 ha. Den and nest sites for the Spotted-tailed Quoll have been recorded in caves, rock crevices, tree hollows, and hollow logs (Edgar & Belcher 1995; Lunney & Matthews 2001). The Spotted-tailed Quoll is mostly nocturnal, although will hunt during the day, and consumes a variety of prey including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl.

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(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable foraging habitat for this species. The study area also contains a low abundance of hollow-bearing trees with large-sized hollows which would provide potential den sites for this species. The proposal would remove approximately 32.03 ha of potential habitat for this species. Considering this species was not recorded in the study area during the surveys, and as there are relatively large areas of similar habitat for this species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of this species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of similar forest habitat for this species that is contiguous with the study area.
(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of potential habitat for this species. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for this species such that its local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for this species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Considering this species occupies a large home range, and as connectivity of the remaining vegetation in the study area with adjoining vegetation would be maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for this species.
(d) (iii) Habitat importance	Considering this species was not recorded in the study area, and the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, the removal of the 32.03 ha of forest vegetation for the proposal does not represent a significant reduction in important potential available habitat for this species.
(f) Recovery Plan	A draft national recovery plan has been prepared for this species (Long and Nelson 2008). The proposal would not contravene the objectives of this plan. No threat abatement plan is relevant to this species.
(g) KTP	The proposal would contribute to three key threatening processes relevant to this species: 'Clearing of native vegetation', 'Removal of dead wood and dead trees', and 'Loss of hollow-bearing trees'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of this species as: • The species was not recorded in the study area during the surveys. • Approximately 63% of forest habitat in the study area for this species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar habitat that is contiguous with the development site (estimated <5%). • The proposal would not fragment or isolate habitat for this species in the study area or locality.

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Hollow-dependent Arboreal Mammals

- Yellow-bellied Glider (*Petaurus australis*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)

The Yellow-bellied Glider can be found in mid dense to closed forest in which the trees are of sufficient age to have developed suitable hollows for the gliders to nest in. In undisturbed habitat these gliders will maintain their presence in the same area for many years. The diet of the Yellow-bellied Glider consists of invertebrates, nectar and pollen from blossoming eucalypts in particular, although they are primarily exudate feeders feeding on sap from selected trees, which they obtain by gnawing grooves in the bark of the tree. The home range of these gliders has been estimated at 35 hectares and they will travel up to 2 kilometres in a night of foraging (Carthew *et al.* 1999; Russell 1995).

The Squirrel Glider inhabits dry sclerophyll forest and woodland, and is generally absent from the dense coastal ranges. The Squirrel Glider has a specialised diet comprised of nectar, pollen and gum exudates particularly from wattles. The Squirrel Glider requires hollows in standing trees for roosting and nesting purposes and has a home range of 2-3ha to 13ha (Quinn 1995; Rowston 1998; Suckling 1995).

The Brush-tailed Phascogale prefers dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter. However, it is also known to inhabit heath, swamps, rainforest and wet sclerophyll forest. The Brush-tailed Phascogale nests and shelters in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. Females have exclusive territories of approximately 20 - 40 ha, while males have overlapping territories often greater than 100 ha. This species feeds mostly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates (OEH 2016).

(a) Effect on life cycle	The Spotted Gum-Ironbark Forest vegetation in the study area represents suitable habitat for these species. The study area contains a low to moderate abundance of hollow-bearing trees that would provide potential nesting/sheltering habitat for these species. Records for both the Squirrel Glider and Brush-tailed Phascogale occur within 2km of the site. However, none of these species were recorded in the study area during the surveys. The results of the hollow-bearing tree survey (Appendix 4) indicate that the loss of hollow-bearing trees (live trees and dead stags) is estimated at 38% of the total hollow-bearing tree resource available within the study area (Figure 10). The average density of hollow-bearing trees within the development site is estimated at 6 trees/ha, which is the same as the mapped density within the proposed offset area. The proposal would remove approximately 32.03 ha of suitable habitat for these species. Considering these species were not detected in the study area, and the relatively large areas of similar habitat for these species adjoining the development site, it is considered unlikely that the proposal would have an adverse effect on the life cycle of these species such that a viable local population would be placed at risk of extinction. Based on available vegetation mapping (Sivertsen *et al.* 2011) and aerial photo interpretation, the proposed development would remove a relatively small proportion (estimated <5%; at least 700 ha of Spotted Gum-Ironbark Forest vegetation mapped in outer assessment circle) of suitable forest habitat for these species that is contiguous with the study area.

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(d) (i) Habitat Removal	The proposal would result in the removal of approximately 32.03 ha of suitable habitat for these species including 38% of the mapped hollow-bearing tree resource within the study area. The removal of this small area of vegetation for the proposal does not represent a significant reduction in the extent of similar forest habitat contiguous with the development site for these species such that their local occurrence would be placed at risk of extinction.
(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for this species in the study area, it would not reduce the overall east-west width of this corridor. The proposal would also maintain vegetation connectivity through the north-east part of the site. Squirrel Gliders are agile climbers and typical gliding distances range between 20-30 m (and up to 50 m) (Goldingay and Taylor 2009). Based on average glide angle, it is predicted that trees beside roads would need to be approximately 13 m tall to facilitate glider movement across a 20 m gap (Goldingay and Taylor 2009). Yellow-bellied Gliders can also glide larger distances, up to 140 m (NPWS 2003). Given the areas of potential habitat for this species adjoining the proposed haul road typically have a canopy of approximately 10-15 m tall and as the proposed road width would be approximately 15m it is considered unlikely that the proposal would substantially fragment or isolate habitat, or significantly impede movement of these glider species across the study area. The Brush-tailed Phascogale is also an agile species that can traverse short distances of cleared areas (e.g. road) between patches of forest habitat. As this species is nocturnal and the proposed quarry will not be operational at night, vehicle strike is considered unlikely. Considering connectivity of the remaining vegetation in the study area with adjoining vegetation to the north, south and west would be maintained, the proposal is considered unlikely to fragment or isolate habitat in the locality for this species such that its movement in the locality would be impeded.
(d) (iii) Habitat importance	Considering these species were not detected in the study area, and the relatively large areas of similar habitat on adjacent lands which are contiguous with the study area, the removal of the 32.03 ha of forest vegetation for the proposal is unlikely represent a significant reduction in important potential available habitat for these species.
(f) Recovery Plan	A recovery plan has been prepared for the Yellow-bellied Glider (NPWS 2003). This proposal would not contravene the objectives of this plan. For the Squirrel Glider and Brush-tailed Phascogale, no recovery plans had been prepared for these species at the time of reporting. No threat abatement plans are relevant to these species.
(g) KTP	The proposal would contribute to three key threatening processes relevant to these species: 'Clearing of native vegetation', 'Removal of dead wood and dead trees', and 'Loss of hollow-bearing trees'.
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of these species as: • These species were not recorded in the study area during the surveys. • Approximately 63% of forest habitat in the study area for these species would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar forest habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate habitat and is unlikely to impede movement and dispersal of these species in the study area or locality.

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Koala (*Phascolarctos cinereus*)

The Koala generally occurs from the Townsville district in northern Queensland, south along the coast and ranges into Victoria and part of South Australia. Within New South Wales and Queensland, this distribution extends into the western slopes and plains. The Koala lives entirely on a diet of leaves of both eucalypt and non-eucalypt trees and it has been shown that within its range there are local and regional preferences for the tree species used for feeding. Examples of eucalypts used as feed trees are *E. camuldulensis; E. viminalis; E. ovata; E. teretecornis; E. microcorys; E. punctata*. Non-eucalypts recorded have been *Allocasuarina torulosa; Melaleuca quinquenervia*; and *Lophostemon confertus*. Throughout its range the Koala suffers from either a lack of numbers or severe over-population where problems such as eye disease and reproductive tract bacterial disease caused by *Chlamydia psittaci* become prevalent (Martin & Handasyde 1995; Moore & Foley 2000; Phillips & Callaghan 2000; Phillips *et al.* 2000).

(a) Effect on life cycle	Within the Port Stephens area, *Eucalyptus robusta, E. parramattensis* and *E. tereticornis* were identified as preferred feed trees by Lunney *et al.* (1998) and in the CKPoM (PSC 2002). The vegetation in the study area contains one of these feed tree species (*E. tereticornis*). Additionally, one SEPP 44 listed Koala feed tree species (*E. punctata*) was also identified in the study area. As such, the methodology to define suitable Koala habitat under SEPP 44 was used to map Koala habitat across the study area. The species is generally solitary (OEH 2015), but they have a complex social hierarchy, living in breeding aggregations comprising the territory of a dominant male overlapping a small number of mature females, also juveniles of various ages occur (DECC 2008; OEH 2015). Across their range, adult Koalas generally exhibit long-term fidelity to their individual home range. Within the Port Stephens area studies have established home ranges of 0.2 ha to 500 ha, with an average of 80-90 ha (DECC 2008). There is evidence that the population within the Port Stephens area is in decline. The mortality rate in 1995 was estimated to be 5 – 10% of the population. Since 1995 this rate has declined linearly to less than half that level. As trends in road mortality rates of animals can provide a good surrogate for animal abundance, this may indicate a substantial decline in the population at Port Stephens (TSSC 2012). Modelling of the impacts of fire and dogs on the Port Stephens population conducted by Lunney *et al.* (2007) also identified that these two pressures are impacting on the local population. The research estimated the population to be between 350 and 800 individuals, and modelled that under basic assumptions (impacts from dogs and fire), the population was unlikely to survive 50 years (Lunney *et al.* 2007).

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	The study area occurs within the Balickera Koala Management Unit (KMU); PSC 2002) in the Port Stephens LGA. A relatively large number of records of this species occurs within a 5km radius, which suggests that the area is important for the population. However, the density of records in close proximity to the site are relatively low in comparison to other parts of the Port Stephens LGA, with a higher density of records occurring to the south and east of Grahamstown dam on the Tomaree and Tilligerry peninsulas. The majority of the Balickera KMU is mapped as marginal Koala habitat under the CKPoM. Two Koalas were sighted in the south-western part of the study area during the surveys. SAT tests also detected Koala activity on the south-west, central, and north-east parts of the study area. The SAT tests indicate the average Koala activity level across the study area is 8%, with the highest activity level recorded at 13%. Both the average and highest activity levels recorded are considered to be within the low use range, whereby this "level of use by *P. cinereus* is likely to be transitory" (Phillips and Callaghan 2011, p.777). However, a precautionary approach is recommended when interpreting low use results, as "low activity levels recorded in what might otherwise be med-high carrying capacity *P. cinereus* habitat may be a result of contemporary population dynamics, landscape configuration and/or historical disturbances including logging, mining, fire, agricultural activities and/or urban development" (Phillips and Callaghan 2011, p.777). During clearing there is the potential for displacement of an individual if the development site forms part of its home-range. The removal of an area of an individual's home range may force it to move, potentially impeding on the home range of another individual. This could result in conflicts in the local area due to the high fidelity the species exhibit to their home range. Based on the assessment of an average home range in the Port Stephens area of 80 – 90 ha (DECC 2008), the proposal has the potential to impact on part of the home range of one adult Koala. While there is the potential to displace one individual, this impact is unlikely to be significant due to the large area of available habitat adjoining the development site. Lunney *et al*. (2007) modelled the carrying capacity of the Port Stephens area to be a maximum of 2,500 individuals. However, the population within the same area was estimated to be only 350 – 800 individuals (Lunney *et al.* 2007). Based on this assessment, habitat availability is not the limiting factor for the Koala population in Port Stephens area and it is likely that there is a large amount of available habitat within the locality that is either un-occupied, or could potentially support a higher density of Koalas. The decline of the Koala population has historically been attributed to habitat loss; however, impacts from fires, dogs (Lunney *et al.* 2007) and motor vehicles (Phillips *et al*. 1996) have been identified as significant threats to the species. The habitat loss due to the proposal (11.19 ha) has been assessed as minor in the context of the large expanse of forest vegetation adjoining the study area that is also likely to contain suitable Koala feed tree species. The Seaham Spotted Gum – Ironbark Forest (NPWS 2000) has been largely attributed as marginal Koala habitat in the CKPoM mapping; however this community often contains SEPP44 listed feed tree species (*E. tereticornis, E. punctata*) that are locally dominant or co-dominant, as well as tree species that may be locally important in the LGA (*E. acmenoides, E. crebra, C. maculata*) as listed in the CKPoM. The proposal also has the potential for increased impact to the species from vehicle strikes as there will be an increase in traffic. The proposed development is to incorporate traffic calming measures to reduce the risk of vehicle strike (see Section 2.1.3.2). The proposal would not increase dog numbers in the locality. Based on this information, it is considered unlikely that the proposal would impact on the life cycle of the local population, such that it would place it at the risk of extinction.
(d) (i) Habitat Removal	The proposal would remove 11.19 ha of Koala habitat as defined under SEPP44. This equates to 20% of the Koala habitat within the study area. The CKPoM Koala habitat mapping suggests that the majority of forest vegetation in the Balickera KMU is marginal habitat (including the study area). However, it is considered that a large portion of this vegetation is likely to constitute Koala habitat as defined under SEPP 44 due the presence *E. punctata* and *E. tereticornis* as co-dominants. The proposed development would remove a relatively small proportion of the large expanse of similar Spotted-Gum Ironbark Forest vegetation that is contiguous with the study area.

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(d) (ii) Habitat Fragmentation	The proposed development site forms part of a larger forested corridor that runs north-south between the Pacific Highway to the east, and cleared grassland/wetlands to the west adjacent to the Williams River. While the proposal would reduce habitat connectivity for this species in the study area, it would not reduce the overall east-west width of this corridor. Within the study area, Koala habitat as defined under SEPP44 extends from the south-west corner to the north-east part of the study area. The proposed development would impact on the northern part of this mapped habitat. However, the proposal would also maintain vegetation connectivity through the north-east part of the site via two corridors (one along Seven Mile Creek and one along the north-east boundary). Considering the connectivity of the Koala habitat to be retained in the study area with adjoining vegetation would be largely maintained, the proposal is considered unlikely to substantially fragment or isolate habitat in the locality for this species.
(d) (iii) Habitat importance	The proposal would result in the removal of a relatively low proportion of similar forest habitat for this species that is contiguous with the study area. Resident individuals occurring within the study area would form part of a larger population occurring within the north-south corridor due to high vegetation connectivity in this area. The proposal would retain the majority (80%) of suitable Koala habitat in the study area, and would also maintain vegetated corridors on the eastern part of the site to allow movement of this species to adjoining habitat to the north-east. In consideration of the above, the removal of 11.19 ha of suitable habitat for this species is considered unlikely represent a significant reduction in important available habitat for this species in the locality.
(f) Recovery Plan	The Approved Recovery Plan for the Koala (*Phascolarctos cinereus*) (DECCW 2008) identifies mechanisms to conserve Koala habitat and increase our understanding of the biology and ecology of this species. The proposal does not contravene the objectives of the plan. None of the threat abatement plans are relevant to this species in the context of the proposal.
(g) KTP	The proposal would contribute to one key threatening process relevant to this species: "Clearing of native vegetation".
Conclusion	The proposal is considered unlikely to have a significant impact on a local population of these species as: • Approximately 80% of suitable Koala habitat in the study area as defined under SEPP 44 would be retained. • The area of habitat to be removed is relatively small in the context of the extent of similar forest habitat that is contiguous with the development site (estimated <5%). • The proposal would not isolate habitat and is unlikely to impede movement and dispersal of this species in the study area or locality.

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EPBC Act Assessments

Critically Endangered and Endangered Species

Birds

- Regent Honeyeater (*Anthochaera phrygia*)
- Swift Parrot (*Lathamus discolor*)

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population*

Regent Honeyeater and Swift Parrot feed tree species are present within the proposed development area (i.e. Spotted Gum – Ironbark Forest). Approximately 32.03 ha of open forest containing suitable foraging habitat for these species would be removed. Due to the nomadic nature of the Regent Honeyeater's movements and the migratory nature of the Swift Parrot, no local populations would be present and it is therefore unlikely that the proposal would lead to a long-term decrease in the size of their populations.

The proposed development area will be progressively rehabilitated, as such there is the potential for these species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age. Proposed offset measures will include both the provision and long-term protection of habitat containing feed tree species.

- *reduce the area of occupancy of the species*

Neither species is known to occupy the study area. The action will lead to the removal of up to 32.03 ha of potential foraging habitat for these species. The proposed development area will be progressively rehabilitated, as such there is the potential for these species to utilise the area as foraging habitat once

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the rehabilitation reaches a suitable age. Proposed offset measures will also secure 57.2 ha of similar open forest habitat surrounding the development site in-perpetuity.

- *fragment an existing population into two or more populations*

The proposal would reduce habitat connectivity for these species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As both of these species are highly mobile, the proposed action will not fragment any populations of these species.

- *adversely affect habitat critical to the survival of a species*

The National Recovery Plan for the Regent Honeyeater identifies that any breeding or foraging areas where the species is likely to occur is habitat critical to their survival (Commonwealth of Australia 2016). As such, in the region the 'important bird area' around Cessnock (Birdlife International 2016) is likely to be the only area critical to the survival of the species.

The National Recovery Plan for the Swift Parrot (Saunders and Tzaros 2011) outlines that 'habitat critical to the survival of the Swift Parrot includes; those areas of priority habitat for which the Swift Parrot has a level of site fidelity or possess phenological characteristics likely to be of importance to the Swift Parrot, or are otherwise identified by the recovery team'. As such, in this region the 'important bird area' around Cessnock (Birdlife International 2016) is likely to be the only known area critical to the survival of the species.

The vegetation within the study area likely provides opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas. As such, it is unlikely that the 32.03 ha of potential foraging habitat within the development site is critical to the survival of these species.

- *disrupt the breeding cycle of a population*

The Swift Parrot is only known to breed in Tasmania. The Regent Honeyeater is known to breed in three key areas: two of them in NSW i.e. Bundarra-Barraba and Capertee Valley. There have been some historical breeding records from within the Hunter Region but these have occurred in the Kurri – Cessnock area. Therefore, the proposed action is unlikely to disrupt the breeding cycle of either species.

- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

As outlined above, the study area may provide opportunistic foraging habitat and supplementary foraging areas for both of these species. There is a large amount of suitable foraging habitat for these species to be retained within the study area and in the wider locality. As such, the removal of 32.03 ha of foraging habitat within the development area is unlikely to lead to the decline of these species.

- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

The proposed action would not result in any invasive species becoming established in areas of potential habitat for these species. The majority of the vegetation to be retained in the study area is proposed to be secured under a biobanking agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

- *introduce disease that may cause the species to decline*

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Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.

- *interfere with the recovery of the species*

The proposed development is unlikely to interfere with the recovery of these species.

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Mammals

- Spotted-tailed Quoll (*Dasyurus maculatus*)

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population*

This species utilises a range of coastal forest and heath habitats that possess mature trees, old-growth elements and/or dense understoreys, typical of vegetation found in the study area. Given the relatively small area of suitable habitat for the Spotted-tailed Quoll that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of this species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of a local population.

- *reduce the area of occupancy of the species*

The action will lead to the removal of up to 32.03 ha of suitable foraging and marginal denning habitat for this species. The proposed development area will be progressively rehabilitated, as such there is the potential for this species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age. Proposed offset measures will also secure 57.2 ha of similar open forest habitat surrounding the development site in perpetuity.

- *fragment an existing population into two or more populations*

The proposal would reduce habitat connectivity for this species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As this species is highly mobile and occupies large home ranges, the proposed action is unlikely to fragment any populations of this species.

- *adversely affect habitat critical to the survival of a species*

The native vegetation proposed for removal is not considered to represent critical habitat for this species.

- *disrupt the breeding cycle of a population*

The proposal is unlikely to disrupt the breeding cycle of this species.

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- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

There is a large amount of suitable foraging habitat for this species to be retained within the study area and in the wider locality. As such, the temporary removal of 32.03 ha of potential habitat is unlikely to lead to the decline of this species.

- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

The proposed action would not result in any invasive species becoming established in areas of potential habitat for this species. The majority of the vegetation to be retained in the study area is proposed to be secured under a biobanking agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

- *introduce disease that may cause the species to decline*

Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.

- *interfere with the recovery of the species*

The proposed development is unlikely to interfere with the recovery of this species.

Vulnerable Species

- Koala (*Phascolarctos cinereus*)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species*

The Koala was recorded on site during field surveys. Two Koalas were sighted in the south-western part of the study area during the surveys. SAT tests also detected Koala activity on the south-west, central, and north-east parts of the study area. The SAT tests indicate the average Koala activity level across the study area is 8%, with the highest activity level recorded at 13%. During clearing there is the potential for displacement of an individual if the development site forms part of its home-range. The removal of an area of an individual's home range may force it to move, potentially impeding on the home range of another individual. This could result in conflicts in the local area due to the high fidelity the species exhibit to their home range. Based on the assessment of an average home range in the Port Stephens area of 80 – 90 ha (DECC 2008), the proposal has the potential to impact part of the home range of one adult Koala. While there is the potential to displace one individual, this impact is unlikely to be significant due to the large area of similar forest habitat that is contiguous with the study area.

Given the relatively small area of suitable habitat for this species that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of this species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of a local population. Proposed offset measures will include both the provision and long-term protection of habitat containing key feed tree species (for the Koala).

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- *reduce the area of occupancy of an important population*

The action will lead to the removal of up to 11.19 ha of foraging habitat for this species. The proposed disturbance area will be progressively rehabilitated, as such there is the potential for this species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age.

- *fragment an existing important population into two or more populations*

The proposal would reduce habitat connectivity for this species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As this species is highly mobile and occupies large home ranges, the proposed action is unlikely to fragment any local populations.

- *adversely affect habitat critical to the survival of a species*

The *EPBC Act Referral Guidelines for the Vulnerable Koala Combined populations of Queensland, New South Wales and the Australian Capital Territory,* Commonwealth of Australia 2014, outline a Koala habitat assessment tool to determine if a site contains critical Koala habitat. The habitat within the extraction area has been assessed against the criteria, and is detailed in **Table 18** (the site occurs within a coastal area, as such these criterion have been used).

Table 18: Assessment of habitat critical to the survival of the Koala

Attribute	Score	Discussion
Koala Occurrence	+1	Two Koalas were sighted in the south-western part of the study area during the 2013 surveys. SAT tests also detected Koala activity on the south-west, central, and north-east parts of the study area. The SAT tests indicate the average Koala activity level across the study area is 8%, with the highest activity level recorded at 13%.SAT surveys indicated low activity levels (up to 13%) within the study area surrounding the development site. The SAT surveys were completed in 2013, which is within the last 5 years.
Vegetation Composition	+2	The forest in the study area contains *Eucalyptus punctata*, which is a SEPP 44 food tree species. Within the study area, there is also low numbers of *Eucalyptus tereticornis*, which is a SEPP 44 and CKPoM food tree species.
Habitat Connectivity	+2	The patch size of the development site was determined to be >1,000 ha through aerial photo analysis, as identified in the BAR (section 1.2.2).
Key Existing Threats	+1	Vehicle strikes and dog attacks have been identified as a key threat to the Port Stephens population. The study area is located on freehold land that has not been developed for residential or rural land use. The forest is largely intact and no evidence of koala mortality from vehicle strike or dog attack was recorded.
Recovery Value	+1	Uncertain whether the habitat is important for achieving the interim recovery objectives, as it is not known if the habitat is: • Of sufficient size to be genetically robust/operate as a viable sub-population, or • Free of disease or have low incidence of disease, or • Breeding.

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Attribute	Score	Discussion
		The SAT surveys indicated low activity levels (7%) within the development site. The SAT surveys indicate that koalas are moving through the lower-lying areas of the study area (such as along creeklines) rather than through the elevated ridgeline and upper slopes where the development site is situated. The Seven Mile Creek corridor (creekline and associated riparian habitat) is likely acting as the main movement corridor for koalas to move through the study area and will not be cleared for the development. The contiguous habitat surrounding the development site will be retained and protected under a Biobanking Agreement.
Total Score	**7**	**As such the impact area is classified as habitat critical to the survival of the species.**

The impacts of the proposed action were assessed against the factors detailed in Figure 2 (Assessing adverse effects on habitat critical to the survival of the Koala) of the EPBC Act Referral Guidelines (detailed in the following sections). The assessment concluded that while the extraction area was assessed as critical habitat, the impacts of the proposal are unlikely to adversely affect habitat critical to the survival of the species due to the large area of habitat, with similar characteristics, occurring in the locality.

The EPBC Act koala guidelines state that the upper and lower 'thresholds' in the assessment flowchart provides an indication of the level of impact that is likely to be significant and provides the following example: a significant impact would be expected if 25 ha of habitat scoring 6 or 7 was being completely cleared. The study area occurs within the Balickera Koala Management Unit (KMU); (PSC 2002) in the Port Stephens LGA. A relatively large number of records of the Koala occur within a 5 km radius, which suggests that the area is important for the local population. However, the density of records in close proximity to the site are relatively low in comparison to other parts of the Port Stephens LGA, with a higher density of records occurring to the south and east of Grahamstown dam on the Tomaree and Tilligerry peninsulas. On this basis, the proposed development (involving removal of 11.19 ha of Koala habitat within the development area) would be considered unlikely to adversely affect habitat critical to the survival of the koala and a referral is unlikely to be required.

It is also noted that:

- Approximately 79% of suitable Koala habitat in the study area as defined under SEPP 44 would be retained.
- The area of habitat to be removed is relatively small in the context of the extent of similar forest habitat that is contiguous with the development site (estimated <5%).
- The proposal would not isolate habitat and is unlikely to impede movement and dispersal of this species in the study area or locality.

During clearing there is the potential for displacement of an individual if the development site forms part of its home-range. The removal of an area of an individual's home range may force it to move, potentially impeding on the home range of another individual. This could result in conflicts in the local area due to the high fidelity the species exhibit to their home range. Based on the assessment of an average home

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range in the Port Stephens area of 80 – 90 ha (DECC 2008), the proposal has the potential to impact part of the home range of one adult Koala. While there is the potential to displace one individual, this impact is unlikely to be significant due to the large area of similar forest habitat that is contiguous with the study area.

- *disrupt the breeding cycle of an important population*

The proposal is unlikely to disrupt the breeding cycle of this species.

- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

There is a large amount of suitable foraging habitat for these species to be retained within the study area and in the wider locality. As such, the removal of 11.19 ha of foraging habitat is unlikely to lead to the decline of this species.

- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposed action would not result in any invasive species becoming established in areas of habitat for this species. The majority of the vegetation to be retained in the study area is proposed to be secured under a biobanking agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

- *introduce disease that may cause the species to decline*

Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat and is unlikely to introduce disease that may cause the species to decline.

- *interfere with the recovery of the species*

The proposed action was assessed against the impacts detailed in Section 8 of the *EPBC Act Referral Guidelines* to determine if it is likely that the action will substantially interfere with the recovery of the species (detailed in the following sections). The assessment concluded that it is unlikely that the action will substantially interfere with the recovery of the Koala.

Increasing Koala fatalities in habitat critical to the survival of the Koala due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.

The proposed action is unlikely to lead to the increase in dog attacks in the locality as it does not involve the construction of residential dwellings and associated pet ownership. Additionally, the proposed action will implement a vertebrate pest control program within the Subject Land, with wild dogs as one of the target species.

Increasing Koala fatalities in habitat critical to the survival of the Koala due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.

The proposal has the potential for increased impact to the species from vehicle strikes as there will be an increase in traffic. However, traffic assessments concluded that the proposal will only cause a minor increase in traffic volume. It is also worth noting the frequency of traffic on the haul road (10 per hour) reduces potential for obstructing koala passage, especially as haulage is suspended between 10 pm and 5 am where koala movement is higher than during the day.

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The proposed action will implement recognised mitigation measures including installing an underground culvert along the access road and restrict speed limits along internal roads to 40 km/hour in relevant locations. It is recognised that this control is only applicable to the Subject Land.

Facilitating the introduction or spread of disease or pathogens (e.g. Chlamydia or *Phytophthora cinnamomi*) that are likely to significantly reduce the reproductive output of Koalas or reduce the carrying capacity of the habitat.

As outlined above (response to introduce disease criteria), it is unlikely that the proposed action will introduce or spread a disease or pathogen that is harmful to the species or its habitat. As such, the potential for the proposed action to reduce the reproductive output of the species is unlikely.

Creating a barrier to movement to, between or within habitat critical to the survival of the Koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the Koala.

As outlined above (response to habitat fragmentation criteria), the proposal would not isolate habitat and is unlikely to impede movement and dispersal of this species in the study area or locality.

As such, it is unlikely that the proposed action will lead to the long-term reduction in genetic fitness or access to habitat critical to the survival of the Koala.

Change the hydrology which degrades habitat critical to the survival of the Koala to the extent that the carrying capacity of the habitat is reduced in the long-term.

The final landform will be monitored throughout the life of the quarry, to ensure that the level above the maximum predicted groundwater level is maintained. Additionally, no extraction of groundwater is proposed as part of the action. As such, the proposal is unlikely to substantially modify the hydrological regime in the area.

References

DECC (2008). *Recovery Plan for the Koala* (Phascolarctos cinereus), Department of Environment and Climate Change NSW (DECC), Sydney.

DotE (2013). *Matters of National Environment Significance. Significant impact guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999*, Department of the Environment (DotE), Canberra.

DotE (2014). *EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Department of the Environment (DotE), Canberra.

Port Stephens Council (PSC) (2002). *Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) – June 2002*. Prepared by Port Stephens Council with the Australian Koala Foundation.

Bats

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species*

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The Large-eared Pied Bat was recorded on site during field surveys.

The Large-eared Pied Bat is a cave-dwelling species (with roosts also recorded in crevices in cliffs, old mine workings and the disused, bottle-shaped mud nest of the Fairy Martin) which forages in well-timbered areas containing gullies. The development area does not contain roosting habitat for this species.

The Grey-headed Flying-fox was not recorded roosting or foraging within the study area during field surveys, however, eucalypt species within the development area are likely to provide opportunistic foraging resources.

Given the relatively small area of suitable habitat for these species that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of these species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of any local populations. Proposed offset measures will include both the provision and long-term protection of habitat containing foraging resources for these bat species.

- *reduce the area of occupancy of an important population*

The action will lead to the removal of up to 32.03 ha of foraging habitat for these species. The proposed disturbance area will be progressively rehabilitated, as such there is the potential for these species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age.

- *fragment an existing important population into two or more populations*

The proposal would reduce habitat connectivity for these species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As these species are highly mobile and occupy large home ranges, the proposed action is unlikely to fragment any local populations.

- *adversely affect habitat critical to the survival of a species*

The habitat present within the development area is not considered critical to the survival of either bat species.

- *disrupt the breeding cycle of an important population*

The proposal is unlikely to disrupt the breeding cycle of these species.

- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

As outlined above, the study area provides foraging habitat for these species. There is a large amount of suitable foraging habitat for these species to be retained within the study area and in the wider locality. As such, the removal of 32.03 ha of foraging habitat is unlikely to lead to the decline of these species.

- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposed action would not result in any invasive species becoming established in areas of habitat for these species. The majority of the vegetation to be retained in the study area is proposed to be secured under a biobanking agreement. Implementation of a vertebrate pest management plan is

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required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

- *introduce disease that may cause the species to decline*

Provided mitigation measures within a Landscape and Rehabilitation Management Plan are adhered to, the action will not result in the establishment of invasive species into the rehabilitation area or surrounding habitat.

- *interfere with the recovery of the species*

The proposed development is unlikely to interfere with the recovery of these species.

Migratory Bird Species

- Oriental Cuckoo (*Cuculus optatus*)
- Rainbow Bee-eater (*Merops ornatus*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Yellow Wagtail (*Motacilla flava*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Rufous Fantail (*Rhipidura rufifrons*)

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*

One migratory species (Rufous Fantail) was recorded in the study area during the surveys. The remaining migratory bird species were not detected in the study area. The Spotted Gum – Ironbark Forest in the study area represents suitable foraging habitat for these species. The proposed action will directly impact on 32.03 ha of foraging habitat for these species. The proposed action would not substantially modify the ground or surface water hydrology within the vegetation to be retained in the study area, and it is unlikely that there will be modification to any areas of retained habitat for this species due to the proposed action.

The proposal would reduce habitat connectivity for these species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As such, the proposal is considered unlikely to isolate or substantially fragment any important habitat for these species in the study area.

- *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or*

The proposed action would not result in any invasive species becoming established in areas of important habitat for these migratory species. The majority of the vegetation to be retained in the study area is proposed to be secured under a biobanking agreement. Implementation of a vertebrate pest

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management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

- *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) or an ecologically significant proportion of the population of a migratory species.*

Given the relatively large areas of habitat adjoining the study area and as the majority of vegetation in the study area will be retained, including corridors to facilitate movement to the north, it is unlikely that the proposed action will disrupt the lifecycle of an ecologically significant proportion of the population of these species.

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APPENDIX 7: GROUNDWATER DEPENDENT ECOSYSTEM ASSESSMENT

Where present potential impacts to Groundwater Dependent Ecosystems during the construction and operation phases may include:

- Changes to water quantity include draw down of groundwater as a result of dewatering activities during the construction and operation of the proposed development; this may result in increased fluctuation of groundwater levels and affect the rate of groundwater recharge and evapotranspiration during mining operations in the locality. Alteration of surface flow regimes through constructed diversion banks, excavation and detention basins may also affect groundwater levels.

- Potential impacts on water quality include changes in chemical properties of groundwater such as pH, salinity, nutrient levels or other chemical constituents through exposure and disturbance of subsurface materials during the operations. Additionally, there is potential for contamination from petrochemical spills and from polluted stormwater runoff from the proposal.

It is likely that there will be changes to groundwater levels within the study area. However, it is also anticipated that surface water management principles will be implemented to prevent contamination of surface (and therefore groundwater) quality.

For more details, refer to the Water Resources Assessment prepared by Umwelt in Appendix M of the Environmental Impact Statement (JBA Urban Planning Consultants Pty Ltd 2016).

The rapid assessment methodology developed by DLWC (2002) has been used to identify, attribute a value and assess the vulnerability of GDEs within the study area. The assessment steps and responses are given in the following sections.

1. Identify Geographical Area

The study area is identified in **Figure 1, Section 1.1.2**.

2. List GDEs Present

The groundwater dependency of each of the vegetation community variants that occur within the study area was reviewed as listed in **Table 19**. The dependency of the vegetation within the study area was determined through a combination of topographical analysis and site observations. The groundwater dependence of each vegetation community variant was classified into one of the following three categories:

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- Obligate: ecosystems entirely or highly dependent on groundwater;
- Facultative: ecosystems with proportional dependence on groundwater or which may only use groundwater opportunistically or to a very limited extent;
- Non-Groundwater Dependent Ecosystem: ecosystems with no apparent dependence on groundwater.

One vegetation community variant was identified as ground water dependent. The ecosystem identified is typically associated with Shallow Alluvial Groundwater Systems which are associated with the drainage lines and creeks. The distribution of the vegetation community variant in the study area is shown in **Figure 11**.

Table 19: Review of groundwater dependency of vegetation in the study area.

Plant Community Type	Vegetation Community variant	Ecosystem Type	Groundwater System	Groundwater Dependency
HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Seaham Spotted Gum – Ironbark Forest	Terrestrial Vegetation	N/A	Non-GDE
	Hunter Valley Moist Forest	Terrestrial Vegetation	Shallow Alluvial	Facultative

3. Assess the Vulnerability of GDEs

The groundwater dependent ecosystem identified within the study area has been assessed as facultative and is considered to use groundwater opportunistically or to a very limited extent based on the underlying geology and species composition within this community. Therefore, it is not expected that the proposal will influence groundwater levels or quality such that there will be any significant impact on areas of this GDE (outside of the development footprint) within the study area, during both the construction and operation phases provided appropriate controls are implemented.

4. Assess the Value of the Ecosystems

The Hunter Valley Moist Forest community variant within the study area, while having undergone historical modification still holds important values, such as:

- Biodiversity value – the system adds to the ecological diversity of the region;
- They system and its associated vegetation may play an important role in river health; and
- The system is connected to other non-groundwater dependent ecosystems and integrated into the broader environment.

5. List Management Tools to be used

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Management tools proposed for the project area are designed to protect and enhance water features and riparian zones:

- Control and treat stormwater runoff; and
- Impose appropriate conditions on groundwater licences.

6. Prioritise Management Actions

Both are equally important.

7. Implement Management Actions

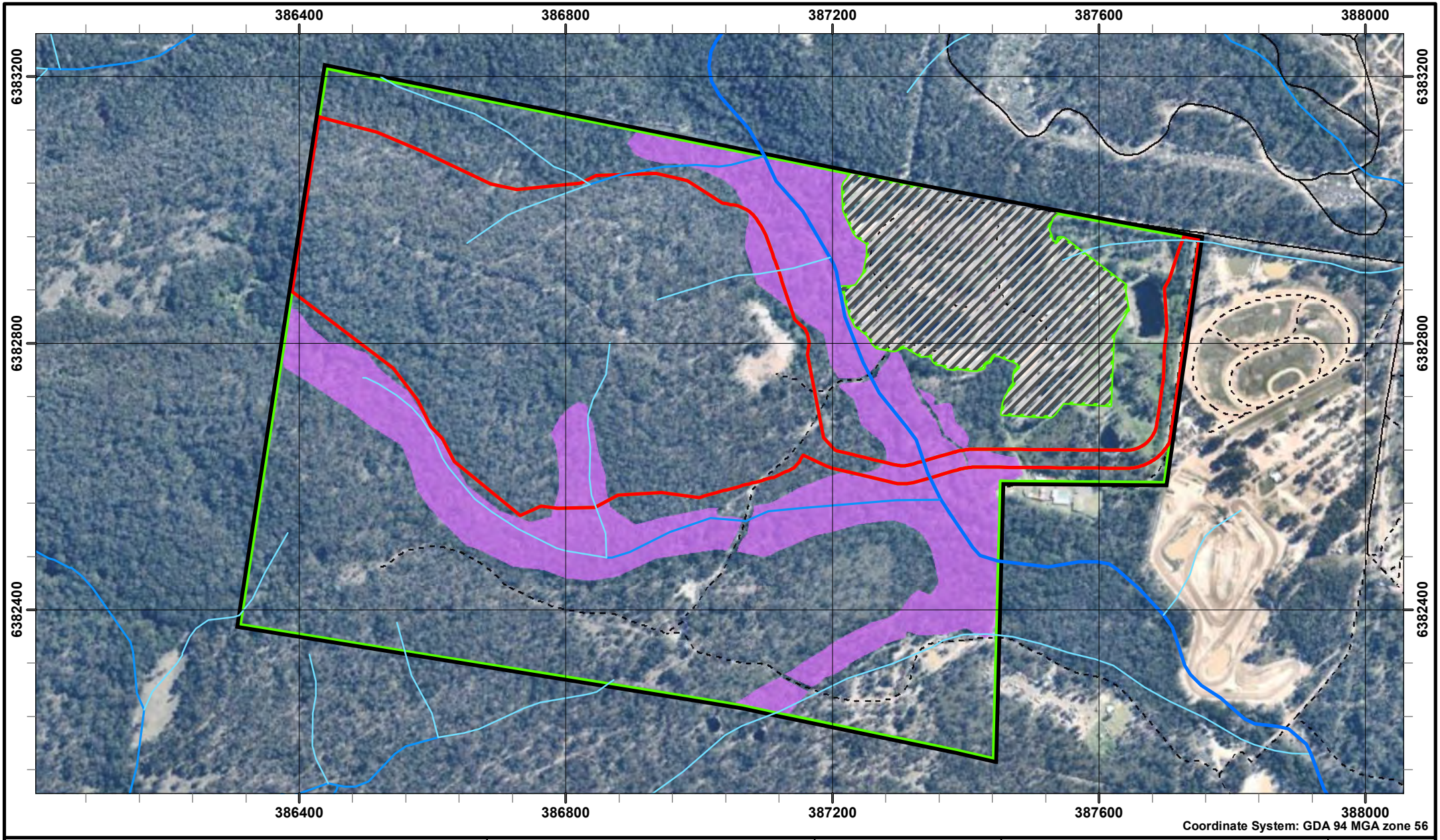
A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) to be prepared for the project must include guidelines for storm water management and erosion and sedimentation control to prevent and minimise impacts on the adjoining GDE areas.

8. Review Process and Outcomes

The groundwater dependent ecosystem identified within the study area has been assessed as facultative and is considered to use groundwater opportunistically or to a very limited extent based on the underlying geology and species composition within these communities. Therefore, it is not expected that the proposal will influence groundwater levels or quality such that there will be any significant impact on the GDE's (outside of the project disturbance) within the study area, during both the construction and operation phases provided appropriate controls are implemented.

Details for monitoring of management actions will be contained within the above management plans.

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Study Area (100.94 ha)
Development Site (33.68 ha)
Offset Site (57.2 ha)
Gardenland (Excluded - 10.05 ha)
Local Road
Track

Ground Water Dependent Ecosystem – Facultative

Hunter CMA Stream Order

1
2
3

Metres
0 25 50 100 150 200 250

N

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DRAWN BY: amarshall

DATA SOURCE:
NSW Land and Property Information - 2016
nearmap - 2016

Distribution of facultative GDE vegetation in the study area

Eagleton Rock Syndicate Pty Ltd
Biodiveristy Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
11

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APPENDIX 8: AQUATIC HABITAT ASSESSMENT

This assessment addresses the relevant Aquatic Habitat Protection Requirements detailed in the SEARs (requirements from NSW Department of Industry, Resources and Energy).

Initial Assessment

Field surveys were undertaken in January 2016 to identify and assess aquatic and riparian habitats within the study area. Prior to undertaking field surveys, mapped watercourses and aerial photos were examined to enable surveys to be targeted in areas most likely to contain aquatic habitat.

Aquatic habitat within the study area was determined to consist of riparian areas associated with six 1st order streams, two 2nd order streams, and one 3rd order stream. The 3rd order stream runs north-west to south-east through the study area. Several constructed dams were also identified in the study area. The locations of the riparian areas and dams in relation to the proposed quarry are shown on **Figure 12**.

Riparian Habitat Condition Assessment

Methods

The condition of the riparian habitat in the study area was assessed using a modified version of AUSRIVAS habitat assessment (Turak *et al*. 2004; Parsons *et al.* n.d.). A combination of Australian Rivers Assessment System (AUSRIVAS) habitat assessments as developed by Victorian and NSW state agencies was used. Parameters included; riparian complexity and width, instream condition, stream substrate complexity, local land use, sources of local and catchment level pollution, shading and water quality were considered as potentially influencing the local aquatic community structure and composition as well as overall river function.

To assist in understanding the main drivers of site condition, HABSCORE was also used. HABSCORE was originally developed by the United States Environmental Protection Agency and has been adapted for Australian conditions by the Environmental Monitoring Unit at the Environment Protection Authority of Victoria (Barbour *et al*. 1999, Barbour and Stribling 1991). It classifies stream habitat condition based on the variety and quality of substrate, channel morphology, bank structure and riparian vegetation (Barbour *et al*. 1999).

It is noted that benchmarked AUSRIVAS assessments were not conducted for the aquatic habitat surveys. Such assessments require macroinvertebrate and water quality sampling as well as macroinvertebrates identifications and AUSRIVAS calculations. The benchmarked assessments were not considered necessary for this assessment.

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Results

The majority of the riparian habitat within the study area is intact and is occasionally dissected by access tracks. The riparian areas consist of the forest vegetation as described in Section 1.3.2**.** Vegetation coverage in most areas was relatively high (50-60% PFC). The ground cover vegetation is relatively low in some areas along the 3rd order stream as result of past disturbance (i.e. Hunter Valley Paintball previously operated in this area).

The stream substrate of the riparian area is comprised mainly of sand and silt although some areas contained large cobbles. Finer substrate and detrital accumulations were moderate although these may have been washed out due to a large rainfall event which occurred a week before the assessment was conducted. The stream banks were relatively stable in most areas, with low levels of erosion of the banks occurring in some areas (particularly at bends in the stream).

During sampling, the 3rd order stream was flowing above the water mark. The water was grey and turbid due to high silt levels but no odour was evident. The proportion of organic material was moderate in most areas and mostly comprised of leaves and twigs.

It is likely that water levels within the creek are much lower at other times of the year and is likely to consist of a series of disconnected pools (as observed during previous ecological surveys). Some macroinvertebrates were observed including Water Striders (Gerridae) and Whirligig Beetles (Gyrinidae), which suggests that the creek rarely dries up entirely. No fish or crustaceans were observed. These species are likely to be largely absent due to the ephemeral characteristics of the habitat.

Terrestrial fauna habitat within the riparian zone includes the associated vegetation, hollow bearing trees, rocks, woody debris and a range of substrates.

No infestation of aquatic weeds or other Macrophytes were observed. No evidence of pollution was observed.

Threatened Species

Database searches were undertaken to compile a list of threatened species, endangered populations and endangered ecological communities listed under the *Fisheries Management Act 1994* which may be present in the study area using the following databases:

- NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife: (www.wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp); and
- Department of the Environment's (DotE) Protected Matters search tool: (www.environment.gov.au/erin/ert/epbc/index.html).

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No threatened freshwater species, endangered populations and endangered ecological communities listed under the FM Act have been recorded within the locality (5km radius of the study area). Following the database searches and habitat assessment, it is considered unlikely that any threatened aquatic species would occur in the study area.

Photo Monitoring Points

Four photo monitoring points were established at locations within the riparian zones during the surveys in January 2016 (**Figure 12**). Two photo monitoring points were placed adjacent to 1st order streams occurring centrally within the study area. One monitoring point was placed adjacent to a 2nd Order stream to the north east of the development site boundary. The fourth monitoring point was placed adjacent to the 3rd order stream on the eastern side of the development site boundary.

All of the photographs (included below) show that the riparian vegetation is healthy condition. No dieback was evident and no major weed infestations were present during the assessment.

Assessment of Likely Impacts

The proposed development would directly impact on riparian habitat associated with three 1st order streams occurring within the footprint. The project also has the potential to have indirect impacts on other drainage lines adjoining the development site during the construction and operation phases through erosion, sedimentation and contaminants in stormwater run-off.

The proposal would also involve construction of a new bridge across the 3rd order stream (Seven Mile Creek) for the haul road. This would directly impact a small section of riparian vegetation during construction, and has the potential to have indirect impacts downstream during the construction phase through erosion and sedimentation, and introduction of weeds. While the assessment indicated that the occurrence of fish species is unlikely given the creek is ephemeral, the bridge will be designed so as to maintain connectivity and ensure movement of aquatic fauna would not be impeded.

Ameliorative Measures

Details of proposed ameliorative measures are provided in Section 2.1.3 of the BAR. In summary, a number of management plans would be prepared and implemented for the proposed development to minimise impacts on adjoining terrestrial and aquatic habitats during the construction and operation phases. Additionally, the retained riparian habitat adjoining the development site in the study area is proposed to be secured under a biobanking agreement, which involves the implementation of a range of management actions to improve biodiversity values across the site.

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Plate 1: **Riparian Photo Monitoring Point 1**



Plate 2: **Riparian Photo Monitoring Point 2**

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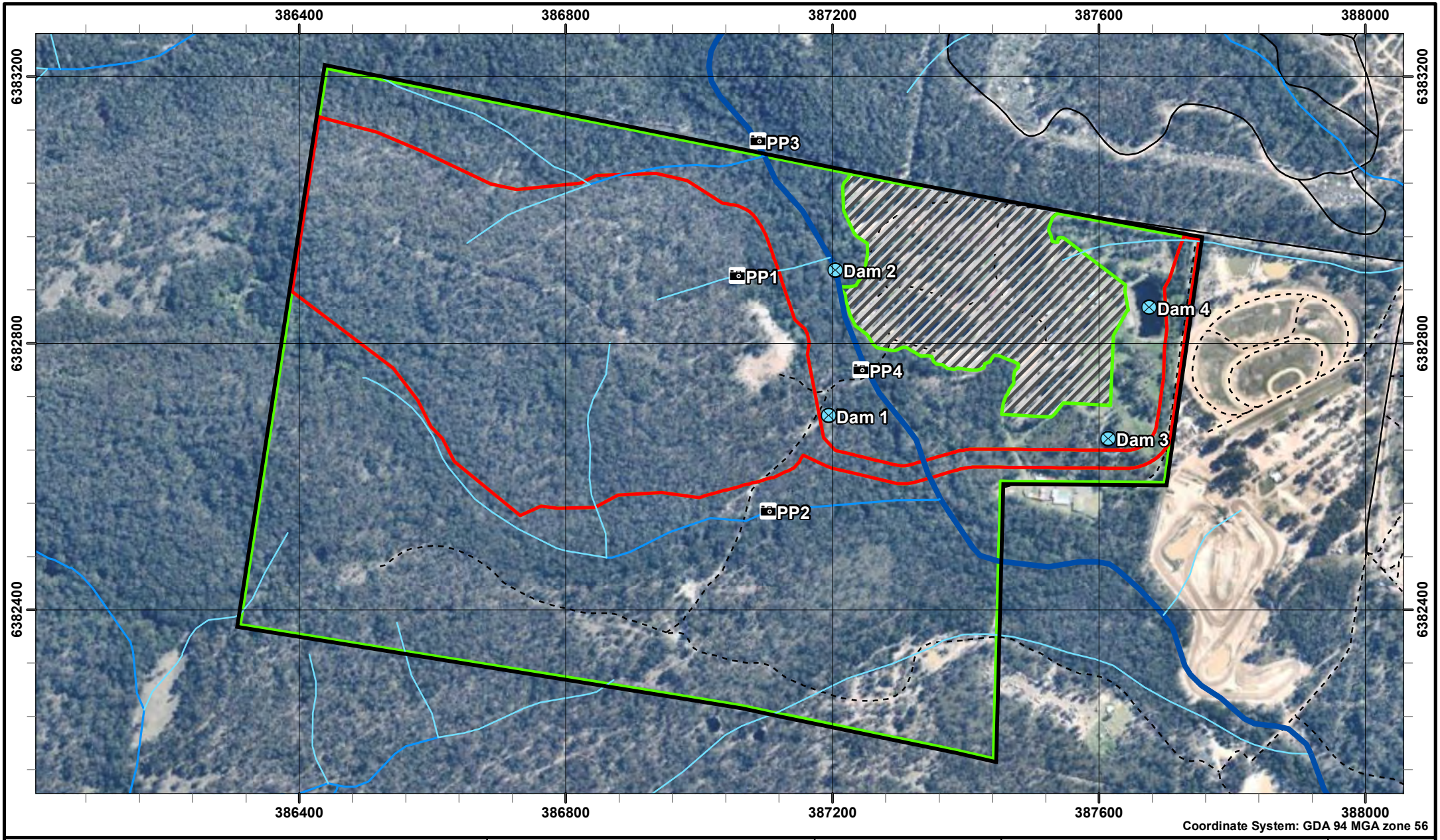


Plate 3: Riparian Photo Monitoring Point 3



Plate 4: Riparian Photo Monitoring Point 4

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Local Road
- Track
- Development Site (33.68 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Dam
- Photo Point

Hunter CMA Stream Order

- 1
- 2
- 3

Metres
0 25 50 100 150 200 250

N

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DRAWN BY: amarshall

DATA SOURCE:
NSW Land and Property Information - 2016
nearmap - 2016

Riparian Habitat Assessment - Development & Offset Sites

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
12

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APPENDIX 9: FAUNA SPECIES RECORDED IN THE STUDY AREA (2013)

	Scientific Name	Common Name
Amphibians		
1	*Limnodynastes peronii*	Striped Marsh Frog
2	*Litoria fallax*	Dwarf Green Tree Frog
3	*Litoria latopalmata*	Broad Palmed Frog
4	*Litoria peronii*	Peron's Tree Frog
5	*Pseudophryne coriacea*	Red Backed Toadlet
6	*Uperoleia laevigata*	Smooth Toadlet
Birds		
1	*Acanthiza lineata*	Striated Thornbill
2	*Acanthiza pusilla*	Brown Thornbill
3	*Acanthorhynchus tenuirostris*	Eastern Spinebill
4	*Anas castanea*	Chestnut Teal
5	*Anas superciliosa*	Pacific Black Duck
6	*Aquila audax*	Wedge- tailed Eagle
7	*Aviceda subcristata*	Pacific Baza
8	*Chenonetta jubata*	Australia Wood duck
9	*Climacteris picumnus*	Brown Treecreeper
10	*Colluricincla harmonica*	Grey Shrike-thrush
11	*Cormobates leucophaea*	White- throated Treecreeper
12	*Corvus coronoides*	Australian Raven
13	*Cracticus tibicen*	Australian Magpie
14	*Cracticus torquatus*	Grey Butcherbird
15	*Dacelo novaeguineae*	Laughing Kookaburra
16	*Dicaeum hirundinaceum*	Mistletoebird
17	*Eopsaltria australis*	Eastern Yellow Robin
18	*Eurystomus orientalis*	Dollarbird
19	*Geopelia humeralis*	Bar- shouldered Dove
20	*Gerygone olivacea*	White- throated Greygone
21	*Grallina cyanoleuca*	Magpie-lark
22	*Greygone mouki*	Brown Greygone
23	*Leucosarcia melanoleuca*	Wonga Pigeon
24	*Lichenostomus chrysops*	Yellow Faced Honeyeater
25	*Malurus cyaneus*	Superb Fairy-wren
26	*Manorina melanocephala*	Noisy Miner
27	*Meliphaga lewinii*	Lewin's Honeyeater

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	Scientific Name	Common Name
28	*Melithreptus lunatus*	White-naped Honeyeater
29	*Myiagra rubecula*	Leaden Flycatcher
30	*Myzomela sanguinolenta*	Scarlet Honeyeater
31	*Neochmia temporalis*	Red- browed Finch
32	*Ocyphaps lophotes*	Crested Pigeon
33	Oriolus sagittatus	Olive- backed Oriole
34	*Pachycephala rufiventris*	Rufous Whistler
35	*Pardalotus punctatus*	Spotted Pardalote
36	*Pelecanus conspicillatus*	Australian Pelican
37	*Petroica boodang*	Scarlet Robin
38	*Philemon corniculatus*	Noisy Friarbird
39	*Platycercus eximius*	Eastern Rosella
40	*Podargus strigoides*	Tawny Frogmouth
41	*Psophodes olivaceus*	Eastern Whipbird
42	*Ptilonorhynchus violaceus*	Satin Bowerbird
43	*Rhipidura albiscapa*	Grey Fantail
44	*Rhipidura leucophrys*	Willie Wagtail
45	*^Rhipidura rufifrons*	^Rufous Fantail
46	*Sericornis frontalis*	White-browed Scrubwren
47	*Strepera graculina*	Pied Currawong
48	*Trichoglossus haematodus*	Rainbow Lorikeet
49	*Vanellus miles*	Masked Lapwing
50	*Zosterops lateralis*	Silvereye
Mammals		
1	*Antechinus stuarti*	Brown Antechinus
2	**Cervus timorensis*	*Deer
3	*#+Chalinolobus dwyeri*	#+Large-eared Pied Bat
4	*Chalinolobus gouldii*	Gould's Wattled Bat
5	*Chalinolobus morio*	Chocolate Wattled Bat
6	*#Falsistrellus tasmaniensis*	# Eastern False Pipistrelle
7	**Felis catus*	*Cat
8	*Macropus rufogriseus*	Red- necked Wallaby
9	*#Miniopterus australis*	# Little Bentwing-bat
10	*#Mormopterus norfolkensis*	# Eastern Freetail-bat
11	*#Myotis macropus*	# Large-footed Myotis
12	*Nyctophilus sp.*	Unidentified Long-eared Bat
13	*Petaurus breviceps*	Sugar Glider
14	*#+Phascolarctos cinereus*	#+Koala
15	*Rattus fuscipes*	Bush Rat

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	Scientific Name	Common Name
16	*Rattus lutreolus*	Swamp Rat
17	**Rattus rattus*	*Black Rat
18	*Tadarida australis*	White-striped Freetail-bat
19	*Tarida australis*	White Striped Mastif Bat
20	*Trichosurus vulpecula*	Common Brushtail Possum
21	*Vespadelus pumilus*	Eastern Forest Bat
22	*#Vespadelus troughtoni*	# Eastern Cave Bat
23	*Vespadelus vulturnus*	Little Forest Bat
Reptiles		
1	*Dendrelaphis punctulata*	Green Tree Snake
2	*Lampropholis delicata*	Delicate Skink
3	*Physignathus lesueurii*	Eastern Water Dragon
4	*Pseudonaja textilis*	Eastern Brown Snake
5	*Tiliqua scincoides scincoides*	Blue Tongue Lizard

# denotes a threatened species listed as Vulnerable under the TSC Act
+ denotes a threatened species listed as Vulnerable under the EPBC Act
^ denotes an EPBC Act-listed migratory species
* denotes an introduced species

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APPENDIX 10: BRUSH-TAILED PHASCOGALE HABITAT MAPPING

The information detailed below is provided due to questions raised by Port Stephens Council in their submission regarding the proposed development. Council "noted that important habitat for the Brush-tailed Phascogale is known within Kings Hill, located to the south of the proposed development. Accordingly, potential cumulative impacts should be assessed".

In response to Council's submission, the cumulative impact on Brush-tailed Phascogale habitat within a 10 km radius of the study area has been estimated using data available to Kleinfelder. This includes data from the EcoBiological (2010) study of the Kings Hill development, LHCCREMS vegetation map data and Port Stephens Council zoning maps. It is acknowledged that more recent studies have been completed for the Kings Hill development; however, this data is not publicly available. As such, the values calculated by Kleinfelder for the 10 km locality is acknowledged to be broad and is likely to over-estimate the cumulative impacts on Phascogale habitat.

The LHCCREMS vegetation communities treated as Phascogale habitat in this assessment are listed in **Table 20**. These LHCCREMs communities have been matched with vegetation types listed on the OEH threatened species profile page for the Brush-tailed Phascogale within the Hunter – Central Rivers CMA (link provided below).

http://www.environment.nsw.gov.au/threatenedspeciesapp/profileData.aspx?id=10613&cmaName=Hunter-Central+Rivers

The Council zones that are considered to retain Phascogale habitat include:

- E1 – National Parks and Nature Reserves
- E2 – Environmental Conservation
- E3 – Environmental Management
- RE1 – Public Recreation
- RE2 – Private Recreation
- SP1 – Special Activities (Hunter Water Land)
- W1 – Natural Waterways

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- W2 – Recreational Waterways

The vegetation within these zones is protected by the zone objectives and by the associated restrictions on development in that zone. With respect to Hunter Water land, the retention of native vegetation is a key part of the management of the catchment's water supply and is unlikely to be cleared on any substantial scale.

Table 20: Brush-tailed Phascogale Habitat Mapping results

Brush-tailed Phascogale Habitat Classification / Community	Area (ha) within Conservation Zoning	Area (ha) within Development Zoning	Totals (ha)
Marginal			
Alluvial Tall Moist Forest	17	142	159
Coastal Narrabeen Moist Forest	17	21	38
Coastal Ranges Open Forest	1	120	121
Coastal Sand Wallum Woodland - Heath	241	8	249
Coastal Sheltered Apple - Peppermint Forest	1	4	5
Dry Rainforest Canopy Dominant	27	3	30
Hunter Valley Dry Rainforest	144	221	365
Riparian Melaleuca Swamp Woodland	569	295	864
Swamp Mahogany - Paperbark Forest	251	288	539
Swamp Oak Rushland Forest	23	57	80
Swamp Oak Sedge Forest	42	127	169
Sub-total	**1333**	**1286**	**2619**
Optimal			
Coastal Plains Scribbly Gum Woodland	4	96	100
Coastal Plains Smooth-barked Apple Woodland	3077	4636	7713
Coastal Sand Apple - Blackbutt Forest	449	45	494
Hunter Lowland Redgum Forest	23	165	188
Hunter Valley Moist Forest	771	1063	1834
Lower Hunter Spotted Gum - Ironbark Forest	41	695	736
Seaham Spotted Gum Ironbark Forest	861	3155	4016
Sub-total	**5226**	**9855**	**15081**
Grand Total	**6559**	**11141**	**17700**

The total mapped Optimal habitat within 'conservation' zonings within a 10 km radius of the study area was 5,226 ha compared with 9,855 ha within 'development' zonings, resulting in a grand total of 15,081 ha of Optimal Brush-tailed Phascogale habitat in the locality (**Figure 13**, **Table 20**).

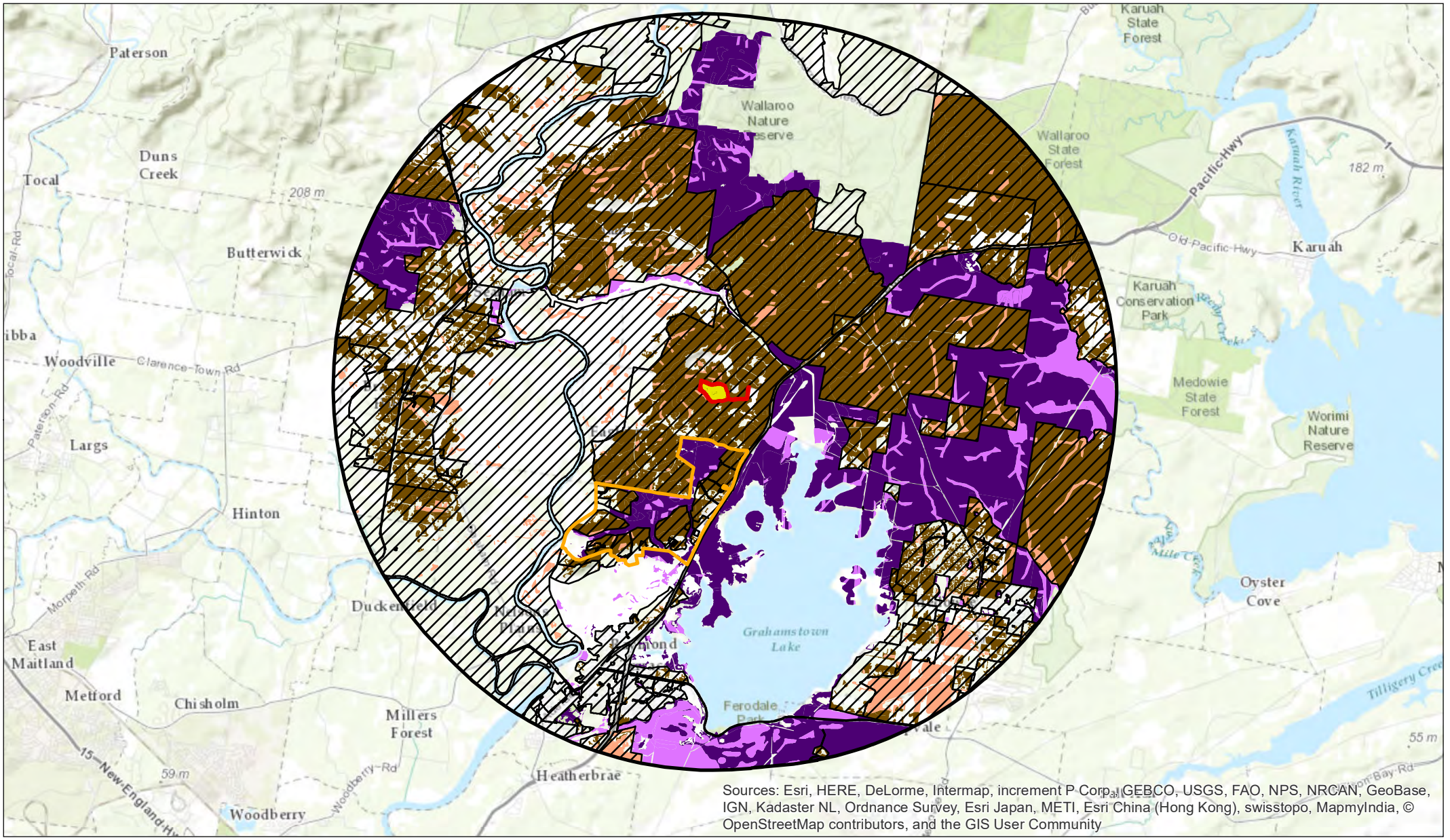
The cumulative area of impact on Phascogale habitat (based on the current development proposal and the Kings Hills development (ecobiological (2010) development footprint)) is estimated to be 281 ha of optimal habitat (dry sclerophyll forest and woodland types) (**Figure**

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13). This represents approximately 3% of the mapped optimal habitat within current 'development' zonings and 2% of the total optimal habitat available in the locality. Currently, the area of optimal and marginal Brush-tailed Phascogale habitat in reserves or retained under conservation zoning provisions is 6,559 ha (or 37%).

Therefore, it is concluded that cumulative impacts (NB: restricted to assessing the current proposal and the Kings Hills development – as details of any other development applications within adjoining lands are not known) on the local Brush-tailed Phascogale population are unlikely to be significant.

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- Project Footprint
- Kings Hill Proposed Development
- 10km Buffer around Footprint
- Habitat in Development Area
- Development Zoning
- Marginal Habitat
- Optimal Habitat
- Marginal Habitat in development zoning
- Optimal Habitat in development zoning

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GDA 94 MGA zone 56

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DATA SOURCE:
NSW Land and Property Information - 2016
Hunter CMA - 2013
nearmap - 2016

Brush-tailed Phascogale Habitat within 10km

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Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:

13

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APPENDIX 11: STAFF CONTRIBUTIONS

The qualifications, title, and contribution of each staff member involved in this assessment are outlined in the following table.

Name	Qualification	Title/Experience	Contribution
Adam Blundell	B. Env Sc. (Hons)	Principal Ecologist	Report review (2016)
Aaron Mulcahy	BEnv Sc & Mgt MScStud (Botany) Accredited Biobanking Assessor (no. 172)	Senior Ecologist	Vegetation surveys, credit calculations, and report writing (2016)
Dan Pedersen	BSc (Biology)	Senior Ecologist	Targeted threatened flora surveys, vegetation mapping and report review (2013)
Gayle Joyce	BSc (Forestry) (Hons)	GIS Specialist	GIS and figure preparation
Gilbert Whyte	PhD	Senior Ecologist	Riparian Habitat Assessment
Kristy Peters	B. ParkMgt (Hons)	Senior Ecologist	Report review (2016) and report update (2017)
Luke Foster	B. Sc. Env & Mgt M. Env Sci	Ecologist	Fauna trapping and nocturnal surveys, anabat analysis, SAT Tests and report writing (2013)
Philippa Fagan	BBioCons	Ecologist	Vegetation surveys (2016)
Samara Schulz	B. Env Sc. & Mgt (Hons) Accredited Biobanking Assessor (no. 167)	Senior Ecologist	Targeted threatened flora surveys, vegetation mapping, SAT Tests and report writing (2013)
Steve Williams	BSc (Ecology)	Ecologist	Vegetation surveys (2016)

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APPENDIX 5. BIOBANKING CREDIT REPORT (2017)

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Biodiversity Offset Strategy



Eagleton Rock Syndicate Pty Ltd

Eagleton Quarry

13 Barleigh Ranch Way, Eagleton NSW

17 July 2017

Biodiversity Offset Strategy

Eagleton Quarry

13 Barleigh Ranch Way, Eagleton NSW

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Project Number: 20163494
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Prepared for:

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Abbreviations

BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology (2014)
BOS	Biodiversity Offset Strategy
ECs	Ecosystem Credits
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
FBA	Framework for Biodiversity Assessment
GIS	Geographic Information System
ha	hectares
IBRA	Interim Biogeographic Regionalisation of Australia
OEH	Office of Environment and Heritage (NSW)
RDP	Rapid Point Data
SCs	Species Credits
TEC	Threatened Ecological Community (as defined under Commonwealth and NSW Legislation)
TSC Act	*Threatened Species Conservation Act* 1995 (NSW)

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STAGE 3: BIODIVERSITY OFFSET STRATEGY

Kleinfelder were commissioned by Eagleton Rock Syndicate Pty Ltd to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) for a proposed hard rock quarry at Lot 2 DP1108702, 13 Barleigh Ranch Way, Eagleton NSW (hereafter referred to as the 'study area'). The BAR and BOS have been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD 7332, dated 6 November 2015). The relevant SEARs relating to these reports include:

- *"Accurate predictions of any vegetation clearing on site;*
- *A detailed assessment of the potential biodiversity impacts, paying particular attention to threatened species, populations and ecological communities, having regard to the requirements of OEH (see Attachment 2); and*
- *A detailed description of the proposed measures to maintain or improve the biodiversity values of the region in the medium to long term"* (p.2).

Points 1 and 2 are addressed in the BAR, and point 3 is addressed in the BOS (this report). This project has been assessed under the NSW Biodiversity Offsets Policy for Major Projects using the Framework for Biodiversity Assessment (FBA) (OEH 2014) in accordance with OEH's requirements in the SEARs. This BOS forms an addendum to the BAR and provides an assessment of proposed offset measures for the development, including their suitability to compensate for loss of biodiversity values on the proposed development site.

This strategy has been structured to comply with the reporting requirements of the FBA, as detailed in Appendix 9 of the FBA. Section 1.1 of this strategy provides an assessment of the proposed onsite offset site. Section 1.2 of this strategy provides a summary of the biodiversity credits for the proposed development and offset sites, and Section 1.3 details the proposed strategy for securing any remaining biodiversity offsets/credits not fulfilled by the onsite offset.

1.1 OFFSET SITE

1.1.1 Site Description

It is proposed that the majority of land not subject to development within Lot 2 DP 1108702 be secured as a biobank site as part of the offset for the project. The proposed offset site is 60.83 ha and occupies that southern and eastern parts of the study area. The proposed offset site would exclude the existing operational areas of Port Stephens Gardenland which is located on the north-east part of the site. The majority of the offset site is vegetated with dry sclerophyll

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forest. Small areas of modified grasslands (1.56 ha), dams (0.61 ha), un-vegetated areas and access tracks (1.41 ha) also occur in the proposed offset site.

A Location Map and Site Map of the proposed offset site is provided in **Figures 1 and 2** respectively.

1.1.2 Landscape Features

1.1.2.1 Identification of Landscape Features

The landscape features detailed in Section 4.1 of the BBAM 2014 including IBRA bioregion, IBRA subregion, Mitchell landscape, rivers and streams, wetlands, and the extent of native vegetation in the outer assessment circle for the offset site are described in **Table 1**. These landscape features are also shown in **Figure 1, Section 1.1.1**.

Table 1: Landscape features of the offset site

Landscape Feature	Offset Site
IBRA bioregion	NSW North Coast
IBRA subregion	Karuah Manning
Mitchell landscape	Newcastle Coastal Ramp
River, streams and estuaries	The biobank site contains a series of 1st order streams, two 2nd order streams and one 3rd order stream (i.e. Seven Mile Creek) and the associated riparian buffers
Wetlands	No important or local wetlands occur within the biobank site.
Native vegetation extent	See Section 1.1.2.2
State or regionally significant biodiversity links	None identified

1.1.2.2 Determining Landscape Values

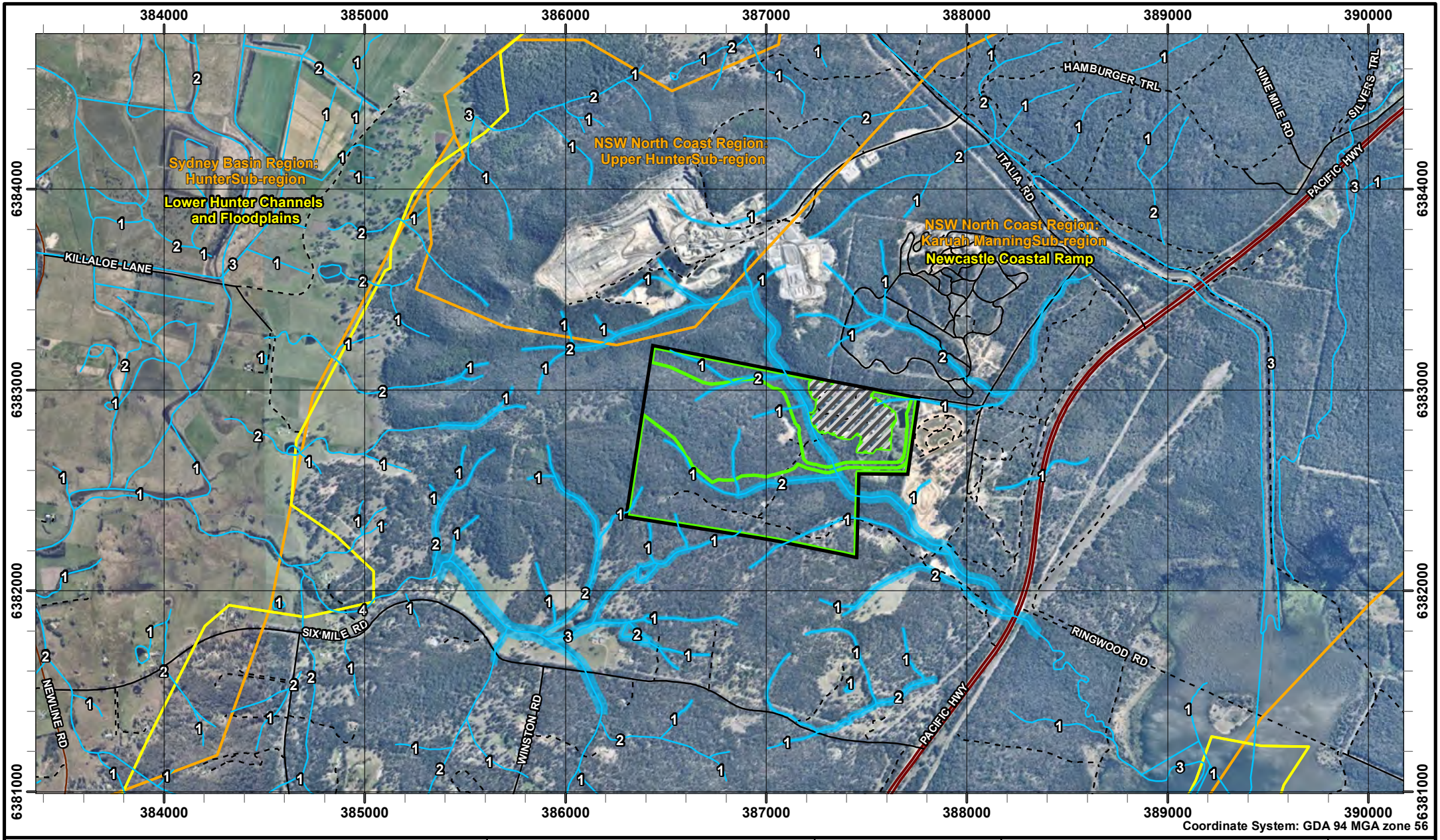
The landscape assessment for the offset site was undertaken in accordance with Section 4.2 and Appendix 6 of the BBAM 2014 through a combination of GIS analysis and ground-truthing. The patch size was determined to be >1,000 ha through aerial photo analysis. The offset site was assessed as occurring within a 'strategic location' as defined in Section 4.2.6 and Appendix 6 of the BBAM 2014 as the site contains a riparian buffer on both sides of a 3rd order stream (i.e. Seven Mile Creek).

Details of the landscape assessment are provided in **Table 2** and **Figure 3**.

Table 2: Offset site landscape assessment

Assessment Circle	Vegetation cover before biobank	Vegetation cover after biobank
100 ha circle	73% (71-75)	73% (71-75)
1000 ha circle	74% (71-75)	74% (71-75)
Patch Size	**Landscape Value Score**	
>1000 ha	21.00	

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Riparian Buffers
- Mapped Rivers & Streams (labelled with stream order)
- Mitchell Landscapes Boundary (V3)
- IBRA Subregion Boundary (V7)
- PrimaryRoad
- Sub-arterial Road
- Local Road
- Track

Metres
0 100 200 400 600 800 1,000

N

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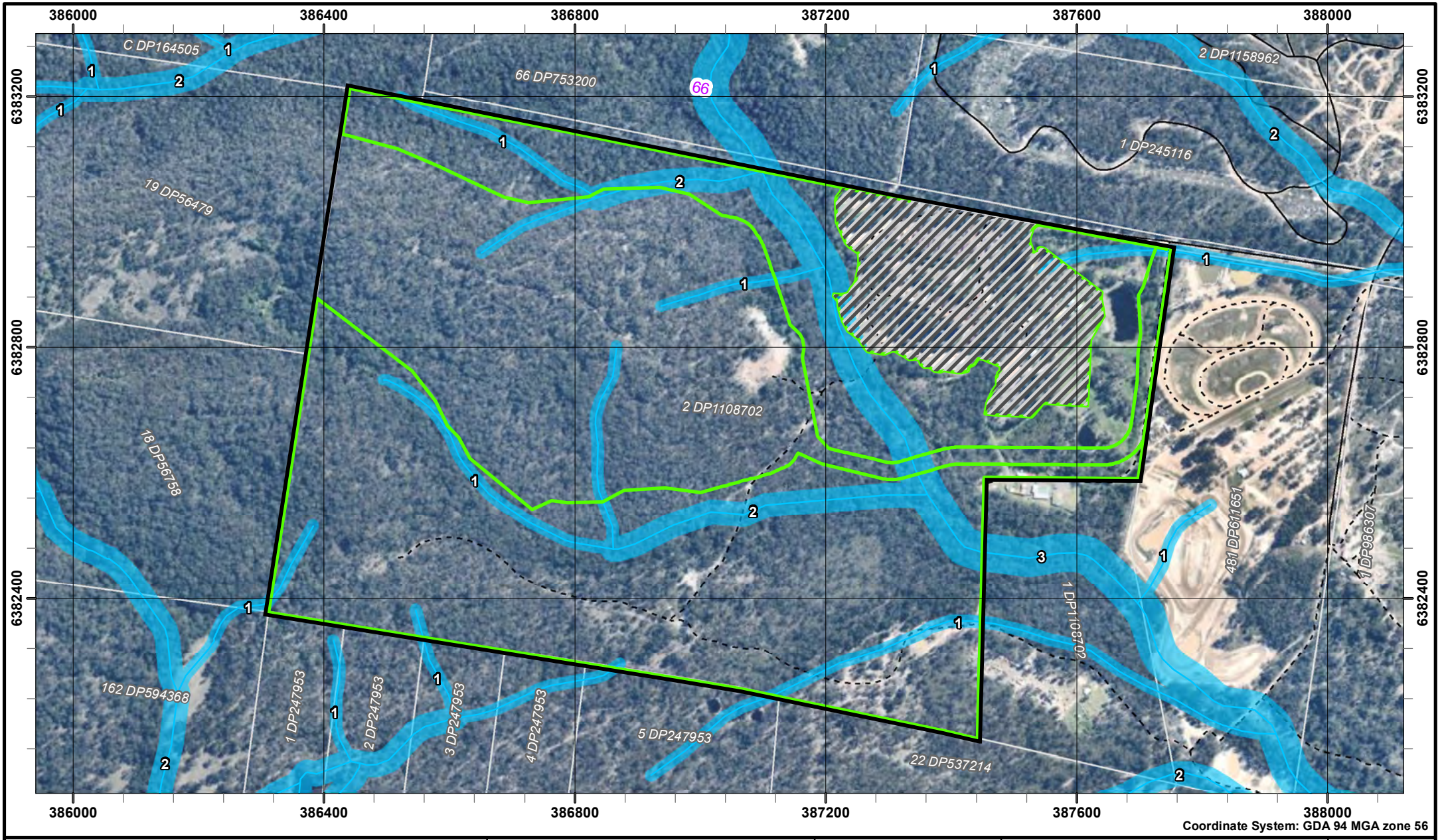
PROJECT REFERENCE: 20173040
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DRAWN BY: bdeane
DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Location Map - Offset Site

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FIGURE:
1

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Study Area (100.94
Offset Site (57.2 ha)
Gardenland (Excluded - 10.05 ha)

Local Road
Track
Mapped Rivers & Streams (labelled with stream order)
Lot
Riparian Buffers

Metres
0 25 50 100 150 200 250

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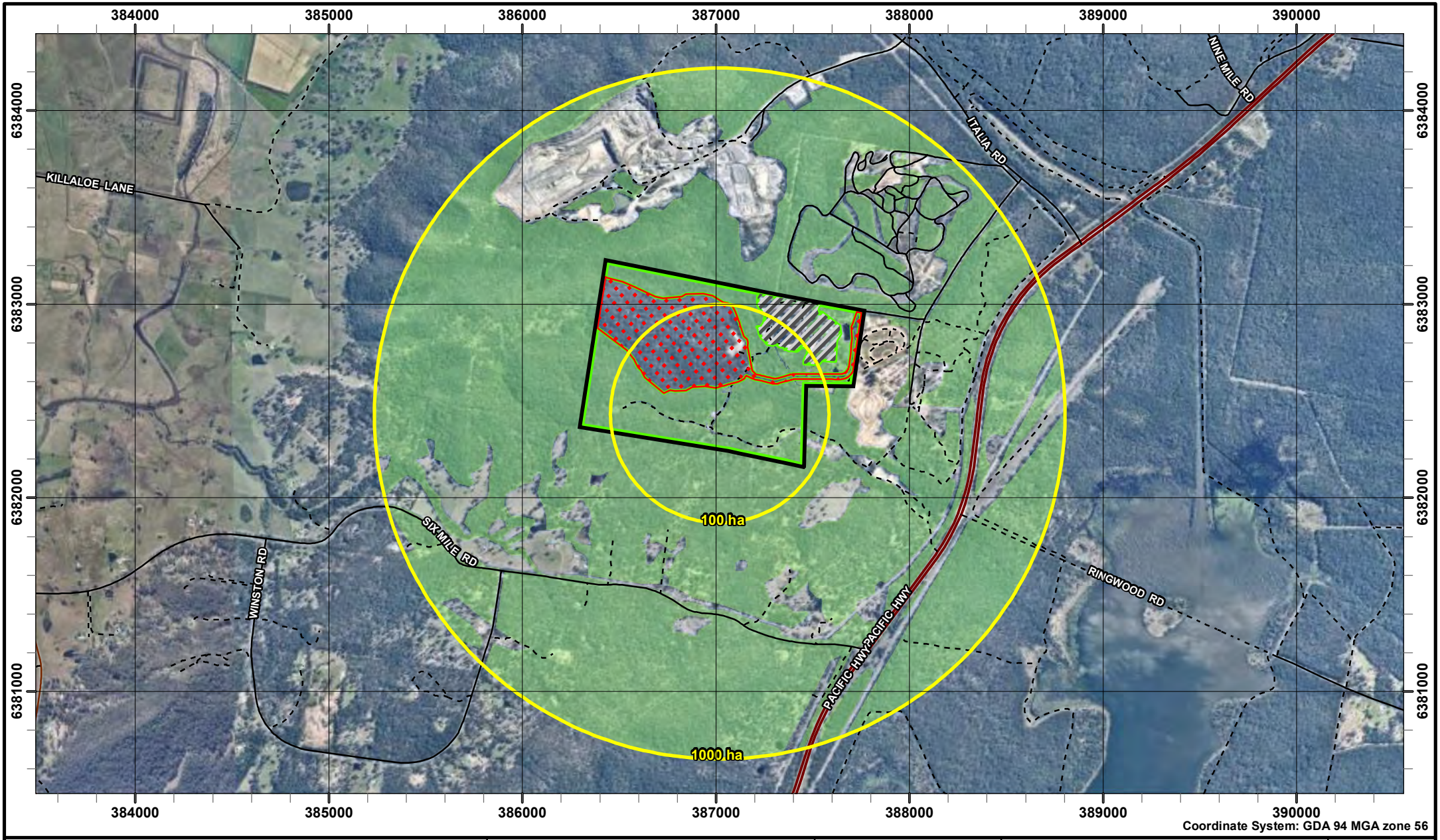
DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Site Map - Offset Site

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FIGURE: 2

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Development Site (33.7 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Assessment Circles
- Native Vegetation
- Primary Road
- Sub-arterial Road
- Local Road
- Track

Metres
0 100 200 400 600 800 1,000

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DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Landscape Assessment - Offset Site

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FIGURE: 3

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1.1.3 Native Vegetation

1.1.3.1 Methodology

Native vegetation at the offset site was assessed in accordance with Section 5 of the BBAM 2014. Full descriptions of the specific methods used to undertake the assessment of the native vegetation in the offset site are provided in Section 1.3.1 of the BAR.

1.1.3.2 Assessment Results

The vegetation within the proposed offset site was determined to comprise two plant community types (PCTs) as defined in the VIS database: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest; and HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley. These PCTs are not consistent with any threatened ecological communities (TECs) listed under the TSC Act 1995 and/or EPBC Act. Section 1.3.2 of the BAR provides detailed discussion of the vegetation classification across the study area (i.e. development and offset sites) and justification for determining that the vegetation in the study area is not consistent with any TECs.

The HU804 vegetation in the offset site was stratified into three vegetation zones based on differences in vegetation structure and condition resulting from past disturbance:

1. HU804_moderate-good: this zone includes the majority of HU804 vegetation in the offset site and contains vegetation in relatively high condition with low disturbance.

2. HU804_moderate-good_medium: this zone includes areas of HU804 in the southern and north-east parts of the offset site which have been degraded through understorey slashing and/or disturbance, and past clearing. However, these areas still contain relatively high native overstorey cover and/or native ground cover. Weed abundance is higher in this zone than zone 1.

3. HU804_low: this zone consists of modified exotic grasslands that are currently slashed, and small areas of highly disturbed vegetation. It is proposed that these areas be revegetated to improve connectivity on the eastern side of the site.

4. HU804_moderate-good_poor: a very small area of this zone has been mapped on the north-east part of the site, and consists of a thin strip of planted and regenerating native trees with no native understorey (i.e. dominated by Lantana). As this zone is <0.25 ha it has been mapped in with the adjoining vegetation zone for the calculations.

The HU798 vegetation in the offset site was identified as the riparian vegetation associated with Seven Mile Creek in the eastern part of the proposed offset site. The occurrence of HU798 within the offset site comprises a fourth vegetation zone:

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5. HU798_moderate-good: this zone includes all of HU798 vegetation in the offset site and contains vegetation in relatively high condition with low disturbance.

A number of small un-vegetated areas and access tracks also occur within the offset site.

Table 3 provides a detailed description of each PCT, including the vegetation class, floristic description, and justification of evidence used to determine PCTs. **Figure 4** shows the distribution of PCTs / vegetation zones on the offset site. Plot and transect data are provided in Appendix 3 of the BAR.

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Table 3: Descriptions of PCTs and vegetation zones within the offset site

Veg Zone	Plant Community Type	Vegetation Class	Floristic description	Justification for PCT selection	Area (ha)
1	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (moderate-good) **Equivalent Somerville (2009) map unit:** MU65 Spotted Gum/ Broad-leaved Mahogany/ Red Ironbark moist shrubby open forest	Hunter-Macleay Dry Sclerophyll Forests	The canopy layer of this community on the site is typically dominated by *Corymbia maculata* with a range of co-dominant species across the site including *Eucalyptus punctata, E. acmenoides, E. fibrosa, E. crebra,* and *E. globoidea*. Within the drainage lines, other co-dominants the relative abundance of *E. punctata* and *E. acmenoides* is higher, and other co-dominants such as *E. siderophloia, C. gummifera* and *Angophora costata* also occur. The midstorey is sparse across most of the site, with a higher midstorey cover typically occurring in the drainage lines. Common midstorey species include *Dodonaea triquetra*, *Allocasuarina torulosa, Acacia falcata*, *Persoonia linearis, Melaleuca nodosa, Myrsine variabilis, Glochidion ferdinandi, Acacia irrorata* and *Melaleuca styphelioides.* The shrub layer ranges from moderately sparse to dense, with common species including *Leucopogon juniperinus*, *Breynia oblongifolia*, *Bursaria spinosa, Pultenaea villosa, Leptospermum polygalifolium, Zieria smithii, Acacia ulicifolia, Acrotriche divaricata* and *Notelaea ovata*. Common native species in the ground layer include *Imperata cylindrica*, *Microlaena stipoides, Themeda australis, Entolasia stricta, Oplismenus aemulus, Lepidosperma laterale*, *Dianella caerulea*, *Lomandra longifolia, Lomandra multiflora, Pratia purpurascens, Desmodium rhytidophyllum* and *Cheilanthes sieberi*. This majority of this vegetation zone has a relatively low abundance of exotic species. The most abundant exotic species in this vegetation zone is *Lantana camara*, which occurs most frequently in the drainage lines and lower slopes.	HU804 was determined as the closest equivalent PCT for this community on the site. Comparison of floristic data indicates a very high similarity between this PCT and the community onsite, with the majority of species listed in the VIS for HU804 recorded consistently across this vegetation zone. The following key species that have been relied upon for identification of this vegetation type were consistently present and/or recorded at relatively high abundance within the plots conducted: *Corymbia maculata, Eucalyptus fibrosa, Allocasuarina torulosa, Persoonia linearis, Leucopogon juniperinus, Breynia oblongifolia, Bursaria spinosa, Pultenaea villosa, Microlaena stipoides, Themeda australis, Lepidosperma laterale, Dianella caerulea, Lomandra multiflora, Pratia purpurascens,* and *Cheilanthes sieberi.* The structure of this vegetation on the site is consistent with the description for HU804, comprising an open eucalypt forest with a grass understorey. The description for HU804 is also consistent with the location and landscape position (i.e. low ranges of the lower Hunter Valley) of this community on the site. All PCTs in the dry sclerophyll forest (shrub/grass) subformation, and the wet sclerophyll forest formations (i.e. for assessing vegetation in the drainage lines) listed for the Hunter-Central Rivers CMA were considered in undertaking the above determination. Four other potentially suitable PCTs were identified (HU803, HU806, HU814 and HU798). HU803 was considered the next closest equivalent PCT as it has a relatively high similarity in all strata for this community onsite; however, this PCT was excluded as it is described as occurring on the Central Coast, and does not list the Mitchell landscape of the site (i.e. Newcastle Coastal Ramp). HU806 and HU814 also have a moderate floristic similarity with the vegetation onsite but were excluded due to an overall lower floristic similarity compared to HU804. HU798 was also considered for the areas of this vegetation community within the drainage lines which have a higher abundance of mesic	45.35

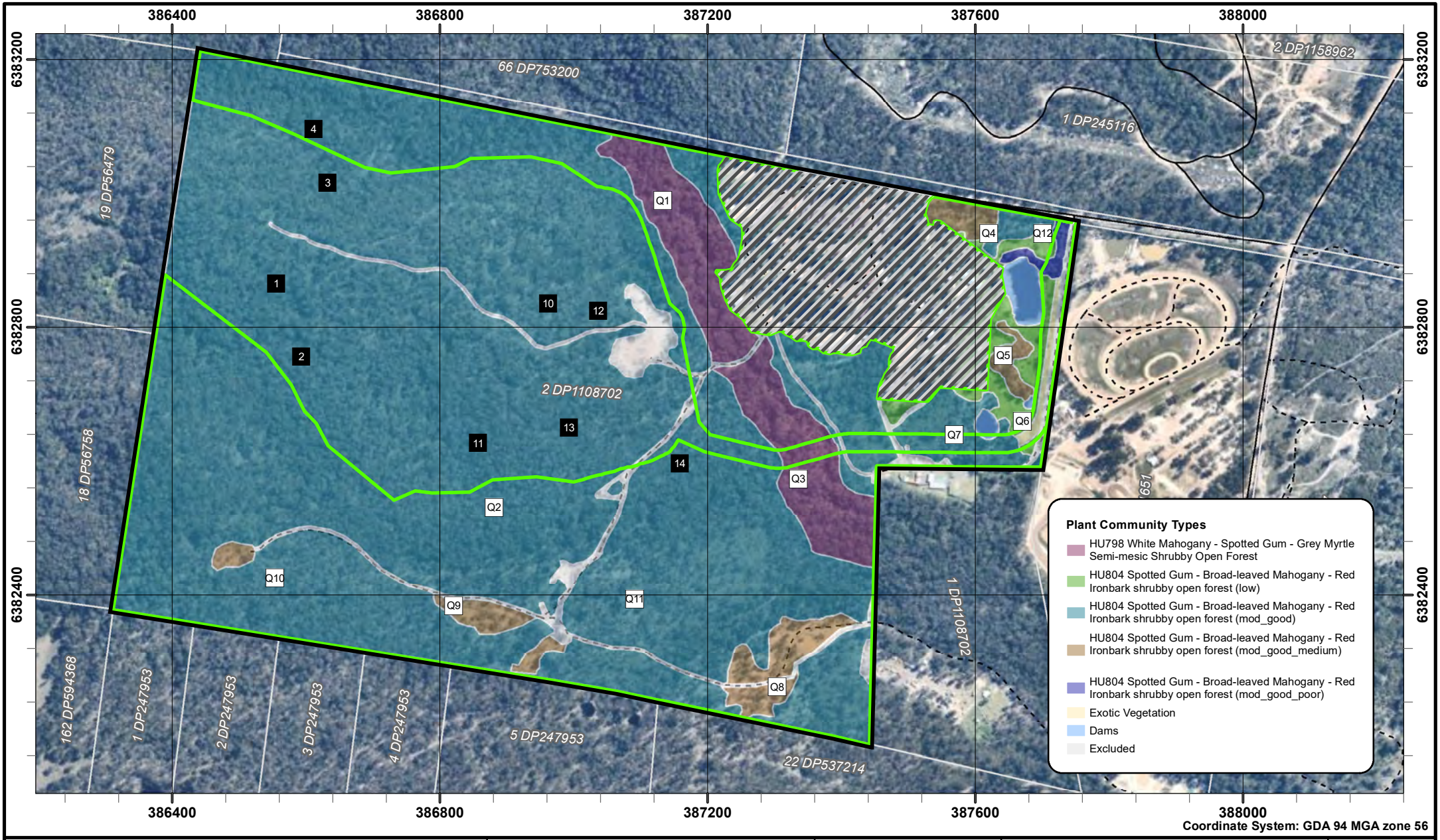
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Veg Zone	Plant Community Type	Vegetation Class	Floristic description	Justification for PCT selection	Area (ha)
				species. While this PCT has a moderate floristic similarity to most of the drainage lines within the offset site, only the riparian vegetation associated with the third order stream, Seven Mile Creek, is consistent with a wet sclerophyll forest formation.	
2	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (moderate-good_medium)	Hunter-Macleay Dry Sclerophyll Forests	This vegetation zone has similar dominant species and floristic composition to the vegetation in zone 1, but has a lower species diversity. The midstorey and shrub layers are also very sparse or absent in this vegetation zone as a result of slashing and past disturbance. In the south-east part of the site, the ground layer of this zone is also relatively sparse as a result of Hunter Valley Paintball previously operating in this area. Exotic plant cover is also higher in this vegetation zone.	See discussion and justification of PCT selection in zone 1.	3.10
3	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (low)	Hunter-Macleay Dry Sclerophyll Forests	This zone consists of modified grasslands that are currently slashed, and small areas of highly disturbed vegetation. These areas are dominated by a number of exotic grasses and herbs such as *Paspalum dilatatum, Axonopus fissifolius, Vulpia myuros, Stenotaphrum secundatum, Panicum repens, Hypochaeris radicata* and *Senecio madagascariensis*. Native ground cover species occur in relatively low abundance in these areas; common species include *Cynodon dactylon, Eragrostis brownii, Dichondra repens* and *Pratia purpurascens*. While this zone currently contains non-native vegetation, it is proposed that these areas be revegetated to improve connectivity on the eastern side of the site with a species composition consistent with HU804.	See discussion and justification of PCT selection in zone 1.	1.29

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Veg Zone	Plant Community Type	Vegetation Class	Floristic description	Justification for PCT selection	Area (ha)
4	HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley (moderate-good) **Equivalent Somerville (2009) map unit:** The best fit for HU798 is MU59 White Mahogany/ Spotted Gum/ Grey Myrtle shrubby open forest of the central and lower Hunter Valley. Although MU59 is reported to be a dry sclerophyll forest, this map unit has a dominance of *Eucalyptus acmenoides*, *Backhousia myrtifolia* and a mesic understorey characterised by a variety of fern species.	Northern Hinterland Wet Sclerophyll Forests	This vegetation zone is floristically similar to the vegetation in zone 1 but has a dominance of *Eucalyptus acmenoides*, *Backhousia myrtifolia*, *Melaleuca linearifolia*, *Callistemon salignus* and ferns in the understorey. The dominance of such species and the mesic understorey is consistent with a wet sclerophyll forest formation.	HU798 was considered for the vegetation within the drainage lines across the offset site, which have a higher abundance of mesic species. This PCT has a moderate floristic similarity to most of the drainage lines within the offset site but the first and second order streams are too dry to be considered mesic. The riparian vegetation associated with the first and second order streams are considered to represent a minor variation within HU804. Only the riparian vegetation associated with the third order stream, Seven Mile Creek, is consistent with a wet sclerophyll forest formation and as such, HU798 was determined to be the most appropriate equivalent PCT for this vegetation in the offset site.	5.48
-	Excluded	-	-	The excluded areas include dams, access tracks and un-vegetated areas (i.e. fill material) in the offset site.	1.98
				Total	**57.21**

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Coordinate System: GDA 94 MGA zone 56

Study Area (100.94 ha)
Offset Site (57.2 ha)
Gardenland (Excluded - 10.05 ha)
Lot
Local Road
Track
Plot Locations (KLF)
Plot Locations (PDA Services)

Metres
0 25 50 100 150 200 250

N

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DRAWN BY: bdeane
DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Plant Community Types and Vegetation Zones

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
4

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1.1.4 Threatened Species

1.1.4.1 Ecosystem Credit Species

Predicted ecosystem credit species for the offset site were identified and assessed in accordance with Section 6.3 of the BBAM 2014. No ecosystem credit species were excluded from the predicted species list for the purpose of the assessment, and no species had their offset multiplier modified for the assessment.

1.1.4.2 Species Credit Species

Methodology

An assessment for two species credit species, Koala (*Phascolarctos cinereus*) and Southern Myotis (*Myotis macropus*), was undertaken on the offset site in accordance with Section 6.5 and 6.5 of the BBAM 2014. The assessment methodology (i.e. targeted surveys and habitat mapping) for each species is described in Section 1.4.2.2 of the BAR.

Assessment Results

Koala

Two Koalas were sighted in the south-western part of the offset site during the surveys by Kleinfelder in 2013 (**Figure 5**). SAT tests also detected Koala activity on the south-west, central, and north-east parts of the study area (**Figure 5**). Fifty percent of the SAT tests (N=14) showed some sign of Koala activity across the study area (range 3%-13%). According to Phillips and Callaghan (2011), this level of activity is considered to be low use range (<22.52% activity levels) and therefore the use by Koalas is “likely to be transitory” (p.776). **Table 4** summarises the results of the SAT tests that showed signs of activity.

SAT tests and sightings determined that Koalas were using a range of tree species throughout the study area including Grey Gum (*E. punctata*), White Mahogany (*E. acmenoides*), Grey Ironbark (*E. siderophloia*), Forest Red Gum (*E. tereticornis*) and Spotted Gum (*Corymbia maculata*). Of these, Forest Red Gum and Grey Gum are the only species listed as Koala feed trees under SEPP 44. Grey Gum, White Mahogany and Spotted Gum are listed as tree species that may be important to Koalas in the Port Stephens LGA under the CKPoM (PSC 2002).

The CKPoM Koala habitat mapping for the study area shows only a very small area of preferred Koala habitat in the south-west, with the remainder of the site mapped as marginal habitat. Detailed assessment of Koala feed tree density across the study area identified a total of 52.59 ha of suitable Koala habitat as defined under SEPP 44 (i.e. trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component) (**Figure 5**). Of this, 41.40 ha of suitable Koala habitat occurs within the offset site.

Table 4: SAT test results

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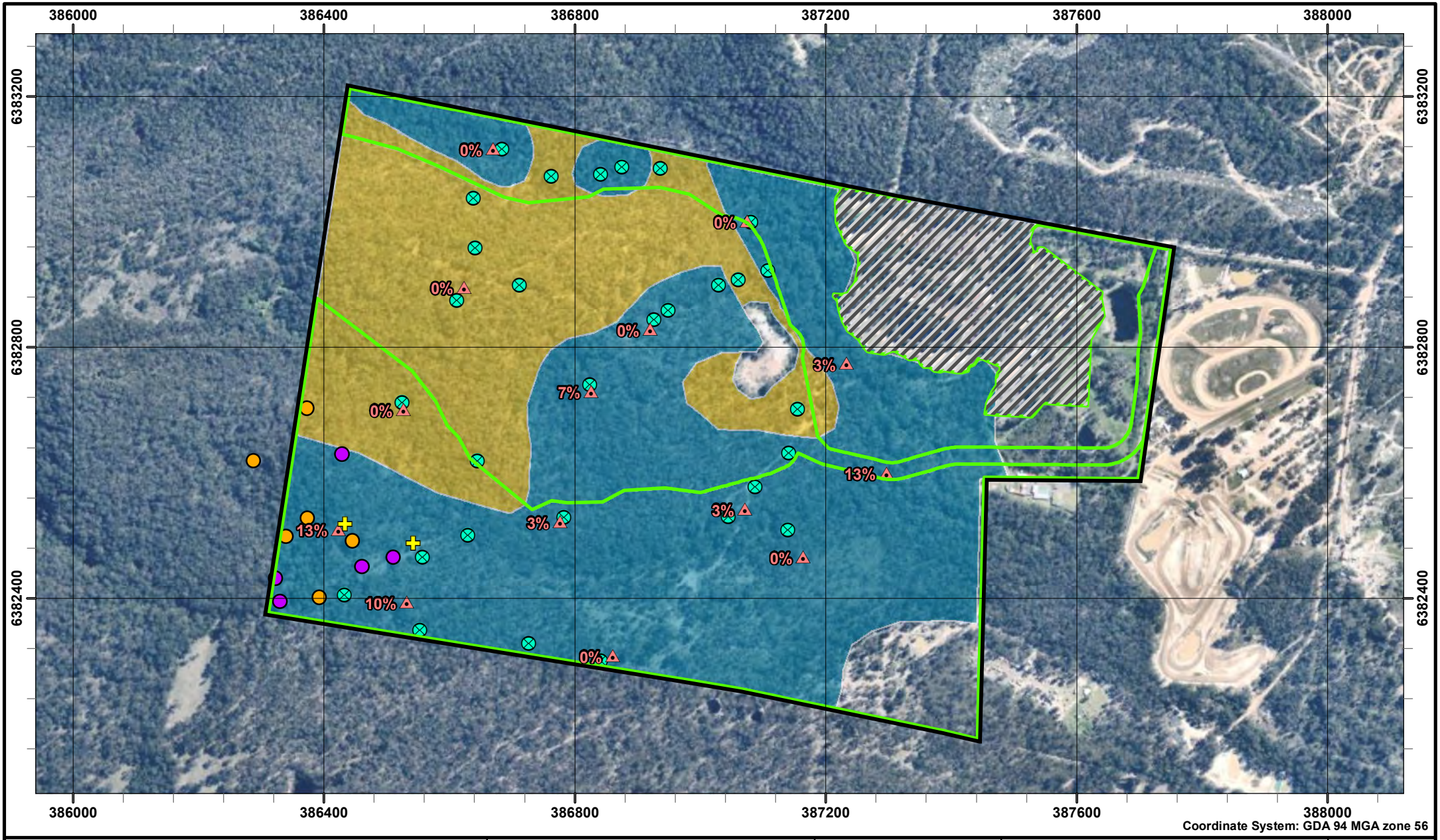
SAT ID	Trees with pellets	Total trees surveyed	Activity level %
8	1	30	3%
11	1	30	3%
5	2	30	7%
13	2	30	7%
7	3	30	10%
10	4	30	13%
12	4	30	13%
		MEAN	8%

Southern Myotis

The Southern Myotis was recorded at one location along Seven Mile Creek in the eastern part of the study area, within the offset site (**Figure 6**). The TSPD indicates that breeding habitat for the Southern Myotis includes hollow-bearing trees, bridges, caves or artificial structures within 200 m of riparian zone. Hollow-bearing trees are present (albeit in low to moderate abundance) throughout the forest vegetation in the study area. All areas of HU804 (moderate-good) and HU798 within 200 m of the dams and the 2nd and 3rd order streams on the eastern part of the offset site were mapped as suitable breeding habitat for this species (**Figure 6**). The remaining 1st order drainage lines in the study area are highly ephemeral and do not contain suitable foraging habitat (i.e. streams and pools).

A total of 49.49 ha of Southern Myotis habitat occurs in the study area. Of this, 33.03 ha of Southern Myotis habitat occurs in the offset site.

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Coordinate System: GDA 94 MGA zone 56

- Study Area (100.94 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- less than 15% *Eucalyptus Punctata*
- greater than 15% *Eucalyptus Punctata*
- Assessment Points
- SAT Test Location (Label indicates activity level)
- Koala Sighting

SEPP 44 Koala Habitat Mapping

- <15% SEPP 44 Koala Feed Trees
- >15% SEPP 44 Koala Feed Trees

Metres
0 25 50 100 150 200 250

N

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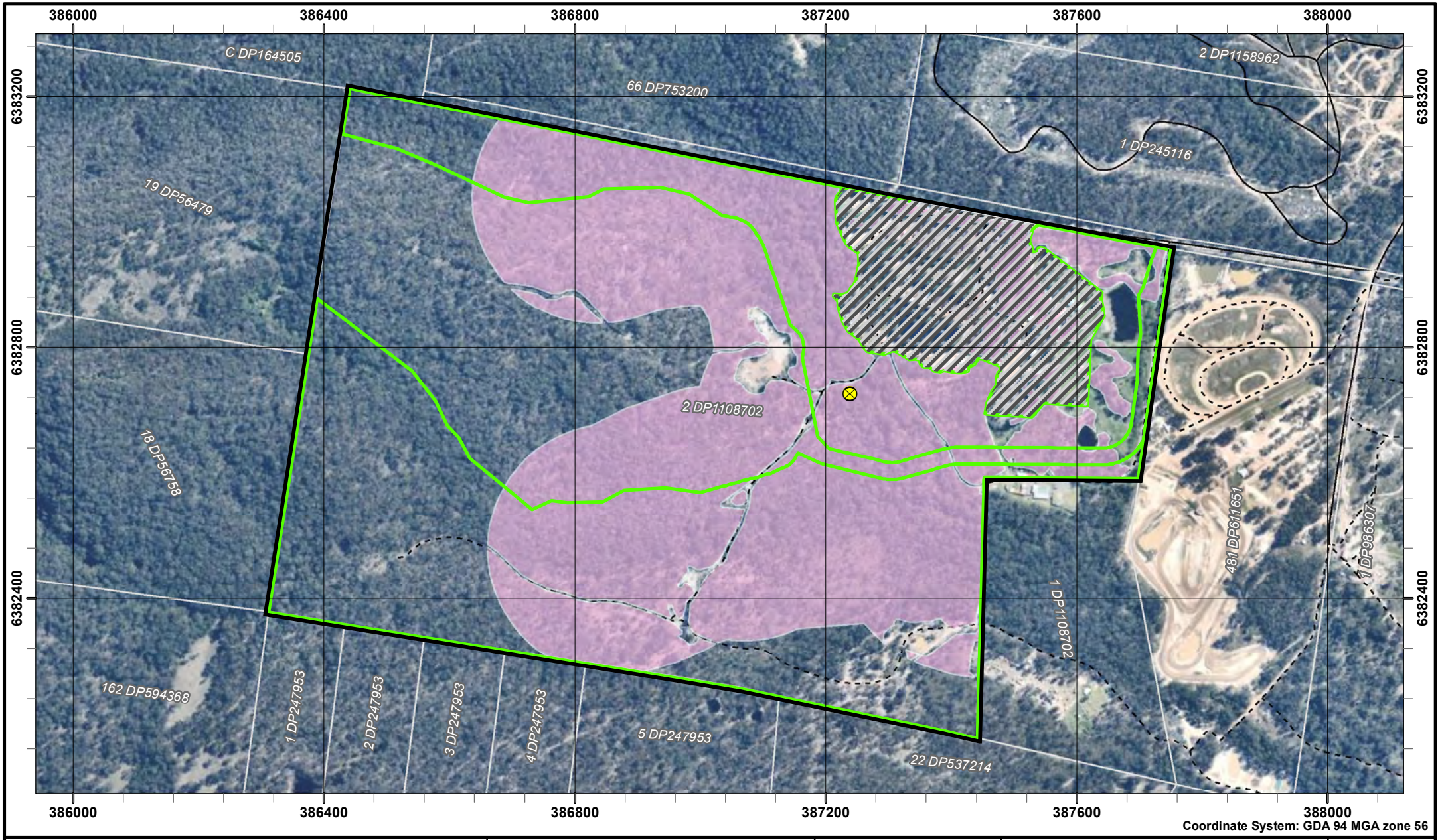
DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

SEPP 44 Koala Habitat Mapping

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
5

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- Study Area (100.94 ha)
- Offset Site (57.2 ha)
- Gardenland (Excluded - 10.05 ha)
- Lot
- Local Road
- Track
- Southern Myotis Location
- Southern Myotis Habitat

Metres
0 25 50 100 150 200 250

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DRAWN BY: bdeane

DATA SOURCE:
NSW Land and Property Information - 2017
Nearmap - 2017

Southern Myotis Habitat Mapping

Eagleton Rock Syndicate Pty Ltd
Biodiversity Assessment Report
Eagleton Quarry
13 Barleigh Ranch Way, Eagleton NSW

FIGURE:
6

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1.1.5 Offset Site Biodiversity Credits

1.1.5.1 Ecosystem Credits Created

Table 5 provides a summary of the ecosystem credits generated for each vegetation zone at the offset site. **Table 5** also shows the percentage cleared within the major catchment area, current and future biometric site value scores, and averted loss in site value for each vegetation zone. The biobanking credit report for the offset site is included in this strategy.

Table 5: Summary of ecosystems credits generated at the offset site

Veg Zone #	Plant Community Type	% Cleared in Major Catchment Area	Site value score		Averted loss in site value	Area (ha)	Credits
			Before	After			
1	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (moderate-good)	48	83.85	98.44	7.16	45.35	485
2	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (moderate-good_medium)	48	75.00	93.75	5.73	3.10	35
3	HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (low)	48	22.40	40.89	2.08	1.29	13
4	HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley (moderate-good)	42	73.61	92.19	6.25	5.48	63
					Total	**55.22**	**596**

1.1.5.2 Species Credits Created

Table 6 provides a summary of the credits generated for each species credit species assessed at the offset site. The biobanking credit report for the offset site is included in this strategy.

Table 6: Summary of species credits generated at the offset site

Scientific Name	Common Name	Area of Habitat (ha)	Species Credits
Myotis macropus	Southern Myotis	33.03	235
Phascolarctos cinereus	Koala	41.40	294

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1.1.5.3 Management Actions

Retirement of biodiversity credits requires certain management actions to be implemented that underpin the predicted improvements to biodiversity values on the biobank site. These management actions are divided into two categories: standard management actions required for all biobank sites and additional management actions required for certain vegetation types and species. The specific actions proposed for each standard and additional management action category for the biobank site are set out in **Table 7** and **Table 8**, respectively. The additional actions are also listed in the biobanking credit report for the biobank site in this strategy. Specific details on the management actions to be undertaken at the biobank site would be provided as part of the biobanking agreement and will be detailed in the Management Actions Template.

Table 7: Standard management actions for biobank sites

Standard management action category	Proposed actions
Management of grazing for conservation	• Installation and/or maintenance of stock exclusion fencing (wildlife friendly) along external property boundaries.
Weed control	• Preparation and implementation of a weed control action plan.
Management of fire for conservation	• Preparation and implementation of a fire management plan.
Management of human disturbance	• Installation and/or maintenance of fencing along boundaries to discourage encroachment of adjoining landholders and restrict recreational activities (e.g. trail bike riding, horse riding and hunting). • Restriction of vehicular access to the site by road. • Installation of signage at appropriate locations. • Liaison with adjoining landholders (where appropriate).
Retention of regrowth and remnant vegetation	• Installation and/or maintenance of fencing along certain boundaries. • Permitted clearing provisions of the NSW *Native Vegetation Act* are extinguished. • Firewood collection and timber harvesting are not permitted.
Replanting or supplementary planting where natural regeneration will not be sufficient	• Implementation of the planting actions.
Retention of dead timber	• Installation and/or maintenance of fencing or markers along boundaries. • Restriction of vehicular access to the site by road. • Installation of signage at appropriate locations.
Erosion control	• Repair existing tracks displaying active erosion. • Implementation of the erosion control actions.
Retention of rocks	• Installation and/or maintenance of fencing along land boundaries. • Restriction of vehicular access to the site by road. • Installation of signage at appropriate locations.
Note: These management actions are required to be considered under the BBAM; however, it is noted that not all are applicable to the site.	

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Table 8: Additional management actions required for the biobank site

Additional management action category	PCTs and species credit species to be targeted	Proposed actions
Exclude commercial apiaries	HU804	No establishment of commercial apiaries within the site.
Exclude miscellaneous feral species	HU804 and Koala	The implementation of the vertebrate pest management plan.
Feral and/or overabundant native herbivore control	HU804	No evidence of overabundant native herbivores (e.g. heavily grazed vegetation or large areas of bare ground) was observed during the assessment.
Fox control	HU804	The implementation of the vertebrate pest management plan.
Maintain or re-introduce natural flow regimes	Southern Myotis	The proposed haul road will be designed to maintain natural flow regimes along Seven Mile Creek. None of the drainage lines within the biobank site have been altered or modified; the existing natural flow regimes will be maintained with no additional management.
Slashing	Koala	The exclusion of slashing would be achieved through installation and maintenance of boundary fencing around the biobank site.

1.2 CREDIT SUMMARY

A summary of the biodiversity credits required at the proposed development site, and the credits that would be generated at the offset site is provided in **Table 9**.

The proposed offset site would satisfy a large proportion of the biodiversity credits required at the development site. There is a shortfall of 1,303 HU804 ecosystem credits and 127 Southern Myotis species credits once the credits generated at the onsite offset are accounted for. The Koala species credit requirement would be fully satisfied by the credits generated at the onsite offset site. The proposed strategy for securing the remaining biodiversity credits to satisfy the shortfall is discussed in **Section 1.3**.

Table 9: Summary of biodiversity credits generated at the development and offset sites

Ecosystem / Species	Credits Required at Development Site	Credits Generated at Onsite Offset Site	Credit Balance
HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	1,836	533	-1,303
HU798 White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley (moderate-good)	0	63	+63

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Ecosystem / Species	Credits Required at Development Site	Credits Generated at Onsite Offset Site	Credit Balance
Southern Myotis (*Myotis macropus*)	362	235	-127
Koala (*Phascolarctos cinereus*)	291	294	+3

1.3 ADDITIONAL CREDIT REQUIREMENTS

At this stage, the proponent intends to secure the remaining 1,303 HU804 ecosystem credits and 127 Southern Myotis species credits that would be required for the proposed development by purchasing suitable credits from existing biobank sites. For example, the biobank site under biobanking agreement no. 96 has HU804 ecosystem credits that are currently available for purchase and retirement. The proponent intends to pursue negotiations to purchase the required credits from existing biobank sites should the project be approved.

A search for available or pending Southern Myotis species credits was undertaken on 17 July 2017. No Southern Myotis species credits were available or pending issue at that time. Kleinfelder have lodged a “credits wanted” expression of interest on the OEH Biobanking website on 17 July 2017.

A search for available or pending HU804 ecosystem credits (and matching credits) was undertaken on 10 May 2017 and again on 22 May 2017. There is a total of 3,238 matching credits currently available on the credit register to address the 1,303 ecosystem credit shortfall for HU804 (see **Table 10** below).

Table 10: Number of HU804 matching credits available (at 22 May 2017)

Matching Ecosystem Credit Type	IBRA Sub-region	Agreement ID	Credits Available
HU804	Upper Hunter	188	1,711
HU804	Karuah Manning	214	328
HU804	Karuah Manning	223	47
HU802	Upper Hunter	188	310
HU630	Karuah Manning	96	842
Total ecosystem credits available			**3,238**

However, if the required credits are unavailable at existing biobank sites at the time, the proponent may also secure an offsite offset site under a biobanking agreement to satisfy the credit requirements.

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1.3.1 Offset Availability

The development site credit report lists the following PCTs as offsetting options for HU804:

- Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest, (HU804);
- Melaleuca decora low forest of the central Hunter Valley, Sydney Basin Bioregion, (HU564);
- Slaty Red Gum grassy woodland on hinterland foothills of the southern North Coast, (HU619);
- Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast, (HU802);
- Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast, (HU803);
- Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter, (HU806);
- Red Ironbark - Spotted Gum - Prickly-leaved Paperbark shrubby open forest of the Lower Hunter, (HU807);
- Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter, (HU814);
- Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter, (HU815);
- Spotted Gum - Narrow-leaved Ironbark shrub - grass open forest of the central and lower Hunter, (HU816); and
- Grey Box - Grey Gum - Rough-barked Apple - Blakely's Red Gum grassy open forest of the central Hunter, (HU822).

A large area of freehold land containing these PCTs is present within the Karuah-Manning IBRA sub-region. A preliminary assessment of available vegetation mapping (Sivertsen *et al*. 2011) for the Karuah-Manning IBRA sub-region indicates that approximately 26,300 ha of vegetation equivalent to the PCTs listed above is present on freehold land. A large portion of this vegetation would also provide suitable breeding habitat for the Southern Myotis. As such, it is considered that there is sufficient land available that could be secured as a biobank site to generate the quantity of ecosystem and species credits required for the development, should the credits be unavailable for purchase at existing biobank sites.

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1.3.2 Credit Retirement

All ecosystem and species credits required for the development will be retired at the offset sites in accordance with the FBA prior to commencement of clearing and construction. No variation of the offset rules or supplementary measures are sought for the proposed onsite offset or the remaining ecosystem and species credits required.

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CREDIT REPORT – OFFSET SITE

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BioBanking credit report

This report identifies the number and type of credits required at a BIOBANK SITE

Date of report: 19/06/2017 Time: 8:51:34AM Calculator version: v4.0

Biobank details

Proposal ID:	167/2016/3996B
Proposal name:	Eagleton Hard Rock Quarry Offset Area
Proposal address:	Barleigh Ranch Way Eagleton NSW 2324
Proponent name:	Eagleton Rock Quarry Pty. Ltd
Proponent address:	PO Box 826 Newcastle NSW 2300
Proponent phone:	0429 877 704
Assessor name:	Samara Schulz
Assessor address:	64 Medcalf Street Warners Bay NSW 2282
Assessor phone:	02 4949 5200
Assessor accreditation:	167

Additional information required for approval:

- ☐ Use of local benchmark
- ☐ Expert report...
- ☐ Request for additional gain in site value

Ecosystem credits summary

Plant Community type	Area (ha)	Credits created
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	49.74	533.00
White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	5.48	63.00
Total	55.22	596

Credit profiles

1. White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley, (HU798)

Number of ecosystem credits created	63
IBRA sub-region	Karuah Manning

2. Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest, (HU804)

Number of ecosystem credits created	520
IBRA sub-region	Karuah Manning

3. Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest, (HU804)

Number of ecosystem credits created	13
IBRA sub-region	Karuah Manning

Species credits summary

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Koala	Phascolarctos cinereus	41.40	294
Southern Myotis	Myotis macropus	33.03	235

Additional management actions

Additional management actions are required for:

Vegetation type or threatened species	Management action details
Koala	Exclude miscellaneous feral species
Koala	Slashing
Southern Myotis	Maintain or re-introduce natural flow regimes
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Exclude commercial apiaries
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Exclude miscellaneous feral species
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Feral and/or over-abundant native herbivore control
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Fox control
Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Slashing
White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Exclude commercial apiaries
White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Exclude miscellaneous feral species
White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Feral and/or over-abundant native herbivore control
White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Fox control

APPENDIX 6. ENVIRONMENTAL IMPACT STATEMENT

State Significant Development Application
Environmental Impact Statement

Eagleton Quarry
Barleigh Ranch Way

Submitted to Department of Planning and Environment
On Behalf of Eagleton Rock Syndicate Pty Ltd



January 2017 ▪ 15647

JBA Urban Planning Consultants Pty Ltd ABN 84 060 735 104 / Sydney t +61 2 9956 6962 w jbaurban.com.au

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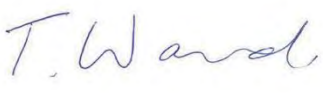
JBA operates under a Quality Management System. This report has been prepared and reviewed in accordance with that system. If the report is not signed below, it is a preliminary draft.

This report has been prepared by:



Jim Murray 27/01/2017

This report has been reviewed by:



Tim Ward 27/01/2017

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Statement of Validity

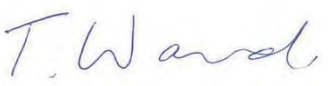
Development Application Details	
Applicant name	Eagleton Rock Syndicate Pty Ltd
Applicant address	PO Box 898 Newcastle NSW 2300
Land to be developed	Part of Lot 2 in Deposited Plan 1108702, located on Barleigh Ranch Way (or Killaloe Lane)
Proposed development	Gravel and aggregate quarry with production capacity up to 600,000 tonnes per annum for up to 30 years, as further described in Section 4 of this Environmental Impact Statement

Prepared by	
Name	Tim Ward
Qualifications	Bachelor of Science, Master of Environmental Management
Address	173 Sussex Street, Sydney
In respect of	State Significant Development - Development Application for development described above.

Certification

I certify that I have prepared the content of this EIS and to the best of my knowledge:

- it is in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000;
- all available information that is relevant to the environmental assessment of the development to which the statement relates; and
- the information contained in the statement is neither false nor misleading.

Signature 

Name Tim Ward

Date 27/01/2017

Executive Summary

Purpose of this Report

This submission to the Department of Planning and Environment (the Department) comprises an Environmental Impact Statement (EIS) for a Development Application under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP& A Act). It relates to the proposed hard rock quarry at Eagleton, NSW.

Under clause 7, and clause 5 of Schedule 1, of *State Environmental Planning Policy (State and Regional Development) 2011* development for the purposes of extractive industry that extracts from a total resource of more than 5 million tonnes is State Significant Development (SSD). The proposed Eagleton Quarry will extract from a total resource of approximately 10 million tonnes, and so is SSD.

A request for the issue of Secretary's Environmental Assessment Requirements (SEARs) was sought on 15 October 2015. Accordingly, the SEARs were issued on 6 November 2015. This submission is in accordance with the Department's guidelines for SSD applications lodged under Part 4 of the EP&A Act, and addresses the issues raised in the SEARs.

Overview of the Project

The Eagleton Quarry proposal is for the extraction of a hard rock reserve that is a mixture of various igneous and sedimentary rock formations. The proponent, Eagleton Rock Syndicate Pty Ltd (Eagleton Rock), has identified rock formations suited to local and regional construction markets and therefore the project will contribute to satisfying an identified demand.

The Eagleton Quarry proposal incorporates a 30 year quarry operations area of approximately 30ha which includes a processing, sales and administrative area. The details of the proposal are set out in **Section 4**.

The key development parameters of the development proposal for which approval are sought include:

- Extraction and on-site processing of up to 600,000 tonnes per annum of rock;
- Transporting quarry products by truck to market;
- Improvements to public roads and a right of carriageway (on private land) to support the traffic transporting quarry products; and
- Undertaking quarry operations for 30 years.

The Site

The proposed Eagleton Quarry site is located on part of Lot 2 DP 1108702 which is within the Local Government Area of Port Stephens. The quarry site forms the part of Lot 2 to the west of Seven Mile Creek which transects the broader site. The site requires new infrastructure and equipment. The characteristics and various components of the site are set out in **Section 2**.

Planning Context

Section 6.0 of the EIS considers all applicable legislation in detail. The proposal is consistent with the requirements of all relevant Acts and SEPPs. The site is zoned RU2 – Rural Landscape. The proposal is permissible with consent and meets the objectives of the subject zone.

Environmental Impacts and Mitigation Measures

This EIS provides an assessment of the environmental impacts of the project in accordance with the SEARs and sets out the undertakings made by Eagleton Rock to manage and minimise potential impacts arising from the development.

A number of technical studies have been undertaken by specialist consultants to assess the potential impacts of the proposed Eagleton quarry project. An assessment of these potential impacts, provided in **Section 7**, has determined that there will not be any adverse social, economic and environmental impacts which cannot be managed or mitigated.

Key environmental issues are summarised below:

- **Traffic:** All quarry related traffic is expected to use Italia Road to access the Pacific Highway, via Barleigh Ranch Way (an unformed local public road) and a right of way of the adjoining land. The anticipated traffic will not create any unreasonable impacts on the traffic flow on Italia Road and Barleigh Ranch Way. The access road from the intersections between Italia Road and the Right of Carriageway, as well as the full length of the right of way, and the relevant section of Barleigh Ranch Way will be upgraded to Council's standard for a private rural road, with a sealed surface in order to accommodate the haulage requirements of the proposed quarry traffic. The intersection of Italia Road and the Pacific Highway is not predicted to be significantly affected and will continue to operate safely and at a satisfactory level of service during the lifetime of the project.
- **Flora and Fauna:** The project will require the clearing of approximately 28.4ha of plant community HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest. Biodiversity assessment has been carried out in accordance with the *Framework for Biodiversity Assessment* which has determined that the proposed development will require a total of 1,628 ecosystem credits to be retired under the N*SW Biodiversity Offsets Policy for Major Projects*. In addition to ecosystem impacts two threatened fauna species are identified as being potentially impacted – Koala and Southern Myotis. Species credits of 276 and 334 have been calculated respectively. A Biodiversity Offset Strategy has been provided setting out that a significant amount of credits will be obtained from biobanking the non-developed parts of the quarry site. No threatened flora species have been recorded at the site. No significant impacts have been identified in relation to riparian corridors, aquatic habitats, groundwater dependent ecosystems. The biodiversity assessment also concludes that the proposed development is considered unlikely to have a significant impact on threatened species or communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and a referral to the Commonwealth is not required.
- **Groundwater:** The proposal will extract rock down to 45 mAHD resulting in groundwater above this elevation seeping into the floor of the excavation and causing drawdown within the connected groundwater source. Detailed groundwater modelling has been carried out and subject to peer review, indicating that predicted drawdown beyond the boundary is less than 0.5m at 500m to the north-west of the site, and that there would be only minor baseflow loss to Seven Mile Creek of 0.75 m^3/day (0.27 ML/year). A detailed assessment against the Aquifer Interference Policy has been carried out that concludes that the Eagleton Quarry would have a minimal impact on the aquifer at the site, and would have no impacts to any offsite water supply bores or high priority groundwater dependent ecosystems.
- **Surface Water:** The Water Management System is intended to contain runoff from the quarry area to prevent impacts on the water quality of the

downstream catchment, and includes diversion of clean water, and collection of potentially impacted water in two water management dams providing a total water storage capacity of around 57 ML. A detailed predictive site water balance has been prepared for the site, which concludes that the quarry could be operated without the need to import significant volumes of water for processing and dust suppression and without the need for discharges from the site to Seven Mile Creek.

The water management system includes significant water storage volume in order to prevent spilling for events at least up to the 100 year ARI 24 hour storm event, and internal treatment systems to contain and treat suspended solids and hydrocarbons. It is concluded that the proposed quarry would have no identifiable potential impact on water quality in Grahamstown Dam and will contain any water quality impact on-site meeting the Neutral or Beneficial Effect on water quality as required by Hunter Water. Further, the direct loss in yield is expected to be negligible, estimated to be less than 0.3% of net runoff into Grahamstown Dam.

No significant change to the downstream flooding risk are expected.

- **Noise and Vibration:** Acoustic modelling has been carried out in accordance with the EPA's *Industrial Nose Policy*. Under the operating scenarios modelled there is not predicted to be any exceedances of the project specific noise levels at any receptor, except for manager's residence for the Port Stephens Gardenland landscape supply facility where construction and operational noise activities may exceed the respective criteria. Eagleton Rock is negotiating a private agreement with the owner of this property, who is also the owner of the Eagleton Quarry site.

  Blasting is expected to be controllable within the criteria established under the ANZECC *Guidelines to minimise annoyance due to blasting, overpressure and ground vibration*.

- **Air Quality:** Air quality modelling has been carried out in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.* The modelling indicates that there will be no significant impact on local air quality as a result of the proposed Eagleton quarry, and that emissions from the quarry will not cause any additional exceedances of the EPA's air quality criteria. The modelling relies upon the inclusion of best practice dust control measures, and these are included as mitigation measures.

- **Visual Impact Assessment:** Analysis of view corridors identifies that the quarry development will not be visually intrusive from any sensitive viewpoint. In all cases, it will be largely screened by intervening topography and existing vegetation.

- **Indigenous Heritage:** Assessment of Aboriginal cultural heritage has been carried out in accordance with the OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. The assessment identified two areas of Potential Archaeological Deposits and one Aboriginal item. The item will not be impacted as it is within the vegetated riparian corridor that will be retained. The new crossing of Seven Mile Creek will impact on of these PADs and this area will be subject of subsurface testing, in consultation with local Aboriginal stakeholders, prior to the commencement of works in this area.

- **Historic Heritage:** The site is not located at or in the vicinity of any listed heritage items, and is unlikely to contain previously undiscovered historic heritage. As such, no impact to historic heritage is anticipated.

- **Waste:** It is not expected that the quarry development will generate large quantities of waste requiring off-site disposal. The largest amount of waste will be organic green materials associated with clearing of vegetation. Where

possible these materials will be transferred to the adjacent landscape supplies facility for input into its normal operations.

The site includes a deposit of some 3,000 tonnes of rejected tile fragments. It is proposed to assess these tile fragments in accordance with the EPA's Recovered Aggregate Exemption 2010, and reuse them as aggregate for the construction of the on-site access road, haulage roads and the processing area.

- **Hazards:** The quarry will not store or handle any dangerous goods in excess of the screening thresholds in the Department of Planning's *Applying SEPP 33* guideline.

  A suite of measures have been proposed to ensure that contractors and staff are trained to prevent, control and survive bush fires. This includes the establishment of a number of alternative emergency access routes for incoming bush firefighting crews and for emergency exit of staff.

Conclusion and Justification

The assessment undertaken and outlined in this Environmental Impact Statement demonstrates that the proposed Eagleton Quarry project will not have any adverse social, economic and environmental impacts that cannot be managed or mitigated. The project will efficiently and effectively quarry a significant gravel resource to provide essential materials for the ongoing construction of housing and roads in the Hunter and Sydney metropolitan regions in an environmentally responsible manner.

1.0 Introduction

This Environmental Impact Statement (EIS) is submitted to the Department of Planning and Environment pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of an application for State Significant Development (SSD) for a hard rock quarry at Eagleton, NSW.

The key parameters for the development of the quarry are as follows:

- Extraction and on-site processing of up to 600,000 tonnes per annum of rock;
- Transporting quarry products by truck to market;
- Improvements to public roads and a right of carriageway (on private land) to support the traffic transporting quarry products; and
- Undertaking quarry operations for 30 years.

The EIS has been prepared by JBA, for the proponent, Eagleton Rock Syndicate Pty Ltd (Eagleton Rock) and is based on information provided by Eagleton Rock and supporting technical documents provided by the expert consultant team (see Table of Contents).

This EIS has been prepared in accordance with the requirements of Part 4 of the EP&A Act, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), and the Requirements of the Secretary of the Department of Planning and Environment for the preparation of the EIS, which are included at **Appendix A**. This EIS should be read in conjunction with the supporting information and plans appended to and accompanying this report.

The EIS is structured as follows:

Section 1: Introduction, overview of the project, background, project team and approvals process.

Section 2: Site analysis, overview of existing site conditions, and summary of opportunities and constraints.

Section 3: Consideration of alternatives and reasons for carrying out the project

Section 4: The strategic and statutory planning framework applying to the site.

Section 5: A detailed description of the proposed development.

Section 6: Summary of the key issues from Consultation.

Section 7: Environmental assessment of the Project.

Section 8: A consolidated table of proposed Mitigation Measures.

Section 9: Project Justification

Section 10: Conclusion

1.1 Overview of Proposed Development

The Eagleton Quarry Project is for the extraction of a hard rock reserve that is a mixture of various igneous and sedimentary rock formations. Eagleton Rock has identified rock formations suited to local and regional construction markets and therefore the project will contribute to satisfying an identified demand. The Eagleton Quarry proposal incorporates a 30 year quarry operations area of approximately 30ha which includes a processing, sales and administrative area.

1.2 Background to the Development

Eagleton Rock in association with its affiliate company Williamtown Sand Syndicate Pty Ltd is developing constructions material product streams to compliment a new and dynamic quarry company.

Eagleton Rock is developing further construction material product streams to compliment a new and dynamic quarry company. The company has detailed plans to provide high quality products and will work towards energy efficient process systems that reduce waste and improve its environmental footprint.

The proposed Eagleton Quarry would service demand for aggregate and crushed rock products in the Hunter, Central Coast and Sydney regions. It is anticipated that most of the customers would be based in Newcastle, Central Coast and the Lower Hunter. However, it is recognised that the significant growth in Sydney is creating ongoing demand for concrete and road surfacing aggregates.

Lower Hunter's growth for the next 20 years has been forecast by the NSW Department of Planning and Environment and documented within the *Hunter Regional Plan 2036*. This Plan has identified future development areas, principal land use types, settlement patterns and conservation outcomes. Key goals are to:

- Grow Australia's next major city; and
- Grow the largest regional economy in Australia.

The Plan forecasts that an additional 70,000 dwellings will be needed in the region by 2036, and that an additional 60,000 jobs will be created. The ongoing building and infrastructure development associated with these forecasts will create strong demand for the materials proposed to be extracted and processed at the Eagleton Quarry. In addition, the strategic location of the quarry will also make it a viable supply to the Port of Newcastle for the continued expansion of port facilities include coal loading and handling facilities.

The proposed quarry is located on the western part of Lot 2 in DP 1108702. The eastern part of Lot 2 is occupied by an existing landscape supplies facility, which has been operating at the site for over 10 years and is known as Port Stephens Gardenland.

The quarry will be operated independently from Port Stephens Gardenland landscape supplies facility and is an unrelated business. However, where appropriate this EIS considers the cumulative impacts of both facilities operating at the same time.

1.3 Approvals Process

Figure 1 below outlines the main steps in the approval process for a State Significant Development Application with indicative assessment timeframes.

The Eagleton Quarry proposal is currently at Step 2 with the public exhibition of the EIS. It is highlighted that at the current time the Minister has put in force a series of delegations. As such, the Minister is unlikely to determine the Development Application, but rather it will be determined under delegation to the Department of Planning and Environment or the Planning Assessment Commission. The appropriate delegated determining authority will be established after the public exhibition period.

1.4 Project Team

An expert project team has been formed to deliver the project and includes:

Proponent	Eagleton Rock Syndicate Pty Ltd
Planning and EIS	JBA
Groundwater	Umwelt Australia and URS
Civil Engineering and Infrastructure	Fisher Engineering Pty Ltd
Flora and Fauna	Kleinfelder
Water Quality and Quantity	Umwelt Australia
Traffic and Transport	GHD Newcastle
Indigenous Heritage	McCardle Cultural Heritage Pty Ltd
Air Quality and Greenhouse Gas	Pacific Environment
Noise	Global Acoustics
Geotechnical	Qualtest Laboratory Pty Ltd
Economics	Hunter Research Foundation Centre

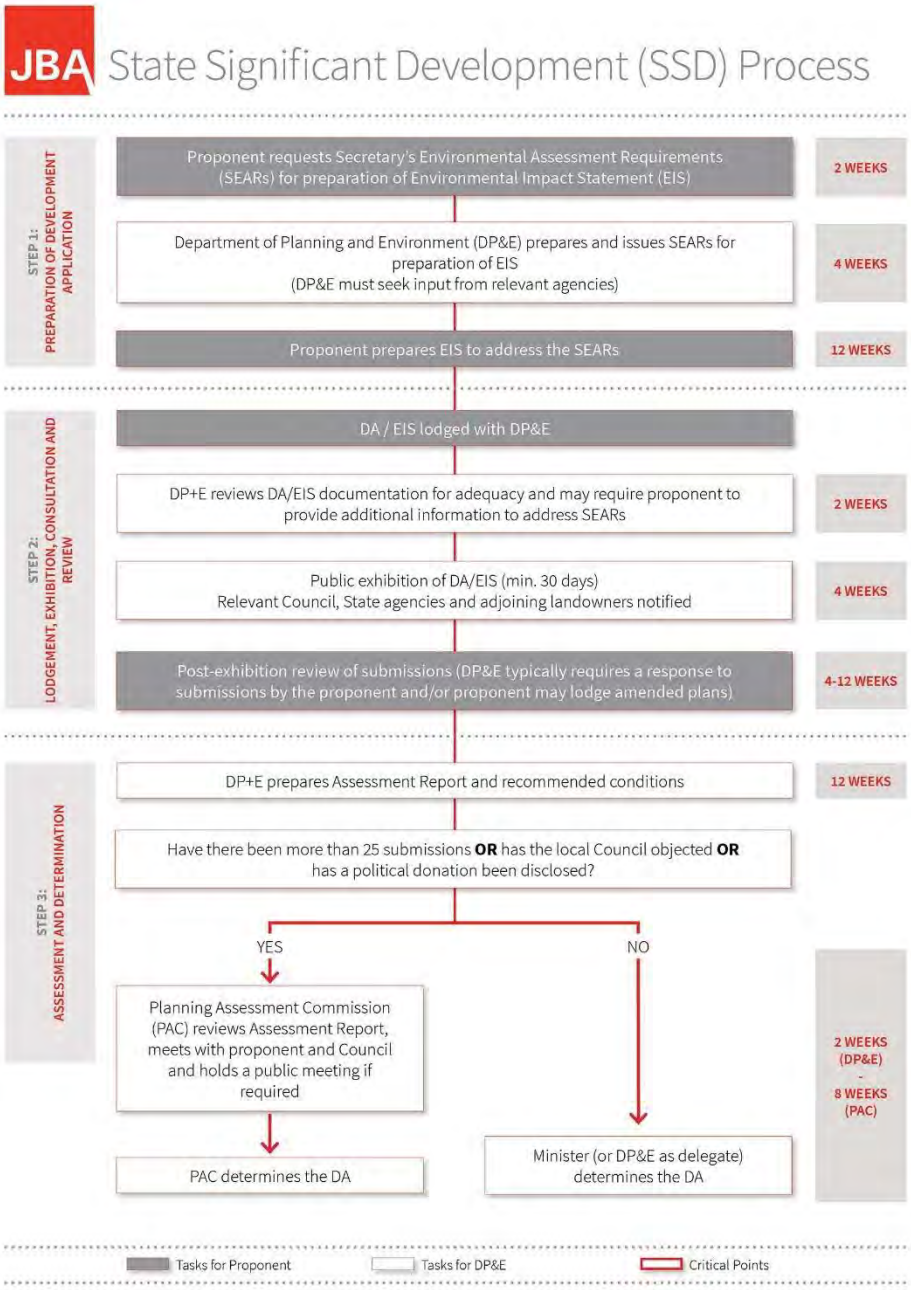


Figure 1 – State Significant development – development application process flow chart

2.0 Site Analysis

2.1 Site Location and Context

The proposed Eagleton Quarry is located at a site approximately 12km north of Raymond Terrace, within the Local Government Area of Port Stephens. The site is approximately 1.5km to the west of the Pacific Highway, approximately 2km southwest of the intersection of the Pacific Highway with Italia Road, and approximately 2.5km northwest of Grahamstown Dam. The site's location is shown at **Figure 2**.

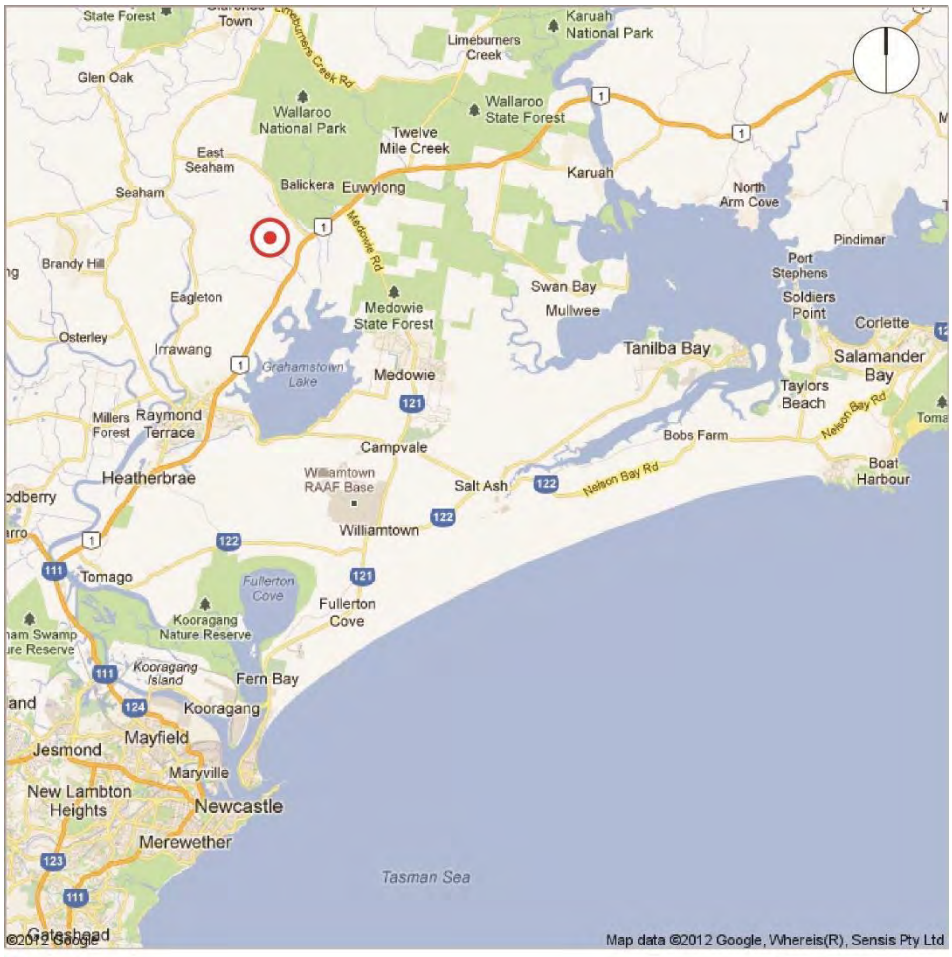


Figure 2 – Locality Plan
Source: Google Maps (modified by JBA)

2.2 Land Ownership and Legal Description

The Eagleton Quarry site is located on part of Lot 2 DP 1108702, located on Barleigh Ranch Way, Eagleton. Lot 2 is split north-south by Seven Mile Creek. The quarry site forms the part of Lot 2 to the west of the creek.

The land is owned by the owner and operator of the existing Port Stephens Gardenland landscape supplies business which operates on the eastern part of Lot 2 DP 1108702.

The right of carriageway upon which access to the proposed Eagleton Quarry site relies is located on private land legally described as Lot 2 DP 1158962 and Lot 1 DP 245116. A copy of DP 115227 (which is the precursor to Lot 2 DP 1158962 and Lot 1 DP 245116) is attached at **Appendix B** showing the right of carriageway.

It is highlighted that the right of carriageway as shown in DP 115227 is not in the same location as the existing gravel road used by landowners for access to Barleigh Ranch Way. The existing gravel road is located approximately 50m to the west of the right of way.

2.3 Site Characteristics

The characteristics and natural features of the site are shown in **Figure 3** and described in the following sections.

2.3.1 Physical Context

The site is located in an area of undulating hills. The site is on a west to east trending spur which ranges from approximately 120m AHD at the north western boundary to about 30m AHD in the southeast. The site is split north-south by Seven Mile Creek, which has a minor tributary running east-west through the site. Seven Mile Creek forms a valley through the site at between 45m AHD in the north and 30m AHD in the south.

2.3.2 Physical Infrastructure

The site has a number of un-sealed partially formed vehicle tracks, including an existing crossing of Seven Mile Creek, and a cleared area of approximately 0.6ha which has been cleared and graded.

2.3.3 Geological Setting

Reference to the Statewide Geology GIS database and the Newcastle 1:100,000 Geology Sheet indicates that three geological units are present near the site, as follows:

- The Italia Road (Cui) comprises sandstone, shale and coal. This is shown as sub cropping at the eastern side of the site.
- The Balickera Conglomerate (Cul) comprises conglomerate, rhyolite, tuff and ingnimbrite and is shown as sub cropping over the remainder of the site.
- The Eagleton Volcanics (Ceg1e) sub crops to the north west of the site.

2.3.4 Natural and Cultural Heritage

The site is heavily wooded with vegetation type “Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin”.

The site is split north-south by Seven Mile Creek, which has a minor tributary running east-west through the site. Seven Mile Creek conveys water to the south-east spilling Grahamstown Dam. As such, the site is within the drinking water catchment of Grahamstown Dam.

There is a high potential for isolated finds and/or artefact scatters or aboriginal significance in the vicinity of Seven Mile Creek and its tributaries.

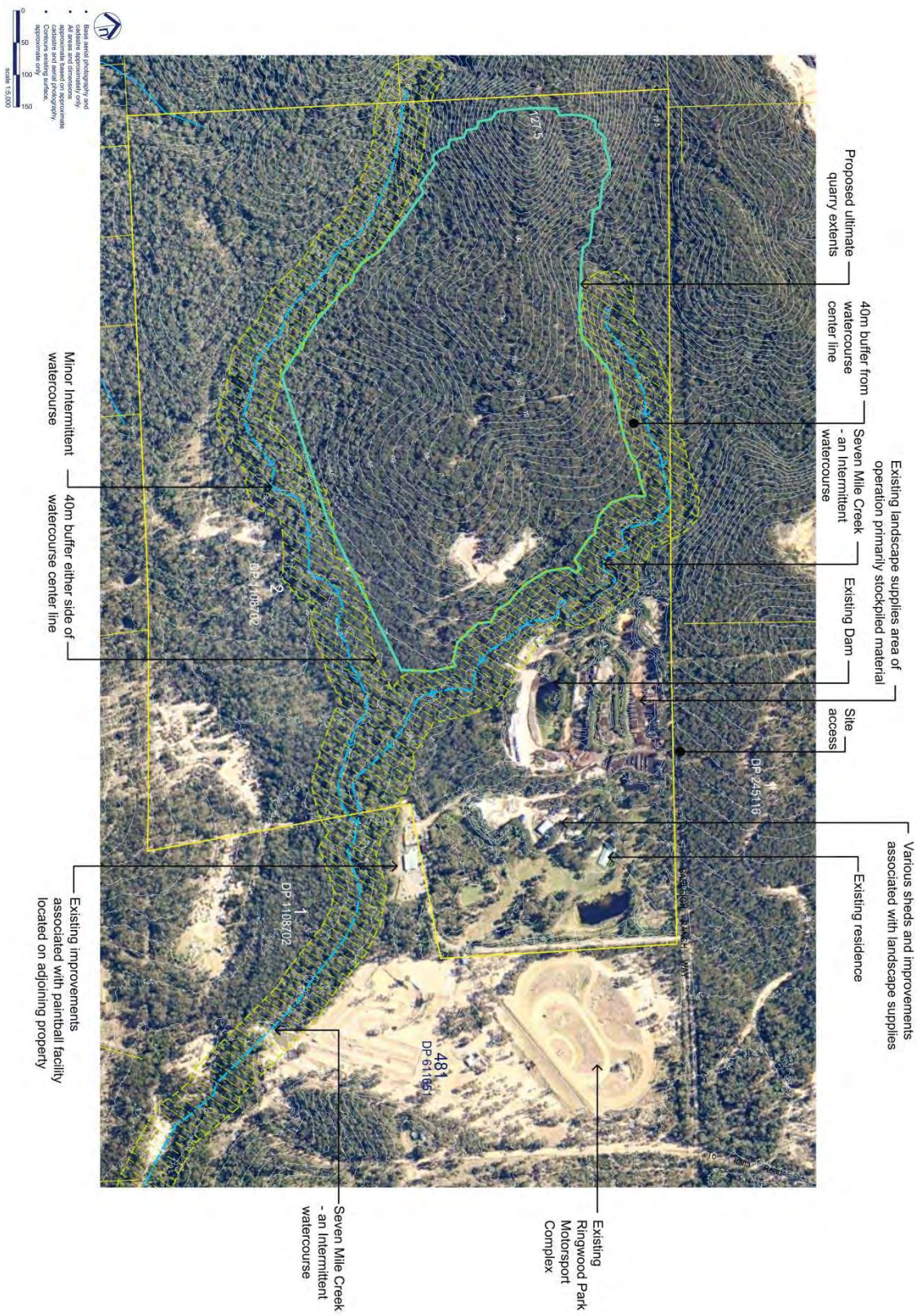


Figure 3 – Site Characteristics and Features
Source: Eagleton Rock Syndicate

2.3.5 Existing Transport Network

The local road access arrangements for the site are shown in **Figure 4** below. Access to the proposed quarry site is via Italia Road, which connects along a right of carriageway access road located on private land to Barleigh Ranch Way (a public road). The quarry site is accessed directly off Barleigh Ranch Way.

Italia Road connects through to Seaham in the west, and provides access to the Boral Seaham Quarry. The right of access provides access to a number of adjacent recreational land users, and Barleigh Ranch Way also provides access to the existing Port Stephens Gardenland landscape supplies facility.



Figure 4 – Road Access Plan
Source: Google Maps (modified by JBA)

2.4 Surrounding Development

Existing Development at the Site

The property (Lot 2 DP 1108702) is currently occupied by the Port Stephens Gardenland landscape supplies business and associated dwelling, which is situated in the north eastern corner of the site.

Surrounding Commercial / Recreational Development

Boral's Seaham quarry is located on lot C DP1645505 and Lot 66 DP753200 immediately to the north and northwest, and is clearly visible in **Figure 4**. The site is surrounded by a number existing recreational uses including:

- The MG Car Club located at Lot 1 DP 245116 and Lot 2 DP 1158962 to the northeast of the proposed Eagleton Quarry. The MG Car Club currently takes its access from the same right of carriageway as the Eagleton Quarry is proposed to. However, a Development Application (16-2011-564-3) was approved by Port Stephens Council in October 2013 (and subsequently modified in July 2015) for an upgraded racing track facility including a new intersection to provide access directly to the MG Car Club from Italia Road.

The upgraded MG Car Club race track is approved for race meetings and Supersprint and Hillclimb events on weekends, and for general track use 9am-5pm 7-days per week. Lot 1 DP 245116 and Lot 2 DP 1158962 contain the right of carriageway which benefits the proposed Eagleton Quarry site.

- Hunter Valley Paintball is located at Lot 1 DP 1108702 to the southeast of the proposed quarry, and immediately south of the existing landscape supplies operation. Hunter Valley Paintball also relies on the right of carriageway for access.
- Hunter MCC Raceway and MX Central are located at Lot 481 DP 611651 to the east of the site, between the landscape supplies operation and the Pacific Highway. Hunter MCC Raceway and MX Central also rely on the right of carriageway for access.

Surrounding Residential Properties

The nearest residential dwelling is located adjacent to the Port Stephens Gardenland landscape supplies operation which is a manager's resident for the landscaping supplies business. The owners and occupiers of this dwelling are supportive of the Eagleton Quarry proposal. The next nearest residential dwellings are located approximately 1km to the southwest of the site on Six Mile Road.

There is a single residential dwelling located to the northeast of the site, located on Italia Road between the intersections with the Pacific Highway and the right of carriageway. This dwelling is approximately 1.8 km away from the quarry site but only approximately 400m from the Pacific Highway. The nearest dwelling to the west is approximately 2km away. The location of neighbouring land uses and closest sensitive receivers are shown in **Figure 5**. A detailed adjoining properties map is provided at **Appendix C**.



Figure 5 – Surrounding Land Uses
Source: Google Maps (modified by JBA)

Future Residential Area of Kings Hill

The future Kings Hill residential area located south of Six Mile Road is predicted to result in significant residential intensification. At its most northerly extent the future R1 zoned residential area is limited to land within approximately 500m of the Pacific Highway, with the residual land zoned for large lot residential and environmental living.

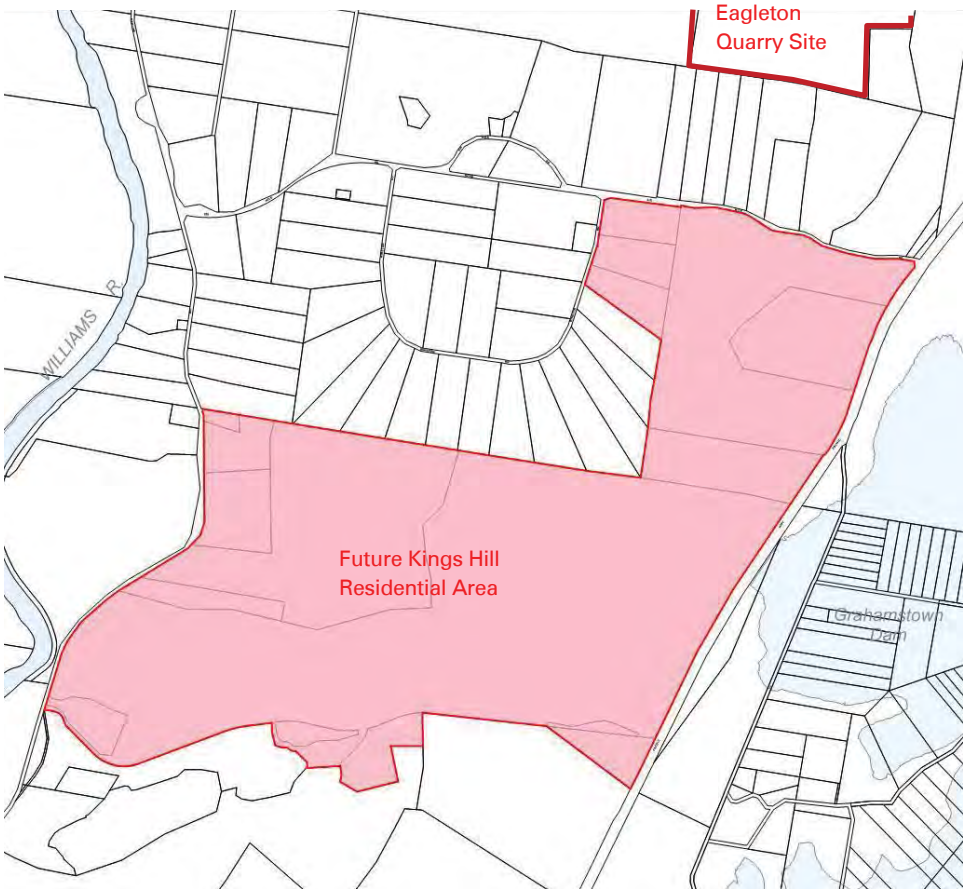


Figure 6 – Location of Future Kings Hill Residential Area
Source: Port Stephens Development Control Plan 2014 (modified by JBA)

3.0 Project Justification and Alternatives

3.1 Resource Description

The identified resource contains a mixture of igneous and sedimentary rock formations suitable for concrete, road surfacing and road base aggregates, as described in the Preliminary Resource Assessment provided at **Appendix F**. The three main resource types include:

- Conglomerate which is a matrix of lithic sandstone comprising volcanogenic lithic fragments and lesser quartz and feldspar. The conglomerate is located at lower elevations generally in the eastern part of the proposed quarrying area.
- A porphyritic, felsic igneous rock (rhyodacite) which also contained some ignimibrite. The rhyodacite is mainly quartz and feldspar with fine groundmass, feldspar and shards of volcanic glass.
- At higher elevations to the northwest of the site a finer grained felsic igneous rock (rhyolite) has been identified, which contains higher amount of fine groundmass and correspondingly reduced quantities of quartz and feldspar.

3.2 Products and Market Demand

The resources described above have been identified as being suitable for a wide range of crushed and processed rock products used throughout the civil and construction industries including road bases, ballast aggregates, drainage aggregates, concrete aggregates and sealing aggregates.

Eagleton Rock is developing further constructions material product streams to compliment a new and dynamic quarry company. The company has detailed plans to provide high quality products backed up with long term quality and technical systems.

The proposed Eagleton Quarry would service local and regional demand for aggregate and crushed rock products. As such, most of the customers would be based in Newcastle, Central Coast and the Lower Hunter. Sydney is also a potential market for high quality concrete aggregates and road surfacing aggregates.

Demand for aggregate products will be driven by a combination of;

- Infrastructure – State or Federal spending on Roads, Rail, Ports, Schools, Housing, Hospitals etc.
- Private Investment – Commercial development, Industrial development and Residential construction

Lower Hunter's population growth for the next 20 years has been forecast by the NSW Department of Planning and Environment and is documented within the *Hunter Regional Plan 2036*. The Regional Plan has identified future development areas, principal land use types, settlement patterns and conservation outcomes. In particular, the Plan aims to:

- Ensure that sufficient employment lands are available to cater for 60 000 new jobs; and
- Plan for an additional 130,000 residents and 70,000 new dwellings.

These forecast figures indicate strong demand for quarried materials in the Lower Hunter Region and also to support the demand for materials in the Sydney Region where in recent years a number of essential reserves have been depleted.

Local projects requiring significant volumes of material in the immediate future are:

- RMS major road projects including M1 to Raymond Terrace, Singleton Bypass, Jesmond to Ranking Park, Tourle Street bridge duplication.
- Local Government road maintenance works.
- Newcastle Airport / RAAF expansion.
- Newcastle Port side land redevelopment (former BHP land).
- New Maitland Hospital.
- Commercial developments.
- Employment lands development.
- Residential development.

3.3 Objectives of the Development

The objectives of the proposed Eagleton Quarry are to establish a business providing high quality crushed rock and aggregate to meet ongoing construction demand in the Hunter, Central Coast and Sydney regions, in an efficient and environmentally sensitive manner without generating unreasonable impacts on the surrounding environment. The project seeks to provide up 20 full time equivalent job during the 30 year of the quarry

3.4 Analysis of Alternatives

3.4.1 Option 1: Not Proceeding with any Quarry Development

As set out in **Section 3.3** above there is an identified demand for crushed rock and aggregate products. With this in mind, the alternative of not undertaking the proposed activity is not considered appropriate as there is an identified demand for the product.

Furthermore, it has been identified that growth in the Lower Hunter is expected to include the addition of 115 000 dwellings this alone will create the demand for in excess of 20MT. This growth is replicated in the continuing expansion of the coal export activities at the Port Newcastle – with the development of a new coal export terminal forecast for the coming years. The products which will be extracted from the quarry are integral to the construction industry to ensure projects can be economically and sustainably delivered. Plentiful supply is paramount to ensure efficient and economical supply of these products to the open market.

Failure to proceed with the proposed quarry will result in a limited supply of construction aggregates from a well located location capable of providing material to both the Lower Hunter region and the Sydney Market in an economically and environmentally sustainable manner. The result will be a scarcity of product, price increases and additional haulage cost to provide material from alternate location located further north such as Karuah, Port Macquarie and further south of Sydney towards Marulan.

3.4.2 Option 2: Alternative Sites

Another alternative which has been considered is the opportunity to undertake the proposed quarry activities on another site.

The site was originally identified due to its proximity to an existing quarry which quarries similar material – being the Boral Seaham Quarry to the north of the site. The proposed Eagleton Quarry will essentially extract materials from the same deposits of aggregate materials.

When identifying this opportunity, a range of alternative sites were investigated in a band between the Pacific Motorway just north of the proposed site to Martins Creek to the north west of the proposed quarry. Analysis of the alternatives informed Eagleton Rock that the proposed sites location was far more environmentally and economically sustainable due to its onsite attributes and constraints whilst also being much closer to the arterial road network.

3.4.3 Option 3: Quarry Layout

The proposed quarry layout has been optimised to consider site constraints and opportunities. Alternative layouts were dismissed due to non-conformant management of constraints and negative environmental impacts. The proposed layout and sequence of expansion limits impacts and provides a complying outcome for primary constraints including;

- Surface water
- Groundwater
- Noise impacts
- Ecology
- Air quality

The issues outlined above informed the ultimate quarry design and reflect the overall Eagleton Rock quarry philosophy which is to minimise off-site impacts by:

- operating with maximum efficiency and minimal environmental footprint,
- concentrating quarry activities, and
- avoiding double handling of material.

In addition to potential primary constraints the quarry layout and in particular the processing area will provide an efficient point of sale from the processing plant eliminating double handling of material and excessive stockpile storage areas.

The location of the internal access road has been selected to minimise conflict with the adjoining Gardenland landscape facility's operations.

3.4.4 Option 4: Quarry Access

Access to the site is via a right of carriageway over private land connecting Italia Road to Barleigh Ranch Way. A copy of DP 115227 showing the right of carriageway is attached at **Appendix B**.

There were two variations to be considered in relation to the quarry access arrangements.

- Use of the right of carriageway.
- The location of the site access connection to Barleigh Ranch Way.

Use of Right of Carriageway

The right of carriageway is currently the only legal access to the site. Consultation with the owner of the land has confirmed that there is no constraint to the use of the right of carriageway for providing access to the proposed Eagleton Quarry, subject to appropriate improvement works being implemented.

Notwithstanding this, Eagleton Rock consulted with the RMS to investigate alternative access arrangements to the site that would avoid the need to use the right of carriageway or the existing Italia / Pacific Highway intersection. In particular, as can be seen in the Adjoining Properties Map (provided in **Appendix C**), the road reserve for Barleigh Ranch Way continues eastward beyond the right of carriageway, extending for approximately 350m connecting to the Pacific Highway.

This option would involve creating a new at-grade intersection on the Pacific Highway only 650m from the existing Italia Road intersection. Eagleton Rock has consulted with the RMS in relation to the creation of a new-at grade intersection with the Pacific Highway at this location. Based on these consultations it is not considered likely that RMS would agree to the new intersection. This alternative access would also require clearing land to create a new road where one does not currently exist – with potential biodiversity and heritage impacts.

Ultimately, given the ongoing suitability of the existing access arrangements via Italia Road and the right of carriageway, and the complications associated with creating a new at-grade intersection on the Pacific Highway, it was determined that the most suitable access arrangement was to use this existing route via the right of carriageway.

Location of Driveway Connection

There were a number of possible locations identified for the site access driveway connection to Barleigh Ranch Way, as follows:

- Access driveway located to the west of the Port Stephens Gardenland landscape supplies facility, with Seven Mile Creek crossing located at the northern boundary of the Site. This option would require the construction and maintenance of approximately 900m of public road along Barleigh Ranch Way, and a sub-optimal connection of the internal access road with quarry dispatch areas due to steep grades. It would also result in maximising the vehicle conflict between landscape supplies vehicles and quarry vehicles along Barleigh Ranch Way.
- Access driveway located adjacent to the Port Stephens Gardenland landscape supplies facility, with the internal access road running through the landscape supplies facility. This option would cause logistical and safety complications for the operator of the landscape supplies business due to the close interactions that would occur between the quarry trucks and the operational areas of the landscape supplied facility.
- Access driveway located near the eastern boundary of the site, with an internal access road that follows the eastern and southern boundary of the site, minimising the demands on the public road as well as minimising the potential for conflict between the Eagleton Quarry traffic and the landscape supplies facility traffic.

The third option was selected as the preferred location for the internal site access road because it has the least impact on the adjacent Gardenland facility, is better suited to the ultimate location of the sales dispatch area, and best conforms to the site's constraints. In particular, the third option provides for a road with flatter grades, a better crossing of Seven Mile Creek (as it is at a location where

the creek and its banks are better defined and more easily spanned by a bridge), and provides for a more logical connection to the existing electricity network.

4.0 Description of the Development

4.1 Introduction

The Eagleton Quarry project is for the extraction of a hard rock reserve that is a mixture of various course conglomerate and fractured igneous rock. Eagleton Rock has identified rock formations in demand throughout the local, regional and Sydney civil construction and concrete markets.

The site is a greenfield site that requires new infrastructure and equipment.

The Eagleton Quarry proposal incorporates a 30 year quarry operations area of approximately 30ha which includes a processing, sales and administrative area.

The quarry layout is shown in **Figures 7, 8 and 9** and in **Appendix D** for various stages of quarrying. The following sections explain the works, activities and processes associated with the construction of the quarry and the associated infrastructure and the operation of the quarry.

4.2 Construction Activities

The following construction activities are required prior to the commencement of product delivery from the Eagleton Quarry:

- Clearing of vegetation and topsoil stripping – approximately 30ha of vegetation is required to be cleared progressively over the 30-year life of the quarry to produce the ultimate quarry footprint;
- Improvements to the access roads involving pavement reconstruction / widening and tar sealing of the access roads (subject to further design and detailed pavement design);
- Construction of stormwater quality and quantity devices.
- Construction of internal site access road and quarry haul road; and
- Establishment of a pad for processing and sales areas.

Throughout the initial works program, it is proposed materials won during these works will be used in the construction of other onsite works (i.e. blasted rock from processing pad or dams would be crushed and screed on site for use as roadbase in the construction of haul roads and access roads).

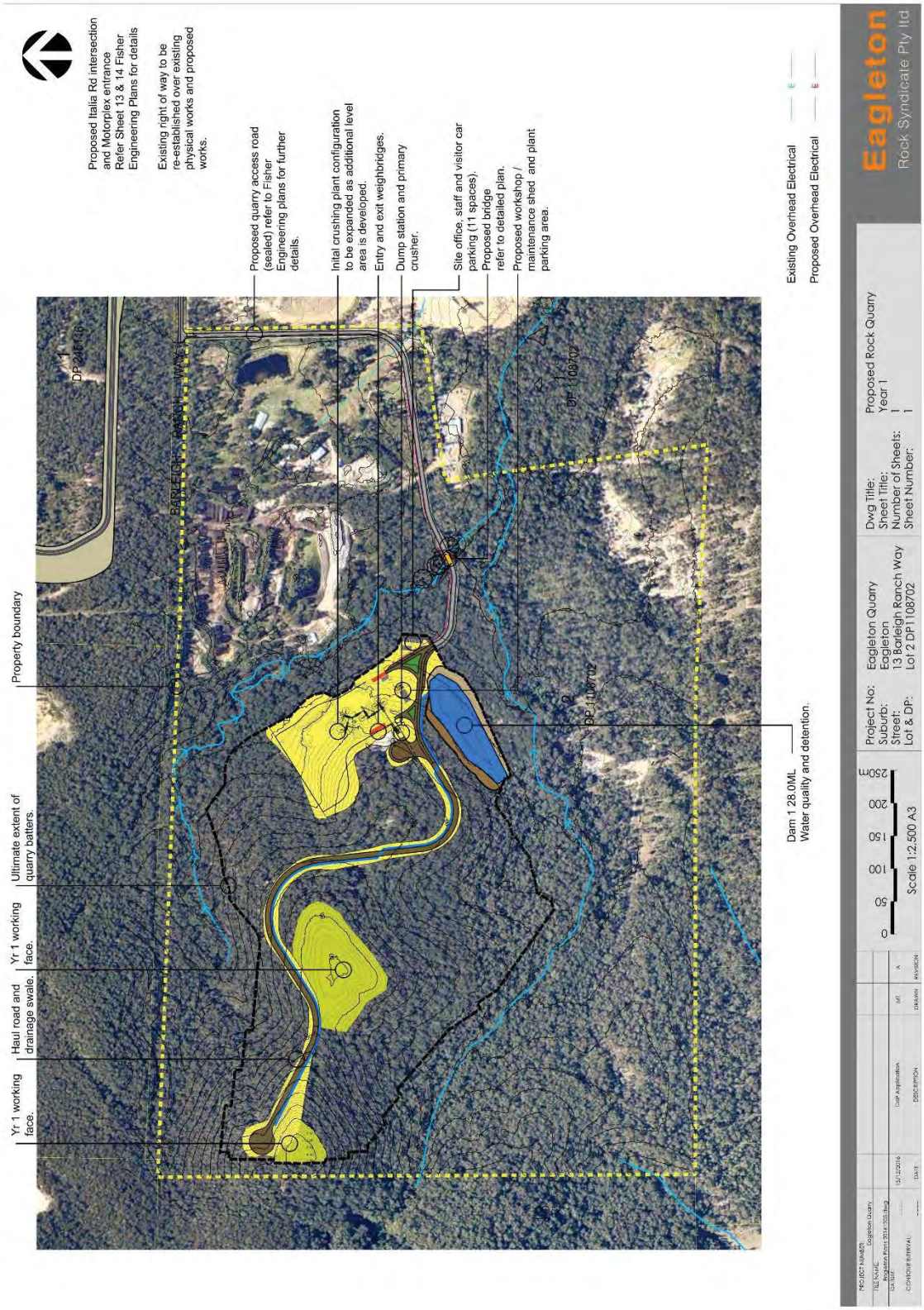


Figure 7 – Eagleton Quarry – Year 1
Source: Eagleton Rock

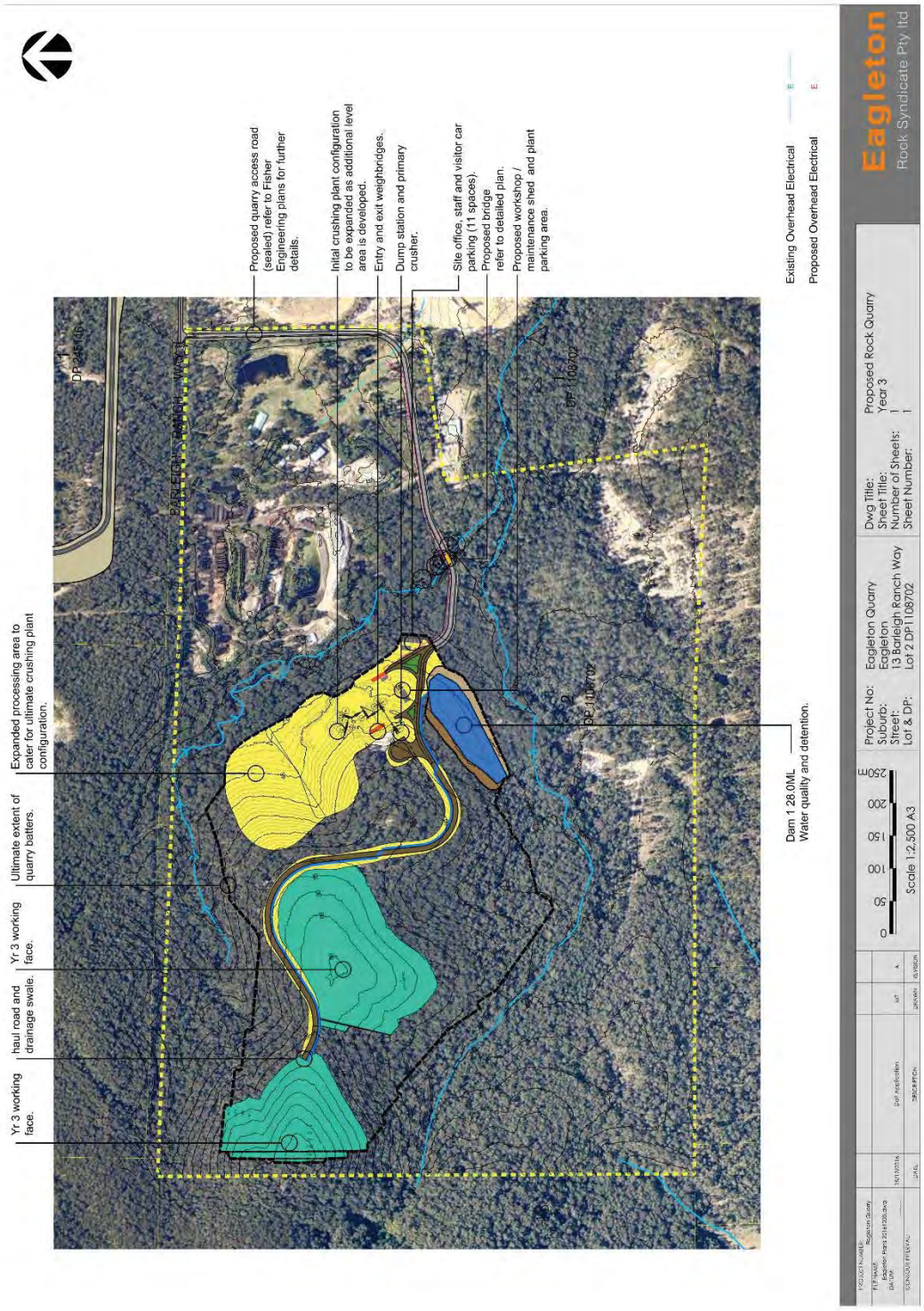


Figure 8 – Eagleton Quarry – Year 3
Source: Eagleton Rock



Figure 9 – Eagleton Quarry – Year 5
Source: Eagleton Rock

4.3 Site Access and Road Improvements

4.3.1 Barleigh Ranch Way and Right of Way

The proposal involves an upgrade to the intersection between the existing gravel road right of carriageway and Italia Road (see **Figure 4**). It is proposed to upgrade this intersection to a Major Access Driveway type intersection designed to provide for heavy road vehicles and articulated vehicles, as illustrated in Australian Standard AS 2890.2-2002.

As described in Section the existing gravel road is not located on the right of carriageway as shown in DP 115227, which is located approximately 50m to the east of the gravel road. It is intended to upgrade the existing gravel road in its current location, and to relocate the right of carriageway on the DP to reflect the location of the infrastructure. Negotiations are underway with the adjoining land owner to extinguish the existing easements, which are in the wrong location, and to establish new easements in the location of the existing access road.

The existing gravel road and the depicted length of Barleigh Ranch Way (approximately 350m) would be upgraded by improving alignment, pavement thickness, drainage and sealing the finished surface for the extents shown in **Figure 4** and **Appendix E**. The proposed sealed surface will be constructed to the relevant Port Stephens Council local road standards for a private rural road, being a 7m sealed road surface with 1m shoulders and table drains as required, and will provide an efficient access to the quarry allowing for minimal dust generation, minimal noise and minimal haulage times.

The approved MG Car Club motor racing facility will also take access from the right of way. Two access points have been approved under DA 16-2011-564-3 by Port Stephens Council. The first is located immediately south of the Italia Road intersection. The second is located approximately 650m south of the Italia Road intersection. Details of the intersection arrangements are provided in **Appendix E**.

4.3.2 Internal Site Roads

The internal site access road will be constructed to the relevant Port Stephens Council local road standards for a private rural road, being a 7m sealed road surface with 1m shoulders and table drains as required. The site access road will be established prior to the commencement of quarrying operations.

A new bridge or culvert crossing will be constructed over Seven Mile Creek. The bridge will be a 14.2m single span bridge, 7.0m wide (2 lane) with integrated kerb and handrail. The bridge will be clear of the 1:100 year flood level, and the footings will be located clear of the banks of the creek.

Haul roads within the quarry area will be unsealed gravel pavements. These unsealed roads will be maintained periodically via grading compaction rolling along with watering on as needs basis to minimise dust.

Detailed plans showing the alignment and form of the new internal site road and upgrades to existing roads are provided in **Appendix E**.

4.4 Administration Area

The administration area is located at the entrance to the main quarry on the southwestern side of Seven Mile Creek. The administration area will provide a defined entrance to the quarry, visitor car parking will be provided at this location with no unauthorised access beyond this point, only sales trucks and authorised contractors and quarry vehicles will be permitted beyond this point.

Within the administration area office accommodation, staff and visitor amenities and training room will be provided in a prefabricated/transportable form of construction. The administration area will be connected to mains power and telecommunications networks with water being collected from roofs and stored in tanks or alternatively topped up by a private supplier. Effluent disposal will be collected, treated and disposed of via a spray irrigation system onsite and will be subject to a separate Council approval or tanked offsite.

4.5 Processing Area

The processing area will comprise the working elements of the quarry where raw material will be feed into the crushing and screening plant and deposited into designated product stockpiles, mobile plant will be stored, maintained and refuelled and sales trucks will be loaded with product elements of the processing area will include the following:

- Weighbridge x 2 (way in and way out).
- Fuel storage comprising a 20 kilolitre diesel storage tank which will be designed and installed in accordance with *Australian Standard AS 1940–2004: Storage and Handling of Flammable and Combustible Liquids*, including being separately bunded to prevent any spillage from entering the surface water catchment. All tanks will have appropriate firefighting equipment and spill kits available. The storage tank will have its own integrated fuel bowser which will allow refuelling of mobile plant on a fully bunded impermeable apron. Crushing and screen plant which cannot be easily moved to the refuelling area will be refuelled via a 2,000l fully bunded fuel trailer which will be towed to the plant and refuelled in that location. The fuel trailer will have a spill kit fitted at all times.
- A maintenance shed will be installed with dimensions of 24m long x 12 m wide x 12m high. This shed will house tools, oxy acetylene gas equipment, welders, bearings, hardware, steel, screen cloths and general operation stock. This shed would also house small volumes of greases, oils and other chemicals (such as cleaner, degreasers and plant/equipment fluids).
- Processing plant as detailed in section 4.7.
- Silo for the storage a stabilising additives (cement or lime type products) for roadbase production.
- Product stockpiles.
- Sales truck circulation road.

4.6 Extraction and Processing

This proposal involves quarrying conglomerate, rhyodacite and rhyolite materials from a nominal starting volume of 150,000tpa to a maximum extraction rate of 600,000 tonnes per annum within the first 5 years of operation.

4.6.1 Drilling and Blasting

The quarrying process will involve traditional drill and blasting techniques to produce rock fragments suitable for haulage to the processing plant where further processing to reduce size and improve shape will take place.

It is proposed that the Eagleton Quarry would require approximately 1 blast per month (up to 12 per year). Blasting will take place during regular operating hours and only occur during favourable weather conditions to minimise impacts. Blasting would not take place on weekends or during the night time or evening periods (including early mornings).

It is proposed two working faces will be operational and the pit will develop as depicted in the quarry development plans working towards creating the ultimate pit landform which at the completion will be rehabilitated as per the rehabilitation plan.

Importantly, quarrying will advance generally in a north to south direction in 5 metre bench heights to ensure an operating face is maintained between the extraction area and receptors to the south. Sections illustrating this are shown in **Figure 10**.

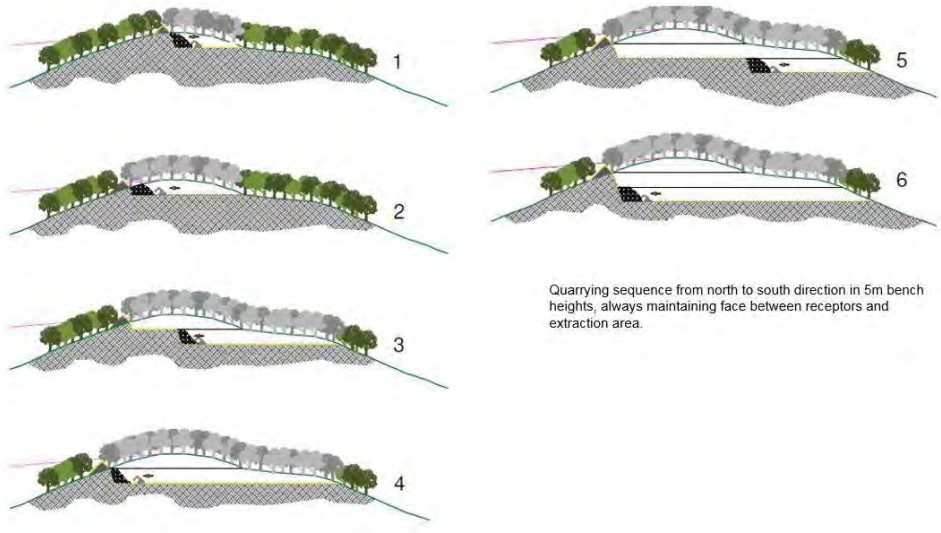


Figure 10 – Approach to Extraction
Source: Eagleton Rock

4.6.2 Processing

Blasted material will be loaded by excavator and hauled from the pits active faces with articulated dump trucks to the dump bin feed directly to the primary jaw crusher in the processing area.

Initially, the processing area will have limited space available for equipment. The initial quarry set up will therefore utilise mobile diesel powered processing equipment. The mobile diesel powered plant will be progressively phased out as processing area restrictions are relieved and replaced with modular equipment that will ultimately be electrically powered.

Processing equipment located within the processing area will include the following sequentially aligned plant:

- Dump station – a elevated dump bin where articulated dump trucks discharge quarried material which is then feed directly into the jaw.
- Jaw Crusher – Machine designed to crush and break up the materials in a vertical manner.
- Screens – Machinery used as a fines extract and grader of material then outputting clean graded material.
- Cone Crushers – Machines designed to crush and break up the material by squeezing and spinning the material.
- Screens – Machinery used as a fines extract and grader of material then outputting clean graded material.

- Pugmill (when required) – Machine designed to introduce additives to produce specific road base products.
- Impactor VSI – Machine that uses a rock lined spinning rotor to accelerate material before being impacted in a rock lined crushing chamber.
- Screens – Machinery used as a fines extract and grader of material then outputting clean graded material.
- Stackers – Machines used to convey material into stockpiles.

A water truck will operate throughout the site periodically to maintain moisture content in unsealed roads to minimise dust generation.

Figure 11 illustrates the proposed layout of the plant and equipment in the ultimate configuration (i.e. based on the electric equipment). **Figure 12** diagrammatically depicts the quarry product processing process. The processing equipment is optimised to produce materials of demand in an efficient and economical way.

To minimise impacts of noise emissions from the quarry noise barriers next to the jaw crusher and cone crushers have been included in the development proposal and are detailed within the Noise Impact Assessment report presented in **Appendix J**. Additional temporary noise barriers will be provided around the crushers during the initial diesel powered plant period.

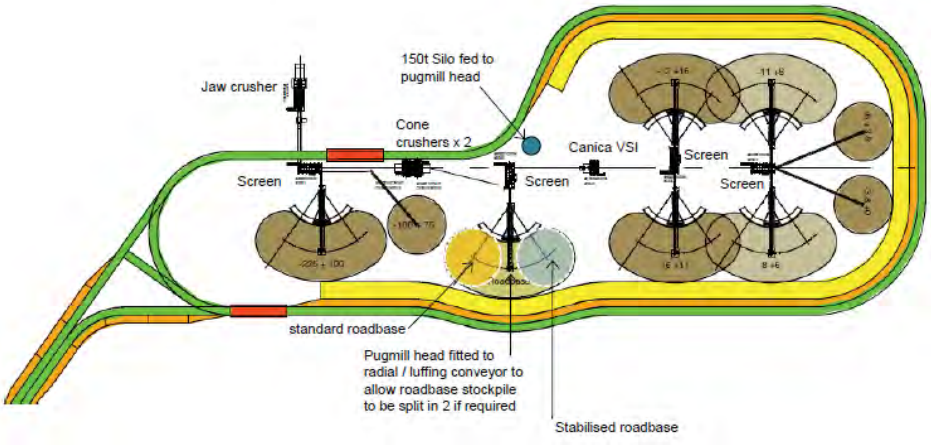


Figure 11 – Details of Processing Area (Ultimate Configuration)
Source: Eagleton Rock

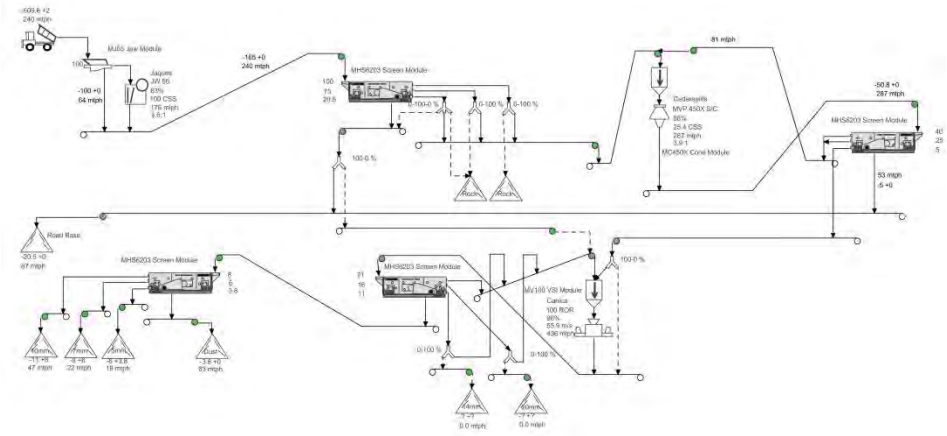


Figure 12 – Process Diagram

Source: Eagleton Rock

4.6.3 Sales and Maintenance

Processed materials will be loaded into sales trucks using two mobile loaders across the two processing areas.

4.7 Operation Hours

Operational quarry activities will be split into the following categories:

- **Extraction** and **Processing** – Includes all activities related to establishing, drilling and blasting, constructing, winning and processing material.
- **Sales** – The loading of processed materials from stockpiles into sales trucks and the management of existing stockpiles
- **Maintenance** – Related to scheduled and unscheduled maintenance of plant and equipment. Note this does not include civil or construction type maintenance.

Proposed processing and extraction activities are proposed as 7:00am – 6:00 pm Monday to Friday and 7:00am to 4:00pm Saturdays. Scheduled maintenance would generally be limited to processing hours. However, in the event of urgent unscheduled maintenance that cannot be completed within this period, maintenance works may need to be undertaken anytime 7 days per week.

Sales activities would be 5:00am to 10pm Monday to Friday and 5am-4pm Saturdays.

4.8 Services and Utilities

Electrical services to the site will be connected via an extension of the existing 11kva supply which currently services the property including the existing landscape supplies business. It is planned to extend this power to new administration and processing area via a new transmission line following the new internal site access road. An upgrade to this existing connection to provide additional capacity would involve the installation of a 750kw substation. The increased capacity will enable the quarry operation to consider the viability of converting the processing plant to electric power source, reducing fuel burn and switching to a cleaner more efficient power source.

The site is currently not serviced for disposal of effluent or potable water. Potable water needs will be met by purchased town water supplied by tanker trucks.

Effluent disposal will be either pump out or on site disposal via a treatment and spray irrigation system. These arrangements will be subject to separate Council approval prior to the commencement of quarry operations.

4.9 Water Management

A detailed Water Management Plan has been prepared by Umwelt Australia and is provided at **Appendix M**. The Eagleton Quarry has been designed to be self-sufficient in terms of water supply. Water running from all operational areas, including extraction areas, processing and sales, and haul roads, will be conveyed to stormwater dams.

The first dam will be installed during the initial construction period prior to any quarrying commencing

The second dam will be installed at the critical point of disturbed area which would trigger the requirement for additional volume for detention storage, this is at approximately year 5 of quarrying operations.

4.10 Employment

Site will be staffed by a combination of permanent employees and contractors. Generally, there will be around 10 staff working and 10 contractors on site at any given time including:

- 1 x Quarry Manager;
- 1 x Production Manager;
- 6 x Plant operators;
- 2 Office administrator / sales staff;

In addition, approximately 10 specialist contractors will be brought to the site on a needs basis to perform specific tasks i.e. hydraulic fitter, drill and blast and various technicians.

These figures do not include haulage operators which at a peak production of 600,000tpa would generate the need for approximately 20 - 25 additional full time jobs based on average 2-hour round trip.

4.11 Material and Vehicle Movements

The majority of daily vehicle trips generated by the proposed quarry development will be from sales and subsequent truck returns after delivery of quarry materials. These trips would be spread across a full day of quarry operations.

Vehicle movements to quantify traffic volumes are calculated based on sales estimates. Trucks picking up product generally average 32 tons in a truck & dog. Based on an output of 600,000 tonnes per annum approximately 18,750 heavy vehicles per year hauling product offsite would be required.

This equates to approximately 85 sales trucks dispatched per day, or approximately 170 truck movements per day (in/out). Most sales trucks are expected to be dispatched to locations within the Newcastle, Lower Hunter and Lower North Coast regions.

The site would also receive fuel and other supplies, notably bulk lime for pug mill operations, by regular truck deliveries. It is estimated that these would be up to 10 deliveries per week, or two per day on average.

Staff vehicle movements would result from the 10 (maximum) staff members arriving and leaving by car, 6 days a week. Operational and sales related staff vehicles would generally arrive before the sales trucks and leave after the sales activities for the day are complete, and so there would be minimal overlap.

An analysis of the potential impacts on traffic from the proposed development is provided in **Section 7.3**.

4.12 Quarry Development and Staging

The quarry will be progressively developed over an approximate life span of 30 years. The prepared development plans as presented in **Appendix D** sets out the proposed works and areas of disturbance over time as follows:

- Construction Phase – Quarry establishment period including the construction of access road, haul roads, intersections, stormwater devices, initial processing area, administration area.
- Operation Year 1 – Establishment of extraction areas involving clearing, drill and blast and extraction of material ready for haulage to the processing area via the haul roads established during the construction phase. See **Figure 7** for Year 1 quarry extent.
- Operation Year 1 to 5 – Expansion of the initial extraction areas through creating benches and faces and expanding the processing area to accommodate a more efficient plant layout and stockpile configuration. Processing area will transition from diesel powered processing equipment to electric powered processing equipment near the end of this period. Additional water quality and quantity control devices will be implemented including the construction of a second dam. See **Figure 8** for Year 3 quarry extent.
- Operation Year 5 onwards – Expansion of the initial extraction areas through creating benches and faces. **Figure 9** presents the Year 5 quarry extent along with the ultimate quarry footprint.

4.13 Closure and Rehabilitation

A Rehabilitation and Closure Management Plan has been prepared by SLR and is provided at **Appendix Q**. The Rehabilitation and Closure Management Plan will be progressively reviewed and updated over the life of the operation, and a Final Rehabilitation and Closure Plan will be completed at least three years prior to the planned completion of the operations.

The area is dominated by Seaham Spotted Gum – Ironbark Forest with Hunter Valley Moist Forest interspersed. The broad rehabilitation objective for the post-quarry landform is to establish a similar land use on the disturbed areas. **Figure 13** illustrates the final landform conceptual layout.

The proposed quarry operation will result in a final landform that comprises a series of 10 m wide and 15 m high benches at the western end of the quarry, in an amphitheatre configuration. Each stepped bench will be revegetated.

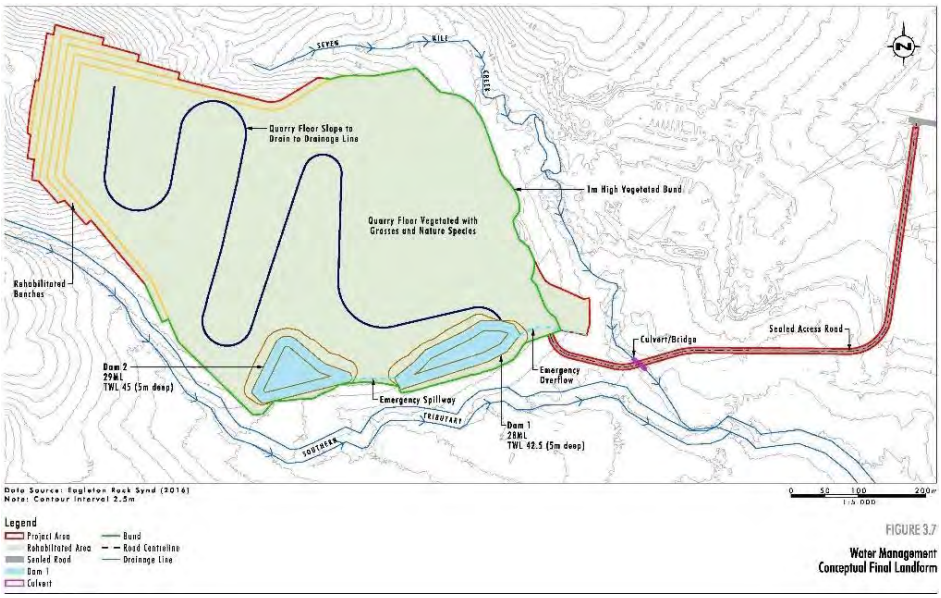


Figure 13 – Final Landform Water Management Plan
Source: Umwelt

The final pit/void will be approximately 28.6ha in area. Until such time that extraction has ceased, rehabilitation will occur around the perimeter of the pit only along the benches, and will not involve the pit floor.

Once operations have ceased, all buildings and infrastructure will be removed. These areas will be reshaped and ripped where necessary for topsoiling and revegetation. The pit floor (void area) will be vegetated with appropriate native species to create a stable wetland. The wetland will be formed as a shallow depression with the low point in the location of the final retention pond in the south-east corner of the void.

Elements such as drainage paths, contour drains and ridgelines will be shaped, as much as practical, to undulating profiles in keeping with natural landforms of the surrounding environment.

The floor of the quarry will have an overall slope of approximately 0.5% and will drain along varying drainage line alignment from the benched section at the western end of the quarry to the water storage dams at the south-eastern boundary of the extraction area. The floor of the quarry will be predominantly free draining and will not have a final void. Several minor depressions will however be created along the in the alignment of the drainage line. These minor depressions will help reduce erosion potential, enhance the sediment trapping capacity and in the longer term increase habitat value of the quarry floor which is to be vegetated with native species.

The minor depressions will also provide a passive mechanism for groundwater recharge into the underlying stratum. This will assist in offsetting the predicted 13.5 ML/year reduction groundwater recharge as a result of groundwater seeping from the elevated benched area the western edge of the proposed quarry onto the quarry floor.

In order to limit impacts to surface water systems it is proposed that the quarry water management system will remain in place until the water quality from the quarry area meets the target objectives. With the use of vegetation and only limited exposed inert rock, it is expected that there will be limited risk of impacts on surface water post-closure.

As part of decommissioning the quarry at the end of the Project, water management dams will either remain in use for identified and approved future land uses or will be removed. If the dams are to be retained, the required capacity of the dams will be assessed and modified as necessary.

Some of the proposed diversion drains and channels will remain in place as part of the final landform in circumstances where they are considered to be stable in the long term and where required to minimise erosion.

All areas disturbed by removal or modification of water management structures will be reshaped and revegetated. The measures required to effectively decommission the water management system and the water management controls required in the final landform will be considered in further detail as part of the detailed quarry closure planning process.

5.0 Legislative Framework and Strategic Context

5.1 Commonwealth Legislation

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) encompasses an assessment and approvals system for:

- Actions that have a significant impact on matters of National Environmental Significance (NES);
- Actions that have a significant impact on the environment of Commonwealth land; and
- Actions carried out by the Commonwealth Government.

An EPBC Act Online Database search has been undertaken for the project and the results are included at **Appendix G**. The matters of NES are listed below, and the relevance of each matter of NES is summarised as follows.

- World Heritage areas: There are no World Heritage Areas within the locality. The proposed proposal will therefore not affect any World Heritage Area.
- National Heritage Places: There were no National Heritage Places identified within the locality, so the proposal will not impact upon any National Heritage Places.
- Wetlands protected by international treaties (i.e. the Ramsar Convention): The closest Ramsar site is the Hunter Estuary Wetlands which includes Kooragang Nature Reserve. The proposed site is over 10km from the Kooragang Nature Reserve and will not impact upon the Hunter Estuary Wetlands or any other Ramsar site.
- Nationally listed threatened species and ecological communities: A total of 30 Threatened species listed under the *EPBC Act* have been identified by the *EPBC Act* online database Search as likely to occur within the locality. A number of these species, however, are confined to oceanic habitats (*e.g.* albatrosses and whales) and would therefore not occur within the subject site. All the 'non oceanic' Threatened species identified by the *EPBC Act* online database search as potentially occurring on the quarry site are addressed in Section 7.3. The assessment concludes that the proposed development is considered unlikely to have a significant impact on EPBC Act-listed threatened species and a referral to the Commonwealth is not required.
- Nationally listed Ecological Communities: The subject site not does not support any Threatened Ecological Communities listed under the EPBC Act.
- Nationally listed migratory species (i.e. CAMBA, JAMBA agreements): While the subject site contains known and/or potential habitat for some migratory species, this habitat represents a very small area of habitat for migratory species in the context of available habitat in the locality and region. The vegetation proposed to be removed from the proposed extraction area could therefore not be considered to represent an important area of habitat for any migratory species and the proposal is considered unlikely to cause a significant impact on listed migratory species.
- All nuclear actions: The proposal does not constitute a nuclear action.
- The environment of Commonwealth marine areas: The proposal will not affect any Commonwealth marine areas as the site is located inland.

In addition to the matters of NES, other matters protected by the EPBC Act include the following:

- Commonwealth Lands: Seven items have been identified within the locality of the site, however these do not occur in close proximity to the site and will therefore not be affected by the proposal.
- Commonwealth Heritage Places: Two Commonwealth Heritage Places have been identified near the site, being the Salt Ash Weapons Range and Williamtown RAAF Base Indigenous Sites. These are located well away from of the site and will not be affected by the proposal.
- Places on the Register of the National Estate (RNE): Six places listed on the RNE been identified in the search area, being Seaham Swamp Nature Reserve, Salt Ash Weapons Range, Williamtown RAAF Base Indigenous Sites, Post Office (former), King Street Urban Conservation Area and Raymond Terrace Courthouse and Police Station. These are located well away from of the site and will not be affected by the proposal.
- Listed Marine Species: No marine habitats occur within the site and the habitat proposed to be removed is unlikely to represent an area of important habitat for listed 'terrestrial marine' species. The proposal is therefore unlikely to cause a significant impact on listed marine species.
- Whales and Other Cetaceans: The site does not contain habitat for whales or other cetaceans.
- Critical Habitats: No critical habitats listed under the *EPBC Act* have been identified within the search area.
- Commonwealth Reserves. No Commonwealth Reserves have been identified within the search area.

The proposed development is not considered to be a 'controlled action' as no potentially significant impacts on matters of NES have been identified and the proposal will not impact the environment of Commonwealth land. As such, no referral to the Commonwealth is considered necessary.

5.2 Planning Legislation

5.2.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) governs the approvals process for developments in the State. Part 4 of the EP&A Act provides the legislative framework for development requiring consent, including the preparation, assessment and determination of development applications.

Section 89C of the EP&A Act provides that a State environmental planning policy may declare development to be State Significant Development (SSD). As detailed in **Section 5.4.1** below, the proposed quarry development is a type of development declared by the S&RD SEPP to be SSD.

The Minister for Planning is the consent authority for SSD, however the Minister has established delegations meaning this development application will be determined by the Planning Assessment Commission or officers of the Department. Section 89H requires that the matters for consideration listed in section 79C of the EP&A Act are taken into consideration in determining a development application for SSD. This EIS provides an assessment that enables all of these matters to be considered by the Minister (or delegate).

Section 89J of the EP&A Act specifies legislative approvals that are not required in regards to an approved SSD. In particular, approvals under the following legislation are not required if the SSD application is approved:

- An Aboriginal Heritage Impact Permit under section 87 or section 90 of the National Parks and Wildlife Act 1974 (NPW Act) to affect or destroy an Aboriginal object.
- An authorisation referred to in section 12 of the *Native Vegetation Act 2003* to clear native vegetation.
- A controlled activity approval under section 91 of the *Water Management Act 2000.*

Section 89K of the EP&A Act specifies legislative approvals which must be applied consistently with a SSD consent. Approvals under the following legislation identified in Section 89K are expected to be required for the proposed Eagleton Quarry:

- Consent from Port Stephens Council under Section 138 of the *Roads Act 1993* to carry out works to a public road.
- An Environment Protection Licence issued by the Environment Protection Authority under Chapter 3 of the *Protection of the Environment Operations Act 1997.*

Approvals under the *Roads Act 1993* and the *Protection of the Environment Operations Act 1997* will subsequently need to be obtained if the Eagleton Quarry is approved.

5.2.2 Environmental Planning and Assessment Regulation 2000

The *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) sets out procedures that relate to preparation and submission of EISs. In particular, Schedule 2 of the EP&A Regulation sets out:

- The process for obtaining SEARs.
- Requirements relating to the form and content of an EIS.

This EIS has been prepared in accordance with Schedule 2 of the EP&A Regulation.

5.3 Other State Legislation

5.3.1 Roads Act 1993

The Eagleton Quarry project includes carrying out of works that affect public roads as follows:

- Improvements to Barleigh Ranch Way, being minor widening, grading, and creation of a bitumen sealed surface.
- Construction of an upgraded intersection connecting the existing Right of Carriageway with Italia Road.

Consent from Port Stephens Council under Section 138 of the *Road Act 1993* will be required for these works. However, as described above, the Section 138 Roads Act consent must be consistent with any SSD consent that is issued.

5.3.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) regulates operations which have the potential to harm the environment. The proposed development is a type of activity listed under Schedule 1 of the POEO Act as the quarry is expected to extract up to 600,000 tonnes per annum. Clause 19 of Schedule 1 of the POEO Act specifies that a land-based extractive industry involves the extraction, processing or storage of more than 30,000 tonnes of extractive material per year requires an Environment Protection Licence (EPL).

As such, the proposal would constitute a scheduled activity, and an EPL will be required. Section 89K of the EP&A Act establishes that if the Eagleton Quarry is approved then the EPL issued for the Eagleton Quarry is required to be consistent with the SSD consent.

5.3.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) regulates activities that are likely to impact on items of Aboriginal cultural heritage value or Aboriginal archaeological significance.

One Potential Archaeological Deposit will be impacted by the proposal, and this will be subject of sub-surface investigations prior to construction commencing in accordance with the OEH's *OEH Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales.*

However, as described above, Section 89J of the EP&A Act sets out that an Aboriginal Heritage Impact Permit is not required for an approved SSD.

5.3.4 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) identifies threatened species and populations, and endangered ecological communities which are protected in NSW. A number of these species are likely to occur or may possibly occur at the site, and these have been assessed in **Section 7.3** in accordance with the SEAs.

5.3.5 Water Management Act 2000

The Eagleton Quarry has been designed to minimise impacts on the surface water system. In particular, the area of proposed quarry operations has been selected in order to avoid the need to modify the existing site drainage channels, being Seven Mile Creek (to the east of quarry operations) and minor intermittent tributary to Seven Mile Creek located to the south of quarry activities.

Seven Mile Creek is identified a third order stream under the Strahler system, and its on-site tributary is identified as a category 1 stream. In accordance with the NSW Office of Water's *Guidelines for Riparian Corridors on Waterfront Land* the appropriate vegetated riparian corridor width on each side of the stream are 20m and 10m respectively. Quarry activities will generally be located outside of riparian corridor for these watercourses.

Notwithstanding the above, it is highlighted that the project involves the construction of a new road over Seven Mile Creek, which include the installation of a new bridge. The installation of the bridge and the carrying out of construction works for the internal onsite access road will require works within the vegetated riparian corridor of Seven Mile Creek. As such, but for Section 89J of the EP&A Act a controlled activity approval issued under Section 91 of the *Water Management Act 2000* from the NSW Office of Water would have been

required for such works. However, as described above, Section 89J provides that a controlled activity approval is not required for approved SSD.

The project is also expected to intercept groundwater. Groundwater within the proposed Eagleton Quarry site is managed by Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources under the *Water Management Act 2000*. The plan commenced in July 2016 and operates for a period of 10 years. The plan establishes rules for sharing water between different types of water and provides users with opportunities to trade water through separation of land and water.

An analysis of the consistency of the proposal with the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources rules for this groundwater source area is provided in **Appendix M** indicates that the proposal is consistent with the rules.

The proposed quarry will penetrate the local aquifer through extraction operations, so an aquifer interference approval issued by the NSW Office of Water under Section 91 of the *Water Management Act 2000* will be required.

5.3.6 Water Act 1912

Whilst the *Water Act 1912* has been replaced in some parts of the State by the *Water Management Act 2000*, it still applies in certain areas and in relation to certain water resources.

In relation to the Eagleton Quarry, since the Water Sharing Plan for the Porous and Fractured Rock Groundwater Sources has commenced the groundwater resources in the vicinity of the site are no longer regulated under Part 5 of the *Water Act 1912*.

5.3.7 Summary of Other Approvals Required

In addition to development consent, the following approvals are expected to be required:

- An EPL from the EPA under the *Protection of the Environment Operations Act 1997*.
- An approval from Port Stephens Council as the Roads Authority under Section 138 of the *Roads Act 1993* for works to Italia Road and Barleigh Ranch Way.
- A, Aquifer Interference Approval issued by the NSW Office of Water under the *Water Management Act 2000* for works that impact on groundwater resources.

But for the application of Section 89J of the EP&A Act, the following approvals would have been required:

- A controlled activity approval issued under Section 91 of the *Water Management Act 2000* for controlled activity works on waterfront land.
- Aboriginal Heritage Impact Permit under the *National Parks and Wildlife Act 1974*.

5.4 Statutory Planning Instruments

5.4.1 State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) was adopted on 1 October 2011 and identifies SSD. Pursuant to clause 7 of Schedule 1 of the SRD SEPP, the development of the Eagleton Quarry is declared to be SSD, because it would extract from a total resource (the subject of the application) of over 5 million tonnes.

Clause 11 of the SRD SEPP also states that development control plans do not apply to SSD. As such, the *Port Stephens Development Control Plan 2013* does not apply to the development.

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

Clause 12 of the SEPP requires that the consent authority consider the compatibility of the proposed extractive industry with the surrounding land uses – both existing land uses and likely future preferred uses. The existing surrounding land uses are described in **Section 2.4** and are generally limited to a quarry, rural industries, and entertainment facilities that are not sensitive land uses and would not be considered to be incompatible with the proposed quarry. The nearest off-site residential dwellings are located approximately 1km to the southwest of the site along Six Mile Road. The minimum lot size is 40ha, indicating that intensification is unlikely to occur in the near future. Environmental assessment through this EIS has determined that the quarry can operate without causing significant amenity impacts to these nearest residences. As such, the proposed Eagleton Quarry is considered to be compatible with existing and likely future surrounding land uses.

Clause 15 of the SEPP requires the consent authority to consider the efficiency or otherwise of the development in terms of resource recovery. The proposed quarry will extract the rock resource in an orderly and efficient manner over a period of 30 years, taking into account site environmental constraints.

Clauses 14, 16 and 17 relate to the requirement of the consent authority to consider the imposition of conditions relating to natural resource management, environmental management, transport and rehabilitation.

The site is not identified in Schedule 1 of the SEPP, which specifies land on which extractive industries are prohibited.

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

The site of the proposed quarry activities largely comprises native vegetation Whilst agricultural uses are likely to have occurred in the past it is unlikely that any substantial ground contamination is present. A Phase 1 Contamination Assessment has previously been carried out for the adjacent Gardenland landscape supplies facility which included a review of historical information and searches of relevant databases.

Searches of databases identified that:

- The site is not listed on the EPA's Contaminated Sites Register.

- There is no record of the storage of dangerous goods at the site (Work Safe NSW).
- The Section 149 Certificate does not identify any critical habitats, conservation areas, mine subsidence issues or contamination notices at the site.

Based on a review of the available historical information, prior to its use as a landscape supplies facility the site appeared to be used for quarrying and prior to this it was vacant bushland. The aerial photography identifies that in 1958 the proposed quarry site was partially cleared, however by 1993 (when the area to the east of the creek was used for quarrying) the Eagleton Quarry area had been almost fully revegetated except for a series of tracks and trails running throughout the site.

Since the commencement of operations of the Gardenland facility in 2000 a small section of the proposed quarry site has been cleared – this is part of the section where the processing area is proposed to be located. Based on a site walkover this part of the site appears to have been subjected to the placement of reject ceramic tile fragments. It is proposed to validate the reject tile fragments in accordance with the criteria set out in the EPA's Recovered Aggregate Exemption 2010 and then to reuse them as crushed aggregate material for the purposes of internal site and haulage road construction and for ground preparation of the processing areas.

Based on the above there is no evidence to suggest that ground contamination is currently causing a risk of harm to the environment. Given that the proposed land use is consistent with the existing and previous uses on the land near the site (i.e. quarrying and landscape supplies) the site is considered to be suitable for the proposed quarry land use.

No remediation is considered necessary, or proposed.

The proposed development involves substantive land forming including relocation of topsoils and extraction of rock. If areas of ground contamination become apparent during the land forming activities, then the EPA will be notified and appropriate controls will be implemented to prevent impacts on the surrounding environment.

5.4.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

Preferred koala fee tree surveys identified that approximately 20% of the canopy trees in the woody vegetated area consist of *Eucalyptus punctata* (Grey Gum), which is listed under Schedule 2 of SEPP 44. The site is therefore determined to be potential Koala habitat.

Port Stephens Council has implemented a Comprehensive Koala Plan of Management (CKPoM) which identifies the Eagleton Quarry site as being Marginal Koala Habitat. Marginal Koala Habitat as defined by the Plan of Management as the lowest Community based survey category, essentially being all forested areas which are neither Preferred nor Supplementary Koala Habitat.

An assessment of potential impacts on koala is provided in **Appendix H**. The assessment was carried out in accordance with the CPKoM, with particular reference to the *Guidelines for Koala Habitat Assessments* set out in Appendix 6 of the CPKoM, and the performance criteria set out in Appendix 4.

Compliance with the provisions of the CKPoM will constitute compliance with the provisions of SEPP 44.

5.4.5 Port Stephens Local Environmental Plan 2013

The site is located within the Port Stephens Local Government Area (LGA) and as such the provisions of the *Port Stephens Local Environmental Plan 2013* (Port Stephens LEP) apply. The relevant clauses of the Port Stephens LEP are described below.

Under the Port Stephens LEP the site is zoned RU2 – Rural Landscape. The proposed development is permissible with consent under this zone.

Clause 5.9 relates to the preservation of trees. The proposal will require the clearing of vegetation, and consent the removal of this vegetation is sought by this Development Application. An assessment of the biodiversity impacts is provided in **Appendix H**.

Clause 7.1 relates to Acid sulfate soils. The site is classified as Class 5 under the LEP's Acid Sulfate Soils Map, and is not within 500m of Class 1, 2, 3 or 4 land. As such, this clause does not apply.

Clause 7.6 relates to the provision of services. The proponent has a strategy for delivering services to the site, as described in **Section 4.8**.

Clause 7.8 of the Port Stephens LEP relates to drinking water catchment. The site is located within the drinking water catchment for Grahamstown Dam. Clause 7.8 states that:

(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider the following:

(a) whether or not the development is likely to have any adverse impact on the quality and quantity of water entering the drinking water storage, having regard to the following:

(i) the distance between the development and any waterway that feeds into the drinking water storage,

(ii) the on-site use, storage and disposal of any chemicals on the land,

(iii) the treatment, storage and disposal of waste water and solid waste generated or used by the development,

(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid any significant adverse impact on water quality and flows, or

(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact

Other controls within the Port Stephens LEP are not expected to be relevant to the proposed Eagleton Quarry.

5.4.6 Port Stephens Development Control Plan 2014

The *Port Stephens Development Control Plan 2007* (Port Stephens DCP) applies to all land within the Port Stephens Local Government Area. This document provides principles and controls for development in the Port Stephens area in relation to the development that requires consent under Part 4 of the EP&A Act. As the proposed development is SSD, the provisions of the Port Stephens DCP

do not apply. However, the proposed development is expected to be able to generally comply with the relevant controls of the Port Stephens DCP.

5.4.7 Port Stephens S94 Development Contributions Plan

The *Port Stephens S94 Development Contributions Plan 2007* (S94 Plan) provides for extractive industries and sets out a rate of contribution for road haulage from industries that cause heavy vehicle movements. Council has indicated that a Heavy Vehicle Haulage Fee will be required under the S94 Plan.

The contribution rate is to be established from a Transportation and Economic Assessment Study to be prepared by the proponent. This study is to identify the impact the increased traffic generated by the development will have on the local road system, with consideration of the existing condition of the specific road(s), its classification, the cost of road repairs on the specific length and the relative increase in heavy vehicle usage of the road generated by specific development.

The S94 Plan also provides that where a developer chooses not to undertake a Transportation and Economic Assessment Study, a nominal contribution of 4 cents per tonne per kilometre of haul route will be levied.

Eagleton Rock has not prepared a Transportation and Economic Assessment Study, and proposes to Council a Heavy Vehicle Haulage Levy of 4c per tonne per km for transportation of quarry products on Italia Road, between the Right of Carriageway and the intersection with the Pacific Highway (a distance of approximately 450m). Based on an annual output of 600,000 tonnes this equates to $24,000 per annum.

In addition, Eagleton Rock would upgrade Barleigh Ranch Way at its own expense to ensure it meets the criteria for trafficable widths and other road safety requirements set out under the ARRB's *Unsealed Road Design Guidelines, March 2009*, and will maintain it as such for the life of the quarry operations.

This approach is considered to be consistent with the S94 Plan in that Council will receive a Heavy Vehicle Haulage Fee for haulage along public roads for which it is required to manage and maintain.

5.5 Strategic Framework

5.5.1 Hunter Regional Plan 2036

By 2036, an additional 130,00 people are expected to be living in the Hunter region. The *Hunter Regional Plan 2036* aims to guide the delivery of homes, jobs, infrastructure and services to support the growing and changing needs of the Hunter. The Regional Plan provides an overarching framework to guide development and investment in the Hunter region to 2036.

In preparing the Regional Plan the NSW Government has acknowledged the growing importance of Greater Newcastle and set the following regionally focused goals:

- The leading regional economy in Australia
- A biodiversity-rich natural environment
- Thriving communities
- Greater housing choice and jobs

The Hunter region has an estimated 322,000 jobs and this is projected to increase to 384,000 by 2036. The Plan aims to strengthen the region's economic resilience, protect its well-established economic and employment bases and build on its existing strengths to foster greater market and industry diversification.

In particular, the completion of the Pacific Highway upgrade has cut travel times offering opportunities for industries to expand and supply products to Greater Newcastle and Sydney. This will act as a catalyst for employment growth. Attracting new industries and growing existing industries that can leverage the accessibility provided by the Pacific Highway will support economic growth.

Direction 13 identifies that, whilst ongoing investment in rural and resource industries underpins the sustainable growth, economic prosperity and ongoing productivity of the Hunter region the continued growth of rural and resource industries can result in potential for land use compatibility issues to arise.

In particular, it identifies that there is also potential for conflict if new housing encroaches into rural and resource areas, leading to increased management costs. Conflict could also affect the potential to sustain or grow rural and resource industries. The expansion of rural and resource industries can also affect established urban activities if not managed appropriately. Land use planning can provide greater certainty for investment in rural and resource industries by establishing clear parameters and transparent processes to support new development.

The proposed Eagleton Quarry project is consistent with the relevant directions and actions associated with Goal 1 of the Regional Plan.

Direction 15 of the Regional Plan identifies the need to protect the quality and security of the region's water supplies. Planning to manage development is a priority within the Hunter's drinking water catchments to balance the needs of growing towns and villages, and rural and resource industries. The Eagleton Quarry site is located within the drinking water catchment, and a comprehensive assessment of water quality has been undertaken in consultation with Hunter Water, to ensure no adverse impacts to the water supply would result from the quarry.

5.5.2 Lower Hunter Regional Conservation Plan

The Regional Conservation Plan (RCP) sets out a 25-year program to direct and drive conservation planning and efforts in the Lower Hunter Valley. It seeks to establish a framework to guide conservation efforts in the Lower Hunter.

The RCP illustrates vegetation communities in the Lower Hunter and their conservation status. It identifies that the site is part of an area where the vegetation reservation target has yet to be met. It also identifies that the site is not part of a high priority regional conservation area, but that a biodiversity corridor passes through the land in the vicinity of the site. This biodiversity corridor represents a 'non-reservation' regional conservation priority, connecting Wallaroo National Park to the vegetation south of Grahamstown Dam.

Importantly, the Hunter Regional Plan supersedes the RCP, and identifies seven regionally significant biodiversity corridors, but does not include the Wallaroo – Grahamstown Dam link.

The RCP sets out that the mechanisms to be employed in offsetting biodiversity impacts in these areas is likely to include BioBanking, planning agreements or dedication of land for national parks or other conservation reserves. A BioBanking assessment has been carried out for the proposed Eagleton Quarry (see **Section 7.2** and **Appendix H**), and it is proposed that an appropriate amount

of Biobanking Credits will be secured and retired to account for the clearing required to develop and operate the quarry.

6.0 Consultation

In preparing the SEARs for the EIS, the Department of Planning and Environment consulted with:

- The Department of Industry –the division of Resources & Energy.
- The Department of Primary Industries (DPI).
- The Environment Protection Authority (EPA).
- The Office of Environment and Heritage – in relation to Biodiversity, Aboriginal Cultural Heritage, Historic Heritage, Water & Soils, Flooding.
- Roads and Maritime Services (RMS).
- Port Stephens Council

Comments and issues raised by these authorities have been considered in preparing the SEARs and have been taken into account in the design of the proposed development and addressed where relevant in this EIS. Subsequent to the issue of the SEARs Hunter Water Corporation provided the Department with requirements in relation to the Grahamstown Dam catchment. These additional requirements were notified to Eagleton Rock and have been addressed in the proposed development.

In the SEARs, the Department also required Eagleton Rock to consult with the following:

- OEH (including the Heritage Branch).
- EPA;
- Division of Resources and Energy within the Department of Industry.
- The Department of Industry –the division of Resources & Energy.
- The Department of Primary Industries (DPI).
- DPI (including the DPI Water, NSW Forestry, Agriculture and Fisheries sections and Crown Lands division);
- RMS.
- NSW Rural Fire Service.
- Hunter Local Land Services.
- Port Stephens Council.
- Community groups.

The issues raised by the council, agencies and the community are detailed below, including how these issues have been taken into account in planning for the development, and where they are addressed in the EIS.

The proposed development will be placed on public exhibition for 30 days in accordance with clause 83 of the *Environmental Planning and Assessment Regulation 2000*. During the public exhibition period Council, State agencies and the public will have an opportunity to make submissions on the project.

6.1 Matters Raised by Council

Council provided input into the preparation of the SEARs. The matters raised by Council in this correspondence are listed in **Table 1**, along with a summary of the response to the issue, and where in the EIS the issue has been addressed in more detail.

Table 1 – Issues Raised by Council

Issues/discussion	Comment/response
Legislation policies and strategies.	The EIS addresses relevant strategic and statutory plans in Section 5.
Engineering requirements, including: - Water management - Access, transport and traffic - Natural resource management - Environmental health	The development will comply with Council's specified engineering policies, standards and requirements.
Biodiversity conservation	A detailed biodiversity assessment has been carried out and is provided in **Appendix H**.
Land use conflict with Kings Hill Urban Release Area	The Kings Hill residential area is located over 1km south of the Eagleton Quarry site. At its most northerly extent the future R1 zoned residential area is limited to land within approximately 500m of the Pacific Highway. The visual impact assessment (**Appendix P**) identifies that there is a substantial ridgeline between the future residential area and the quarry site – meaning that that there will be no visual intrusion caused by the quarry. Air quality (**Appendix K**) and noise impact (**Appendix J**) assessments demonstrate that the quarry would not result in unacceptable impacts to future residents of the residential area.
Bushfire	Bushfire hazards have been addressed in **Section 7.13**.
Hunter water special catchment area (Grahamstown Dam)	A detailed water resources assessment has been provided in **Appendix M**, which has been prepared in consultation with Hunter Water, and demonstrates that the project can comply with Hunter Water's requirements in relation to management of water quality within the Grahamstown Dam catchment.

Eagleton Rock consulted further with Council representatives in May 2016. Key issues discussed during this additional consultation were:

- Access to site from Italia road is of concern to Council.
- Ecology was also noted, specifically koala populations understood to be present at the site, therefore biodiversity offset strategy is important.
- Kings Hill Estate (located south of Six Mile Road) have two Development Applications in which are likely to go through this year once the VPA relating to a new Highway interchange has been finalised.

These issues have been addressed in the relevant sections of the EIS. Potential impacts to the future Kings Hill residential estate are addressed in the sections for air quality (see **Section 7.6**), noise (see **Section 7.4**) and visual amenity (see **Section 7.10**).

6.2 Matters Raised by Agencies

The matters raised by the agencies in their correspondence supporting the SEARs are listed in **Table 2**, along with a summary of the response to the issue, and where in the EIS the issue has been addressed in more detail.

Table 2 – Matters raised by Agencies

Issues/discussion	Comment/response
RMS	
Traffic study to include: ▪ Details of access routes ▪ Traffic counts. ▪ Details of anticipated generated traffic ▪ Assessment of impacts on road network, including cumulative impacts. ▪ Identification of road network upgrades to maintain existing level of service. ▪ SIDRA analysis. ▪ Construction impacts ▪ Road safety risk assessment of the Pacific Highway / Italia Road intersection.	Eagleton Rock has had ongoing and extensive consultation with the RMS in relation to access to the Eagleton Quarry via the Italia Road / Pacific Highway intersection. The most recent meeting was in August 2015. Section **3.4.4** sets out alternative access options that have been discussed with the RMS, including why the proposed access arrangements are preferred. A traffic study has been provided in **Appendix I** and summarised in **Section 7.3**, which includes the outcomes of consultation with the RMS. The traffic study demonstrates no significant impact to level of service or safety issues at relevant intersections. **Section 4** and **Appendix E** provide details of the improvements proposed to local road infrastructure.
Department of Industry	
EIS should include a resource assessment that: ▪ Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and ▪ Documents the methods used to assess the resource and its suitability for the intended applications.	Eagleton Rock contacted the Department of Industry in December 2016, confirming the requirements for assessment. No further issues were raised for assessment. A resource assessment is provided in **Appendix F**.
Department of Primary Industries (Office of Water)	
Annual volumes of surface water and groundwater proposed to be taken by the activity from each surface and groundwater source as defined by the relevant water sharing plan.	Eagleton Rock contacted the Department of Industry in December 2016, confirming the requirements for assessment. No further issues were raised for assessment. A detailed Water Resources assessment is provided in **Appendix M** which provides a detailed assessment of the issues specified by the Office of Water.
Assessment of any volumetric water licensing requirements	

Issues/discussion	Comment/response
The identification of an adequate and secure water supply for the life of the project.	**Appendix M** includes a table which provides for a cross-reference for each of these issues within the Water Resources Assessment report. **Section 7.8** of the EIS provides a summary of the Water Resources Assessment.
A detailed and consolidated site water balance.	
A detailed assessment against the NSW Aquifer Interference Policy (2012) using DPI Water's assessment framework.	
Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.	
Full technical details and data of all surface and groundwater modelling, and an independent peer review.	
Proposed surface and groundwater monitoring activities and methodologies.	
Proposed management and disposal of produced or incidental water.	
Details of the final landform of the site, including final void management and rehabilitation measures.	
Details on buffer requirements to watercourses in accordance with the requirements of DPI Water's Guidelines for Controlled Activities on Waterfront Land (2012).	
Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.	
Consideration of relevant policies and guidelines.	

Issues/discussion	Comment/response
Assessment should include: ▪ Surface water assessment. ▪ Groundwater assessment ▪ Groundwater dependent ecosystems ▪ Watercourses and riparian land. ▪ Landform rehabilitation	
Department of Primary Industries (Crown Lands)	
No issues raised in SEARs.	Eagleton Rock contacted the Department of Industry (Crown Lands) in December 2016. Crown Lands advised that the proposal was reviewed in October 2015 and found there to be no Crown land issues as the proposed development does not require the use of the Crown Road located on the north-western boundary of the site.
Department of Primary Industries (NSW Fisheries)	
No issues raised in SEARs.	Eagleton Rock contacted the Department of Industry (NSW Fisheries) in December 2016. No issues raised for assessment in the EIS.
Department of Primary Industries (NSW Agriculture)	
No issues raised in SEARs.	Eagleton Rock contacted the Department of Industry (NSW Agriculture) in December 2016. No issues raised for assessment in the EIS.
Department of Primary Industries (NSW Forestry)	
Did not provide input into the SEARs.	Eagleton Rock contacted the Department of Industry (NSW Forestry) in December 2016 and provided a summary of the project. NSW Forestry advised that there were no relevant NSW Forestry issues required to be assessed in the EIS.
EPA Eagleton Rock contacted the EPA in December 2016, confirming the requirements for assessment. No further issues were raised for assessment. The issues raised by the EPA in the SEARs and the cross-reference to the relevant section of the EIS is provided below.	
Air quality impact assessment to be prepared in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* including a specific description of proposed dust management strategies.	An air quality impact assessment (**Appendix K)** has been prepared in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*.
Noise and vibration assessment to be provided in accordance with the *Industrial Noise Policy*.	An acoustic assessment has been carried out in accordance with the *Industrial Noise Policy* and is provided in **Appendix J** and summarised in **Section 7.6**.

Issues/discussion	Comment/response
Water management.	**Section 7.8** and **Appendix M** provide a detailed water management system for the project including measures to prevent the pollution of waters.
Waste management.	**Section 7.14**
Provide details of the storage and handling of dangerous goods	Dangerous goods proposed to be stored on site are identified in **Section 7.11.** Assessment of the storage and handling (including transportation) of these dangerous goods is provided in accordance with the DPE's *Applying SEPP* guideline.
Monitoring programs to be provided	The EIS includes details of proposed monitoring programs to manage potential dust, noise and water quality impacts.
OEH	
Aboriginal heritage to be assessed in accordance with Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.	**Appendix O** includes a due diligence assessment prepared in accordance with *Due Diligence Code of Practice* and the *Archaeological Code of Practice*, and includes a description of consultation with the Aboriginal Community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.
Historic heritage assessment of impacts to State and local heritage items, conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, and trees.	The site does not contain any local or State heritage items, and is not in the vicinity of any heritage items, or conservation areas. No impacts to any historic heritage is anticipated. Note that the Heritage Division of OEH has specifically advised that the site is not in the vicinity of any State Heritage Listed sites, and as such, consultation with the Heritage Council is not required. Eagleton Rock further contacted the Heritage Division who have confirmed that no further consultation is required.
Water and soils including: ▪ Identification of ASS, watercourses, groundwater and groundwater dependent ecosystems, and water intake/discharge locations. ▪ Background conditions. ▪ Assessment of water quality. ▪ Assessment on hydrology.	A detailed Water Resources Assessment is provided in **Appendix M** and is summarised in **Section 7.8** of the EIS.
Flood assessment including: ▪ Full water balance for the site. ▪ Risk assessment of silt basins with consideration of the PMF. ▪ Changes to waterflows.	A detailed Water Resources Assessment is provided in **Appendix M** which includes assessment of flood impacts.

Issues/discussion	Comment/response
Biodiversity assessment in accordance with the Framework for Biodiversity Assessment. Specific requirements include assessment of Pterostylis chaetophora.	Eagleton Rock has undertaken ongoing consultation with OEH during the biodiversity investigation and reporting process. A Biodiversity Assessment Report prepared in accordance with the Framework for Biodiversity Assessment is provided in **Appendix H** and summarised in **Section 7.2** of the EIS. **Appendix H** particularly sets out survey results for *Pterostylis chaetophora*. Appendix G also includes a Biodiversity Offset Strategy prepared in accordance with the NSW Biodiversity Offsets Policy for Major Projects.
NSW Rural Fire Service	
No issues raised in SEARs.	Eagleton Rock contacted the NSW Rural Fire Service in December 2016. The NSW Rural Fire Service has raised no issues requiring assessment in the EIS. The NSW Rural Fire Service requested that prior to commencement of operations they are provided with a site induction to understand access, water supply, contact details, evacuation and workplace health and safety matters.
Hunter Local Land Services	
No issues raised in SEARs.	Eagleton Rock contacted the Hunter Local Land Services in December 2016. The Hunter Local Land Services has raised no issues requiring assessment in the EIS, indicating that they will review the EIS once it is placed on public exhibition.
Hunter Water	
No issues raised in SEARs. Eagleton Rock held a meeting with Hunter Water in May 2016. Key issues raised by Hunter Water for assessment in the EIS were: ▪ Flood mitigation/design needs to consider greater than 100 year ARI storm events ▪ The design outcome for the site needs to be neutral or beneficial to Grahamstown Dam water quality. ▪ Hunter Water will contribute to conditions on EPL. ▪ A Peer review of the Water Resources Report would be undertaken by Hunter Water.	A detailed Water Resources assessment is provided in **Appendix M** which provides a detailed assessment of the issues specified by Hunter Water. **Section 7.8** of the EIS provides a summary of the Water Resources Assessment.

6.3 Consultation with the Local Community

A community consultation program was coordinated by Umwelt Australia during 2016, and a detailed Consultation Report is provided in **Appendix R**. The focus of consultation was on proximal and potentially impacted landholders such as those adjacent landholders and businesses and near neighbours located in the area along Six Mile Road, Italia Road, Barleigh Ranch Way and Winston Drive.

In total, 66 stakeholders were provided an opportunity to participate in the program. Of those contacted, a response rate of 32 per cent was obtained, 11 residents, 8 local businesses and 2 agencies. Surrounding businesses included Port Stephens Gardenland, Boral's Seaham Quarry, the MG Car Club, Hunter Valley Paintball, MX Central – Motor Cross, Kings Hill Estate Development and Eagleton Ridge and Songbirds.

Key issues raised in relation to the proposal included are listed in **Table 3**, including a reference where the issue is assessed in the EIS. Nearly half of those interviewed (47%) saw no benefits of the Eagleton Quarry going ahead; however, for those that did identify benefits there was some recognition that it would result in local employment, economic contribution, population increase and potential road upgrades.

Table 3 – Summary of Issues Raised and Response

Key Issue	Response
Noise	Noise impacts are assessed in Appendix J and Section 7.4.
Dust	Dust impacts are assessed in Appendix K and Section 7.6.
Blasting	Blasting impacts are assessed in Appendix J and Section 7.5.
Traffic movements	Traffic is assessed in Appendix I and Section 7.3.
Environmental impacts	Environmental impacts are assessed in Section 7 of the EIS, and mitigation measures proposed to manage potential environmental impacts are set out in Section 8.
Impacts on property values	The EIS has determined that the quarry will not result in significant impacts to human health or amenity. Further, there is already an existing quarry and a number of rural industries / entertainment facilities in the locality. It is therefore not expected that the proposed quarry would impact property values.
Loss of rural lifestyle and livelihood	The EIS has determined that the quarry will not result in significant impacts to human health or amenity. The quarry is compatible with existing rural land uses.
Reducing operating hours to mitigate noise and blasting impacts were also suggested.	Blasting will occur infrequently and only during daytime hours. See also
Sealing Six Mile road was suggested as an opportunity to mitigate the effects of road traffic, noise and dust on local residents	Quarry traffic will not use Six Mile Road. Site access roads will be sealed, including Barleigh Ranch Way.
Improvements to the intersection with the Pacific Highway was also identified as a means of assisting to address potential access difficulties	Improvements to the intersection with the Pacific Highway are not warranted. See Section 7.3 and Appendix I.
Habitat protection, through the development of wildlife corridors.	The proposed onsite offset site will include revegetation of small areas of cleared grassland on the north-east part of the site to ensure habitat connectivity is maintained and improved within the study area. See Appendix H.

In addition to minimising project impacts where possible, keeping residents informed through greater communication and showing them consideration and involvement in management strategies and monitoring were highlighted as project improvement opportunities. Further and ongoing communication was also seen as important, with the majority of near neighbours favouring direct consultation with the company to further discuss implications of assessment outcomes and project planning.

Eagleton Rock has committed to ongoing consultation with the local community in order to achieve the identified communication and engagement objectives.

6.4 Access Road Consultation

Negotiations are underway with the land owner of Lot 2 DP 1158962 and Lot 1 DP 245116 to extinguish the existing access road easements, which are in the wrong location, and to establish new easements in the location of the existing access road.

Consultation with the owner of the land has confirmed that there is no constraint to the use of the right of carriageway for providing access to the proposed Eagleton Quarry, subject to appropriate improvement works being implemented.

7.0 Environmental Assessment

This section of the report assesses and responds to the environmental impacts of the proposed DA. It addresses the matters for consideration set out in the SEARs. The consolidated list of mitigation measures at Section 7 complement the findings of this section.

7.1 Secretary's Environmental Assessment Requirements

In accordance with section 89G of the EP&A Act, the Secretary of the Department of Planning and Environment issued the requirements for the preparation of the EIS on 6 November 2015. A copy of the Secretary's Environmental Assessment Requirements (SEARs) is included at **Appendix A**.

Table 4 provides a detailed summary of the individual matters listed in the SEARs and identifies where each of these requirements has been addressed in this report and the accompanying technical studies.

Table 4 – Summary of consistency with SEARs

Requirement	Location in Environmental Assessment	
General		
The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.	Environmental Impact Statement	
A full description of the development - Site layout and extraction plans - Resource Assessment - Rehabilitation strategy	Section 4 - Appendix D - Appendix F - Appendix R	
List of approvals to be obtained before the development can commence	Section 5.3.7	
An assessment of the likely impacts of the development on the environment	Section 7	
A consolidated summary of all the proposed environmental management monitoring measures, identifying all the commitments in the EIS.	Section 8	
Consideration of the development against all relevant environmental planning instruments (including Part 3 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*);	Section 5.4	
The reasons why the development should be approved having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development.	Section 9	
The development application must be accompanied by a signed report from a suitably qualified expert that includes an accurate estimate of the: • capital investment value (as defined in Clause 3 of the *Environmental Planning and Assessment Regulation 2000*) of the development, including details of all the assumptions and components from which the capital investment value calculation is derived; and • jobs that would be created during each stage of the development.	Under separate cover	
Key Issues	Report / EIS	Appendic
Biodiversity	Section 7.2	Appendix H
Traffic & Transport	Section 7.3	Appendix I
Noise	Section 7.4	Appendix J
Blasting & Vibration	Section 7.5	Appendix J

Requirement	Location in Environmental Assessment	
Air Quality	Section 7.6	Appendix K
Land Resources	Section 7.7	-
Water	Section 7.8	Appendix M
Heritage	Section 7.9	Appendix O
Visual	Section 7.10	Appendix P
Hazards	Section 7.11	-
Social & Economic	Section 7.12	Appendix S
Rehabilitation	Section 4.13	Appendix Q
Consultation		
Government and Agency Consultation	Section 6	Appendix R

7.2 Biodiversity

A Biodiversity Assessment Report has been prepared by Kleinfelder and is included at **Appendix H**. The Biodiversity Assessment Report provides an assessment of the biodiversity values on the proposed development site and the potential impacts of the proposal on these values in accordance with the Framework for Biodiversity Assessment (FBA). The biodiversity assessment focusses on the quarry site and internal access road. Works outside of the site are limited to road upgrade works along the existing cleared road corridors of Barleigh Ranch Way and the right of carriageway. A summary of the assessment and proposed mitigation measures are provided below.

7.2.1 Existing Environment

Survey Effort

The existing ecological environment has been assessed through a number of surveys including:

- Targeted searches for threatened flora carried out by Orogen (now PDA Services) in October 2011.
- Floristic surveys carried out in accordance with the BioBanking Assessment Methodology by Orogen in March 2012.
- Further habitat assessment and targeted threatened flora species searches were carried out by GHD in September 2012.
- A bird species survey for threatened birds was carried out in November 2011.
- Targeted searches for fauna species, including anabat recording, spotlighting, call playback and stag watching, were carried out by GHD in September 2012.

Additional systematic flora surveys were conducted in December 2012 and 2013 and the vegetation mapping was reviewed in 2016 to ensure stratification of vegetation zones is consistent with the FBA.

Additional fauna surveys were conducted in January/February 2013 and January 2016.

A further survey was conducted for *Pterostyis chaemophora* on 18 October 2016, to correlate with the flowering period for this species.

A full description of the survey effort is described in **Appendix H**. The results of these surveys are summarised below.

Native Vegetation

The majority of the site is made up of undulating forested terrain with a mix of mature trees and regeneration. Past logging is evident by regrowth, old logging camps and stumps. Additionally, there are cleared areas within the site that consist of tracks, buildings and dams associated with Port Stephens Gardenland.

The Eagleton quarry site supports two native vegetation communities:

- MU12 Hunter Valley Moist Forest (19.9 ha) – which generally follows the creek lines and riparian corridors.
- MU16 Seaham Spotted Gum-Ironbark Forest (64.3ha) – which generally covers the remainder of the site (except for the cleared areas).

The Seaham Spotted Gum – Ironbark Forest is closely related to the *Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion* Endangered Ecological Community (EEC). The vegetation within the study area was not considered to form part of the *Lower Hunter Spotted Gum – Ironbark Forest* EEC due to its distribution and floristic composition.

The SEARs also indicate that based on existing regional vegetation mapping, vegetation consistent with the *Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions* may be present on the site. No vegetation consistent with the structure or floristic composition of dry rainforest was identified in the study area during the surveys.

The vegetation community on the site is not considered to be an EEC under the *Threatened Species Conservation Act 1995* (TSC Act) or a Threatened Ecological Community under the Commonwealth EPBC Act.

Flora

Table 5 provides a list of flora species identified as having potential habitat in the study area (i.e. targeted threatened flora species). No threatened flora species were identified during the field surveys.

Table 5 – Targeted Threatened Flora Species Identified as Possibly Occurring at the Site

Species	Common Name
Angophora inopina	Charmhaven Apple
Asperula asthenes	Trailing Woodruff
Callistemon linearifolius	Netted Bottle Brush
Cryptostylis hunteriana	Leafless Tongue Orchid
Cynanchum elegans	White-flowered Wax Plant
Diuris pedunculata	Small Snake Orchid
Eucalyptus glaucina	Slaty Red Gum
Grevillea guthrieana	Guthrie's Grevillea
Grevillea parviflora subsp. parviflora	Small-flower Grevillea
Maundia triglochinoides	
Melaleuca biconvexa	Biconvex Paperbark
Persicaria elatior	Knotweed
Pterostylis chaetophora	-
Rhizanthella slateri	Eastern Australian Underground Orchid
Tetratheca juncea	Black-eyed Susan

One threatened flora species (*Pterostylis chaetophora*) is listed in the SEARs by OEH as a matter for further consideration under the FBA. The study area contains potential habitat for this species. As requested in the SEARs targeted searches for species were undertaken across the quarry site when the known reference population was confirmed that to be flowering in the locality. The survey firstly confirmed that the reference population of the species as provided by OEH was in flower on the 18th October 2016, and then surveyed the entire Eagleton Quarry site through systematic parallel transects at approximately 10 m apart in accordance with the NSW Guide to Surveying Threatened Plants. The species was not observed at the site.

Fauna

Table 6 provides a list of the threatened and migratory fauna species identified as occurring in the vicinity of the site. Of the 12 candidate fauna species identified under the Framework for Biodiversity Assessment only two were determined to be present at the site – the Koala and the Southern Myotis.

Table 6 – Threatened and Migratory Fauna Species

Species	Common Name	TSC Act Status	EPBC Act Status
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Circus assimilis	Spotted Harrier	V	-
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-
Falco subniger	Black Falcon	V	-
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Lophoictinia isura	Square-tailed Kite	V	-
Miniopterus australis	Little Bentwing-bat	V	-
Mormopterus norfolkensis	Eastern Freetail-bat	V	-
Myotis macropus	Southern Myotis	V	-
Phascolarctos cinereus	Koala	V	V
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-
Rhipidura rufifrons	Rufous Fantail	-	Migratory
Vespadelus troughtoni	Eastern Cave Bat	V	-

Notes: V = Vulnerable, E = Endangered, CE = Critically Endangered, T = Threatened

The *Port Stephens Council Comprehensive Koala Plan of Management* (CKPoM) and SEPP44 apply to the site. The *Koala Habitat Planning Map* of *Port Stephens Local Government Area*, which accompanies the CKPoM, showed that most of the site was mapped as marginal Koala habitat, with only a small portion of habitat mapped as preferred Koala habitat in the south of the site.

Field surveys were conducted to determine the extent of preferred Koala feed trees (including those listed under the CKPoM and SEPP 44) across the site.

Appendix 6 of the CPKoM, *Guidelines for Koala Habitat Assessments* were used to assess the Koala habitat and impact that the proposed development will have on the study site and surrounding potential koala habitat and/or populations. Compliance with the provisions of the CKPoM will constitute compliance with the

provisions of SEPP 44. Appendix 4 of the CKPoM, *Performance Criteria for development applications* was also followed to achieve its aims and objectives.

Biodiversity Corridors

The Hunter Regional Plan identifies seven biodiversity corridors that connect key habitat areas and support ecological processes for plants and wildlife movement, providing habitat and improving the ability of species to adapt to changes in habitat and climate. The site is not located within or as part of any regionally significant biodiversity corridors. The closest biodiversity corridor is the Watagans to Stockton Link which is shown in the Biodiversity Corridors Map as being located east of the Pacific Highway.

Aquatic Habitat

The stream comprises mainly of sand and silt although some areas contained large cobbles. The stream banks were relatively stable in most areas, with low levels of erosion of the banks occurring in some areas (particularly at bends in the stream).

Some macroinvertebrates were observed including Water Striders (*Gerridae*) and Whirligig Beetles (*Gyrinidae*), which suggests that the creek rarely dries up entirely. No fish or large crustaceans were observed. Species of these taxa are likely to be largely absent due to the ephemeral characteristics of the habitat.

No threatened freshwater species, endangered populations and endangered ecological communities listed under the *Fisheries Management Act 1994* have been recorded within 5km radius of the site. It is considered unlikely that any threatened aquatic species would occur in the study area.

Riparian Corridors

The majority of the riparian habitat within the study area is intact and is occasionally dissected by access tracks. The riparian vegetation consists of the *Hunter Valley Moist Forest* vegetation community. Terrestrial fauna habitat within the riparian zone includes the associated vegetation, hollow bearing trees, rocks, woody debris and a range of substrates. The riparian vegetation is healthy. No dieback is evident and no major weed infestations occur. No infestation of aquatic weeds or other Macrophytes was observed.

Groundwater Dependent Ecosystems

One terrestrial vegetation community variant was identified as ground water dependent – the Hunter Valley Moist Forest. This ecosystem is typically associated with Shallow Alluvial Groundwater Systems which are associated with the drainage lines and creeks.

7.2.2 Impact Assessment

Ecosystem and Species Impact Summary

For the purposes of assessment under the Biobanking Assessment Methodology, both of the vegetation communities occurring at the site are determined to comprise one plant community type as HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest.

The proposed development will remove approximately 28.4ha, requiring a total of 1,628 ecosystem credits.

In addition, the number of species credits required to compensate for the impacts of the proposed development on threatened species is 334 credits for the Southern Myotis and 276 credits for Koala.

The credit report for the site is provided as part of **Appendix H**.

Assessments of Threatened Flora Species

No threatened flora species were recorded in the study area during the surveys by, and no targeted flora species are considered likely to occur at the site following targeted surveys and habitat assessments.

Assessments of Threatened Fauna Species

A total of 18 threatened fauna species were assessed under the TSC Act 1995 *Assessment of Significance guidelines*. Of these, none had a high likelihood of impact as a result of the proposed development. However, the following species were identified as potentially being the most impacted:

- Koala (*Phascolarctos cinereus*) – The Koala was identified as occurring at the site. Field studies determined that Koalas were using a range of tree species throughout the study area, but the level of activity is considered to be low use range and therefore the use by Koalas is "likely to be transitory". The CKPoM Koala habitat mapping for the study area shows only a very small area of preferred Koala habitat in the south-west, with the remainder of the site mapped as marginal habitat. Detailed assessment of Koala feed tree density across the study area identified a total of 53.50 ha of suitable Koala habitat as defined under SEPP 44. Of this, 10.62 ha of suitable Koala habitat occurs within the impacted quarry development area. The proposed development would avoid the majority of suitable Koala habitat in the study area (approximately 80%). These retained areas of suitable Koala habitat (42.88 ha) would be protected and managed in-perpetuity under a biobanking agreement.
- The Southern Myotis was recorded at one location along Seven Mile Creek in the eastern part of the site. Breeding habitat for the Southern Myotis includes hollow-bearing trees, bridges, caves or artificial structures within 200 m of riparian zone. Hollow-bearing trees are present (albeit in low to moderate abundance) throughout the forest vegetation in the study area. All areas of HU804 (moderate-good) within 200 m of the dams and the 2nd and 3rd order streams on the eastern part of the site were mapped as suitable breeding habitat for this species. The remaining 1st order drainage lines in the study area are highly ephemeral and do not contain suitable foraging habitat (i.e. streams and pools). A total of 49.49 ha of Southern Myotis habitat occurs in the study area. Of this, 15.18 ha of Southern Myotis habitat occurs in the impacted quarry development area. The proposed development would avoid the majority of Southern Myotis breeding habitat in the study area (approximately 69%). These retained areas of Southern Myotis habitat (34.31 ha) would be protected and managed in-perpetuity under a biobanking agreement.

Assessments under Commonwealth EPBC Act

Six species were assessed under the EPBC Act assessment of significance guidelines, as follows:

- Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). Neither species is known to occupy the site, although feed tree species are present. Approximately 28.40 ha of open forest containing suitable foraging habitat for these species would be removed. The vegetation within the study area likely provides opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas. As such, it is unlikely that the 28.40 ha of potential foraging habitat within the development site is critical to the survival of these species. As both of these species are highly mobile, the proposed action will not fragment any populations of these species. As the proposed development

area will be progressively rehabilitated, there is the potential for these species to utilise the area as foraging habitat once the rehabilitation reaches a suitable age. Proposed offset measures will include both the provision and long-term protection of habitat containing feed tree species.

- Spotted-tailed Quoll (Dasyurus maculatus) was not recorded during surveys, however the site contains foraging and marginal denning habitat for this species. The native vegetation proposed for removal is not considered to represent critical habitat for this species. Given the relatively small area of suitable habitat for the Spotted-tailed Quoll that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of this species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of a local population or causing fragmentation of any populations of this species.
- The Grey-headed Flying Fox (*Pteropus poliocephalus*) was not recorded roosting or foraging during surveys, however the study area has been identified as providing opportunistic foraging resources. The habitat present within the development area is not considered critical to the survival of this species. Given the relatively small area of suitable habitat for these species that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of these species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of any local populations or causing fragmentation of any populations of this species.
- The *large*-eared Pied Bat (*Chalinobolus dwyeri*) was recoded on site. A precautionary approach was taken and this species was assessed under the guidelines. Findings indicated that due to the lack of maternal roosts such as caves, rocky cliff and outcrops, this species may be utilising the site for foraging purposes only. The habitat present within the development area is not considered critical to the survival of this species. Given the relatively small area of suitable habitat for these species that will be removed compared to the extent of suitable habitat in the study area and surrounding lands, the minor impediment the development would pose to movement of these species and the management actions proposed, it is unlikely that the proposal would lead to a long-term decrease in the size of any local populations or causing fragmentation of any populations of this species.
- The Koala (*Phascolarctus cinereus*) was recorded onsite. The proposal has the potential to impact part of the home range of one adult Koala. This impact is unlikely to be significant due to the large area of similar forest habitat that is contiguous with the quarry development area. Koala activity is relatively low at the site, compared to surrounding areas. As such, it is unlikely that the 10.62 ha of foraging habitat within the development area is critical to the survival of this species.

Six listed migratory species were assessed under the EPBC Act guidelines.

- Oriental Cuckoo (*Cuculus optatus*)
- Rainbow Bee-eater (*Merops ornatus*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Yellow Wagtail (*Motacilla flava*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Rufous Fantail (*Rhipidura rufifrons*)

Vegetation at the site represents suitable foraging habitat for these species, however, only one of these species, the Rufous Fantail (*Rhipidura rufifrons*), was recorded on site during surveys. The proposal would reduce habitat connectivity for these migratory species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As such, the proposal is considered unlikely to isolate or substantially fragment any important habitat for these species in the study area.

No significant impacts have been identified in relation to threatened species or communities or migratory species listed under the Commonwealth EPBC Act, and no referral to the Commonwealth has been made.

Riparian Corridors and Aquatic Habitats

The proposed development would directly impact on riparian habitat associated with three 1st order streams occurring within the footprint. The project also has the potential to have indirect impacts on other drainage lines adjoining the development site during the construction and operation phases through erosion, sedimentation and contaminants in stormwater run-off.

The proposal would also involve construction of a new bridge or culvert across Seven Mile Creek for the haul road. This would directly impact a small section of riparian vegetation during construction, and has the potential to have indirect impacts downstream during the construction phase through erosion and sedimentation, and introduction of weeds.

Whilst the occurrence of fish species is unlikely given the creek is ephemeral, the bridge will be designed so as to maintain connectivity and ensure movement of aquatic fauna would not be impeded.

Potential Impacts to Groundwater Dependent Ecosystems

The groundwater dependent ecosystem identified at the site, being the Hunter Valley Moist Forest community, has been assessed as facultative and is considered to use groundwater opportunistically or to a very limited extent based on the underlying geology and species composition within these communities.

Therefore, it is not expected that the proposal will influence groundwater levels or quality such that there will be any significant impact on the GDE's (outside of the project disturbance) within the study area, during both the construction and operation phases provided appropriate controls are implemented.

Details for monitoring of management actions will be contained within the above management plans.

7.2.3 Mitigation Measures

The proposed development would not impact on any threatened ecological communities, critical habitat, riparian areas of 4th order or higher, important wetlands, estuaries, or significant biodiversity links. The proposed development will require the removal of native vegetation, with impacts to Koala and Southern Myotis. The Biodiversity Assessment Report identifies the following mitigation measures as being necessary to ensure biodiversity impacts are minimised and ensure that biodiversity values are maintained or improved:

- Avoidance and retention of 58.81 ha of native vegetation within the study area. This retained vegetation is proposed to be secured under a biobanking agreement as part of the offset to provide in-perpetuity protection and management of this native vegetation and threatened species habitat. The proposed onsite offset site will include revegetation of small areas of cleared

grassland on the north-east part of the site to ensure habitat connectivity is maintained and improved within the study area.

- Avoidance of 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. Haul road design and construction to ensure existing hydrological regimes for Seven Mile Creek are maintained.
- Retention of vegetation corridors on the southern, central and north-east parts of the study area. Connectivity through the eastern corridor would be enhanced through revegetation of grassland areas.
- The development site should be delineated with permanent wildlife-friendly fencing, and include signage to identify 'no-go' areas.
- Speed limits on traffic using access roads to 40 km / hr (in accordance with CKPoM 2002) will reduce potential for death or injury to wildlife as well as reduce noise and pollution levels.
- Preparation of Flora and Fauna Management Plan (F&FMP), to provide detailed measures and protocols to minimise potential impacts upon wildlife and ensure protection of vegetation immediately adjacent to the development site during the construction phase of the project. The Flora and Fauna Management Plan would include the following:
    - Weed Management Plan and Pest Management Plan;
    - Pre-clearing fauna surveys;
    - Clearing protocols:
    - Hollow-bearing tree clearing protocol;
    - Fauna translocation protocol; and
    - Vegetation clearing protocol.
- Landscape and Rehabilitation Management plan to detail the short and long term measures that would be implemented during the construction and operation phases of the project to minimise impacts on native vegetation and fauna on the site, and ensure the development site is progressively rehabilitated with self-sustaining native vegetation. The Landscape and Rehabilitation Management Plan would include the following:
    - Weed management within the development site during operations;
    - Management of any retained vegetation within the development footprint during operations;
    - Measures to protect areas of native vegetation and fauna habitats occurring adjacent to the development site;
    - Details of traffic-calming measures and signage to be installed within the site to reduce the risk of vehicle strike to Koalas and other native fauna;
    - Details of proposed rehabilitation and revegetation (including timing, target species composition, rehabilitation methods, and ongoing monitoring);
    - Details on appropriate soil handling processes, including topsoil management for later use in any rehabilitation areas;
    - Details on the salvage, storage and redistribution of habitat features (e.g. hollows and logs) within the rehabilitation areas;
    - Fire management;
    - Vertebrate pest control within the development site;

- Details of maintenance, monitoring and performance criteria to assess the condition and functioning of the adjoining vegetation and fauna habitats, and to evaluate progress of rehabilitation works.

7.2.4 Biodiversity Offset Assessment

A Biodiversity Offset Assessment has been prepared and is provided as part of the Biodiversity Assessment Report at **Appendix H**. The biodiversity offsetting requirements have been assessed using the Framework for Biodiversity Assessment under the NSW Biodiversity Offsets Policy for Major Projects.

It is proposed that the majority of land not subject to development for the quarry within Lot 2 DP 1108702 be secured as a biobank site as part of the offset for the project. The proposed offset site is 60.83 ha and occupies that southern and eastern parts of the study area (but not including the Prt Stephens Gardenland landscape supplies area).

Retirement of biodiversity credits requires certain management actions to be implemented that underpin the predicted improvements to biodiversity values on the biobank site. Specific details on the management actions to be undertaken at the biobank site would be provided as part of the biobanking agreement.

The BioBanking calculator was run to assess both the number of ecosystem and species credits that could be generated by the proposed offset site. A total of 630 ecosystem credits, 304 Koala credits and 244 Southern Myotis credits would be generated by biobanking the undeveloped parts of the site. As such, based on the biobanking calculations an additional 998 ecosystem credits and 90 Southern Myotis credits are required for the proposed development.

At this stage, Eagleton Rock intends to secure the remaining 998 ecosystem credits and 90 Southern Myotis species credits by purchasing suitable credits from existing biobank sites. For example, the biobank site under biobanking agreement no. 96 has HU804 ecosystem credits that are currently available for purchase and retirement. Eagleton Rock will pursue negotiations to purchase the required credits from existing biobank sites should the project be approved.

However, if the required credits are unavailable at existing biobank sites at the time, the proponent may also secure an offsite offset site under a biobanking agreement to satisfy the credit requirements. Approximately 26,300 ha of freehold land containing the appropriate plant community types is predicted to be present within the sub-region. this vegetation would also provide suitable breeding habitat for the Southern Myotis. As such, it is considered that there is sufficient land available that could be secured as a biobank site to generate the quantity of ecosystem and species credits required for the development, should the credits be unavailable for purchase at existing biobank sites.

7.3 Traffic and Transport

GHD has carried out a Traffic Impact Assessment which is provided at **Appendix I**, and is summarised below.

7.3.1 Access Roads and Existing Traffic

The key access roads to and from the proposed quarry are the Pacific Highway, the major arterial route through the area, and Italia Road, a prominent local road connecting the Seaham area to the highway.

Pacific Highway

The Pacific Highway is the major arterial route connecting Sydney and Newcastle to northern NSW and south-east Queensland. The section between Raymond Terrace and Karuah was upgraded from a two lane road to a four lane dual carriageway in the period from 1999 to 2002. On the subject section, approximately 12 km north of Raymond Terrace, the highway is in flat to undulating terrain, with large radii horizontal curves and gradients of between 1% and 3%.

The highway is not a full motorway over this length and as such direct access is permissible for local roads and property frontages, mostly restricted to left turns only. Major intersections are provided for more substantial road connections at Italia Road and Medowie Road and there are u-turn facilities for turning traffic. The speed limit of the highway on this section is 100 km/h, which is in keeping with the access standard of the highway over this length.

Management responsibility for the highway rests with the NSW Government through Roads and Maritime Services.

Italia Road

Italia Road is a two way, two lane road that connects the rural communities of East Seaham and Seaham to the Pacific Highway over a length of approximately 10 km. There are a number of prominent land uses off Italia Road, just west of the Pacific Highway, most notably an existing hard rock quarry operated by Boral. The speed limit on Italia road is 90 km/h. Italia Road is classified as a local road under the control of Port Stephens Shire Council.

Pacific Highway / Italia Road Intersection

The Italia Road and Pacific Highway intersection is a t-intersection, with Italia Road meeting the Pacific Highway on the western (or northbound) side of the highway. The intersection was constructed as part of the highway upgrade, completed approximately 2002 as a seagull type, at-grade intersection (see **Figure 14**). Access to Italia Road off the highway is provided by dedicated left and right turn bays for turning traffic from the south and north respectively.

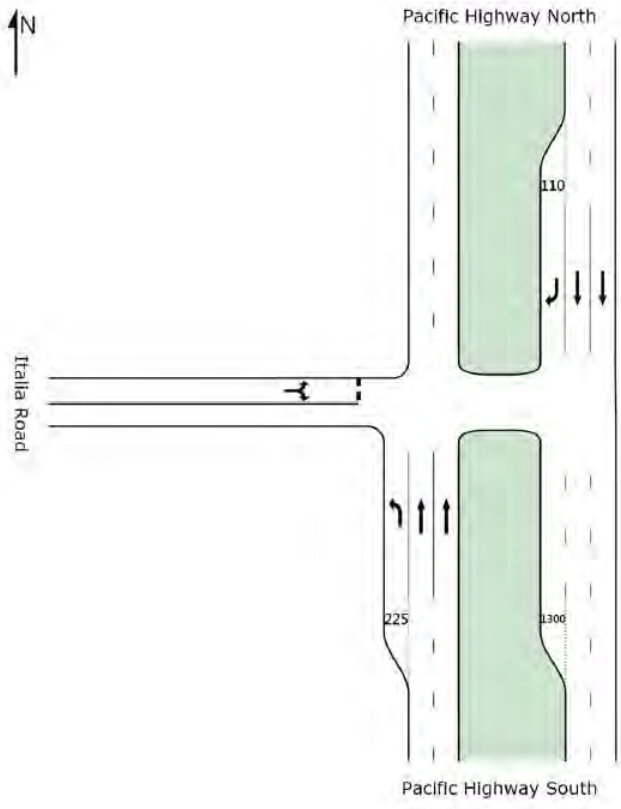


Figure 14 – Italia Road / Pacific Highway Intersection Layout

The intersection allows a two stage process for southbound right turn access to the highway from Italia Road. This is by way of an initial crossing of the northbound carriageway for the right turn movement into an acceleration lane and then a left hand merge for integration with highway traffic. The acceleration lane is approximately 1.3 km in length, allowing heavy vehicles to attain highway speed prior to merging.

The historical use of Italia Road by quarry vehicles and the length of this acceleration lane confirms that the intersection would have been specifically designed for heavy vehicle movements turning right from Italia Road.

Right of Way

Access to the proposed quarry development site is currently available via a formed gravel road connecting Italia Road with Barleigh Ranch Way. The gravel road intersects with Italia Road approximately 500 metres west of the Pacific Highway as a t-intersection. The existing access road does not have a formal road reserve, it is a Right of Way across private property. The gravel road formation is two lanes wide but is unsealed. It currently provides access to a number of properties and recreational businesses in the area, including attractions such as MG car club, Hunter Valley Paintball and Hunter MCC raceway.

Existing Traffic

There are several traffic generators that rely on the Italia Road / Pacific Highway intersection. Of these traffic generators, the dominant heavy vehicle generator is the Boral hard rock quarry which has been in operation for up to 30 years. The Boral quarry access on Italia Road is approximately 1.4 km from the Pacific Highway, or about 900 metres from the first access intersection, to be used for the proposed quarry.

It is also noted that the more localised traffic generators are entertainment facilities (i.e. the MG car club, Hunter Valley Paintball and Hunter MCC raceway) that are mostly weekend based operations, and so would have little concurrent traffic generation with the proposed quarry development.

Existing traffic volumes on the Pacific Highway and Italia Road are calculated or estimated as follows:

- Pacific Highway: 21,500 Average Annual Daily Traffic, 1,350-1,550 peak hour volume, and approximately 23% heavy vehicles.
- Italia Road: 1,350 daily volume, 100-120 peak hour volume, and approximately 31% heavy vehicles.

Peak hour traffic movements through the intersection have also been calculated, and are summarised as follows:

- 1,314 vehicles travelling through the intersection on the Pacific Highway in the AM peak and 1,512 in the PM peak (northbound or southbound).
- 48 vehicles turning into Italia Road from the Pacific Highway during the AM peak, 29 turning right from the southbound carriageway and 19 turning left from the northbound carriageway. In the PM peak, it was 53 vehicles, 32 turning right from the southbound carriageway and 21 turning left from the northbound carriageway.
- 60 vehicles turning out of Italia Road onto the Pacific Highway during the AM peak, 29 turning left and 21 turning right. In the PM peak, it was 58 vehicles, 28 turning left and 30 turning right.

The most recent accident history for the intersection show a total of three traffic incidents from 2010 to 2014, as follows:

- A heavy vehicle entering the Pacific Highway from Italia Road collided with a cyclist who was travelling northbound on the highway.
- A light vehicle left the Pacific Highway and collided with a signpost near the Italia Road intersection.
- A four-wheel drive vehicle travelling northbound on the Pacific Highway struck another four-wheel drive vehicle that was completing a left turn manoeuvre onto the highway from Italia Road.

There were two injuries and no fatalities recorded as a result of these incidents. It is apparent from the nature of the incidents that none occurred solely due to the geometric layout of the intersection, with human error likely playing a role in each of the crashes. In general terms the intersection is considered to have a low accident rate.

7.3.2 Traffic Generation

Potential traffic generation has been calculated based on the projected yearly extraction and expected hours of operation of the quarry. The sales hours for the Eagleton Quarry are proposed as 5 am to 10 pm weekdays and 7 am to 4 pm on Saturdays, with a total of 10 staff on-site at any one time.

GHD has estimated that there will be approximately 192 daily vehicle movements generated by the quarry, comprising 20 movements associated with the arrival/departure of staff, 2 movements associated with support/supply vehicles and the remained (170 vehicles movements) from sales trucks varying rock product.

This equates to approximately 31 vehicles movements during the peak hour periods – 21 in/10 out during the AM peak and 10 in/21 out during the PM peak. A total of 10 trucks (or 20 movements) are expected during each peak hour period.

7.3.3 Internal Roads and Parking

The Port Stephens Council Car Parking Policy within the Port Stephens Development Control Plan 2007 does not include any requirements for parking specific to the use of a quarry. A total of 11 spaces have been provided for staff and visitor parking. There is also provision for short term truck parking and an overflow area for additional parking if necessary.

7.3.4 Potential Traffic Impact

Italia Road

The interaction of the proposed quarry traffic with the existing traffic on Italia Road is expected to be seamless. The number of trucks per hour is very small on a short (500 metre) section of Italia Road; integration with a regular traffic stream of up to 65 vehicles per hour in each direction will involve large gaps and a relatively low density traffic stream.

Italia Road / Pacific Highway Intersection

Cumulative traffic volumes have been calculated. The expected increase on Italia Road represents a 13% increase in daily traffic and up to a 40% increase in peak period volumes, albeit with small absolute numbers at one vehicle every two minutes.

The peak volumes need to split with the likely directional priorities for travel on the Pacific Highway. The additional peak hour volumes have been assumed to be predominantly to / from the south. As such 80% of the traffic generation is assumed to be left in / right out movements at Italia Road. Notwithstanding this, it results in minor increases in overall turning traffic with the dominant flows on the Pacific Highway.

A capacity assessment of the Italia Road intersection has been undertaken using the SIDRA intersection analysis package. The SIDRA modelling shows that the Italia Road intersection is expected to perform poorly in 2026 PM peak period irrespective of the proposed quarry with potentially greater delays and resultant queue increases. The addition of Eagleton Quarry traffic does not further reduce the Level of Service rating. In addition, it is understood that the neighbouring Boral quarry is likely to cease to operate within approximately 10 years and as such the SIDRA results for 2026 are conservative.

7.3.5 Traffic Safety Assessment

Italia Road / Access Road Intersection

The existing access road intersection is positioned on a straight, flat section of Italia Road, providing in excess of 200 metres of sight distance in each direction. Sight distance improvements could be made with the removal of trees within the road reserve on the western side of Italia Road, either side of the access intersection.

This proposed intersection upgrade would include pre-construction and post construction road safety audits as part of the design, construction and certification processes. As such a full safety assessment is not warranted at present because the intersection will be fundamentally changed as part of future works.

Italia Road / Pacific Highway Intersection

A preliminary safety assessment has been undertaken for the Italia Road / Pacific Highway intersection. An assessment of available sight distance to and from the intersection is considered the primary safety parameter. The required sight distance for the intersection can be broken into two cases.

- Safe intersection sight distance (SISD) for approaching vehicles to be able to observe a vehicle at the intersection and take necessary action to avoid a collision, stopping if necessary. This is the minimum sight distance which should be provided on the major road at any intersection.
- Minimum gap sight distance (MGSD) is the distance corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections. This is the key decision parameter for the driver entering the major road.

Based on Austroads Standards, the SISD is 262m. The downhill grade of approximately 3% is factored in as it increases the required distance for a vehicle to stop safely. This is an additional 10m, increasing the SISD for the intersection to 272m for car to car observations. This is reduced by 28 metres to 244 metres using the shorter reaction time of 1.5 seconds. SISD was also calculated for heavy vehicles using empirical formulas. This returned a required SISD of 354m for trucks, the additional distance for extra braking requirements. The MGSD is calculated as between 167m and 250m for cars, and between, 365m and 420m for trucks.

Actual site distances are as follows:

- Car to car (1.1 m driver eye height to 1.1 m vehicle height) 275 m
- Car to truck (1.1 m driver eye height to 2.4 m truck height) 310 m
- Truck to truck (2.4 m driver eye height to 2.4 m truck height) 385 m

A comparison of these survey results to the theoretical SISD and MGSD calculations shows that the actual sight distance is marginal in a number of circumstances. A generalised description of these circumstances is provided as follows

- An approaching car has adequate sight distance for a waiting car or truck at the intersection.
- The calculations show that an approaching truck requires more distance to stop (354 m) than is available (310 m) but the differential is not critical in that a shorter reaction time reduces the distance required and the driver would have time to slow substantially to avoid a collision.
- The minimum gap sight distance for a car turning right is met (250 m versus 275 m) for the base calculation of 9 seconds decision and intersection clearance time.
- The minimum gap sight distance for a loaded truck has been calculated as 420 metres taking into account decision and intersection clearance time (15 seconds) but there is only 385 metres available. The time assumptions are critical in these circumstances because a 2 second reduction in gap acceptance reduces the requirement to 365 metres which is available.

An independent road safety audit was also carried out on the Italia Road intersection. The principal concerns of the audit team relate to the following issues:

- There is no intersection control for Italia Road at the highway, which is exacerbated by faded 'hold' line pavement marking and lack of street lighting at the junction. This is a Medium-High Risk Rating.
- SISD between the northbound highway travel lanes and the Italia Road junction is marginal for a car to car scenario, improved for a car to truck scenario. This is a Medium Risk Rating.

Eagleton Rock would undertake minor improvements to Italia Road to address the condition of the intersection identified in the first issue, which is expected to be limited to additional traffic signs and line-marking to reinforce the current operating arrangement.

In relation to the second audit issue, it is noted that rectification works to improve sight distance would involve adjusting the vertical alignment of the northbound lanes of the Pacific Highway, which would incur significant cost. The medium risk is deemed to be acceptable given the high cost of rectification works.

7.3.6 Construction Traffic Impacts

Construction traffic impacts are expected to be limited to the delivery of plant, quarry operation equipment and building materials, including ready mix concrete for infrastructure and site facilities.

It is expected that the construction based traffic generation would be less than the future operational traffic volumes as previously outlined. There may be more light vehicles in peak hour for construction personnel (estimated at 20) but these employees are more likely to travel in groups. Heavy vehicle arrivals would be more spasmodic across the day as building materials arrive during working hours.

A construction traffic management plan is not considered necessary for the Italia Road intersection with the Pacific Highway as it would operate as normal.

The proposed quarry access intersection with Italia Road would require some form of interim traffic control during working hours only.

It is proposed that the preparation of a construction traffic management plan would be prepared prior to the establishment of the site access and associated facilities.

7.3.7 Conclusions and Recommendations

The Traffic Impact Assessment has determined that the development will not have any adverse impact on the surrounding road network or operation of surrounding intersections.

The assessment also confirms that suitable design parameters have been adopted for the internal access roads, traffic circulation and on-site car parking.

Safety of the Italia Road, Pacific Highway intersection has been assessed geometrically in relation to sight distance and gap acceptance criteria for the intersection. The analysis shows that the intersection generally meets the required criteria and that sight and stopping distance are satisfactory.

7.4 Noise

An Acoustic Assessment has been prepared by Global Acoustic and is provided at **Appendix J**. Global Acoustic has undertaken an assessment of the existing noise environment, and has conducted an assessment of the proposed quarry operations against the relevant criteria.

Also note that this section does not assess blasting vibration and overpressure, which are assessed in **Section 7.5**.

7.4.1 Relevant noise assessment criteria

Operational Noise

The principal criteria applicable to the operation of the proposed development are contained within the EPA's *Industrial Noise Policy* (INP).

The INP establishes methods of determining the intrusiveness and amenity limits for noise. Whilst the intrusiveness criteria are established on existing background noise levels, the amenity criteria provide a cap for industrial noise based on the character of the existing environment with adjustments for areas subject to high existing industrial noise or road traffic noise levels.

The project specific noise criteria are established by identifying the lowest of the intrusiveness and amenity criteria to ensure that a conservative assessment is achieved. It is noted that in this case, the intrusiveness criteria has been selected as it falls below the amenity criteria. The intrusive criteria are established by measuring the existing background noise level and adding 5 dBA. **Table 7** sets out the criteria which will be used to assess the potential impact of the proposal during operations.

The two groups of residential receptors are those located on Six Mile Road and the dwelling located on Italia Road. These two areas have different background noise levels, and so different intrusive noise assessment criteria have been generated. For receptors on Six Mile Road a single background noise measure was taken, located at 266 Six Mile Road. This address is located almost equidistant between Pacific Highway and New Line Road, and therefore represents a conservative background noise level since it is unlikely to be affected by existing road traffic noise.

Table 7 – Project specific operational noise assessment criteria

Period	Receptors on Italia Road		Receptors on Six Mile Road	
	Measured Background Noise Level (L_{A90} dBA) [3]	Project Specific Noise Level (L_{Aeq} dBA) [2]	Measured Background Noise Level (L_{A90} dBA) [3]	Project Specific Noise Level (L_{Aeq} dBA) [2]
Morning Shoulder [1]	38	43	35	39
Day	44	49	36	41
Evening	43	48	34	39
Night	31	36	34	39

Notes:

1) The morning shoulder (5.00am to 7.00am) has been adopted as the midpoint between day and night periods, as per section 3.3 of the INP.
2) The governing criteria for the Project Specific Noise Level are the Intrusiveness Criteria.
3) Measured background noise level used for calculating criteria is the Rating Background Level (RBL).

In addition to the two groups of off-site residential receptors described above and in **Table 7**, there is a residential receptor located as part of the adjacent Port Stephens Gardenland landscape supplies facility, which is used by the manager of that facility. The same project specific noise criteria have been applied to this residence as for the Six Mile Road residential receptors, even though its existing background noise levels would be higher than the Six Mile Road receptors because it is located closer to all existing noise sources – being located immediately adjacent to the landscape supplies facility and the MX Central – Motor Cross track.

In addition, the INP establishes operational noise criteria for nearby commercial and industrial land uses, which apply when the facility is in use:

- Commercial receivers: $L_{Aeq,\ period}$ 65 dBA is acceptable, 70 dBA is maximum.
- Industrial receivers: $L_{Aeq,\ period}$ 70 dBA is acceptable, 75 is maximum.

Construction Noise

The NSW Interim Construction Noise Guidelines (ICNG) specifically relates to construction, maintenance and renewal activities. The guideline suggests that for short-term construction (not more than three weeks), a qualitative assessment will suffice and for longer-term construction, a quantitative assessment is required, with comparison to relevant criteria.

Six stages of construction are proposed for quarry establishment. These stages will be undertaken at separate times so that cumulative noise from more than one activity does not result. However, in total the proposed construction period exceeds three weeks, so a quantitative assessment has been prepared.

The ICNG recommended noise levels for the nearest residences in relation to work undertaken during standard construction hours are the measured background noise level (i.e. the RBL) plus 10dB. A threshold of 75dBA is also established as 'highly noise affected' as this is considered to represent the point above which there may be strong community reaction to noise. Standard construction hours are 7am-6pm Monday to Friday, 8am-1pm Saturdays, with no work on Sundays or public holidays.

Construction noise criteria for nearby residential receptors are set out in **Table 8**.

Table 8 – Project specific construction noise assessment criteria

Criteria	Receptors on Italia Road	Receptors on Six Mile Road
Rating Background Level (RBL)	44	36
Noise Affected Criteria	54	46
Highly Noise Affected Criteria	75	75

Road Traffic Noise

The NSW Road Noise Policy applies different noise limits dependent upon the road category and type of project or land use. Italia Road and the Pacific Highway are considered to be a sub-arterial road and a freeway respectively. The road traffic noise assessment criteria for these roads are the same as each other, as follows:

- Day time (7am-10pm): 60 dBA $L_{Aeq, (15\ hour)}$
- Night time: (10pm-7am): 55 dBA $L_{Aeq, (9\ hour)}$

Sleep Disturbance

To assess the possibility of sleep disturbance, the OEH *Road Noise Policy Guidelines* (RNP Guidelines) have been consulted to determine suitable criteria. The RNP criteria suggest that sleep disturbance is not likely when $L_{A1,1minute}$ (or maximum noise level) does not exceed the existing background levels by more than 15dBA.

In this instance, when 15 dBA is added to the existing background level, the criteria would be 46 dBA for receptors on Italia Road and 49 dBA for receptors on Six Mile Road.

Cumulative Noise Criteria

The cumulative impact of more than one development can be compared against the amenity criteria provided in the Industrial Noise Policy. The amenity criteria act like an overall cap on industrial noise levels at any receptor, but need to be adjusted to take into account existing industrial noise sources.

Existing noise levels from these other industrial facility is unknown. For the purpose of this assessment it has been assumed that logged period L_{Aeq} have been generated by road traffic at the Italia Road location, and, existing industry at the Six Mile Road location. In accordance with the INP the standard Rural Amenity Criteria have therefore been adjusted downwards by 2-4 dBA for Six Mile Road receptors to account for existing industrial noise, and upwards by between 1 and 6 dBA for the Italia Road receptor to account for existing highway traffic noise. Calculated cumulative noise criteria for residential receptors are shown in **Table 9**.

Table 9 – Cumulative noise criteria ($L_{Aeq, period}$)

Period	Italia Road Residential Receptors	Six Mile Road Residential Receptors	Commercial Receptors	Industrial Receptors
Morning Shoulder [1]	55	41	55	60
Day	58	46	55	60
Evening	53	43	55	60
Night	52	36	55	60

7.4.2 Impact Assessment

Noise Assessment Methodology

Noise levels were calculated using DataKustik CadnaA noise modelling software. The CONCAWE methodology was used to determine the acoustic impact of operational activities at selected receptor locations.

The modelling included consideration of the topography of the site and its surroundings as well as with consideration of meteorological data available from the Bureau of Meteorology weather station at Williamtown. Data analysis showed no prevailing meteorological condition as majority of wind speeds recorded were in excess of 5 m/sec. Therefore, the noise modelling was carried out for neutral atmospheric conditions only.

Road traffic noise calculations were performed using the CoTRN methodology.

Construction Noise Assessment

Six construction activities were identified for noise modelling, as follows:

- Vegetation clearing and stripping.
- Construction of access roads and intersection improvements.
- Site preparation for civil works.
- Civil works, including construction of haul roads, bridge crossing and dams.
- Installation of infrastructure.
- Road sealing.

Modelling assumptions and parameters for each construction activity is described in **Appendix J**.

Predicted construction noise levels were modelled for each receiver location for the six construction activities identified. Predicted noise results are compared to construction noise criteria. No exceedance of construction noise criteria is predicted for any construction task.

For Six Mile Road residential receptors, the highest modelled construction noise level is $L_{Aeq,\ 15\text{-}min}$ 41 dBA, well below the 46 dBA criterion. For the Italia Road residential receptor, the highest modelled construction noise level is $L_{Aeq,\ 15\text{-}min}$ 50 dBA, well below the 54 dBA criterion.

No exceedance of construction noise criteria is predicted for any construction task, with the exception of the manager's residence for the landscape supply operation where construction noise activities may exceed the construction noise management level by up to 5 dBA (but would remain below the highly noise affect ted criterion). Eagleton Rock is negotiating a private agreement with the owner of this property, who is also the owner of the Eagleton Quarry site.

Noise Generation from Operational Activities

Three operational scenarios were assessed summarised – being production at full capacity up to 600,000 tonnes per annum, for operational years 1, 5 and 10. Year 10 of the quarry operations is representative of the quarry operations from Year 10 to Year 30.

Within each of the three primary scenarios, a series of secondary scenarios were assessed, considering the various modes of operation proposed. Each mode of operation consists of various activities, some of which will operate concurrently

depending on the mode of operation. The seven activities included in the various quarrying operational modes are:

- Vegetation clearing and stripping.
- Drilling and blasting.
- Extraction.
- Processing. Note that acoustic barriers will be constructed adjacent nominated processing plant items (generally limited to crushers), and have been provided for in the noise model.
- Sales (i.e. including delivery trucks on the internal site access road extending along Barleigh Ranch Way and the right of way to the intersection with Italia Road).
- Maintenance / road building.
- Rehabilitation.

Modelling assumptions and parameters for each construction activity is described in **Appendix J**. Importantly, quarrying will advance generally in a north to south direction in 5 metre bench heights to ensure an operating face is maintained between the extraction area and receptors to the south.

It is also highlighted that the operational scenarios modelled include some of the same activities as have been modelled during construction (such as clearing and stripping, drill rig, excavators etc.). As such, whilst the construction and operational noise modelling scenarios are separate, the on-site activities associated with the modelled scenarios potentially represent a combination of construction and operational activities. Where this is the case the scenario has been assessed as an operational noise scenario and assessed against the operational noise criteria, which is a conservative approach to the noise impact assessment.

The comparison of the modelled noise impacts of worst-case operational activities for the residential receptor on Italia Road is summarised in **Table 10**. As can be seen in the table there would be no exceedances of the project specific noise criteria.

Table 10 – Impact assessment for Italia Road residential receptor

Period	$L_{Aeq,period}$ (averaged over the period)			
	Project Specific Noise Level	Year 1	Year 5	Year 10
Day	49	37	38	37
Morning Shoulder	36	33	33	33
Evening	48	27	27	27

The comparison of the modelled noise impacts of worst-case operational activities for the residential receptors on Six Mile Road is summarised in **Table 11**.

Table 11 – Impact assessment for Six Mile Road residential receptors

Year	Receiver	Morning Shoulder (dBA $L_{A,eq,\ period}$)	Day (dBA $L_{A,eq,\ period}$)	Evening (dBA $L_{A,eq,\ period}$)
Project Specific Noise Levels (dBA $L_{A,eq,\ period}$)		**39**	**41**	**39**
Year 1	R3	33	39	28
	R6	34	40	29
	R7	35	41	31
	R8	34	40	29
	R9	33	38	29
	R10	35	39	30
	R13	34	38	29
Year 5	R3	35	39	30
	R6	37	40	32
	R7	37	41	32
	R8	37	41	32
	R9	36	40	31
	R10	35	39	30
	R13	35	39	30
Year 10	R3	35	39	30
	R6	37	41	32
	R7	37	41	32
	R8	37	41	32
	R9	36	40	31
	R10	35	40	30
	R13	35	40	30

There would be no exceedances of the project specific noise criteria at any receptor, with the exception of the manager's residence for the landscape supply operation where operational noise impacts may exceed the project specific noise criteria by up to 12 dBA. Eagleton Rock is negotiating a private agreement with the owner of this property, who is also the owner of the Eagleton Quarry site.

Road Traffic Noise

An assessment of the potential impact in traffic noise on Italia Road has been undertaken and the results are set out in **Table 12**. It is illustrated from the results that the proposal will not result in an exceedance of the established criteria. An assessment of the potential impact on the Pacific Highway has been considered unnecessary due to the high level of traffic on this road and the minor level of traffic which will be contributed by the proposal.

Table 12 – Predicted traffic noise on Italia Road ($L_{Aeq15hr}$(dBA))

Receptor	Day Limit	Year 1-5		Year 5-30	
		Peak Hour	Non-Peak Hour	Peak Hour	Non-Peak Hour
R01	60	58	56	58	56

Sleep Disturbance

An assessment of the potential impact of the proposal during the night has been assessed, noting that sleep disturbance results apply to the morning shoulder period. No exceedances of sleep disturbance criteria are predicted.

At the Italia Road residential receptor, $L_{A1,1\text{-minute}}$ noise was predicted to be 42 dB, below the 46 dB criterion. At the Six Mile Road residential receptors, the highest $L_{A1,1\text{-minute}}$ noise level was predicted to be 48 dB, below the 49 dB criterion.

At the manager's residence at the Port Stephens Gardenland landscape supplies facility night time noise impacts may exceed the sleep disturbance criterion by up to 9 dBA. Eagleton Rock is negotiating a private agreement with the owner of this property, who is also the owner of the Eagleton Quarry site.

Vacant Land Assessment

An assessment of vacant lot area is a requirement of the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments*.

Assessment of vacant land in this policy is through evaluation of recommended maximum noise levels rather than project specific noise levels. Recommended maximum noise levels for a rural area are $L_{Aeq,period}$ 55 dB and 50 dB for the day and evening periods respectively.

Noise predictions for the Eagleton Quarry have been conservatively based on $L_{Aeq,15\text{-min}}$ which are generally 2-3dB higher than the $L_{Aeq,period}$ criteria. The noise modelling provided in Appendix J shows that neither the 55 dB (daytime) or the 50 dB (contour) extend significantly into any of the surrounding rural residential properties, and that the noise levels do not exceed these criteria over more than 25 percent of vacant lot area for any stage or time period.

Cumulative Assessment

For all of the residential receptors the cumulative noise criteria is higher than the project specific noise criteria. As such, compliance with the project specific noise criteria indicates compliance also with the cumulative noise criteria. No exceedances of the cumulative noise criteria for any residential receptor are predicted, except for the manager's residence at the Port Stephens Gardenland landscape supplies facility. Eagleton Rock is negotiating a private agreement with the owner of this property, who is also the owner of the Eagleton Quarry site.

7.4.3 Mitigation and Management

The results of the assessment have identified that there will not be any exceedance of the established criteria during normal production up to 600,000 tonnes per annum.

The noise modelling has assumed that noise barriers are located within 2m of nominated processing plant equipment. To ensure the noise modelling assumptions are reflected in the implementation of the quarry, the acoustic barriers would need to be of minimum height 4.8 metres, be of impervious construction (except for minimal openings required for conveyor pass though), and have minimum density of 20 kg/m^2. Barriers would need to be constructed within 2 metres of specific plant items, as follows:

For the initial diesel powered plant configuration, barriers would be required on the:

- West side of the Jaw Crusher, minimum length 12 metres. Barrier to extent as far south as practical without impeding the excavator;

- South side of the Northern Cone Crusher, minimum length 18 metres;
- South-west side of the North-eastern Cone Crusher, minimum length 12 metres; and
- West and south sides of the VSI Crusher (an 'L' shaped barrier), 18 x 6 metres with long leg oriented north/south.

For the ultimate electric powered plant configuration, barriers would be required on the:

- South side of the Jaw Crusher, minimum length 12 metres; and
- Western side of the Secondary and Tertiary Crushers (entire length of feed tower structures, with 5 metre extension to south).

7.5 Blast Vibration and Overpressure

An assessment of blast vibration and overpressure has been included as part of the acoustic report, provided in **Appendix J**.

7.5.1 Assessment Criteria

Blast vibration and overpressure criteria have been adopted from the Australian and New Zealand Environment and Conservation Council (ANZECC) publication *'Guidelines to minimise annoyance due to blasting, overpressure and ground vibration'*. These guidelines specify the following levels of peak particle velocity (PPV) from ground vibration:

- Not exceed 5mm/s for more than 5% of the total number of blasts over 12 months;
- Maximum level should not exceed 10mm/s at any time; and
- 2mm/s should be a long term regulatory goal.

ANZECC also recommend the following guidelines for air blast overpressure:

- Not exceed 115 dBA L_{peak} for more than 5% of the total number of blasts over a period of 12 months; and
- Maximum level should not exceed 120 dBA L_{peak}.

Furthermore, the guidelines state that blasting should generally be limited between 9:00am to 5:00pm on Monday to Saturday and should not take place on Sunday or public holidays.

Blast overpressure at sufficiently high levels in the range of 133 dB and above may cause structural damage to some building elements such as windows. However, this is well in excess of annoyance criteria specified above.

For assessment of damage due to ground vibration, Australian Standard AS2187.2-1993 Explosives – Storage, Transport and Use contains an appendix specifying recommended levels for peak vibration velocity to protect typical buildings from damage. These are:

- Structures that may be particularly susceptible to ground vibration – 5mm/sec;
- Houses and low rise residential buildings; commercial not included below – 10mm/sec; and

- Commercial and industrial buildings or structures of reinforced concrete or steel construction –25mm/sec.

Blast overpressure of 133 dB has been adopted as the project specific criterion for structural damage. For ground vibration, a PPV criterion of 10 mm/sec has been adopted for residential buildings, and a PPV of 25 mm/sec has been adopted for commercial and industrial buildings.

7.5.2 Impact Assessment

It is proposed to have 12 blasts per year, an average of one per month, with 100 holes per blast.

Three receptors closest to the blasting area were selected for assessment, other receivers further from the blast location should experience noise and vibration levels lower than predicted for those nearest.

The allowable maximum instantaneous charge (MIC) mass per blast to comply with the blast vibration and overpressure levels was calculated. The limiting MIC for private residences for all the blasts would be overpressure related.

The landscape supplies facility manager's residence and nearest commercial buildings are approximately 300 metres from the active quarry area at the closest point. MIC limits to ensure blast criteria are met have been calculated at these receptors. The maximum allowable MIC will be vibration related for these receptors. Higher MIC will be possible when blasting at greater distances.

Power lines are located north, south and east of of the quarry, with the closest power lines located approximately 900 metres from the nearest blast area. Due to the distance to power lines, and the higher 25mm/s PPV threshold, limiting MIC to allow compliance at residences will, by default, provide compliance for power lines.

7.5.3 Mitigation and Management

Careful blast design and shot firing will be employed to ensure that the quarry would be operated to comply with Blast MIC levels and avoid possible blast impacts. Multiple blast monitors will be used for initial blasting to establish site-specific K and B constants. This will allow more accurate blast vibration predictions and therefore optimisation of the allowable MIC. Dilapidation surveys will be conducted at any potentially affected receivers prior to initial blasting activities.

7.6 Air Quality

An Air Quality and Greenhouse Gas Assessment has been undertaken by Pacific Environment and is provided at **Appendix K**. Pacific Environment has examined the existing air quality environment and has undertaken detailed modellings of the expected emissions to be released as part of the quarry operations. From these investigations an assessment of the potential impacts has been carried out and recommendations to be implemented during the construction and operational phase of the proposed development identified.

7.6.1 Relevant assessment criteria

PAE Holmes has identified the relevant criteria are required be adopted in the assessment of the potential emissions from the proposed development. The identified criteria have been developed by the Environmental Protection Authority (EPA) and are health based. The relevant criteria include:

- *EPA Air Quality Standards for Particulate Matter Concentrations*; and

- *EPA Criteria for Dust (Insoluble Solids) Fallout*.

Under the EPA Air Quality Standards for Particulate Matter Concentrations, the emissions will be assessed against criteria for Total Suspended Particulates (TSP) and Particulate Matter less than 10 microns (PM_{10}). The emissions will be assessed against the EPA standard for an averaging period as follows:

- TSP – 90 mg/m^3 Annual Average
- PM_{10} – 50mg/m^3 24-Hour Average
- PM_{10} – 30 mg/m^3 Annual Average

The above EPA criteria are consistent with the *National Environment Protection Measure for Ambient Air Quality* (Ambient Air-NEPM 1988), yet include further measures of air quality such as dust deposition.

Acceptable criteria for deposition of dust relate to an incremental increase of $2g/m^2$/month and a total maximum dust deposition rate of $4g/m^2$/month.

7.6.2 Existing environment

Meteorology

The local meteorological conditions are a major influence in the air quality environment. Generally, winds are predominantly from the west north west, except for summer, where winds predominantly arrive from the north east to the south. A wind rose of the existing environment is provided in the Air Quality and Greenhouse Gas Assessment at **Appendix K**.

Air Quality

The existing PM_{10} concentrations for the area were assessed at three different sites which are publicly accessible (Beresfield, Newcastle and Wallsend). The average annual PM_{10} concentration for the closest monitoring site (Beresfield) was 20.4 $\mu g/m^3$. Due to the surrounding residential and industrial sites in Beresfield, this is a highly conservative estimate of PM_{10} concentrations at the proposed Eagleton Quarry site.

As with Pm10, the closest monitoring site for PM2.5 is at Beresfield, which recorded a background annul average PM2.5 concentration of 7 $\mu g/m^3$.

No TSP concentration data has been available for analysis. Despite this, an annual average of TSP concentration can be ascertained from assuming that 40% of the TSP is PM_{10}. As such, it is considered that the existing annul average TSP concentration is approximately 50 $\mu g/m^3$.

The locality is already impacted by the existing Boral Quarry. However, the Boral Quarry does not monitor dust, and no other local data that characterised this location for dust deposition has been identified. As such, data from Lynwood quarry were used. The median of the monthly values identified at Lynwood Quarry was 1.8 g/m^2/month, which is the figure which will be adopted at the site.

In summary, the existing air quality environment at the site is estimated to consist of the following factors:

- Annual average PM_{10} concentration of 20 $\mu g/m^3$;
- 24-hour PM_{10} concentrations – daily varying;
- Annual average PM2.5 concentration of 7 $\mu g/m^3$;
- Annual average TSP concentration of 50 $\mu g/m^3$; and

- Annual average dust deposition of 1.8 g/m^2/month

7.6.3 Quarry Emission Sources

Construction Phase Emissions

PAE Holmes has identified that dust and particulate matter emissions will be the principal emissions during the construction phase of the proposed development. The following activities have been identified as potentially causing emissions:

- Site preparation works including vegetation clearing, bulk earthworks and access road construction;
- Excavation and stockpiling of excavated material;
- Movement of heavy plant and machinery within the site;
- Graders / scrapers working access road construction; and
- Wind erosion from exposed surfaces.

Operational emissions

A number of sources of emissions have been identified. **Table 13** summarises the annual dust emissions expected to be generated during the maximum throughput scenario of 600,000 tonnes per annum, with processing activities limited to daytime hours.

Table 13 – Estimated Annual Dust Emission

Activity	TSP (kg/y)	PM_{10} (kg/y)	PM_{10} (kg/y)
Extraction Area			
Drilling rock	1,328	690	40
Blasting rock	1,304	678	39
Excavator loading	622	294	45
Hauling to Processing area	24,818	6,377	638
Processing Area			
Unloading at processing area	311	147	22
Rehandle rock to hopper	311	147	22
Primary Crushing	360	162	30
Secondary Crushing	360	162	30
Tertiary Crushing	360	162	30
Crushing (Fines)	900	360	21
Screening (controlled)	660	222	15
Fines Screening (controlled)	1,080	660	660
Pug Mill	180	110	110
Stacking stockpiles - aggregate	311	147	22
FEL loading trucks - aggregate	622	294	45
Hauling product to site boundary	12,409	3,188	319
Hauling product to Italia Road	36,370	6,981	1,689
Grading roads	1,412	1,412	1,412
Wind Erosion			
WE - Extraction Area	26,798	13,399	2,010
WE – from conveyors	27	14	2
WE - Processing Area (stockpiles)	416	208	31
Total	110,959	35,816	7,232

Emission estimates have been conservatively based on diesel processing equipment being used. The ultimate arrangement using electrically powered processing equipment will result in lower emissions as a result of less diesel combustion at the site.

It is highlighted that best practice management and controls have been assumed in establishing operational emissions, including:

- Use of water carts/trucks to control emissions from haul roads.
- Enforcement of speed limits onsite and on right of way.
- Progressive rehabilitation of exposed areas.
- Application of water at the crusher and on conveyor transfer points.
- Minimising drop height of material during truck loading and unloading.
- Use of water sprays when drilling.
- Sheltering of stockpiles and transfer points where possible.
- Proper blast design.
- Management of dust generating activities during unfavourable meteorological conditions.

7.6.4 Impact assessment

Construction Dust Assessment

It has been considered that these emissions will be significantly lower than the emissions experienced in the operational phase of the development. As such, Pacific Environment has conducted a risk assessment. Where there is risk of an impact, then site-specific mitigation will be required in proportion to the level of risk. This risk assessment concludes that the risk of dust soiling, human health and ecological impacts during earthworks are assessed as being medium. Impacts caused by construction and track-out are considered to be low.

Pacific Environment provides a number of recommendations to minimise dust emissions during construction, noting that most of the recommended measures are routinely employed as 'good practice' on construction sites. At Eagleton Quarry, particular attention should be paid to controlling dust generated by earthworks due to the risk level of this activity compared to construction and track-out risks.

These recommendations and any further management/mitigation measures will be included in a Dust Management Plan. However, even with a rigorous Dust Management Plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time. There is the risk that the on-site office buildings as well as the small number of residential properties and businesses in the immediate vicinity of the site boundary might experience some occasional dust soiling impacts. This does not imply that impacts are likely, or that if they did occur, that they would be frequent or persistent. Given the distances between the construction sites and the receptors, overall construction dust is unlikely to represent a serious ongoing problem. Any effects would be temporary and relatively short-lived, and would only arise during dry weather with the wind blowing towards a receptor, at a time when dust is being generated and mitigation measures are not being fully effective. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the residual effects will be 'not significant'.

General Modelling Results

The Air Quality Assessment has been undertaken in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Department of Environment and Conservation, 2005). The CALMET/CALPUFF modelling system has been selected to perform the modelling which takes into account meteorological conditions. Modelling has been conservatively based on emissions occurring between 7am-6pm, noting that no extraction or processing will occur after 6pm.

Modelling has identified that no privately owned receivers are predicated to experience ground level concentrations above the relevant assessment criteria for PM_{10} concentrations, $PM_{2.5}$ concentrations, TSP concentrations and dust deposition levels.

The predicted incremental ground level concentrations at the receptor locations have all been shown to fall below the relevant criteria, including at the manager's residence for the adjacent Gardenland landscape supplies facility. The largest off-site ground level concentration will occur at the closest off-site receptor, located south of the site on Six Mile Road. The concentration at this receptor will be significantly below the relevant criteria. **Table 14** summarises the modelled air pollutant concentrations for the most affected receptors, all of which are well below the relevant criteria. In the table, receptor R34 is the Italia Road residential receptor. The other 5 receptors are located on Six Mile Road.

Table 14 – Predicted ground level concentrations at key receptor locations

Receptor ID	PM_{10}		$PM_{2.5}$		TSP	DD
	24 Hour	Annual	24 Hour	Annual	Annual	Annual
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	g/m^2/month
Criteria	50	30	8	25	90	2
R34 (Italia Road)	5.5	0.4	1.3	0.1	1.0	0.1
R7	5.2	0.4	1.1	0.1	0.6	0.04
R6	4.4	0.3	1.0	0.1	0.5	0.03
R8	4.2	0.3	0.9	0.1	0.5	0.03
R5	4.1	0.3	1.0	0.1	0.4	0.03
R4	3.4	0.2	0.8	0.1	0.4	0.03

In addition to dust emissions, blasting causes the emission of nitrogen oxide. Due to low amounts of ANFO proposed to be used at the Eagleton Quarry and the historical analysis of Hunter Valley mines which shows that 80% of blast plumes do not result in NO2 levels above the ambient levels, it is considered that that there is minimal risk of adverse NO_2 impacts due to blasting at the quarry.

Kings Hill Area

The potential impact on the Kings Hill area has been assessed due to the potential for an increased residential community. The Kings Hill area, located up to four kilometres south of the site, has an approved rezoning for up to 4,500 residencies. The above modelling has demonstrated that future residents in this area will not experience adverse air quality conditions as a result of the proposed development.

Cumulative Impact Assessment

The cumulative assessments of PM_{10} and $PM_{2.5}$ concentrations at the worst impacted receptors have been plotted in **Appendix K** showing the cumulative 24-hour average concentration compared with the assumed background. Pacific Environment's analysis of these plots is that the addition of the project would be unlikely to result in any days over the impact assessment criteria level, and that the project has a very minimal impact on current PM_{10} and $PM_{2.5}$ concentrations

The predicted pollutant concentrations, including the emissions from Gardenland, at each of the sensitive receptors have been added to the adopted background levels. There are no privately owned receivers that are predicted to exceed the annual average assessment criteria when existing background concentrations are included.

7.6.5 Mitigation and Management

As described in Section 7.6.3, the Eagleton Quarry would implement a number of best practice mitigation measures on-site to ensure that dust impacts are minimised. These measures have been assumed in the dust modelling, and would need to be implemented to ensure the development is consistent with the modelling.

In addition to these measures, Eagleton Rock will commit to the installation of an air quality monitor at a location representative of nearby receptors.

7.6.6 Greenhouse Gas Assessment

An assessment of the predicated greenhouse gas emissions has been carried out to determine the potential impact of the proposed development. The greenhouse gas emissions have been separated into three distinct categories, consisting of:

- Direct greenhouse gas emissions;
- Energy product use indirect greenhouse gas emissions; and
- Other indirect greenhouse gas emissions.

Pacific Environment has estimated that the average annual greenhouse gas emissions generated by the proposed development would be 0.04 Mt $CO_{2\text{-equivalents}}$ representing approximately 0.0003% of Australia's average annual commitment under the Kyoto Protocol. This is considered to be a very small portion of Australia's commitment, and an even smaller portion on a global scale. This estimate is based on concurrently use of diesel and electricity to operate the processing plant. In reality, the emissions will be significantly lower as the plant will not be operated as diesel and electricity at the same time.

7.7 Land Resources

7.7.1 Soils and Land Capability

The potential for erosion exists due to the relatively high dispersiveness of the soils in the broader Seven Mile Creek catchment, particularly in the lower parts of the catchment (i.e. downstream of the site). Provision has been made for erosion protection downstream of the creek crossing.

There is currently no known contamination at the site, and contamination is not expected due to the lack of development that has occurred. Prior to final closure, a preliminary investigation into potential sources of contamination including additional Phase 1 sampling and analysis will be undertaken. This will be used to determine whether a detailed assessment (for example, Phase 2 sampling and

analysis) should be conducted to quantify the amount of contaminated material that may require remediation.

Where possible all identified sources of contamination will be remediated during the operational phase of the site. In some cases, this may not be possible and in these circumstances the remediation will be undertaken following closure and during the decommissioning phase.

7.7.2 Landform and Geotechnical Stability

Landform design and modelling will be undertaken during closure planning. Areas of rehabilitation will be designed to achieve a stable final landform commensurate with the surrounding environment. The proposed quarry operation will result in a final landform that comprises a series of 10 m wide and 15 m high benches at the western end of the quarry.

The final landform must provide long-term stability. Overall slopes will be no greater than 1:3 (V:H), achieved by re-contouring overburden or using in situ material. Elements such as drainage paths, contour drains and ridgelines will be shaped, as much as practical, to undulating profiles in keeping with natural landforms of the surrounding environment.

To ensure the safety of the final void, the surrounding final slopes should be left in a condition where the risk of slope failure is minimised. This may require the benches to be battered back from the vertical to enable a stable overall slope angle. Prior to closure, investigations will be undertaken to confirm a range of geotechnical criteria, including:

- Height and inclination of slope and number and spacing of intermediate benches;
- Shear strength of the highwall soils and rocks;
- Density and orientation of fractures, faults, bedding planes, and any other discontinuities, and the strength along them; and
- The effects of the external factors, such as surface runoff.

The floor of the quarry will be predominantly free draining and will not have a final void. Several minor depressions will however be created along the in the alignment of the drainage line. These minor depressions will help reduce erosion potential, enhance the sediment trapping capacity and in the longer term increase habitat value of the quarry floor which is to be vegetated with native species.

The geotechnical stability of the final landform would be monitored annually to identify any landform slumping, and to assess any features that could impact on the performance of the final surface water management system.

7.7.3 Farmland and Rural Industries

The Eagleton Quarry site is located near the top of a heavily vegetated ridge. Land the north comprises the existing Boral Seaham Quarry. West of the site is a continuation of the vegetated ridgeline. South of the site is also a continuation of the vegetated landscape, with the land falling away to Six Mile Road, which contains rural residential properties, some of which may be carrying out smaller agricultural activities.

To the east of the site is an existing composting facility and a range of entertainment land uses including paintball and car racing.

There is no significant farmland or agriculture taking place at the Eagleton Quarry site, or in the immediate vicinity of the site.

7.7.4 Land Use Compatibility

Clause 12 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* requires that the consent authority consider the compatibility of the proposed extractive industry with the surrounding land uses – both existing land uses and likely future preferred uses.

The existing surrounding land uses are described in Section 2.4 and are generally limited to a quarry, rural industries, and entertainment facilities that are not sensitive land uses and would not be considered to be incompatible with the proposed quarry.

The nearest off-site residential dwellings are located approximately 1km to the southwest of the site along Six Mile Road. The minimum lot size is 40ha, indicating that significant intensification is unlikely to occur in the near future along Six Mile Road.

The Kings Hill residential area is predicted to result in significant residential intensification. However, the closest future development areas of Kings Hill are located over 1km south-east of the quarry, and area generally limited to land within 500m of the Pacific Highway. An existing ridgeline exists between these parts of Kings Hill and the quarry site, indicating that any visual or acoustic impacts to these future residential areas would be lower than the impacts at the closest existing residents on Six Mile Road.

Environmental assessment through this EIS has determined that the quarry can operate without causing significant amenity impacts to the existing residences on Six Mile Road. As such, the proposed Eagleton Quarry is considered to be compatible with existing and likely future surrounding land uses, including the future residential areas of Kings Hill.

7.8 Water Resources

A Surface Water Assessment has been prepared by Umwelt (Australia) Pty Ltd and provided at **Appendix M**. This Assessment has examined the potential water resource impacts of the proposed development through an analysis of the existing environmental conditions and the projected operation of the development. A number of strategies and mitigation measures have been suggested to manage the potential impacts of the proposed development.

7.8.1 Existing Environment

Landform and Catchments

The surface water characteristics of the site are dominated by Seven Mile Creek which runs through the site from north to south. Seven Mile Creek originates to the west of the site, with the watershed at an elevation of close to 130 m AHD. The upper slopes of the Seven Mile Creek catchment area are hills with grades of between 10 per cent and 20 per cent.

The Seven Mile Creek catchment is typically steep with undulating hills covered with woodland areas and some pastoral grasses. The vegetation within the catchment exhibits considerable variation in the density of the undergrowth.

The initial creek gradients are relatively steep, but becoming flatter further downstream. Adjacent to the proposed quarry, Seven Mile Creek has stream width of typically 1 to 3 metres in extent with an average bed slope of approximately 1 per cent. However, the bed slope is variable with a mixture of pools and riffles along its length. Seven Mile Creek is characterised by a diverse bed matrix, including side bars in areas of deposition comprising well rounded

pebble sediments in a light brown sandy clay matrix, together with branches and debris from the woodland area.

Downstream of the site, Seven Mile Creek flows in a south easterly direction through woodland area, under the Pacific Highway and down to Grahamstown Dam approximately 2km to the southeast of the site.

Seven Mile Creek is a third order watercourse according to the Strahler system for classifying watercourses. In the part of the site relevant to the proposed quarry, there are two second order watercourses, and four first order drainage lines.

Seven Mile Creek flows intermittently and is therefore not a major stream in terms of catchment yield, but the water quality is of significance given the presence downstream of Grahamstown Dam. Grahamstown Dam supplies a significant proportion of the Lower Hunter region's potable water requirements, varying from 30 per cent to 75 per cent, depending on the rainfall. Grahamstown Dam has a direct catchment of 115 square kilometres (or 11,500 ha), of which the Seven Mile Creek catchment comprises 2.6 per cent.

The 30 hectare extraction area for the Eagleton Quarry therefore represents only 10% of the Seven Mile Creek catchment and less than 0.3% of the Grahamstown Dam catchment.

Existing Water Quality

Water quality in Seven Mile Creek is of significance given the presence downstream of Grahamstown Dam. Hunter Water Corporation note in its *Catchment Management Plan* that the use of the land for grazing within the Seven Mile Creek catchment can result in sediment and nutrient loading issues. It is also noted that Boral's Seaham Quarry occupies approximately 35 ha of the upper most section of the Seven Mile Creek catchment, and discharges to Seven Mile Creek in accordance with its Environment Protection Licence.

Hunter Water Corporation has monitored water quality data in Seven Mile Creek approximately 100m downstream of the Pacific Highway and the nearby Nine Mile Creek downstream of the Pacific Highway. A summary of these water quality results is provided in **Table 15**.

Project specific water quality monitoring was also carried out for the proposal, and the data obtained is summarised in **Table 15**. All on-site tests were analysed for Total Petroleum Hydrocarbons, BTEX, Polycyclic Aromatic Hydrocarbons, Organochlorine Pesticides and Organophosphorus Pesticides. No detectable concentrations of these chemicals were recorded in any samples.

Existing water quality data are compared against the criteria set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Lowland coastal flowing rivers in NSW (ANZECC criteria) in **Table 15** below. As can be seen in the table, water quality in Seven Mile Creek is frequently outside the trigger values. This indicates that site-specific values will need to be determined for assessment of potential impacts.

Table 15 – Existing water quality and ANZECC guideline values

Water Quality Variable	Monitoring Data – Average of HWC monitoring data		Project Specific Water Quality Monitoring	ANZECC Guidelines Trigger Values
	Seven Mile Creek	Nine Mile Creek	Seven Mile Creek	
Total Phosphorus (mg/L)	0.12	0.08	0.04 – 0.41	0.025
Total Nitrogen (mg/L)	1.04	0.97	0.6 – 3.7	0.35
Ammonia (mg/L)	0.06	0.08	-	
Conductivity (μS/cm)	475	226	144 – 610	125 – 2,200
Turbidity (NTU)	161	62	-	
Total Suspended Solids (mg/L)	-	-	<5 – 870	40
Total Dissolved Solids (mg/L)	-	-	271 – 336	
pH	7.2	6.5	6.85 – 8.03	6.5 – 8
E. coli (MPN/100mL)	1,470	153	-	
Entrococci (col/100 mL)	365	234	-	

Notes: 1) Sample not analysed to charge balance, Total Dissolved Solids (TDS) based on major cations and anions only

Existing Flooding Regime

The flooding characteristics of Seven Mile Creek catchment were modelled for the 100 year ARI 9-hour storm event, using a hydrodynamic model which simulates natural rainfall-runoff processes and the performance of natural systems. Flooding extents, peak flow rates and peak velocities were calculated by the model.

The flood modelling indicated that the peak velocities within the creek system are not excessive, typically within the range of 1.0 to 1.6 m/s, and that there are no areas of significance currently impacted by flooding.

As shown in **Figure 15**, the extent of flooding around Seven Mile Creek in the vicinity of the site is very localised to the river channel. Downstream towards the flood extent becomes more substantial. The potential impact of the proposal is assessed in **Section 7.8.5** below.



Figure 15 – 100 Year Flood Extents of Seven Mile Creek and its tributaries
Source: Umwelt

Water Access Licencing

The site is located within the Sydney Basin – North Coast Groundwater Source. Based on the NSW Office of Water website there are 149 Water Access Licences within this groundwater source with a total licenced volume of over 57,000 ML/year. The long-term average annual extraction limit for the groundwater source has been established as 90,000 ML/year. The total volume of unassigned water is 3,453 ML/year.

7.8.2 Water Management System

The proposed construction and operational activities for the Eagleton Quarry are located upslope of Seven Mile Creek, with the potential to impact on the existing watercourse system and downstream water bodies. Under Section 120 of the *Protection of the Environment Operations Act 1997*, it is an offence to pollute waters or cause harm unless licensed to do so. Inherent in the concept of not causing harm is the need to manage the risk of spilling from water management dams or related infrastructure.

It should be noted that the relatively steep topography and the requirement to remain outside of the 40 metre creek buffer zone has resulted in limited space available in the immediate vicinity of the quarry for water management works. Particularly, the extent of the quarry extraction area has been contained to the north and the south by the two second order watercourse. Further, due to the location of this site on the upstream edge of the catchment, only a limited amount of clean water diversion is required.

The Water Management System is intended to contain runoff from the quarry area to prevent impacts on the water quality of the downstream catchment, and includes the following:

- a clean water diversion channel on the western side of the quarry to keep clean water out of the quarry, although with a very limited catchment estimated at around 0.2 hectares;
- dirty water catch drains constructed on the perimeter of the quarry extraction and infrastructure area, being primarily channels excavated in rock or with a grassed invert and rock erosion protection, depending on the founding conditions.
- two primary water management dams located downstream of the dirty water catch drains outside of the quarry extraction area providing a total water storage capacity of around 57 ML;
- an additional channel sediment trap constructed on the dirty water catch drain at the change in grade;
- excavation during the operational phase of additional deep "sumps" excavated into the quarry floor by creating a slope of approximately 2.5% away from the central access road, with a 1 to 1.5m high bund maintained around the perimeter of the extraction area.

The design criteria for the components of the water management system are:

- Clean water diversion – 100 year ARI.
- Quarry operational areas – contain runoff from Quarry during a 100 year ARI 24 hour flood event. All dirty water catch drains will be sized for the 100 year ARI event.
- Rehabilitated areas – 95th percentile 5 day rainfall event.
- Whole of quarry – safe conveyance of runoff up to the Probable Maximum Flood.

The water management system has been designed so that no discharge from the site is expected to occur during events up to the 100 year ARI 24 hour storm event.

For the internal site access road crossing Seven Mile Creek the bridge been designed with a conveyance capacity that can accommodate the peak runoff in Seven Mile Creek from the 100 year ARI nine hour storm event before overtopping. The surface of the access road crossing Seven Mile Creek will drain

towards the south-western side of the creek, where runoff will be contained in the access road sediment dam. Water will be abstracted from this facility for dust suppression to ensure the risk of spilling is in line with the WMS design requirements.

A schematic representation of the Water Management System is provided in **Figure 16**, and plans of the Water Management System are provided in **Figure 17**, for Year 1 of quarry operations, and **Figure 18** for Year 5 and onwards.

The proposed water management system will be largely put in place at the commencement of quarrying activities and will remain in place over the 30 year life of mine with minimal changes.

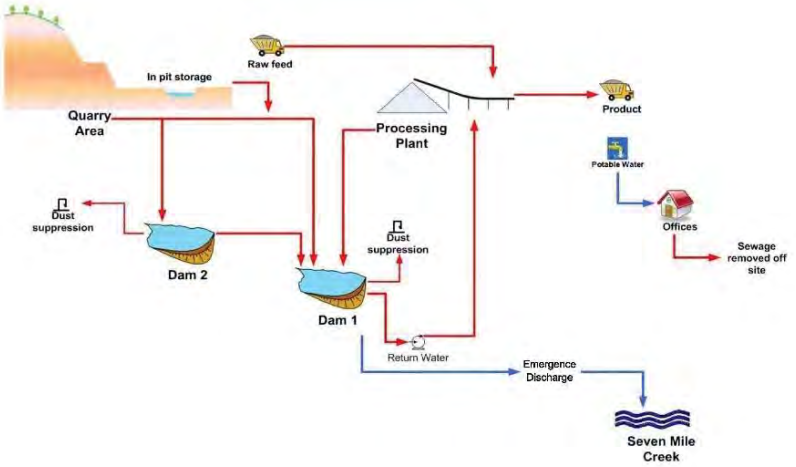


Figure 16 – Schematic Water Management System
Source: Umwelt

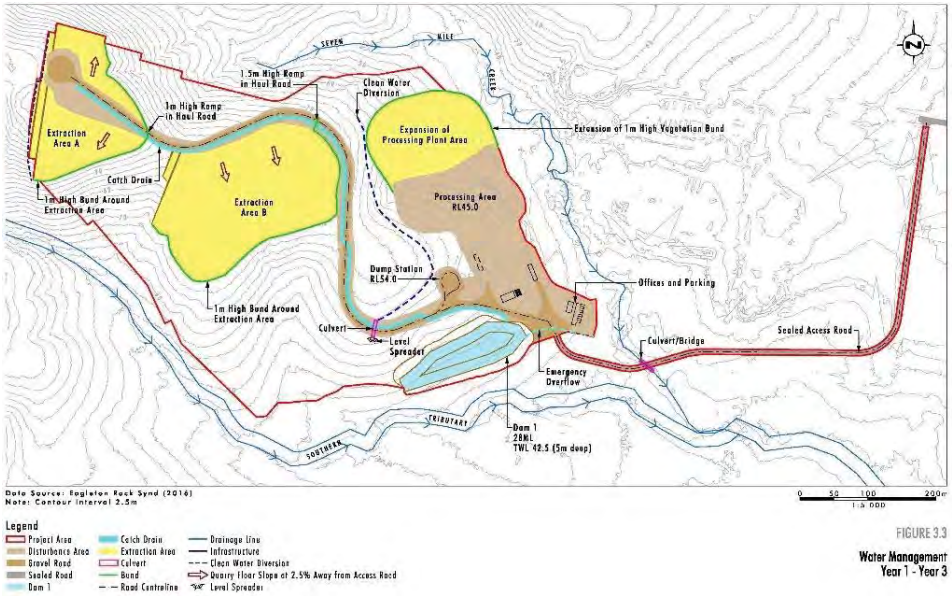


Figure 17 – Water Management System Plan – Years 1-3
Source: Umwelt

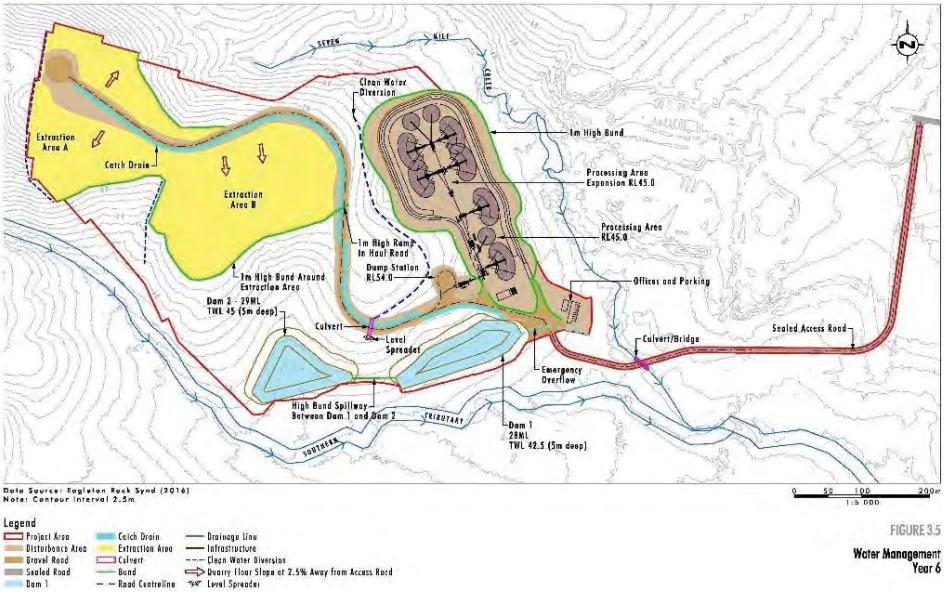


Figure 18 – Water Management System Plan – Year 6
Source: Umwelt

7.8.3 Site Water Balance

A detailed predictive site water balance has been prepared for the site, based on consideration of a number of factors including, rainfall, historical evapo-transpiration rates for the site, and the nature of existing catchments and watercourses.

After an examination of surrounding Bureau of Meteorology stations, Umwelt has identified that the average yearly rainfall is 1,126.7 mm. An analysis of evaporation rates in the area has also identified that the average yearly evaporation is 1,731 mm, once adjusted to account for site characteristics. From this analysis, it is expected that the proposed quarry site will only have a surplus rainfall over evaporation for two months of the year (May and June).

The availability of water on-site and ability to contain runoff on-site has been analysed for a rage of operational stages using 43 years of daily rainfall and runoff data. The predictive water balance model shows that the availability of water for processing and dust suppression and the volume of water stored on-site vary significantly. However, the analysis shows that the quarry could be operated without the need to import significant volumes of water for processing and dust suppression and without the need for discharges from the site to Seven Mile Creek.

7.8.4 Groundwater Modelling

In February 2014 URS undertook a hydrogeological investigation for Eagleton Hard Rock Quarry. The URS report provides the baseline data to inform the groundwater modelling and assessment, and is provided at **Appendix L**.

In accordance with SEARS for the project, the groundwater report was peer reviewed by Brian Rask of SLR and the findings of the peer review set out in a report dated 9 February 2016 is provided in **Appendix M**. The peer review raised a number of issues in regard to the 2014 URS report. The conceptual geological model that was used by URS has been revised and a new groundwater model built for the site by Umwelt.

Details of the conceptual geological model that was developed and the revised groundwater model are set out in the report 'Numerical Groundwater Model for Eagleton Quarry (October 2016)' which is provided in **Appendix M**.

The revised numerical groundwater model was subject of a further full technical peer review by Brian Rask of SLR in October 2016, which concludes that the groundwater modelling, and associated impact assessment, is fit for purpose to address the requirements of the SEARs and Aquifer Interference Policy. A copy of the Peer Review of the Umwelt groundwater model is provided at **Appendix N**.

Based on the revised geological model, simulation of groundwater conditions and changes to the groundwater regime of the 30 year life of the quarry was undertaken and groundwater inflow rates at various times over the life of the quarry estimated. Inflows varied from 3 ML in year 1 of quarry operations to 7.7 ML in year 24.

Modelling indicates that maximum drawdown of the groundwater table as a result of the proposed quarry is limited to the site with the relatively slow extraction progress over 30 years reducing the impact of drawdown significantly.

Modelling also shows that there is limited impact of drawdown outside of the site with a drawdown of less than 1m likely to extend to approximately 200 m to the west, north and south of the quarry extraction area.

Modelling indicates that the potential for cumulative impact is minor based on the limited propagation of drawdown outside of the property boundary with depressurisation of 1 m or less in the underlying fractured rock aquifer predicted within the property boundary.

7.8.5 Impact Assessment

Water Quality

The water management measures including storage and containment of potentially affected water, reuse of water and the management of the overall water balance are intended to prevent uncontrolled spillage of water affected by quarry operations.

The water management system includes significant water storage volume in order to prevent spilling for events at least up to the 100 year ARI 24 hour storm event. The water balance indicates that the quarry can be operated without the need to discharge.

In addition to the storage dams and in-pit storage for the management of water from operational areas, the following is proposed:

- Internal treatment systems will be installed to contain and treat TSS and hydrocarbons should oil spillages occur.
- Sewage will be contained within a pump out system and removed off site.

With the implementation of the proposed water management system, it is estimated that there is a low risk of impacting on the water quality of the downstream watercourses.

The site is located within Grahamstown Dam catchment. In accordance with Hunter Water Corporation's recently prepared guidelines, 'Protecting our Drinking Water Catchments: Guidelines for developments in the drinking water catchments' the proposed development is required to demonstrate Neutral or Beneficial Effect on water quality which is defined as:

- Having no identifiable potential impact on water quality.

- Will contain any water quality impact on the development site and prevent it from reaching any water course, water body or drainage depression on the site.

As discussed above, the proposed Eagleton Quarry will be operated with effectively a closed water management system and can be operated without discharging to Seven Mile Creek and Grahamstown Dam during storm events up to and including the 100 Year ARI 24 hour event. Water balance modelling using 43 years of daily rainfall and evaporation data shows that the proposed water management system can accommodate without discharge back to back 100 Year ARI 24 hour storm events as occurred at Eagleton on 21 and 22 April 2016. It is therefore considered that the proposed development has no identifiable potential impact on water quality and will contain any water quality impact on-site meeting the Neutral or Beneficial Effect on water quality as required.

Flow Volumes to Grahamstown Dam

The Eagleton Quarry has the potential to impact on annual flow volumes due to the need to control runoff from disturbed areas, including quarry extraction areas and the various rock processing areas. The quarry would reduce the catchment area of Seven Mile Creek and Grahamstown Dam for the life of the quarry with the net loss in catchment area being small relative to the total catchment of Grahamstown Dam. The direct catchment of Grahamstown Dam typically contributes approximately 50% of the total water make to the Dam with the remainder of the water being pumped to the dam from Williams River via Balickera Canal. The direct loss in yield is estimated to be less than 0.3% of net runoff into Grahamstown Dam.

Flooding

Based on the flood extents modelled for the catchment and an anticipated reduction in catchment area, no significant change to the downstream flooding risk are expected. Some small changes are expected due to the slightly reduced catchment area to Seven Mile Creek, and the presence of an access road crossing Seven Mile Creek.

It is also noted that the bridge proposed for the creek crossing can accommodate the 100 year critical duration flood without overtopping the access road. Erosion protection is proposed downstream of the bridge to reduce the risk of erosion. There are no areas of significance upstream of the bridge that may be impacted by increased ponding upstream of the structure.

Groundwater

The proposal to extract rock down to 45 mAHD will result in groundwater above this elevation seeping to the floor of the excavation. This will cause drawdown within the connected groundwater source. Maximum predicted drawdown is 15 m at the end of 30 years of extraction. Relatively slow extraction progress over 30 years would reduce the impact of drawdown significantly.

The closest private bore is located about 400 m to the south-east of the site, installed at 20 m depth. The next closest private bore is located approximately 1.4 km south-west of the site, installed in fractured rock aquifer and used for stock and domestic purpose. The prediction simulation indicates that drawdown outside of the site boundary is zero; therefore negligible impact is predicted at any of the surrounding private bores.

In terms of impact on baseflows, discharge to Seven Mile Creek calculated for three segments in the groundwater model indicates that Seven Mile Creek is mainly ephemeral and loses water in its upper reaches however does receive minor baseflow contribution from groundwater mainly in its lower reach. Results from predictive simulations indicate that there is minor baseflow loss to Seven

Mile Creek as a result of the proposed quarry with a decrease of 0.75 m^3/day (0.27 ML/year) over the period of 30 years of the project.

The Aquifer Interference Policy requires that proponents demonstrate that specified minimal impact considerations can be met. For the purposes of this assessment the groundwater source category at Eagleton Quarry is defined as being 'less productive', based on the yield data from surrounding groundwater bores. Key outcome of this assessment is that the project will meet all conditions and as such have a minimal impact on the aquifer at the site, for the following reasons:

- There are no high priority groundwater dependent ecosystems within proximity to the site or that could be affected by drawdown from the quarry.
- There are no listed high priority culturally significant sites within proximity to the site or that could be affected by drawdown from the quarry.
- Groundwater modelling indicates that there will be no impacts to any offsite water supply works.
- Groundwater modelling indicates the variation in water table as a result of the proposed quarry development would be less than 10% at the project site boundary.
- Groundwater modelling indicates that the drawdown in the water table will not extend to or impact adversely on any surrounding groundwater supply bores.
- Predicted pressure head decline is less than 1.
- The proposed quarry will not use groundwater and is highly unlikely to affect groundwater quality or the beneficial use category of the area.

Impacts on Watercourses and Associated Ecosystems

Seven Mile Creek is a diverse ephemeral creek system with areas of ponding associated with erosion and deposition on Seven Mile Creek. The creek includes small gravel bars, and pools that are likely to provide useful ecological habitats.

The loss of yield predicted for Seven Mile Creek will potentially impact on the drying and wetting cycles within the creek, however the reduction in yield is well within the normal seasonal and yearly rainfall variations. As such, the change in flow is unlikely to dramatically alter the flow regime and existing habitats.

There are no known ecosystems within the ephemeral creeks that are dependent on environmental flows. Consequently, it is considered that there is no need for any special provisions for environmental flows within Seven Mile Creek.

The proposed bridge over Seven Mile Creek will be constructed so as to not impede flows or fish passage.

Water Licencing

Eagleton Quarry will require extraction from the Sydney Basin – North Coast Groundwater Source of up to a maximum of 7.7 ML/year (in year 24 of quarry operations). Considering the small volume of water that will be extracted as a result of quarrying operations, in the context of the long-term average annual extraction limit for the groundwater source (90,000 ML/year), and the currently unassigned water (3,453 ML/year), it is considered that sufficient groundwater access licences would be available to Eagleton Rock. A Water Access Licence application has been submitted to the NSW Office of Water and is currently being processed.

7.8.6 Mitigation and Management Measures

Operational Water Management Strategy

The proposed water management strategy is as follows:

- Construct sufficient storage initially to accommodate surplus water as predicted by the water balance model. A total storage dam capacity of 57 ML is proposed to be constructed, to be supplemented by though provision of in-pit storage. This will contain runoff from in excess of a 100 Year ARI 24 hour storm event.
- Retain sufficient water for one year's supply to the processing plant.
- Operate water management dams with a freeboard equivalent to the 100 year ARI 24 hour storm event at all times, except immediately after an equivalent or more extreme event. Dam levels will then be drawn down through the treatment and discharge of the water.

Erosion and sediment control strategies will also be implemented during the operational phase of the quarry, including:

- Identifying and delineating disturbance areas and ensuring that these are minimised (e.g. where clearing vegetation ahead of quarry extraction activities).
- Limiting the number of roads and tracks on undisturbed areas, outside of the quarry extraction area.
- Reviewing the performance of the sediment dams in terms of the volume of sediment collected, and ensuring compliance of the water quality during spill events.
- Assessing the adequacy of the maintenance on the sediment control system, including channel maintenance, frequency of desilting of dams, and related issues that could impact on the performance of the water management system.
- Managing erosion on topsoil stockpiles and other disturbed areas, including a review of the rehabilitation practices both on a regular basis and when issues are identified.

Surface Water Monitoring

A Surface Water Monitoring Program will be prepared and implemented for the Project. The ANZECC guidelines will be used to inform review of monitoring data, assisting in the assessment of any areas of concern. However, monitoring will also compare upstream and downstream qualities.

Surface water quality monitoring will be undertaken at upstream and downstream locations on Seven Mile Creek. For the Project, ongoing surface water quality monitoring will aim to:

- Record and document the water qualities upstream and downstream of the Project so as to highlight any areas of concern or impact. The parameters and frequency of sampling will be monthly sampling of pH, EC, TSS, Total Phosphorus and Total Nitrogen.
- Monitor the performance of the water management systems and associated sediment control measures monthly and after major storm events. Flow monitoring of Seven Mile Creek will be undertaken by visual observation during water quality sampling, the visual flow data observations will be used to inform the assessment of water quality data.

- Document rainfall depths, water usages, dam volumes and discharges (during extreme events) together with other data that will facilitate updating of water balances, assessment of spill risk and associated water management requirements.
- Review and monitor the performance of erosion and sediment controls at construction areas, including the creek crossing and associated water management measures.
- Undertake dam safety and maintenance checks biennially (every two years) on all water management dam walls to assess structural integrity and maintenance requirements, including removal of any trees and shrubs that may impact on the integrity of the walls, and ensuring adequate erosion protection is in place.
- Report results of surface water monitoring activities in the Annual Environmental Review which will be distributed to the relevant government agencies and made available to the public. All monitoring data will be retained in an appropriate database.

Groundwater monitoring

All existing bores will continue to be monitored until they are disturbed or quarried through. A network of bores will be maintained through the life of the quarry. It is proposed to monitor groundwater levels at these bores quarterly and the following water quality parameters six monthly:

- pH
- Conductivity
- Total Dissolved Solids
- Chloride
- Arsenic
- Total Phosphorus
- Total Nitrogen, NOx, Ammonia.

Groundwater level and quality results will be analysed, compared with groundwater model predictions and reported annually.

Construction

The erosion and sediment control strategies and measures to be implemented for construction activities will include:

- ensuring that the water management dams required for sediment control are constructed downstream of proposed construction areas prior to other construction activities in order to prevent sediment movement off site;
- use of sediment fences, catch drains and other appropriate collection and interception measures during the construction of the water management dams and other components of the water management strategy;
- addition of gypsum to disturbed soils to reduce their dispersivity as and where required prior to the rehabilitation of the soils; and
- ongoing inspection and maintenance on the sediment control measures, including improvements to the rehabilitation of areas that are eroding, de-silting activities, and other general maintenance.

Particular attention will be paid to areas outside of the quarry water management system such as the entrance road and associated creek crossing. Any contractor undertaking work on Project will be required to prepare a detailed construction

Erosion and Sediment Control Plan which meets the requirements of the *Blue Book Volumes 1 and 2* (Landcom, 2004 and DECC, 2008).

7.9 Heritage

7.9.1 Indigenous Heritage

An Indigenous Archaeological Assessment has been undertaken by McCardle Cultural Heritage Pty Ltd (MCH) to identify the potential for aboriginal artefacts and any required management or mitigation measures in regards to these artefacts. The heritage assessment focusses on the quarry site. Works outside of the site are limited to road upgrade works along the existing cleared road corridors of Barleigh Ranch Way and the right of carriageway. The Indigenous Archaeological Assessment is provided in **Appendix O**.

Consultation

MCH has undertaken consultation with the relevant stakeholders in accordance with the SEARs. This consultation was separated into four stages as set out below:

- Stage 1 – Notification of project proposal and registration of interest
- Stage 2 – Presentation of information about the proposed project
- Stage 3 – Gathering information about cultural significance
- Stage 4 – Review of Draft Cultural Heritage Assessment

Archaeological Potential

Knowledge from previous assessments suggests that the potential for isolated finds and/or artefact scatters is influenced by waterways and the landform.

It is considered that there is a high potential for isolated finds and/or artefact scatters on the site due to presence of Seven Mile Creek. A moderate potential for finds is also considered along the second order streams to the south of the site, and a low potential across other areas due to the distance to reliable water and also the steep landform.

It was noted by MCH that a large majority of the site has been subject to past land use activities and environmental factors which have disturbed the land. These past land uses and environmental factors include the old quarry area (currently a landscape supplies facility), motorcycle and walking tracks, fencing, clearing and general erosion. As such, the potential significance of a large portion of the site has been reduced.

MCH and Aboriginal representatives surveyed the site to identify the potential significance of the site. From this survey, two Potential Archaeological Deposit (PAD) sites were identified due to their environmental characteristics. These sites include a creek bed and extend 50 metres beyond the creek bed on either side. Vegetation cover across the site hampered the survey and as such, these areas have been selected to be further surveyed in the future to ensure any significant artefacts are identified. The two PAD sites and their environmental features are shown in **Figure 19** and are described as follows:

- PAD 1 – follows Seven Mile Creek.
- PAD 2 – follows the east-west tributary which flows into Seven Mile Creek.

One isolated find was encountered within a creek bed on a site which is located within PAD 2. This find consisted of a mudstone flake which has been visibly weathered, and was assessed as being of very poor integrity and having low research potential and scientific significance.

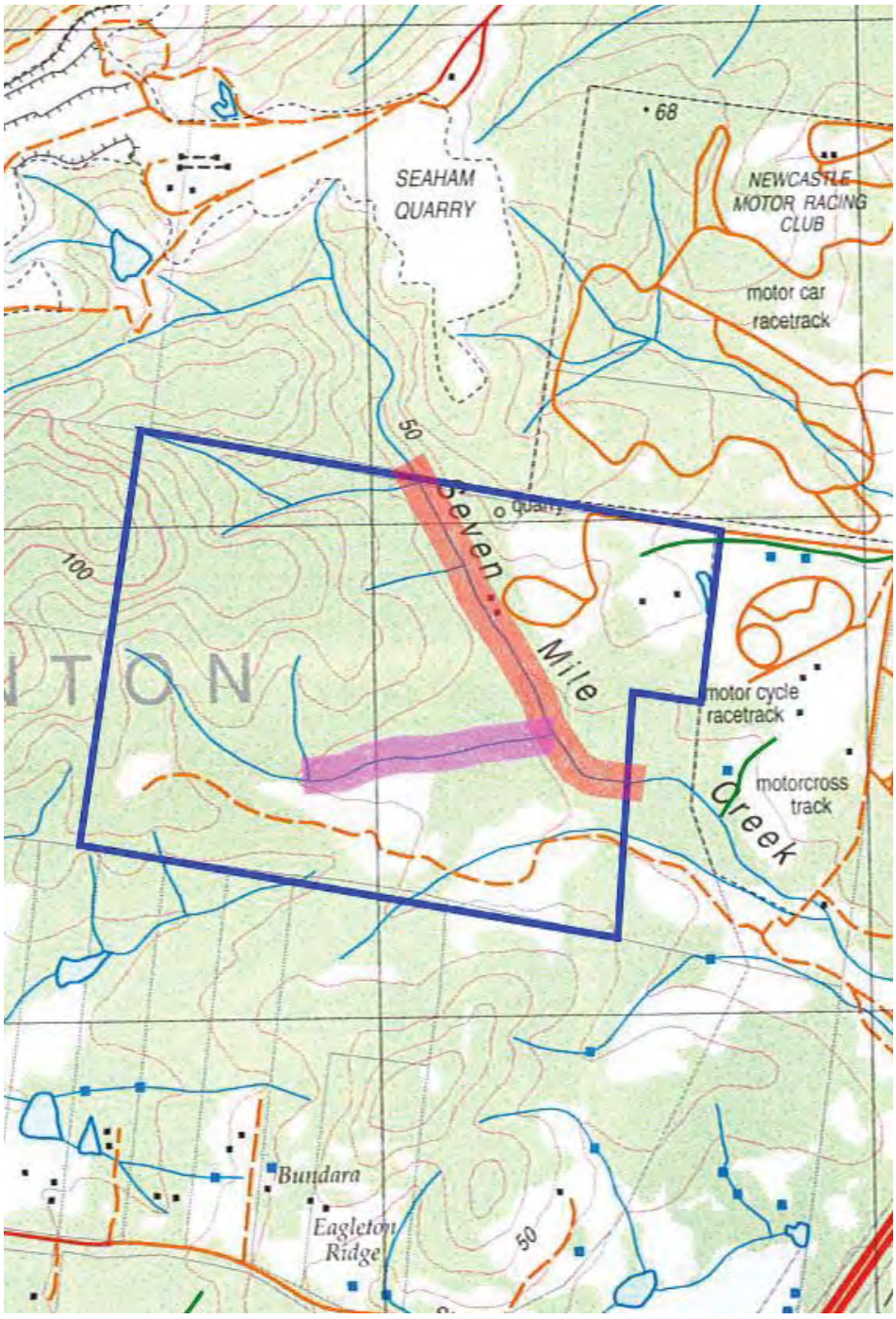


Figure 19 – Location of Aboriginal Heritage PADs
Source: McCardle Cultural Heritage

Impact Assessment

The *OEH Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* has been consulted to assess the potential impact of the proposed development on the identified sites of potential archaeological significance.

PAD 1 will be partially impacted by the proposed development, especially through the construction of roads and bridges during the construction of the

quarry. The consequence of this impact would be a partial loss of value. Whilst no Aboriginal items have been discovered in this PAD, there is a high potential for both surface and subsurface cultural materials to be present.

Subsurface testing is appropriate when a PAD has been identified, and it can be demonstrated that sub-surface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity. As such, the area where the proposed internal site access road will cross Seven Mile Creek will need to be subject of subsurface testing in order to establish whether any items of Aboriginal cultural heritage are present.

The area of PAD 2 will not be impacted by the proposed quarry development, as a 20m vegetated riparian buffer will be provided between the quarry operations and the creek line.

A limited cumulative impact is considered to result from the proposed development due to a number of considerations. These include:

- The net development footprint is small and does not affect a high proportion of any particular landform present within the site;
- The location of the development footprint away from reliable water sources and within the disturbed context ensures the cumulative impacts are focused in areas of low potential;
- Comparable landforms (creeks and slopes) to the site contain a similar archaeological resource occur in multiple contexts within the local area and throughout the Hunter Valley;
- Identified deposits occur outside the development footprint; and
- The PADs have been subject to long term past land uses (clearing, fencing and erosion) that have resulted in a disturbed landscape and therefore the potential value of the archaeological resource is lessened.

Mitigation and Management Measures

Following the above assessment, MCH has provided several recommendations for the ongoing archaeological management of the site and potential mitigation measures to be adopted. Overall MCH has suggested that decisions in regards to the management of the site and potential archaeological deposits should be made in consultation with the local Aboriginal community.

Part of PAD 1 will be impacted by the construction the site access road so a subsurface investigation will be undertaken prior to construction works in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW*.

A strategy of conservation and protection has been recommended as the preferred option for the identified PAD sites considering the high potential for cultural materials on the sites. This strategy includes the following measures:

- The persons responsible for the management of the site will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010*, under the *National Parks and Wildlife Act 1974*;
- The involvement of the registered Aboriginal stakeholders in the ongoing management of the Aboriginal cultural materials within the project study area will be promoted and included in the Environmental Management Plan; and

- A cultural awareness program will be included as part of the site induction program and developed with the registered Aboriginal stakeholders and form part of the Environmental Management Plan.

7.9.2 Non-Indigenous Heritage

The closest non-indigenous heritage listed site is 'Balickera House', located at 303 Italia Road, which is over 2km to the north of the Eagleton Quarry site. This item is listed as Item I3 under the *Port Stephens Local Environmental Plan 2013*, and as being of local heritage significance.

Importantly, the existing Boral Seaham Quarry is located immediately adjacent to the heritage item and in-between the heritage item and the Eagleton Quarry site. Given the existing quarry land use in the locality, a new quarry at Eagleton, further away from the heritage item than the existing Boral Seaham Quarry, is not considered to impact on any aspect of the item in any way.

Consultation with the Heritage Office has indicated that there are no State Heritage items in the vicinity of the site. Review of the State Heritage Register identifies that the closest State Heritage Items are:

- SHR No. 00023: Seaham Quarry – a geological site located over 6km west of the Eagleton Quarry site, in the village of Seaham.
- SHR No. 00558: Courthouse and Site – a built heritage site located at Clarence Town over 11km north of the Eagleton Quarry site.

Based on the EPBC Act Protected Matters Report (see **Appendix G**), dated October 2016, there are no World Heritage Properties, National Heritage Places and no Commonwealth Heritage Places within the vicinity of the Eagleton Quarry site. The closest Commonwealth listed site being the Williamtown RAAF Base, which is a Commonwealth Heritage Place, located over 12km to the south-east of the Eagleton Quarry site.

With consideration of the above results from database searches it is considered that the proposed Eagleton Quarry will not impact on any known built heritage items.

Further, there are currently no known built structures on the site, and the site remains almost entirely vegetated, except for a series of recently made tracks and trails running throughout the site. As such, the risk of historic heritage items being present on-site is considered to be low and no site survey by a heritage specialist is considered to be warranted.

7.10 Visual

A Visual Impact Assessment has been carried out by JBA and provided at **Appendix P**. This assessment has examined the potential visual impact of the proposed quarry operations on existing surrounding residents and from significant view points in the surrounding area.

Eight significant viewpoints have been identified and an analysis from these points has been provided. From this analysis it has been made apparent that existing environmental features such as ridge lines and trees shield the site from view.

A sectional analysis from the surrounding residential properties to the site has also been carried out. On these sections it is evident that many of the sight lines from surrounding properties are not directed towards the proposed quarry. Furthermore, where sight lines are partially directed towards the site of the

proposed quarry, environmental elements such as dense vegetation provided screening.

It has been concluded that dense wooded vegetation cover the slopes surrounding the site, and therefore provide a level of screening. Significant view corridors and views from surrounding residential properties will not be adversely impacted by the proposed quarry due to the location of the site beyond existing sight lines, and also the existing environmental factors such as the ridge line and trees.

7.11 Hazards

7.11.1 Stored Dangerous Goods

The quarry will store and use small quantities of a range of dangerous goods, as listed below in **Table 16**. All dangerous goods would be stored in suitable containers in the maintenance area.

Table 16 – Dangerous Goods stored on-site

Dangerous Good	Volume Stored	Storage Volumes and Container Type	Dangerous Goods Class and Packaging Group	Purpose
Diesel Fuel	20 kL	2*10kl tanks 0r 1*20kl tank	C1	Plant fuel
Diesel Fuel	2.4 kL	Fuel cart 1* 2.4kl tank	C1	Plant fuel
Petrol fuel	50 L	Small 20 litre and 10litre drums	3 (PGII)	Mowers and Whipper snippers.
Engine oil	400 L	200 litre drums	N/A	Diesel engines
Hydraulic Oil	800 L	200 litre drums	N/A	Hydraulic systems
Transmission Oil	200 L	20 litres drums	N/A	Plant transmission
Diff Oil	200 L	20 litres drums	N/A	Plant diffs
Degreaser	20 L	20 litres drums	3 (PGII or III)	Cleaning engines for repair
Grease	100 L	20 litres drums	N/A	Lubricate pins and bushes
Coolant	200 L	20 litres drums	3 (PGIII)	Plant engine cooling systems
Cleaning Agent	20 L	20 litres drums	8 (PGII or PGIII) or 5.1	Cleaning general
Pesticide	20 L	20 litres drums	6.1	Weed control
Acetylene (part of oxy acetylene kit)	48 L	compressed gas tank	2.1	Maintenance and repair welding

7.11.2 Impact Assessment (Storage)

The Department of Planning's guideline Applying SEPP 33 sets out the thresholds at which the storage of dangerous goods needs to be considered in more detail through a Preliminary Hazard Analysis. The intention of the guideline is to establish thresholds below which a development is not considered to represent a significant risk to the health and safety of surrounding people and the surrounding environment.

Under Applying SEPP 33 the following needs to be considered:

- All dangerous goods of the same class need to be assessed together if they are stored in the same location. If dangerous goods of the same class are stored together then they are all taken to be the most hazardous Packaging Group.
- If class C1 and/or class C2 combustible liquids are present on site and stored with other flammable liquids, they are to be treated as Class 3 PGIII, because under these circumstances they may contribute fuel to a fire.

Table 17 below sets out the assessment of the combined dangerous goods classes against the thresholds set out in Applying SEPP 33 (except for Class 3 dangerous goods). Class 3 materials are assessed below.

Total Class 3 materials are petrol (50L), degreaser (20L), and coolant (200L). In addition, as described above, Class C1/C2 materials stored with Class 3 dangerous goods need to be considered as Class 3 PGIII dangerous goods for the purposes of assessment under SEPP 33. The total volume of C1/C2 materials to be stored at the site is 22,400L. Making the volume of Class 3 dangerous goods for the purposes of the assessment a combined total of 22,670L. The most hazardous Packaging Group is PGII. As such, Figure 9 of *Applying SEPP 33* applies to the project.

Figure 9 of Applying SEPP 33 sets out a relationship between the volume of Class 3 PGII dangerous goods at the site and the distance to sensitive receptors. For 22,670L stored a distance to sensitive receptors of between 10m and 11m is required. Given that the distance between the dangerous goods storage areas at the site and the closets site boundary is over 300m it is not considered that the storage of Class 3 dangerous goods represents any potential for off-site impact.

Table 17 – Hazards screening assessment

Dangerous Goods Class	Volume Stored	Threshold
Class 5.1	20L	2 tonnes
Class 6.1	20L = 0.02m^3	0.5 m^3
Class 8 PGII or PGIII	20L = 0.02m^3	PGII = 25m^3, PGIII = 50m^3
Class 2.1 (not LPG)	48 L = 0.048 m^3	5m^3

As demonstrated by **Table 17** and the Class 3 analysis the storage of dangerous goods does not exceed the thresholds set out in Applying SEPP 33. As such the storage of dangerous goods does not represent any potential for off-site impact.

It is highlighted that 20kL diesel storage tank will be separately bunded to prevent any spillage from entering the quarry's surface water system.

7.11.3 Impact Assessment (Transport)

Table 2 of Applying SEPP 33 sets out screening thresholds for the number of transport movements for dangerous goods associated with the development. The relevant screening thresholds are:

- Class 3: 30 per week or 500 per year.
- Class 2.1: 30 per week or 500 per year
- Class 5.1: 30 per week or 500 per year.
- Class 6.1: All movements, but with a minimum load of 1 tonne.
- Class 8: 30 per week or 500 per year.

The proposed Eagleton Quarry will have transport requirements substantially less than the thresholds, in particular it is not expected that delivery of diesel or petrol will be no more than 1 per week and other dangerous goods combined would not be expected to exceed once per week on average.

7.11.4 Explosives

It is highlighted that whilst explosive materials will be periodically used on site for blasting, there will be no storage of explosive materials at the site outside of these times. Explosive material would be brought to the site on an as-needs basis by the specialist contractor, and would be handled and used in accordance with relevant Australian Standards.

7.12 Socio-economic

7.12.1 Economic Benefits

The main economic benefit of the proposed Eagleton Quarry would be the security of supply of aggregate to Newcastle and the Hunter region. The Hunter Regional Plan forecasts that an additional 70,000 dwellings will be needed in the region by 2036, and that an additional 60,000 jobs will be created. The ongoing building and infrastructure development associated with these forecasts will create strong demand for the hard rock gravel materials proposed to be extracted and processed at the Eagleton Quarry. In addition, the strategic location of the quarry will also make it viable to supply aggregate to the Port of Newcastle for the continued expansion of port facilities, as well as for infrastructure projects throughout the Hunter region.

Cement Concrete and Aggregates Australia identified in its 2015 submission to the Commonwealth Government's Australian Infrastructure Audit:

- One kilometre of highway uses up to 25,000 tonnes of crushed rock.
- One kilometre of suburban roadway requires 5,000 tonnes of crushed rock,
- One kilometre of railway requires 2,000 tonnes of aggregate.
- A high-rise building can use up to 1,000 tonnes of aggregate per floor.
- Construction of a typical house, including driveway and landscaping, uses about 110 tonnes of aggregate.

Based on these estimates, the construction of 70,000 new dwellings within Newcastle and the Hunter region would require over 7 million tonnes of aggregates, in addition to requirements for local and regional infrastructure.

It is also highlighted that the Eagleton Quarry could supply the Greater Sydney Metropolitan area, where there is continuing strong pipeline of new

development, as well as a significant infrastructure improvement program underway via a range of major road and rail projects. In its 2015 Policy Priorities Cement Concrete and Aggregates Australia further identified that:

- WestConnex will require 1.7 million tonnes of construction materials.
- The North West Rail Link will require 1.5 million tonnes of construction materials.

The Commonwealth Government is also planning the construction of a new Western Sydney Airport at Badgerys Creek, which is estimated to require approximately 200,000 tonnes of aggregate for the construction of the first stage, in addition to the significant infrastructure improvements that will support the new Western Sydney Airport including new motorways, regional road upgrades (e.g. The Northern Road, Bringelly Road and Elizabeth Drive), and possible rail connections.

To meet future demand for additional housing, as well for affordable public infrastructure an efficient supply of heavy construction materials, including aggregates, is necessary. Due to its convenient location, immediately adjacent to the Pacific Highway and in close proximity to the major growth areas around the Hunter Valley and the Sydney Metropolitan Region, the Eagleton Quarry would contribute to the efficient supply chain necessary to support the levels of development that is being driven by the strong economic growth in NSW.

Initially the quarry will employ up to 12 people, potentially rising to 18-20 employees as the quarry develops, as well as providing for approximately 20 - 25 additional full time equivalent jobs for haulage truck drivers.

7.12.2 Regional Economic Analysis

An Economic Assessment has been carried out by the Hunter Research Foundation Centre to estimate the flow on benefits of the Eagleton Quarry project to the regional economy. The Economic Assessment is provided at **Appendix S**.

Focusing on the initial investment into the proposed Eagleton Quarry, the Economic Assessment estimates the impacts of these expenditures in terms of the number of jobs created and the total flow-on consumption and investment expenditures through an input-output model for the Hunter Region.

The estimated construction (capital) and operating expenditure over a 24-year operating life is calculated by Eagleton Rock to be $100.2 million. In addition to this direct investment, the Economic Assessment estimates that an additional $74.4 million in economic activity will occur across the Hunter Region (in 2016 dollars), including:

- $4.3 million of flow-on benefits stemming from capital expenditure; and
- $70.1 million flow-on benefits from ongoing operating expenditure.

In terms of the employment impacts from the proposed investment, the Hunter Research Foundation Centre estimates that an average of 41 jobs per year will be generated over the 24 years of the project from the direct investment expenditures associated with Eagleton Quarry, and associated flow-on expenditures.

The proposed Eagleton Quarry will therefore support the continued growth of the Hunter Region through provision of necessary construction materials, as well as through increasing economic activity and providing jobs in the region.

7.12.3 Local Infrastructure Improvements

The existing gravel road along the right of carriageway and a section of Barleigh Ranch Way of approximately 350 meters will be upgraded to a 6m wide two coat sealed road with 1 m gravel shoulders on both sides. In addition, the intersection of the right of way with Italia Road will be formalised.

Whist Barleigh Ranch Way and the right of carriageway are essentially dead-end roads, only providing access to the Port Stephens Gardenland, paintball and motor-cross facilities, the land owners and visitors of these facilities will benefit as these roads will be safer due to a better skid resistant surface and line marking with appropriate signage.

The sealed road will also remove a source of local dust and noise created from the use of the unsealed road. Ongoing maintenance costs of the gravel road will also be substantially reduced for local land owners.

7.12.4 Impacts to Local Infrastructure and Services

The quarry is a small employer and will not generate significant demand for additional community based infrastructure and services. However, the quarry is a large generator of heavy vehicle movements which will impact on the capability and longevity of local road infrastructure.

Port Stephens has a specific clause in its Port Stephens S94 Development Contributions Plan 2007 which provides for extractive industries. Clause 4.5 of the S94 Plan sets out a rate of contribution for road haulage from industries that cause heavy vehicle movements.

The contribution rate is to be established from a Transportation and Economic Assessment Study to be prepared by the proponent. This study is to identify the impact the increased traffic generated by the development will have on the local road system, with consideration of the existing condition of the specific road(s), its classification, the cost of road repairs on the specific length and the relative increase in heavy vehicle usage of the road generated by specific development.

The S94 Plan also provides that where a developer chooses not to undertake a Transportation and Economic Assessment Study, a nominal contribution of 4 cents per tonne per kilometre of haul route will be levied.

Eagleton Rock has not prepared a Transportation and Economic Assessment Study, and proposes the following strategy for addressing impacts to local road infrastructure.

- Eagleton Rock would upgrade Barleigh Ranch Way at its own expense to ensure it meets the criteria for trafficable widths and other road safety requirements set out under the ARRB's. It will be improved to 8m width of crushed rock pavements and 0.5m shoulders bitumen sealed.
- Eagleton Rock will maintain Barleigh Ranch Way for the life of the quarry operations.
- Eagleton Rock will construct the improvements to the intersection at Italia Road and the Right of Way as a Major Access Driveway generally in accordance with Australia Standards AS28090.2.
- Eagleton Rock will pay to Council a Heavy Vehicle Haulage Levy of 4c per tonne per km for transportation of quarry products on Italia Road, between the Right of Carriageway and the intersection with the Pacific Highway (a distance of approximately 450m):
  - Based on normal annual output of 600,000t this equates to $ 24,000pa.

– For the life of the quarry (of 30 years) this equates to $720,000 if maximum extraction occurs every year for 30 years.

This strategy is considered reasonable and justifiable because of the following:

- Barleigh Ranch Way is a public road, however it is not accessible by the general public. It is a dead end road, with its only access point across a Right of Carriageway across private land. As such, the only users of Barleigh Ranch Way will be Gardenland landscape supplies facility and the Eagleton Quarry. It is therefore reasonable for these users to maintain the road to an acceptable agreed safety standard, rather than defer this to Council.
- It is expected that 100% of heavy vehicles will access the Pacific Highway directly rather than travelling west on Italia Road. The Pacific Highway is owned and maintained by the Roads and Maritime Service and so it is not reasonable for haulage on this road to be considered towards Council's local road network costs.
- If requested by Council, Eagleton Rock will carry out a verification monitoring program to determine whether any vehicles are heading west on Italia Road, and to conduct a Transport and Economic Assessment Study to determine whether the level of contribution remains adequate.

7.12.5 Local Amenity Impacts

Potential local amenity impacts are primarily related to noise and dust. Detailed assessment of these issues has been carried out and comprehensive mitigation and management measures committed to. Eagleton Rock understands that many of its neighbours are concerned about the proposed quarry undermining the rural amenity values of the area and is committed to working with its neighbours and local stakeholders to ensure minimal local amenity impacts occur.

7.13 Bushfire

7.13.1 Existing Environment

The site is characterised by substantial stands of vegetation, which also surrounds the site on all sides. Due to the existing vegetation there is a risk of bushfire, especially during dry summer months.

7.13.2 Potential Impacts

The site is located on land that is designated as Category 1 Vegetation on the Port Stephens Bushfire Prone Land Map. As such the relevant provisions of the NSW Rural Fire Service's *Planning for Bush Fire Protection* have been considered below.

While *Planning for Bush Fire Protection* applies to all land bush fire prone land, the guideline does not specify any specific provisions that apply to development for extractive industries. We have considered below the aims and objectives of the guideline in relation to the project:

- *Afford occupants of any building adequate protection from exposure to a bush fire.*

  The location of buildings at the quarry is in the south-east part of the site.

- *Provide for a defendable space to be located around buildings.*

  The sales, administration and amenities buildings are located in an area surrounded by at least 100m of processing area and internal haul roads, which will be cleared of all vegetation. This 100m represents an adequate defendable space against any bush fire.

- *Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.*

  The sales, administration and amenities buildings are located in an area surrounded by at least 100m of processing area and internal haul roads, which will be cleared of all vegetation. This 100m represents an adequate distance to prevent direct flame contact on the buildings.

- *ensure that safe operational access and egress for emergency service personnel and residents is available;*

  The site access roads have been designed to permit two have vehicles hauling extracted quarry products to pass in opposite directions. As such, it is expected that the access roads will be sufficient for any bush fire fighting vehicles.

- *Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).*

  The site will have capacity to store up to 100,000 m^3 of collected water which will be connected to sumps. This water could be diverted for fire fighting if required. There will also be a water cart on-site at all times, which could be used to support fire fighting activities if required.

Project construction and operational activities that may cause or increase the risk of bushfire include:

- Smoking or inappropriate disposal of cigarette butts.
- Grinding, mowing, slashing and using a petrol powered chainsaw.
- Hot works including any welding or soldering of plant and equipment for repair and/or maintenance.
- Using a petrol or diesel powered motor vehicles (or other plant and equipment) over land containing combustible material.

The quarry extraction, processing and sales areas will be cleared of all existing vegetation. As such, the chances of a bushfire being caused by on-site activities are minimal.

7.13.3 Proposed Management Strategies

All construction works would be carried out in accordance with standard procedures, practices and guidelines for bushfires including.

- Contractors/work staff would be trained in how to prevent, control and survive bush fires. This would include conducting fire drills.
- Work vehicles would be parked in cleared operational areas, away from grass or vegetation.
- Work vehicles would be equipped with appropriate bushfire control equipment.
- Alternate fire trail routes for ingress and egress to the site will utilise existing fire trails along the south of the property. Also, an alternative 4-wheel-drive emergency access route will be planned for the northern boundary onto Barleigh Ranch Way. Eagleton Rock will also initiate discussions with neighbouring land owners as to the creation of an alternate emergency exit route if Barleigh Ranch Way is blocked. Emergency access routes, and fire trails will be planned and designed in consultation with Rural Fires Service.

7.14 Waste

7.14.1 Policy Setting

The waste management practices associated with the project would be guided by the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The WARR Act aims to encourage efficient use of resources, reduce environmental harm and reduce waste generation in accordance with the principles of ecologically sustainable development. To meet the objectives of the Act, waste management options must be considered and selected in accordance with the following hierarchy.

- Avoidance of unnecessary resource consumption in the first instance.
- Recovery of resources and reduction of waste volumes through re-use and recycling practices.
- Disposal of wastes as a last resort.

In addition to the WARR Act, the following policies and guidelines would be relevant to the management of waste for this project:

- Waste Avoidance and Resource Recovery Strategy 2007.
- Waste Classification Guidelines (DECC, 2009).

7.14.2 Wastes Generated

Construction and operation of the quarry will require similar types of activities on site, being clearing of vegetation, haulage of rock and other ground materials and land forming. Waste streams from these activities include:

- During construction, general construction waste that may be generated includes scrap building materials, piping cut-offs, plastics, packaging and metal off-cuts. Where possible these materials will be sent for recycling, otherwise they will be removed by the relevant contractor or a licenced contractor for classification in accordance with the Waste Classification Guidelines and disposed of off-site to a suitably licenced landfill.
- Organic green materials from clearing of vegetation which will occur predominately during site establishment and early phases of quarry operations. This material will be mulched onsite and reused in the landscaping areas and as sediment controls around the damps. Overburden from extraction areas which will occur predominately during site establishment and early phases of quarry operations. Soil based material would constitute virgin excavated natural material and is intended to be re-used at the site.
- Waste from office and administration area will include small quantities of recyclables such as paper, glass bottles, aluminium cans, plastics, packaging as well as other non-recyclable waste (such as food contaminated waste) generated by staff. Recyclable material will be collected by a recycling contractor. Non-recyclable waste will be collected separately and disposed of off-site by a licences contractor.
- Sewage waste will arise from the use of on-site amenities. A closed sewage system will be installed into amenities, and sewage water will be collected by a licences contractor for off-site disposal.
- Workshop waste includes small quantities of greases and lubricants, which are classified as Group B liquid wastes under the Waste Classification Guidelines. These materials will be collected and stored in designated drums for off-site disposal by a suitably licenced contractor.

- Wastewater arising from storm water falling on quarry operational areas will be potentially contaminated with silt and sediments. All potentially contaminated surface waters will be collected in the quarry's water collection system, and conveyed for storage in the sediment basins located at the southern extent of quarry activities. Water collected in the sediment basins will be reused onsite for wetting down roads and operational areas. The storm water management system has been designed to prevent spilling from the sediment basins for events up to the 10 year ARI 24 hour storm event.

7.14.3 Reject Tiles

The site currently has approximately 1,000 tonnes of reject tile unused raw material fragments deposited on the cleared area that will be extended to form the processing area. The reject tiles have been sourced from a tile factory in the lower Hunter Valley. The tiles were rejected due to their being cracked or otherwise damaged and not acceptable for sale. They have not been sourced from building sites, and are not demolition waste. It is proposed to use the rejected tile fragments as aggregate base for the road construction. A photograph of the rejected tile fragments at the proposed located for the processing area is shown in **Figure 20**.

The use of the rejected tile fragments in this way is consistent with the EPA's Recovered Aggregate Exemption 2010 being a general exemption issued under Part 6, Clause 51 and 51A of the *Protection of the Environment Operations (Waste) Regulation 2005*.



Figure 20 – Reject tile fragments in processing area

In order to ensure the rejected tile fragments do not pose a risk to the environment testing of the chemical properties and level of contamination (i.e. by inclusion of metal, plastic, plaster, rubber, paper, cloth, paint, wood etc.) in accordance with clause 10 of the Recovered Aggregate Exemption will be carried out prior to use on-site. If the tiles do not comply with the required chemical characteristics, then they will be re-used subject to the provisions of the Environment Protection Licence that will apply to the site.

7.14.4 Impact Assessment

The quarry will generate only small quantities of waste. Where possible these waste materials will be recycled. Waste materials that cannot be recycled will be removed by suitably licenced contractors and disposed of at suitably licenced landfill facilities.

The project includes for the reuse of rejected tile fragments, which are currently located in the proposed area for processing, and can be readily used as base for the site roads. Chemical testing will be carried out to ensure that the reject tile fragments do not pose an on-going unacceptable risk to the environment.

7.14.5 Proposed Management Strategies

All works would be conducted in accordance with the waste management hierarchy established by the WARR Act, that is:

- Unnecessary resource consumption would be avoided to the greatest extent practicable.
- All waste or redundant materials generated by the project would be reuse or recycled where feasible and reasonable.
- All waste material requiring off-site disposal would be classified using the Waste Classification Guidelines.
- Overburden would be re-used at the site for fill or bunding, or will be stored at the site for reuse during rehabilitation.
- Any excess re-usable and recyclable materials that cannot be re-used or recycled on the project site would be transported to an appropriate, licensed recycling facility.
- Any excess materials that are not re-usable or recyclable would be disposed of at nearby licensed waste facilities.
- Any waste oils, greases and lubricants would be stored in designated drums prior to their removal for recycling or disposal.
- Any soils contaminated through fuel or chemical spills would be excavated and transported to a licensed waste facility and the resulting excavation would be filled with suitable clean soil.
- Any weed species that are cleared for the project would be disposed of at a licensed green waste disposal facility or landfill.
- General wastes would be segregated into recyclable and non-recyclable streams through the provision of appropriate disposal bins on the project construction site.
- Transport of wastes to recycling or waste disposal facilities would be undertaken by an appropriately licensed waste transporter.

7.15 Cumulative Impacts

7.15.1 Cumulative Traffic Impacts

The existing traffic from Boral Seaham Quarry and Gardenland landscape supplies facilities will have been captured in the traffic counts carried out for the project at the intersection of the Pacific Highway and Italia Road. It is highlighted that all of the surrounding facilities (except for the approved but not operational upgrade to the MG Car Club racing facility) are mature facilities that are assumed to be operating to their maximum capacity subject to market conditions. Given the age of these facilities (e.g. Boral Seaham Quarry was approved in 1984), the levels of traffic that might have been predicted as part of their respective

development applications should not be relevant to the cumulative assessment, which should be based on the actual traffic generated from these facilities. The modelled traffic impacts at this intersection are therefore considered to represent a full cumulative effect of the project with all surrounding developments, except for the motor racing facility.

The upgraded MG Car Club racing facility may further increase traffic volumes in the area. This approved facility, along with other land uses adjacent the proposed quarry, are primarily recreational in nature and generate traffic that is almost exclusively weekend based. The interaction of weekend based recreational traffic with quarry generated truck movements would be limited to Saturdays. Quarry operations are unlikely to be at full capacity on Saturdays, with deliveries to construction sites generally ceasing around midday. The departure peak from any Saturday motor racing event will be mid to late afternoon and as such any overlap of traffic is unlikely to be significant.

The development consent for the motor racing facility also allows for limited weekday use such as private practice by race cars, general use of the track by road registered vehicles, driver training, educational or promotional events and motorkhana. The numbers of vehicles accessing the track for these types of events is not known but it is expected that midweek patronage would not be large compared to weekend usage which would include many race cars and spectator vehicles. This traffic is also less likely to be generated in peak periods, with a more uniform distribution throughout the day.

As such it is proposed that the cumulative traffic impact on the existing road network is minimal.

7.15.2 Cumulative Noise Impacts

The cumulative impact of more than one development can be compared against the amenity criteria provided in the Industrial Noise Policy. The amenity criteria act like an overall cap on industrial noise levels at any receptor, but need to be adjusted to take into account existing industrial noise sources.

Existing noise levels from other existing and approved industrial facilities is unknown. For the purpose of this assessment it has been assumed that logged period L_{Aeq} have been generated by road traffic at the Italia Road location, and, existing industry at the Six Mile Road location. Based on this the standard Rural Amenity Criteria have been adjusted downwards by 2-4 dBA for Six Mile Road receptors and upwards by between 1 and 6 dBA for Italia Road receptor in accordance with the INP.

For all of the residential receptors the cumulative noise criteria is higher than the project specific noise criteria. As such, compliance with the project specific noise criteria indicates compliance also with the cumulative noise criteria. No exceedances of the cumulative noise criteria for any residential receptor are predicted, except for the Port Stephens Gardenland landscape supplies facility manager's residence.

The approved car racing facility on Lot 2 DP1158962 and Lot 1 DP245116 has potential to generate short duration, high level noise bursts during races, with periods of low noise emission between races. When averaged over the duration of the operating period (daytime only), the resulting $L_{Aeq,11hour}$ emissions are expected to be sufficiently low level as to not cause exceedance of cumulative noise criteria.

7.15.3 Dust

Cumulative impacts have also been assessed by considering emissions from existing dust sources in the area. Potential dust emissions from the existing

Gardenland composting facility, which forms part of the site, have been included in this assessment. There is also an existing quarry operation located approximate 1 km north and an off-road motor cycle track located to the north east of the site.

The cumulative assessments of PM_{10} and $PM_{2.5}$ concentrations at the worst impacted receptors have been plotted in **Appendix K** showing the cumulative 24-hour average concentration compared with the assumed background. Pacific Environment's analysis of these plots is that the addition of the project would be unlikely to result in any days over the impact assessment criteria level, and that the project has a very minimal impact on current PM_{10} and $PM_{2.5}$ concentrations

The predicted pollutant concentrations, including the emissions from Gardenland, at each of the sensitive receptors have been added to the adopted background levels. There are no privately owned receivers that are predicted to exceed the annual average assessment criteria when existing background concentrations are included.

The cumulative assessment indicates that the Project is unlikely to result in any additional exceedances of relevant impact assessment criteria at the neighbouring receivers.

7.15.4 Cumulative Water Impacts

Eagleton Quarry, if approved, will not be the only quarry operating within the Seven Mile Creek catchment. Boral Quarries already operate within the Seven Mile Creek catchment upstream of the proposed project. Boral's environmental assessment states that they do not discharge into Seven Mile Creek, but pump water to Karuah River, so there is limited potential for cumulative surface water quality impacts.

It is estimated from aerial photography that some 35 hectares of Boral Quarry at that time extended into the Seven Mile Creek catchment. The cumulative loss of yield to Seven Mile Creek is thus around 65 hectares, if no discharges from either Boral or Eagleton occur.

As the stream is intermittent and exhibits significant variation in flow volume and duration, it is considered that a reduction in flow volume of Seven Mile Creek will not significantly impact downstream ecosystems.

It is highlighted that whilst the proposed quarry has been designed to fully contain and reuse runoff from an up to 100 year ARI 24 hour storm event, the quarry could also be operated to allow controlled discharges of suitable quality water to Seven Mile Creek to assist in maintaining flow regimes in the creek system.

Groundwater modelling indicates that the cumulative impact of the proposed quarry and surrounding developments and activities will be minor due to the limited propagation of drawdown of groundwater outside of the property boundary.

As the Boral Seaham Quarry has been operational for many years, it has been assumed that it is operating at its maximum capacity that can be reasonably achieved without substantial further investment, and that it has been operating at this capacity during the groundwater investigations. As such, it is assumed that the impacts of the operation of the Boral Seaham Quarry on groundwater have been inherently included in the groundwater model through calibration of the model to recorded groundwater levels at the site and through inclusion of the current topography of the Boral quarry in the model. As such, the potential for cumulative groundwater impacts greater than has been modelled is considered to be low.

8.0 Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed works are detailed in **Table 18** below. These measures have been derived from the previous assessment in Section 7 and those detailed in appended consultants' reports.

Table 18 – Mitigation Measures

Objective	Action
Construction Environmental Management	
Minimise impact of the construction activities associated with the development of the quarry on surrounding area	A Construction Environmental Management Plan (CEMP) will be prepared and implemented for construction works associated with the quarry, including improvements to access roads. The CEMP will include: ▪ Environmental Management ▪ Traffic Management around road works ▪ Air Quality ▪ Water Quality, including Erosion and Sediment Control Plans ▪ Noise ▪ Heritage, including provision subsurface testing at the crossing of Seven Mile Creek ▪ Waste Management ▪ Emergency Response, including form bush fire hazards ▪ Community Consultation
Operational Environmental Management	
Minimise impact of the operational activities associated with the development of the quarry on surrounding area	An Operational Environmental Management Plan (OEMP) will be prepared and implemented for the quarry to guide operational activities. The OEMP will include: ▪ Environmental Management ▪ Traffic Management ▪ Air Quality ▪ Water Quality ▪ Noise & Vibration ▪ Heritage ▪ Waste Management ▪ Emergency Response, including form bush fire hazards ▪ Community Consultation
General	Hours of operation for the quarry will be as follows: ▪ Processing and extraction activities 7:00am – 6:00 pm Monday to Friday and 7:00am to 4:00pm Saturdays. ▪ Scheduled maintenance would generally be limited to processing hours. However, in the event of urgent unscheduled maintenance that cannot be completed within this period, maintenance works may need to be undertaken anytime 7 days per week. ▪ Drill and Blast will take from between 7am-6pm Monday-Friday and Saturday 7am-12pm. ▪ Standard operating hours for loading and dispatching of sales trucks will be from 5.00am-10pm Monday to Friday, and 5am-4pm Saturday. Subject to demand sales loading activities may need to take place up to 10pm Monday-Friday and up to 6pm on Saturdays.
Traffic	
Design of access routes	Access routes from Italia Road to the site will be upgraded, sealed and maintained to meet Council's requirements.

Objective	Action
Flora and Fauna	
Avoid and offset biodiversity impacts.	▪ Avoidance and retention of 58.81 ha of native vegetation within the study area. This retained vegetation is proposed to be secured under a biobanking agreement as part of the offset to provide in-perpetuity protection and management of this native vegetation and threatened species habitat. ▪ Avoidance of 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. Haul road design and construction to ensure existing hydrological regimes for Seven Mile Creek are maintained. ▪ Retention of vegetation corridors on the southern, central and north-east parts of the study area. Connectivity through the eastern corridor would be enhanced through revegetation of grassland areas. ▪ The development site should be delineated with permanent wildlife-friendly fencing, and include signage to identify 'no-go' areas. ▪ Speed limits on traffic using access roads to 40 km / hr (in accordance with CKPoM 2002) will reduce potential for death or injury to wildlife as well as reduce noise and pollution levels.
Flora and Fauna Management Plan	The Flora and Fauna Management Plan would include the following: ▪ Weed Management Plan and Pest Management Plan; ▪ Pre-clearing fauna surveys; ▪ Clearing protocols: ▪ Hollow-bearing tree clearing protocol; ▪ Fauna translocation protocol; and ▪ Vegetation clearing protocol.
Landscape and Rehabilitation Management	▪ The Landscape and Rehabilitation Management would include the following: ▪ Weed management within the development site during operations; ▪ Management of any retained vegetation within the development footprint during operations; ▪ Measures to protect areas of native vegetation and fauna habitats occurring adjacent to the development site; ▪ Details of traffic-calming measures and signage to be installed within the site to reduce the risk of vehicle strike to Koalas and other native fauna; ▪ Details of proposed rehabilitation and revegetation (including timing, target species composition, rehabilitation methods, and ongoing monitoring); ▪ Details on appropriate soil handling processes, including topsoil management for later use in any rehabilitation areas; ▪ Details on the salvage, storage and redistribution of habitat features (e.g. hollows and logs) within the rehabilitation areas; ▪ Fire management; ▪ Vertebrate pest control within the development site; ▪ Details of maintenance, monitoring and performance criteria to assess the condition and functioning of the adjoining vegetation and fauna habitats, and to evaluate progress of rehabilitation works.
Surface Water Quality	
Prevent pollution of waters and impacts on aquatic ecology	▪ Implement Water Management Strategy ▪ Prepare and implement a Water Monitoring Plan which includes. - Surface water quality monitoring will be undertaken at upstream and downstream locations on Seven Mile Creek. - The parameters and frequency of sampling will be monthly sampling of pH, EC, TSS, Total Phosphorus and Total Nitrogen. - Monitor the performance of the water management systems and associated sediment control measures monthly and after major storm events. Flow monitoring of Seven Mile Creek will be

Objective	Action
	undertaken by visual observation during water quality sampling, the visual flow data observations will be used to inform the assessment of water quality data. - Document rainfall depths, water usages, dam volumes and discharges (during extreme events) together with other data that will facilitate updating of water balances, assessment of spill risk and associated water management requirements. - Undertake dam safety and maintenance checks biennially (every two years) on all water management dam walls to assess structural integrity and maintenance requirements, including removal of any trees and shrubs that may impact on the integrity of the walls, and ensuring adequate erosion protection is in place. - Report results of surface water monitoring activities in the Annual Environmental Review which will be distributed to the relevant government agencies and made available to the public. All monitoring data will be retained in an appropriate database. ▪ Implement a Construction Erosion and Sediment Control Plan which meets the requirements of the *Blue Book Volumes 1 and 2* (Landcom, 2004 and DECC, 2008) as part of the CEMP. The performance of erosion and sediment controls at construction areas, including the creek crossing and associated water management measures will be reviewed and monitored during construction. ▪ Implement erosion protection at the bridge for the crossing of Seven Mile Creek.
Groundwater	
Groundwater monitoring	▪ All existing bores will continue to be monitored until they are disturbed or quarried through. A network of bores will be maintained through the life of the quarry. It is proposed to monitor groundwater levels at these bores quarterly and the following water quality parameters six monthly: - pH - Conductivity - Total Dissolved Solids - Chloride - Arsenic - Total Phosphorus - Total Nitrogen, NOx, Ammonia. ▪ Groundwater level and quality results will be analysed, compared with groundwater model predictions and reported annually.
Air Quality	
Minimise impacts to local air quality	▪ Best practice environmental management controls will be applied to the operation of quarry plant, equipment and vehicles, including: - Use of water carts/trucks to control emissions from haul roads. - Enforcement of speed limits onsite and on right of way. - Progressive rehabilitation of exposed areas. - Application of water at the crusher and on conveyor transfer points. - Minimising drop height of material during truck loading and unloading. - Use of water sprays when drilling. - Sheltering of stockpiles and transfer points where possible. - Proper blast design. - Management of dust generating activities during unfavourable meteorological conditions.
Minimise emissions, including of greenhouse gas emissions	▪ Plant and equipment will be maintained in a good condition to ensure efficient operations. ▪ Plant, equipment vehicles not in use will be switched off to minimise emissions.

Objective	Action
Noise and Vibration	
Noise barriers	▪ For the initial diesel powered plant configuration, barriers would be required on the: - West side of the Jaw Crusher, minimum length 12 metres. Barrier to extent as far south as practical without impeding the excavator; - South side of the Northern Cone Crusher, minimum length 18 metres; - South-west side of the North-eastern Cone Crusher, minimum length 12 metres; and - West and south sides of the VSI Crusher (an 'L' shaped barrier), 18 x 6 metres with long leg oriented north/south. ▪ For the ultimate electric powered plant configuration, barriers would be required on the: - South side of the Jaw Crusher, minimum length 12 metres; and - Western side of the Secondary and Tertiary Crushers (entire length of feed tower structures, with 5 metre extension to south).
Minimise operational noise impact on surrounding residences.	A Noise Management Plan (NMP) for operations will be prepared and implemented as part of the OEMP and would detail methods available to mitigate noise. In particular the Plan will include: ▪ Maintenance of all equipment to ensure correct working order; ▪ Selection of quiet equipment and plant where practicable; ▪ No reversing alarms on mobile plant and equipment; ▪ Appropriate training of all staff in relation to noise issues; ▪ Appropriate maintenance of internal haulage roads; ▪ Community consultation program, including 24 hour hotline number for complaints; ▪ Procedures for responding to complaints; and ▪ Nominated responsibilities for noise control during operation, and response to complaints.
Aboriginal Heritage	
Verify presence or otherwise of items in Potential Archaeological Deposit to be impacted by the project.	Prior to construction of the internal site road across Seven Mile Creek carry out subsurface investigations in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW. If items of Aboriginal heritage are discovered then their significance will be assessed in consultation with representatives of the local Aboriginal community and further approvals obtained as necessary.
Protect known Aboriginal items and areas of cultural significance	Implement as part of the Site's environmental management plans a strategy of conservation and protection of Aboriginal heritage through: ▪ Ensuring that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974; ▪ Promoting the involvement of Registered Aboriginal stakeholders in the ongoing management of the Aboriginal cultural materials within the project study area; and ▪ Preparing and implementing as part of the Environmental Management Plan a cultural awareness program, developed with the registered Aboriginal stakeholders, to be included as part of the site induction program.
Waste Management	
Reduce the generation of waste	▪ Unnecessary resource consumption would be avoided to the greatest extent practicable. ▪ All waste or redundant materials generated by the project would be reuse or recycled where feasible and reasonable. ▪ Overburden would be re-used at the site for fill or bunding, or will be stored at the site for reuse during rehabilitation.

Objective	Action
	▪ Any excess re-usable and recyclable materials that cannot be re-used or recycled on the project site would be transported to an appropriate, licensed recycling facility. ▪ General wastes would be segregated into recyclable and non-recyclable streams through the provision of appropriate disposal bins on the project construction site. ▪ Reject tile fragments currently deposited on the ground at the quarry site will be tested against the requirements of the Recovered Aggregate Exemption 2010. If they comply with these criteria, they will be re-used for road base for internal site roads and as surface treatment for the processing area.
Remove and dispose of waste appropriately	▪ All waste material requiring off-site disposal would be classified using the Waste Classification Guidelines. ▪ Any excess materials that are not re-usable or recyclable would be disposed of at nearby licensed waste facilities. ▪ Any waste oils, greases and lubricants would be stored in designated drums prior to their removal for recycling or disposal. ▪ Any soils contaminated through fuel or chemical spills would be excavated and transported to a licensed waste facility and the resulting excavation would be filled with suitable clean soil. ▪ Any weed species that are cleared for the project would be disposed of at a licensed green waste disposal facility or landfill. ▪ Transport of wastes to recycling or waste disposal facilities would be undertaken by an appropriately licensed waste transporter.
Bush Fire Hazards	
Minimise the potential for site activities to cause bush fire	▪ Contractors/work staff would be trained in how to prevent, bush fires. ▪ Work vehicles would be parked in cleared operational areas, away from grass or vegetation.
Ensure that staff and contractors are suitably protected from bush fires.	▪ Contractors/work staff would be trained in how to control and survive bush fires. This would include conducting fire drills. ▪ Work vehicles would be equipped with appropriate bushfire control equipment. ▪ Alternate fire trail routes for ingress and egress to the site will utilise existing fire trails along the south of the property. Also, an alternative 4-wheel-drive emergency access route will be planned for the northern boundary onto Barleigh Ranch Way. Eagleton Rock will initiate discussions with Boral as to the creation of an alternate emergency exit route if Barleigh Ranch Way is blocked. Emergency access routes and fire trails will be planned and designed in consultation with RFS.
Socio-Economic	
Contribute appropriately to the maintenance of local road infrastructure	▪ Upgrade, and maintain for the duration of operational activities, Barleigh Ranch Way to meet Council's requirements. ▪ Pay to Port Stephens Council a Heavy Vehicle Haulage Levy of 4c per tonne per km for transportation of quarry products on Italia Road, between the Right of Carriageway and the intersection with the Pacific Highway (a distance of approximately 450m).
Closure and Rehabilitation	
Ensure minimal environmental impact on quarry closure	▪ Implement the Rehabilitation and Closure Plan
Consultation	
Effective consultation with the community	▪ Carry out additional consultation with local community during project planning and construction. ▪ The OEMP will outline measures for effective consultation with the local community and will include contact details for site manager or other appropriate representative and a complaints handling procedure to address and respond to issues raised by the community.

9.0 Justification of the Proposal

In general, investment in major projects can only be justified if the benefits of doing so exceed the costs. Such an assessment must consider all costs and benefits, and not simply those that can be easily quantified. As a result, the EP&A Act specifies that such a justification must be made having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development.

This means that the decision on whether a project can proceed or not needs to be made in the full knowledge of its effects, both positive and negative, whether those impacts can be quantified or not.

The proposed development involves the operation of a hard quarry for 30 years. The assessment must therefore focus on the identification and appraisal of the effects of the proposed change over the site's existing condition.

Various components of the biophysical, social and economic environments have been examined in this EIS and are summarised below.

9.1 Social and Economic

The main economic benefit of the proposed Eagleton Quarry would be the security of supply of aggregate to Newcastle and the Lower Hunter region. The Lower Hunter Regional Strategy forecasts strong growth for the Lowe Hunter with 66,000 new jobs and an additional 160,000 residents and 115,000 new dwellings being planned for. In addition, the strategic location of the quarry will also make it a viable supply to the Port of Newcastle for the continued expansion of port facilities include coal loading and handling facilities.

9.2 Biophysical

The environmental impact assessment of the proposed development has demonstrated that the quarry:

- Will not have significant impacts on threatened species or their habitats.
- Suitable biodiversity offset sites are available to enable the necessary BioBanking credits to be obtained to ensure biodiversity impacts are offset in accordance with the Framework for Biodiversity Assessment.
- Local amenity impacts associated with air quality, noise and vibration can be managed so that accepted guidelines levels would not be exceeded.
- Can be operated to prevent discharges to Seven Mile Creek, and to ensure there are no water quality impacts to Seven Mile Creek and the downstream Grahamstown Dam.

9.3 Ecologically Sustainable Development

The EP&A Regulation lists 4 principles of ecologically sustainable development to be considered in assessing a project. They are:

- The precautionary principle;
- Intergenerational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation and pricing of environmental resources.

An analysis of these principles follows.

Precautionary Principle

The precautionary principle is utilised when uncertainty exists about potential environmental impacts. It provides that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. The precautionary principle requires careful evaluation of potential environmental impacts in order to avoid, wherever practicable, serious or irreversible damage to the environment.

Whilst the quarry will permanently alter the landform, this EIS has not identified any serious threat of irreversible damage to the environment and therefore the precautionary principle is not relevant to the proposal.

Intergenerational Equity

Inter-generational equity is concerned with ensuring that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The proposal has been designed to benefit both the existing and future generations by:

- maintaining heritage listed items for future generations to appreciate and enjoy;
- implementing safeguards and management measures to protect environmental values.
- facilitating job creation and the provision of housing in close proximity to public transport; and
- Improving the public domain and amenity in The Haymarket precinct.

The proposal has integrated short and long-term social, financial and environmental considerations so that any foreseeable impacts are not left to be addressed by future generations. Particularly, a Rehabilitation and Closure Plan has been prepared to ensure the quarry site is suitably rehabilitated at the completion of quarrying.

Conservation of biological diversity and ecological integrity

The principle of biological diversity upholds that the conservation of biological diversity and ecological integrity should be a fundamental consideration.

The proposal would not have any significant effect on the biological diversity and ecological integrity of the study area. A detailed biodiversity assessment has been carried out concluding that the quarry will not have significant impacts on threatened species or their habitats. Suitable biodiversity offset sites are available to enable the necessary BioBanking credits to be obtained to ensure biodiversity impacts are offset in accordance with the Framework for Biodiversity Assessment.

Improved valuation, pricing and incentive mechanisms

The principles of improved valuation and pricing of environmental resources requires consideration of all environmental resources which may be affected by a proposal, including air, water, land and living things. Mitigation measures for avoiding, reusing, recycling and managing waste during construction and operation would be implemented to ensure resources are used responsibly in the first instance. The quarry operators will contribute to the local Haulage Levy for transporting extractive materials on the local road network.

10.0 Conclusion

The Environmental Impact Statement (EIS) has been prepared to consider the environmental, social and economic impacts of the proposed Eagleton Quarry. The EIS has addressed the issues outlined in the SEARs (**Appendix A**) and accords with Schedule 2 of the EP&A Regulation.

The proposed quarry will satisfy an identified demand in the Hunter Region by the construction industry for additional materials needed to facilitate the construction of housing and infrastructure in the region to reach targets established by the NSW government.

This EIS and its supporting documents have detailed the different components of the proposal and undertaken an assessment of the potential impacts. This assessment has involved a detailed analysis of the existing environment, the potential impact of the proposed quarry and the cumulative impact of the quarry and existing uses in the area.

The environmental assessment of the potential impacts has identified that there will not be any adverse social, economic or environmental impacts which will not be able to be managed, mitigated or offset in the proposed development. A number of recommendations have been made by specialist consultants have been included as mitigation measures to ensure that adequate measures and management principles are put in place to reduce or mitigate these potential impacts.

Having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development, the carrying out of the project is justified and in the public interest to proceed.

APPENDIX 7. EPBC ACT REFERRAL

Eagleton Quarry Project

Application Number: **02547** Commencement Date: **12/08/2024** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Eagleton Quarry Project

1.1.2 Project industry type *

Mining

1.1.3 Project industry sub-type

Other

1.1.4 Estimated start date *

02/12/2024

1.1.4 Estimated end date *

01/12/2054

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

Action Overview

The Eagleton Quarry Project is a proposed hard rock quarry with production capacity up to 600,000 tonnes per annum for up to 30 years from a development site of 33.48 ha. The Eagleton Quarry Project is located 12 km north of Raymond Terrace within the Port Stephens Local Government Area.

The identified resource consists of a mixture of various igneous and sedimentary rock formations suited to local and regional construction markets meeting an identified demand. The Project is State Significant Development in New South Wales (SSD 7332) and was approved by the Independent Planning Commission on 8 July 2024 (refer to **Att 01_Development consent Eagleton Quarry Project SSD 7332**).

The Subject Land (Project Area) covers approximately 101 ha and consists of a single lot, Lot 2 DP 1108702, located at 13 Barleigh Ranch Way, Eagleton (the Site). The majority of the development site (33.48ha) occurs on the north-west part of the study area where the hard rock resource is situated. The Project Area also includes the existing Port Stephens Gardenland site located to the east of the proposed quarry. The remainder of the Project Area contains native vegetation and it is proposed to conserve the largest feasible portion of this land (i.e. subject to NSW Nature Markets and Offsets - NMO - division agreement) under a Biodiversity Stewardship Agreement, this portion is otherwise referred to as the Retention Area and is nominally 57.57 ha.

The Eagleton Quarry Project as approved comprises the following key aspects, illustrated in the attached plans (refer **Att 02A_Eagleton Quarry_Site Layout_Wedgetail 202407**, and **Att 02B_Eagleton Quarry_Site Plans_Kleinfelder 201708**):

- Vegetation clearing and construction of an access road, a bridge over Seven Mile Creek, processing area and water management dams;
- Across the extraction area, progressive clearing of vegetation, drilling and blasting rock;
- Extraction of blasted rock by excavator and transport by articulated truck to the processing area;
- On-site processing of up to 600,000 tonnes per annum of rock;
- Loading of road registered trucks by front-end loader;
- Transporting quarry products by road registered trucks to market;
- Undertaking quarry operations for 30 years;
- Employment of up to approximately 10 staff and 10 contractors;
- Hours of operation:
    - Processing and extraction activities 7:00am – 6:00 pm Monday to Friday and 7:00am to 4:00pm Saturdays.
    - Scheduled maintenance generally limited to processing hours.
    - Loading and dispatch of products 5:00am to 6:00pm Monday to Friday and 5:00am-4:00pm Saturdays.
- The proposed quarry will commence along the northern side of the ridgeline and progress in a south easterly direction, using the natural topography as an extensive natural acoustic and visual barrier.
- The processing plant is positioned at an excavated level of RL 45m in the northern part of the quarry, so that it will be located on the northern side of the existing hill and minimise noise disturbance to the south.
- The existing hill will be retained as a barrier to the processing plant and will be excavated to a height of no less than RL 57.5m until the final year of the quarry life, where barriers will be installed at suitable locations around plant.
- The quarry construction and operations will generate air quality emissions (e.g. dust, greenhouse gases from diesel combustion and blast related emissions), these were assessed and determined to be consistent with the relevant NSW emission criteria.
- The quarry construction and operations will generate noise and vibration emissions (e.g. earth moving equipment, truck haulage and blasting), these were assessed and determined to be consistent with relevant NSW criteria.
- The water management plan for the proposed quarry has also been refined to ensure retention of all stormwater for events of up to a 1 in 500 year frequency, and the controlled release of treated water in a manner that will ensure a Neutral or Beneficial Effect on the Grahamstown drinking water catchment, as required by Hunter Water Corporation.
- Implementation of a Biodiversity Offset Strategy includes:
    - Establishment of an onsite Biodiversity Stewardship Site (BSS) within the Project Area. The onsite Biodiversity Stewardship Site is approximately 57.57 ha subject to final approval of the Stewardship Agreement by the NSW NMO.;
    - Retirement of at least a portion of the credit obligation from this BSS; and
    - Retirement of remaining credit obligations consistent with the Biodiversity Offsets Scheme.
- Closure and rehabilitation based on a final landform that comprises a series of revegetated benches at the western end of the quarry, with open grassed areas and scattered trees.

Access to the quarry is via the Pacific Highway, Italia Road, a right of carriage way, Barleigh Ranch Way, and a private access road constructed from Barleigh Ranch Way to the quarry pit. This referral addresses the private haulage road component of the access, with maintenance and construction activities associated with Barleigh

Ranch Way, the right of carriage way, Italia Road and an upgraded left hand acceleration land onto the Pacific Highway considered unlikely to present a risk to Matters of National Environmental Significance. These activities were the subject of two separate local Council approvals.

NSW Planning Approval Background

The Eagleton Quarry Project has been under development since 2011. This provides an overview in the milestones for the NSW State approval, all documents are available on the NSW Major Projects website at https://www.planningportal.nsw.gov.au/major-projects/projects/eagleton-quarry-project. Copies of the NSW DPHI recommendation report is included as **Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI**, with the IPC Statement of Reasons included as **Att 03B Statement of Reasons for Decision Eagleton Quarry Project SSD 7332 IPC**.

This list comprises the key elements of the NSW Approval process:

- Request for Secretary's Environmental Assessment Requirements in October 2015.
- Secretary's Environmental Assessment Requirements issued for Project SSD 7332 in November 2015
- Environmental Impact Statement (EIS) lodged in January 2017. Note, biodiversity investigations onsite date back to 2011.
- Public exhibition of the Project for 28 Days starting 3 February 2017.
- A Response to Submissions Report was submitted on 13 October 2017. This document resolved in amendments to the Project to further minimise impacts on the community and environment.
- Due to delays in the agreement with Transport for NSW for a suitable intersection with the Pacific Highway on 11 September 2023 an updated assessment was lodged resolving the site access and haulage route.
- This was publicly exhibited for 28 days from 10 October 2023.
- On 24 April 2024 the NSW DPHI referred the Project to the NSW Independent Planning Commission (IPC) with a recommendation of Approval.
- On 1 May 2024, the IPC began receiving submissions from the Public, the submission period closed on 7 June 2024.
- On 8 July 2024, the IPC determined the Project granting its Approval.

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

No

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

A succinct outline of the Strategic and Statutory Context is provided in Section 3.2, 3.3, 3.4 and 3.5 of **Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI, Pages 8-11**. Additional comment on key aspects is included below.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cmth)

Ecological surveys have identified the presence of species listed under the EPBC Act (1999) within the Study Area, and as such requires consideration under the EPBC Act to determine the potential for impact to MNES.

Threatened Species Conservation Act 1995 (TSC Act) & NSW Biodiversity Conservation Act 2016 (BC Act) (NSW)

Section 7.9(2) of the BC Act generally requires all SSD applications to be accompanied by a Biodiversity Development Assessment Report (BDAR). However, clause 28(1) of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* provides that "*The former planning provisions continue to apply … to the determination of a pending or interim planning application*". The Project is a "pending or interim planning application" under this regulation. As a result, although the TSC Act was repealed by the BC Act, some provisions of the TSC Act that would be in force if it had not been repealed (such as assessment guidelines) continue to apply to the Project.

For this reason, the application was accompanied by a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) prepared in accordance with the *2014 Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects (FBA)*, rather than a BDAR.

NSW Environmental Planning and Assessment Act 1979 (EP&A Act) (NSW)

The EP&A Act will be the principal planning instrument that relates to the proposed action. It provides a framework of the overall environmental planning and assessment of development proposal within NSW.

Other Legislation and Policies

New South Wales

- NSW Biodiversity Offsets Policy for Major Projects (OEH 2014);
- State Environmental Planning Policy No 44 (1995);
- State Environmental Planning Policy (Biodiversity and Conservation) 2021;
- Fisheries Management Act 1994 (FM Act); and
- NSW Groundwater Dependent Ecosystem Policy 2002.

Note: Because the development application was lodged before 1 March 2020, the Project must also be assessed under SEPP 44 (see Section 6.1 and Appendix E) as it existed at the time of the application, despite more recent amendments to SEPPs governing impacts of developments on Koalas.

Local

- Port Stephens Local Environmental Plan 2013
- Port Stephens Comprehensive Koala Plan of Management 2002.

Strategically, the proposed Action, and its measures to avoid and mitigate impacts on the environment goes toward supporting the overall aim of the Hunter Regional Plan 2041 strengthen the regions economic resilience, maintain its well established economic and employment bases and build on its existing strengths to foster greater market and industry diversification. A shortage of local quarry materials is an identified capacity risk threatening the delivery of infrastructure and development projects.

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

Initial public consultation was carried out as part of the preparation of the initial EIS. This is detailed in **Att 04_SocialValuesReview Kleinfelder 2017**. Stakeholders consulted included neighbours/adjacent landholders and a number of local businesses.

Key issues in relation to the Project included noise, dust, blasting, company ownership and traffic movements, and these issues were addressed throughout the EIS prepared for the Project.

The EIS was publicly exhibited between 3 February 2017 and 6 March 2017, during which time submissions were received from members of the public and government agencies. In relation to the Public Exhibition of the SSDA, a total of 21 submissions were received from members of the public and community groups. Key issues raised were traffic and road safety (noted in approximately 85% of submissions), air quality and dust (71%), biodiversity (76%), and changes to local amenity (52%). A Response to Submissions Report was submitted in October 2017, addressing the issues raised by agencies and the local community. This report is included as **Att 05B_Response to Submissions 2017_Main Report_JBA**.

An Aboriginal Cultural Heritage Impact Assessment (ACHIA) was carried out by McCardle Cultural Heritage in 2017. The ACHIA included the four stages of consultation with Indigenous stakeholders as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (April 2010). Details of the consultation process are provided in **Att 06_ACHIA_McCardle Cultural Heritage, Section 2, Pg 13-16.** (This document is publicly available).

A further round of engagement occurred during late 2023, early 2024 with the exhibition of the amended response to submissions. In total, the NSW DPHI Assessment Report (**Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI)**, notes a total of 70 submissions were received overall, of which 67 where

objecting and 63 were considered unique submissions.

During May and June 2024, the public were invited to make further submissions during the assessment process by the Independent Planning Commission (IPC).

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint.

Alternatively, email us at privacy@awe.gov.au.

☑ **Confirm that you have read and understand this Privacy Notice ***

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	640388683
Organisation name	WEDGETAIL PROJECT CONSULTING PTY LTD
Organisation address	27 Groves Road, Bennetts Green, NSW 2290

Referring party details

Name	Jonathan Berry
Job title	Principal Advisor
Phone	0421 440 139
Email	jberry@wedgetail.com.au
Address	27 Groves Road, Bennetts Green, NSW 2290

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

ABN/ACN	607606020
Organisation name	EAGLETON ROCK SYNDICATE PTY LIMITED
Organisation address	2300 NSW

Person proposing to take the action details

Name	Darren Williams
Job title	Business Manager for Eagleton Rock Syndicate
Phone	0429 877 704
Email	darren@arbus.com.au
Address	PO Box 1011, Newcastle NSW 2300

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

No

1.3.2.15 Are you proposing the action as part of a Trust? *

No

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

Eagleton Rock Syndicate as an entity has a satisfactory record of responsible environmental management, with no breaches against State or Commonwealth legislation. Eagleton Rock Syndicate is currently managed by Darren Williams of Arbus Developments Pty Ltd (Arbus) who is authorised to sign on behalf of the Eagleton Rock Syndicate (the company proposing to undertake the action). Prior to construction, Eagleton Rock Syndicate will establish the operational entity and engage employees to develop the quarry on its behalf. Darren Williams has not been involved in any proceedings under Commonwealth, State, or Territory laws related to environmental protection or the conservation and sustainable use of natural resources.

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

The Applicant does not have an existing corporate environmental policy or planning framework at present. This will be developed following issue and consistent with the development consent.

The Development Consent (refer to **Att 01_Development consent Eagleton Quarry Project SSD 7332**), requires the development of numerous documents to ensure the Company's environmental performance is held at a high standard, these documents have not been developed as yet, though will be developed as specified within the NSW Consent:

- Environmental Management Strategy
- Noise Monitoring Plan
- Blast Management Plan
- Air Quality Management System
- Water Management System
- Water Management Plan (surface and groundwater)
- Traffic Management Plan
- Aboriginal Heritage Management Plan (not required under consent, but will be developed)
- Biodiversity Stewardship Site Management Plan
- Biodiversity Management Plan
- Rehabilitation Management Plan

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

ABN/ACN	607606020
Organisation name	EAGLETON ROCK SYNDICATE PTY LIMITED
Organisation address	2300 NSW

Proposed designated proponent details

Name	Darren Williams
Job title	Business Manager for Eagleton Rock Syndicate
Phone	0429 877 704
Email	darren@arbus.com.au
Address	PO Box 1011, Newcastle NSW 2300

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

ABN/ACN	640388683
Organisation name	WEDGETAIL PROJECT CONSULTING PTY LTD
Organisation address	27 Groves Road, Bennetts Green, NSW 2290
Representative's name	Jonathan Berry
Representative's job title	Principal Advisor

Phone	0421 440 139
Email	jberry@wedgetail.com.au
Address	27 Groves Road, Bennetts Green, NSW 2290

Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	607606020
Organisation name	EAGLETON ROCK SYNDICATE PTY LIMITED
Organisation address	2300 NSW
Representative's name	Darren Williams
Representative's job title	Business Manager for Eagleton Rock Syndicate
Phone	0429 877 704
Email	darren@arbus.com.au
Address	PO Box 1011, Newcastle NSW 2300

Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)?

Yes

1.4.2 Select reason for exemption

Small Business

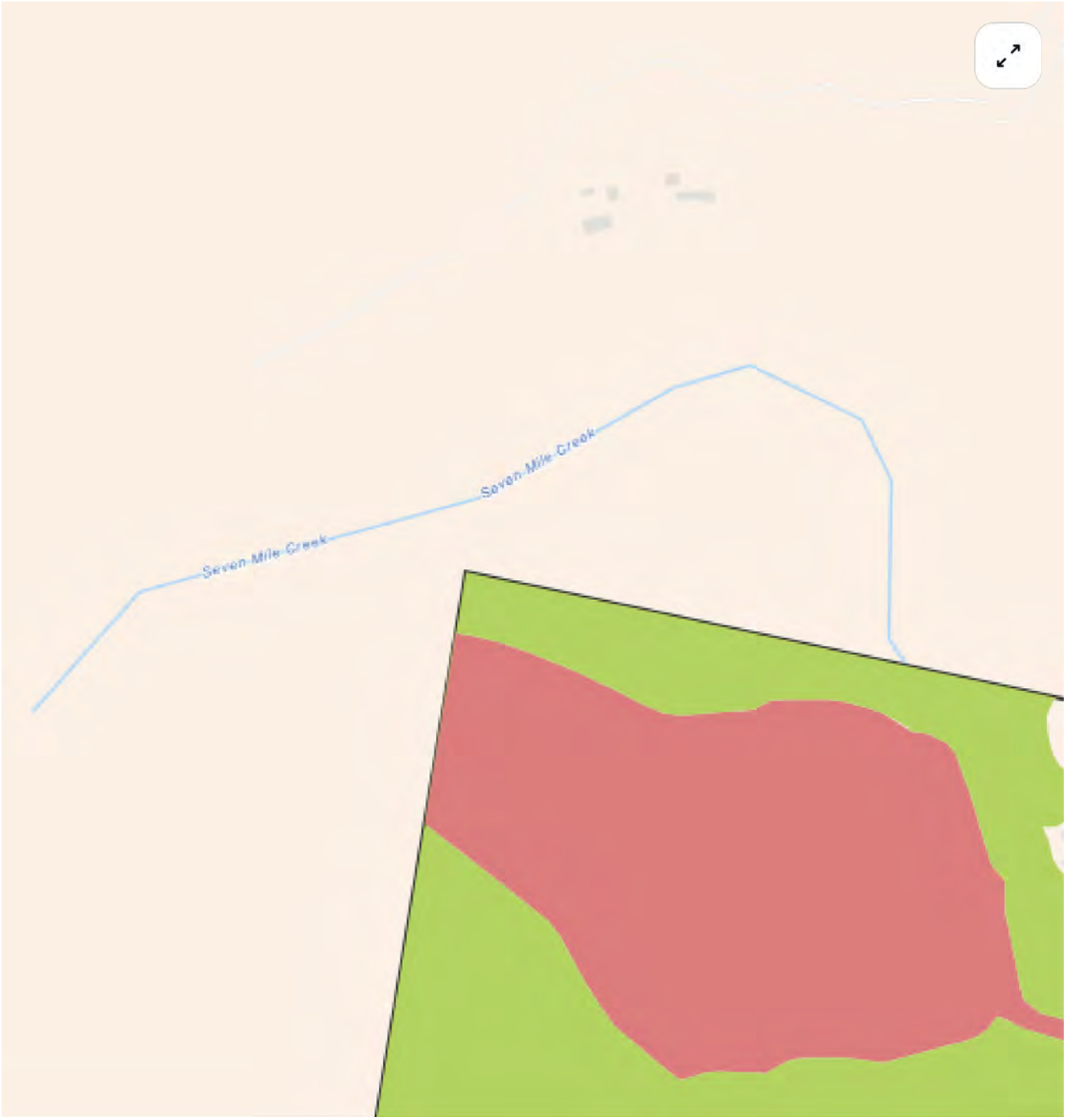
1.4 Payment details: Payment allocation

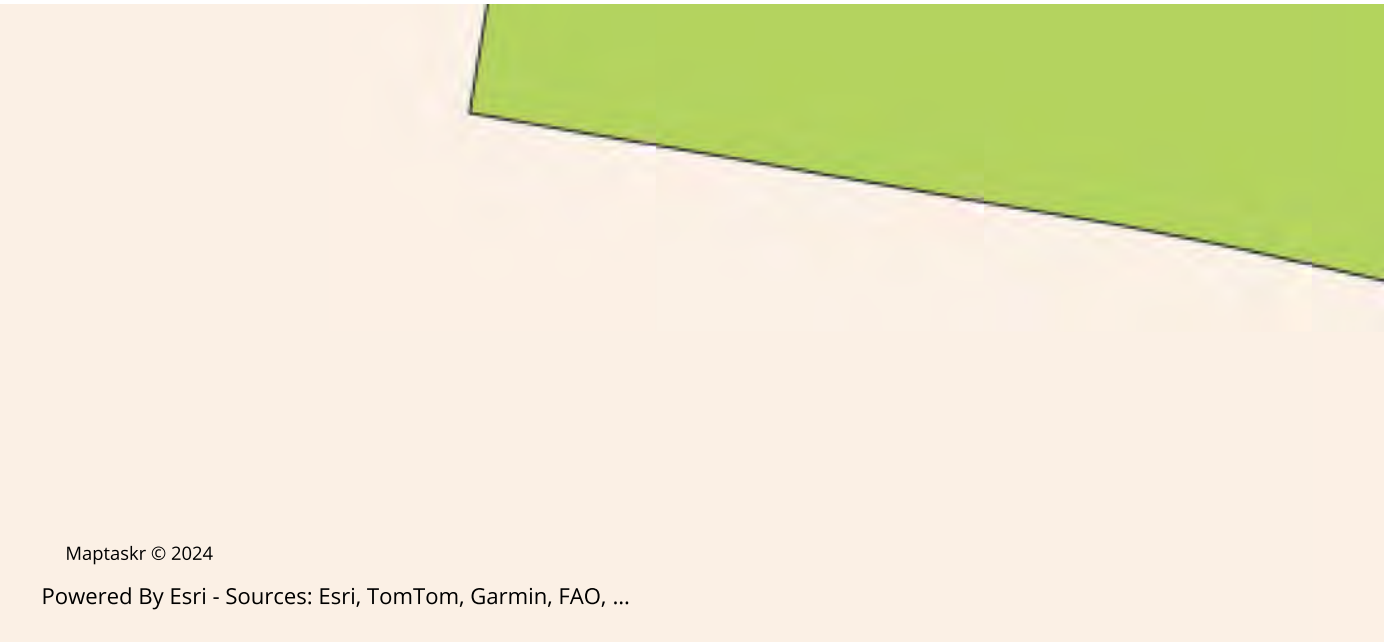
1.4.11 Who would you like to allocate as the entity responsible for payment?

Referring party

2. Location

2.1 Project footprint





2.2 Footprint details

2.2.1 What is the address of the proposed action? *

13 Barleigh Ranch Way, Eagleton NSW

2.2.2 Where is the primary jurisdiction of the proposed action? *

New South Wales

2.2.3 Is there a secondary jurisdiction for this proposed action? *

No

2.2.5 What is the tenure of the action area relevant to the project area? *

The proposed Eagleton Quarry development site is located on part of Lot 2 DP1108702, located on Barleigh Ranch Way, Eagleton NSW. Lot 2 is split north-south by Seven Mile Creek. The quarry site forms the part of Lot 2 to the west of the creek.

The land is freehold land owned by Port Stephens Gardenland, the owner and operator of the existing Port Stephens Garden Landscape Supplies business which operates on the eastern part of Lot 2 DP 1108702. The Proponent has an agreement to purchase the property prior to construction.

The legal access (by right of carriageway) upon which access to the proposed Eagleton Quarry site relies is located on private land legally described as Lot 2 DP 1158962 and Lot 1 DP 245116. The right of way is intended to be ultimately converted to a public road.

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area's environment.

The proposed Eagleton Quarry site is located approximately 12km north of Raymond Terrace, within the Local Government Area of Port Stephens. The site is approximately 1.5km to the west of the Pacific Highway, approximately 2km southwest of the intersection of the Pacific Highway with Italia Road, and approximately 2.5km northwest of Grahamstown Dam.

The project area is zoned RU2 Rural Landscape under *Port Stephens Local Environmental Plan 2013* (LEP) which permits development for extractive industries, thus there will be no changes to zoning for this activity. All lands adjoining the project area are also zoned RU2 under the LEP. The adjoining lands contain a mixture of land uses, including the Boral Quarry to the north, MX Central Motocross Riding Complex to the east, Hunter Valley Paintball to the south-east, and other private landholdings to the south and west. The project area has high vegetation connectivity with adjoining lands to the north, south and west, and forms part of a large expanse of remnant forest vegetation extending from north of Raymond Terrace to Wallaroo State Forest and Wallaroo National Park.

The Project Area is currently owned by Port Stephens Gardenland, which currently operates a landscape supplies business from the north-east part of the site, prior to construction Eagleton Rock Syndicate (or its nominated proxy) will become the owner of the Project Area. The remainder of the project area primarily consists of remnant native forest vegetation, with several smaller cleared and regenerating areas in the central, south-east and north-east parts of the project area as a result of past disturbance and management. Evidence of past logging activities was also observed in the project area (e.g. cut stumps). The proposed development footprint is predominately vegetated with dry sclerophyll forest vegetation (32.03 ha). A small portion of the development footprint consists of disturbed un-vegetated areas, non-native vegetation, and access tracks (1.45 ha). The proposed development footprint includes a hard rock reserve occurring within the project area, containing a mixture of igneous and sedimentary formations.

The development footprint (33.48 ha) is located on the northern part of the project area, entirely within Lot 2 DP 1108702. The majority of the development footprint occurs on the north-west part of the project area where the hard rock resource is situated. This part of the development footprint would be subject to extraction of rock material and would include all infrastructure required for processing and stockpiling. The development footprint would also include a haul road which would extend from the north-east corner of the project area and connect to the south-east end of the main part of the development footprint. The proposed haul road will cross Seven Mile Creek which runs north-west to south-east through the project area.

The project area contains one plant community type (PCT) as defined in the VIS database:

- HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest. (Equivalent to PCT 3244 Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest (according to the updated Eastern NSW Classification v1.1, 2022))

Native vegetation mapped within the several drainage lines present in the Project Area presented a higher abundance of mesic understory species relative to adjacent hills and slopes, with this vegetation being identified as a variation within HU804. Further, vegetation mapped along Seven Mile Creek was identified as HU798 White Mahogony – Spotted Gum – grey Myrtle semi-mesic shrubby open forest of the Central and Lower Hunter Valley.

HU804 was determined to comprise one vegetation zone (HU804 moderate-good condition) within the Development Footprint. A very small area of another vegetation zone (HU804 moderate-good_poor) occurs in the north-east corner of the Disturbance Footprint (in the northernmost section of the haul road at the site entrance). However, as this small area of vegetation is <0.1 ha in size, it has not been identified as a separate vegetation zone for the credit calculations and has been included within zone 1 (HU804_moderate-good). Small

areas of non-native vegetation (i.e. exotic vegetation) and several un-vegetated areas (i.e. access tracks and bare ground) also occur within the Disturbance Footprint. No areas of HU798 greater than 0.25 ha occurs within the Disturbance Footprint.

Vegetation within the Project Area was not consistent with any threatened ecological communities (TECs) listed under the BC Act and/or the EPBC Act.

Additional information on native vegetation present within the project area is contained within **Att 09A_ EPBC Significant Impacts Assessments_WPC, Section 2.1, PG 9-11.**

Access to the proposed quarry site will be via a new local road approved by Council but yet to be constructed. The road connects Barleigh Ranch Way with Italia Road through two Lots (i.e. Lot 1 DP245116 and Lot 2 DP1158962) and run parallel to the Pacific Highway for the majority of its length. The road is required to be constructed as a gravel graded road. It would be utilised by all properties located along Barleigh Ranch Way to access Italia Road.

The proposed primary haulage route for the Project would involve trucks travelling from the quarry pit for approximately 850m on a private road within the Subject Land (Project Area). The trucks will then travel 650m along along an upgraded Barleigh Ranch Way, and and along a 800m relocated right of carriageway before turning right onto Italia Road, travelling 200 m and turning left onto the Pacific Highway. The Italia Road / Pacific Highway intersection will be upgraded to include a left turn acceleration lane, this upgrade will be shared by the three quarries proposing to haul out of Italia Road. Quarry trucks making deliveries to the south of Italia Road would then make a U-turn at the Tarean Road Interchange (approximately 10.5 km to the north) and head south along the Pacific Highway.

Full detail on how existing road infrastructure in and around the project area will be used to provide access is provided in **Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI, Section 6.2, Pg 26 – 29.**

Over the past 10 years the Project Area has remained largely unchanged, with no fire events, or clearing or changes considered likely to affect the values of habitat within the site. In the surrounding area the following key changes have occurred or are proposed:

- Approximately 400m north of the site a car racing circuit has been progressively developed, this has resulted in the clearing of a racing circuit.
- Approximately 1.5km south, is the proposed Kings Hill development, no development has occurred on this site.
- Approximately 2.2km north-west, is the proposed Stone Ridge Quarry, this development has not been approved.
- The existing Boral Seaham Quarry is located less than 300m to the north-west.

3.1.2 Describe any existing or proposed uses for the project area.

Existing Land Uses: Port Stephens Gardenland operate a landscape supplies business in the north-east part of the project area (not within the disturbance footprint). The remainder of the project area primarily consists of remnant native forest vegetation, with several smaller cleared and regenerating areas in the central, south-east and north-east parts of the project area as a result of past disturbance and management.

Proposed Land Uses: Port Stephens Gardenland would remain operational. Additional proposed land uses include a quarry and ancillary infrastructure, with native vegetation within the remainder of the site consisting of the proposed biodiversity stewardship site.

The existing and proposed land uses for the project area are illustrated in **Att 09A_ EPBC Significant Impacts Assessments_WPC, Figure 2, Pg 8.**

The major industries surrounding the project area on adjacent properties are quarrying and recreational sporting (motorcross, car racing and paintball).

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

The proposed development site is situated within the NSW North Coast interim Biogeographic Regionalisation for Australia (IBRA) bioregion, Karuah Manning IBRA subregion, and Newcastle Coastal Ramp Mitchell landscape.

Three 1st order streams occur within the development site. The proposed haul road would also cross one 3rd order stream, namely Seven Mile Creek.

No important or local wetlands occur within the development site and there are no identified state or regionally significant biodiversity links.

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The proposed project is aimed at removing a south-easterly facing spur that ranges from 124m AHD on the western boundary to 29m AHD in the east at the crossing of Seven Mile Creek.

East of and adjoining Seven Mile Creek the predominant slope within the development site is flat, being less than 5 degrees. Moving west from Seven Mile Creek, the slope increases to approximately 10 degrees, becoming steeper with higher elevation. At the western extent of the site, slopes exceed 15 degrees reaching up to 30 degrees in small areas. The crests of the ridge line have flatter slopes of less than 5 degrees.

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

Kleinfelder were commissioned by Eagleton Rock Syndicate Pty Ltd to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) for the proposed Eagleton quarry development, which was revised in 2017. This included an assessment of the existing ecosystem, including flora, fauna and ecological communities present.

Wedgetail Project Consulting Pty Ltd were later contracted by Eagleton Rock Syndicate Pty Ltd to prepare the EPBC Referral, resulting in an update to assessments of flora, fauna and ecological communities within the study area, with surveys commencing in 2023 and continuing into 2024.

Key survey findings from Kleinfelder (2017) in relation to flora and fauna include:

- *One plant community type (PCT) was identified in the study area: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest. The assessment determined that this community does not constitute any listed threatened ecological communities under the TSC Act 1995 and/or EPBC Act 1999.*

The canopy layer of this community on the site is typically dominated by *Corymbia maculata* with a range of co-dominant species across the site including *Eucalyptus punctata, E. acmenoides, E.fibrosa, E. crebra, E. canaliculata* and *E. globoidea*. Within the drainage lines, the relative abundance of *E. punctata* and *E. acmenoides* is higher, and other co-dominants such as *E. siderophloia, C. gummifera* and *Angophora costata* also occur.

The midstorey is sparse across most of the site, with a higher midstorey cover typically occurring in the drainage lines. Common midstorey species include *Dodonaea triquetra, Allocasuarina torulosa, Acacia falcata, Persoonia linearis, Melaleuca nodosa, Myrsine variabilis, Glochidion ferdinandi, Acacia irrorata* and *Melaleuca styphelioides*.

The shrub layer ranges from moderately sparse to dense, with common species including *Leucopogon juniperinus, Breynia oblongifolia, Bursaria spinosa, Pultenaea villosa, Leptospermum polygalifolium, Zieria smithii, Acacia ulicifolia, Acrotriche divaricata* and *Notelaea ovata*.

Common native species in the ground layer include *Imperata cylindrica, Microlaena stipoides, Themeda australis, Entolasia stricta, Oplismenus aemulus, Lepidosperma laterale, Dianella caerulea, Lomandra longifolia, Lomandra multiflora, Pratia purpurascens, Desmodium rhytidophyllum* and *Cheilanthes sieberi*.

This majority of this vegetation zone has a relatively low abundance of exotic species. The most abundant exotic species in this vegetation zone is *Lantana camara*, which occurs most frequently in the drainage lines and lower slopes.

- *No threatened flora species were detected in the study area during these surveys.*

Data sheets from plot surveys can be found in **Att 07A_Revised Biodiversity Assessment Report_Kleinfelder, Appendix 3_Pg 51,** showing detailed native and exotic flora present on-site.

- *A total of 12 threatened fauna species listed under the TSC Act 1995 and/or EPBC Act were detected in the study area during Kleinfelder Surveys (2012, 2013, 2016) surveys: Spotted Harrier, Brown Treecreeper (eastern subspecies), Black Falcon, Square-tailed Kite, Grey-crowned Babbler (eastern subspecies), Large-eared Pied Bat, Eastern False Pipistrelle, Little Bentwing-bat, Eastern Freetail-bat, Southern Myotis, Eastern Cave Bat and the Koala.*

For a full list of fauna species please see **Att 07A_Revised Biodiversity Assessment Report_Kleinfelder, Appendix 9_Pg 122**

- *One EPBC Act-listed migratory bird species was also recorded in the study area during the surveys: Rufous Fantail.*
- *The study area contains a number of 1st, 2nd and 3rd order streams with associated riparian vegetation (i.e. variation within HU804).*

Results of surveys completed by Wedgetail Project Consulting Pty Ltd in 2023 and 2024 included:

- *No threatened **flora** species were detected in the study area during the surveys.*
- *A total of 3 threatened fauna species listed under the EPBC Act were detected in the study area Grey-headed Flying Fox, Koala, Glossy-black Cockatoo.*
- *One EPBC Act-listed migratory bird species was also recorded in the study area during the surveys: Satin Flycatcher.*

For further information see **Att 07A_Revised Biodiversity Assessment Report_Kleinfelder, Stage 1_Pg 1-38** and **Att 09A_EPBC Significant Impacts Assessments_WPC, Section 2.2 & 2.3, Pg 14 and 22 (see Figures in Att 09B_EPBC Significant Impacts Assessments_WPC, Section 2.3, Pg 1-5)**.

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

The Biodiversity Assessment Report undertaken by Kleinfelder (2017) included regional vegetation mapping studies, combined with vegetation surveys and mapping of the study area. Two native vegetation communities were thus identified based on the NPWS (2000) classification system:

- MU16 SeahamSpotted Gum – Ironbark Forest;and
- MU12 Hunter Valley Moist Forest.

Both of these vegetation communities within the study area were determined to comprise one equivalent vegetation community described by Somerville (2009): MU65 Spotted Gum/ Broad-leaved Mahogany/ Red Ironbark moist shrubby open forest. Both of these vegetation communities were also determined to comprise one plant community type (PCT) as defined in the VIS database: HU804 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest.

It is noted that the study area includes several drainage lines, and the native vegetation in close proximity to these drainage lines have a higher abundance of mesic understorey species than the adjacent hills and slopes. These areas are considered to be variation within HU804 and contain a number of dominant species which have been described for MU65 (Somerville 2009) from which this PCT is derived.

This PCT was determined to comprise one vegetation zone (i.e. moderate-good condition) within the development site. A very small area of another vegetation zone (HU804_moderate-good_poor) occurs in the north-east corner of the development site (haul road). However, as this small area of vegetation is <0.1 ha in size, it has not been identified as a separate vegetation zone for the credit calculations, and has been included within the zone 1 (HU804_moderate-good). Small areas of non-native vegetation (i.e. exotic vegetation) and several un-vegetated areas (i.e. access tracks and bare ground) also occur within the development site.

The vegetation within the study area is not consistent with any threatened ecological communities (TECs) listed under the BC Act 2016 and/or EPBC Act. The Spotted Gum- Ironbark Forest vegetation community in the study area was assessed against the *Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion* endangered ecological community (EEC) final determination (NSW Scientific Committee 2010). The vegetation within the study area is not considered to form part of the *Lower Hunter Spotted Gum – Ironbark Forest* EEC based on location, geology and floristics. The final determination describes the EEC as occurring within the Sydney Basin bioregion; the study area is located within the NSW North Coast bioregion.

The study area is also inconsistent with the geology of the *Lower Hunter Spotted Gum – Ironbark Forest* EEC, as the study area occurs on the Ten Mile Road soil landscape (Matthei 1995) which consists of undulating low hills on Carboniferous sediments and acid volcanics. This EEC is primarily associated with Permian substrates of the Lower Hunter soil landscapes of Aberdare, Branxton and Neath. The NSW Scientific Committee (2010) states that the "*Seaham Spotted Gum – Ironbark Forest typically occurs on sediments of Carboniferous age, in contrast to the younger Permian sediments that support Lower Hunter Spotted Gum-Ironbark Forest".* The floristic composition of the vegetation in the study area also has a higher similarity to the Seaham Spotted Gum-Ironbark Forest community than the Lower Hunter Spotted Gum-Ironbark Forest described in *Vegetation Survey Classification and Mapping Lower Hunter and Central Coast Region* (NPWS 2000) asit typically contains a number of other dominant or co-dominant eucalypt species in addition to *Corymbia maculata (Spotted Gum)* and *Eucalyptus fibrosa (Ironbark)*.

The north-eastern part of the development site includes a combined 0.27ha of area dominated by exotic vegetation. These areas include modified grasslands that are routinely slashed, and an exotic shrubland occurring on a constructed bund which extends along the north-east boundary. The exotic grassland areas were verified as being in low condition. While the exotic shrubland area was too narrow to sample with a plot/transect, this area does not have any native understorey, and only contains occasional planted and regenerating trees (i.e. overall canopy cover of <5%). A further 1.15 ha area was excluded from assessment, being unvegetated and consisting of access tracks and bare ground from previous disturbance.

The study area occurs on the Ten Mile Road soil landscape (per the Soil Landscapes of the Newcastle 1:100 000 Map Sheet, Matthei 1995) which consists of undulating low hills on Carboniferous sediments and acid volcanics.

3.3 Heritage

3.3.1 Describe any Commonwealth heritage places overseas or other places recognised as having heritage values that apply to the project area.

No Commonwealth heritage places overseas or other places recognised as having heritage values apply to the project area.

3.3.2 Describe any Indigenous heritage values that apply to the project area.

The Eagleton Quarry Project is located on Worimi Country.

A revised Aboriginal Cultural Heritage Impact Assessment (ACHIA) was carried out by McCardle Cultural Heritage. In particular, the revised Aboriginal Cultural Heritage Impact Assessment includes:

- The outcomes of consultation carried out in accordance with the DECCW guideline Aboriginal Cultural Heritage Consultation Requirements for Proponents; and
- Additional archaeological assessment.

The Aboriginal stakeholders have not assigned any specific or general significance to the site in relation to aesthetic, historical or scientific values. The stakeholders assigned general social/cultural significance to the project area.

Findings of the ACHIA include:

- The ACHIA confirmed that one isolated find (flake) and two potential archaeological deposits (PADs) were identified in watercourses in the vicinity of the Project. One PAD is located along the Seven Mile Creek watercourse to the east of the Project site and one PAD is located along the 2nd order stream to the south of the Project site. McCardle confirmed that the site and PADs are typical of the Hunter Valley region in both their content and location, and that the isolated find was of low scientific significance. The RAPs assigned general social/cultural significance to the Project area, isolated find and PADs.
- McCardle confirmed that the riparian buffer corridors to be maintained along the 2nd and 3rd order watercourses in the vicinity of the site would ensure that the isolated find and PADs would not be impacted by the Project.

Refer to **Att 06_ACHIA_McCardle Cultural Heritage, Section 6, Pg 38-43** for additional detail on the archaeological values on the site.

Details of the recorded sites are available publicly within the Aboriginal Heritage Information Management System (AHIMS), where five (five) Aboriginal Sites are evident within or adjacent to the Project Area, refer to **Att 10 AHIMS Search Result October 2024**.

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

Surface Water Overview

The core component of the development area (i.e. the quarry pit and infrastructure) is bound to the south by a 1st and 2nd order stream, to the east by a 3rd order stream (Seven Mile Creek) and to the north by a 1st and 2nd order stream. The quarry pit intersects the upper portions of three 1st order streams. The quarry access road includes a bridge that crosses Seven Mile Creek.

Seven Mile Creek has a regular base flow and receives discharge from the upstream Seaham Quarry. The 1st order creeks are ephemeral in nature with little or no baseflow and limited surface water storage. The northern 2nd order creek comprises limited baseflow and surface water storage. The southern 2nd order stream has several shallow pools interconnected by subsurface flows.

Given the steep slopes and limited soil depth, it is considered likely the site will have a high degree of runoff once soils are saturated.

The development site is located within the Hunter Water Drinking water catchment and controls have been developed to ensure a neutral or beneficial outcome on water quality.

Surface Water considerations in relation to the existing environment are largely addressed within **Attachment 8A**, while controls are detailed within **Attachment 8B**.

Groundwater Overview

The quarry will extract down to 45 mAHD, approximately 15m above the elevation of the base of Seven Mile Creek at the eastern extent of the site. With the extraction occurring from a ridge spur above the level of the adjacent creeks in a largely volcanic strata there is limited interaction with groundwater aside from water stored within rock fractures.

Groundwater inflow rates into the quarry pit are predicted to range from 3.0 to 7.8 ML/year with drawdowns extending to approximately 150m from the quarry pit at the end of quarrying. Refer to **Attachment 8C** for a summation of the results of earlier studies.

The Studies Completed

The following studies have been completed in relation to surface and groundwater, only No.6 and No.7 are included as attachments:

1. URS Pty Ltd. Eagleton Quarry Hydrogeological Investigation (URS 2014).
    1. Background and numerical model completed now superseded by David, 2016.
2. SLR Consulting Australia Pty Ltd. Groundwater Assessment Peer Review. February 2016a (SLR, 2016a).
    1. Review determined substantial revision of model setup and findings were required to meet requirements, this triggered the reports by Umwelt, 2016 and David, 2016.
3. Umwelt Pty Ltd. Eagleton Hard Rock Quarry Water Assessment – Final. October 2016 (Umwelt, 2016).
   Attachment 8A
    1. Operational elements of the water management system superseded by SLR, 2017.
    2. Information relating to statutory and regulatory requirements, existing surface water, flooding, erosion and sediment control methods and downstream user description remains current.
    3. Relevant groundwater elements effectively replaced by this letter.
4. David, K. Numerical Groundwater Model for Eagleton Quarry. October 2016 (David, 2016). o Current numerical model for the proposed quarry, supersedes the URS Report and is provided in Appendix B.
5. SLR Consulting Australia Pty Ltd. Groundwater Assessment Peer Review. February 2016b (SLR, 2016b).
    1. Determined David 2016 assessment fit for purpose to address the requirements of the SEARs and the NSW AIP. The peer review is provided in Appendix C.

6. SLR Consulting Australia Pty Ltd. Eagleton Quarry Revised Water Assessment. 4 August 2017 (SLR, 2017). **Attachment 8B**
    1. Current report addressing the proposed water management system. Refer to Table 2 of that report for list of elements utilised from the previous Umwelt 2016 report.
7. September 2017: Clarification for Eagleton Quarry Groundwater Modelling (Kleinfelder, 2017). **Attachment 8C**
8. Eagleton Quarry Project Ssd7332 Request For Response To Submissions (RRTS)– Aquatic Ecology Aspects (Marine Pollution Research, June 2017). **Attachment 7B**.

Ecological Aquatic Considerations

Kleinfelder (2017) undertook field surveys in January 2016 to identify and assess aquatic and riparian habitats within the study area. Prior to undertaking field surveys, mapped watercourses and aerial photos were examined to enable surveys to be targeted in areas most likely to contain aquatic habitat. The proposed development site forms part of a larger forested corridor that runs north- south between the Pacific Highway to the east and cleared grassland/wetlands to the west adjacent to the Williams River.

Aquatic habitat within the study area was determined to consist of riparian areas associated with six 1st order streams, two 2nd order streams, and one 3rd order stream. The 3rd order stream runs north-west to south-east through the study area. Several constructed dams were also identified in the study area. Aquatic and riparian habitat assessments carried out within the proposed development area are detailed in **Att 07A_ Revised Biodiversity Assessment Report_Kleinfelder, Appendix 8, Pg 116 - 121**. In addition, Marine Pollution Research completed an aquatic ecology assessment of the creek lines within the Study Area, refer to **Att 07B_AquaticEcology June2017**.

The majority of the riparian habitat within the study area is intact and is occasionally dissected by access tracks. The riparian areas consist of the forest vegetation (as previously detailed in the flora section above)**.** Vegetation coverage in most areas was relatively high (50-60% PFC). The
ground cover vegetation is relatively low in some areas along the 3rd order stream as result of past disturbance (i.e. Hunter Valley Paintball previously operated in this area).

The stream substrate of the riparian area is comprised mainly of sandand silt although some areas contained large cobbles. Finer substrate and detrital accumulations were moderate although these may have been washed out due to a large rainfall event which occurred a week before the assessment was conducted. The stream banks were relatively stable in most areas, with low levels of erosion of the banks occurring in some areas (particularly at bends in the stream).

No threatened freshwater species, endangered populations and endangered ecological communities listed under the *Fisheries Management Act 1994* have been recorded within the locality (5km radius of the study area). Following the database searches and habitat assessment, it is considered unlikely that any threatened aquatic species would occur in the study area.

Terrestrial fauna habitat within the riparian zone includes the associated vegetation, hollow bearing trees, rocks, woody debris and a range of substrates. No infestation of aquatic weeds or other Macrophytes were observed. No evidence of pollution was observed.

The proposed development has been positioned to avoid the 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. A new bridge crossing is proposed to be constructed over Seven Mile Creek.

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	No	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes
S20	Migratory Species	Yes	Yes
S21	Nuclear	No	Yes
S23	Commonwealth Marine Area	No	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	No	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth Heritage Places Overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located near any World Heritage values (i.e. more than 40km away), the scale and intensity of the proposed activity are not of a nature considered to have the potential to impact these values.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located near any National Heritage values (i.e. more than 40km away), and the scale and intensity of the proposed activity are not of a nature considered to have the potential to impact these values.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Ramsar wetland
No	No	Hunter Estuary Wetlands

4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Hunter Estuary Wetland (Ramsar Site) occurs 14 km south of the proposed action, located on the Hunter River / Fullerton Cove. The scale and intensity of the proposed Eagleton Quarry Project is not considered likely to have any direct or indirect impacts on the wetland, due to the distance, and not being hydrologically connected being within disconnected catchments. The activity is therefore unlikely to have a direct or indirect impact.

In addition, the Development Footprint of the proposed action has been designed to avoid impact on streams and must ensure a neutral or beneficial effect on water quality during operations as it drains to Grahamstown Dam, a Hunter Water asset. The proposed water management system is described in **Att 08B_RTS Appendix C_ Revised Water Assessment SLR 2017, Section 3, Pg 5 – 10.** These water management measures have been developed through the various water management assessments for the Project. In addition, a raft of environmental management plans required under the NSW Development Consent are required to minimise onsite and offsite environmental impacts.

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species	Common name
No	No	Angophora inopina	Charmhaven Apple
Yes	No	Anthochaera phrygia	Regent Honeyeater
No	No	Arthraxon hispidus	Hairy-joint Grass
No	No	Asperula asthenes	Trailing Woodruff
No	No	Botaurus poiciloptilus	Australasian Bittern
No	No	Caladenia tessellata	Thick-lipped Spider-orchid, Daddy Long-legs
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Callocephalon fimbriatum	Gang-gang Cockatoo
Yes	No	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Yes	No	Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat
No	No	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
Yes	No	Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)

Direct impact	Indirect impact	Species	Common name
No	No	Cryptostylis hunteriana	Leafless Tongue-orchid
No	No	Cynanchum elegans	White-flowered Wax Plant
No	No	Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)
No	No	Erythrotriorchis radiatus	Red Goshawk
No	No	Eucalyptus camfieldii	Camfield's Stringybark
No	No	Eucalyptus glaucina	Slaty Red Gum
No	No	Euphrasia arguta	
No	No	Falco hypoleucos	Grey Falcon
No	No	Gallinago hardwickii	Latham's Snipe, Japanese Snipe
No	No	Grantiella picta	Painted Honeyeater
No	No	Grevillea parviflora subsp. parviflora	Small-flower Grevillea
No	No	Hirundapus caudacutus	White-throated Needletail
Yes	No	Lathamus discolor	Swift Parrot
No	No	Limosa lapponica baueri	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit
No	No	Litoria aurea	Green and Golden Bell Frog
No	No	Melaleuca biconvexa	Biconvex Paperbark
No	No	Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)
Yes	Yes	Mixophyes balbus	Stuttering Frog, Southern Barred Frog (in Victoria)
No	No	Neophema chrysostoma	Blue-winged Parrot
No	No	Notamacropus parma	Parma Wallaby
No	No	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
No	No	Persicaria elatior	Knotweed, Tall Knotweed
No	No	Petauroides volans	Greater Glider (southern and central)
Yes	No	Petaurus australis australis	Yellow-bellied Glider (south-eastern)
Yes	No	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)

Direct impact	Indirect impact	Species	Common name
No	No	Potorous tridactylus tridactylus	Long-nosed Potoroo (northern)
Yes	No	Pseudomys novaehollandiae	New Holland Mouse, Pookila
Yes	No	Pteropus poliocephalus	Grey-headed Flying-fox
No	No	Pycnoptilus floccosus	Pilotbird
No	No	Rhizanthella slateri	Eastern Underground Orchid
No	No	Rhodamnia rubescens	Scrub Turpentine, Brown Malletwood
No	No	Rhodomyrtus psidioides	Native Guava
No	No	Rostratula australis	Australian Painted Snipe
No	No	Stagonopleura guttata	Diamond Firetail
No	No	Syzygium paniculatum	Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry
No	No	Tetratheca juncea	Black-eyed Susan
No	No	Thesium australe	Austral Toadflax, Toadflax
No	No	Uperoleia mahonyi	Mahony's Toadlet

Ecological communities

Direct impact	Indirect impact	Ecological community
No	No	Central Hunter Valley eucalypt forest and woodland
No	No	Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
No	No	Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
No	No	Lowland Rainforest of Subtropical Australia
No	No	Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions

4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained through database searches (NSW BioNet and Commonwealth Protected Matter search). An assessment was then made of the likelihood of the threatened species, populations, and ecological communities reported or modelled to occur in the locality occurring within the Project Site or using the habitat within the Project Site as an essential part of a foraging range (refer **Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 2, Pg 74 - 103**). Species with a moderate to high likelihood of occurring within the Study Area were then further assessed through a Significant Impact Assessment (refer **Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 1, Pg 45-73**).

The proposed action will not have any direct or indirect impacts on any Threatened Ecological Communities (TECs). No TECs were identified within the Study Area.

Following the likelihood of assessment, the proposed action was considered likely to have a direct impact on the following EPBC-listed threatened species, through removal of potential foraging habitat, further description is contained below:

Swift Parrot and Regent Honeyeater

These species were not recorded within the Study Area during any of the surveys carried out.

Swift Parrot 'important area' mapping does not occur within the Study Area, therefore the site is not likely to be considered to represent a significant foraging area for the species, as the species often returns to forage at the same locations year after year.

Regent Honeyeater 'important area' mapping does not occur within the Study Area, therefore the habitat is not likely to be used for breeding, and is only potential foraging habitat for the species.

Approximately 32.03 ha of open forest, which may provide opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas, will be removed as a result of the proposed action, resulting in a direct impact to the species.

Koala

Two Koalas were sighted in the south-western part of the Study Area during field surveys carried out by Kleinfelder in 2013. SAT tests (2013 & 2024) also detected Koala activity in the south-west, central, and north-east parts of the Study Area in 2013 and 2024. The proposed action will result in a direct impact to the species via the removal of 11.19 ha of native vegetation considered representative of foraging habitat for the species. Due to the low levels of activity recorded through SAT tests (7% and 1% activity) across the Project Site (i.e. the area to be impacted), the habitat to be impacted is not considered to be suitable breeding habitat. During clearing there is the potential for displacement of an individual if the Project Site forms part of its home-range. The removal of an area of an individual's home range may force it to move, potentially encroaching on the home range of another individual. This could result in conflicts in the local area due to the high fidelity the species exhibit to their home range. The proposal also has the potential for increased impact to the species from vehicle strikes as there will be an increase in traffic associated with the quarry construction and operation.

South-eastern Glossy-black Cockatoo

No Glossy-black Cockatoos were recorded within the Project Site during bird surveys, however evidence of Glossy-black Cockatoos foraging was recorded along creek line vegetation within the Study Area (outside the Project Site) during targeted surveys. The proposed action will impact a total of 32.03 ha of native vegetation considered representative habitat for the species. The vegetation within the Project Site is characterized as having a low to moderate density of potential feed trees, Black She-oak (*Allocasuarina littoralis*). Higher condition habitat occurs throughout the locality, and potentially within the Biodiversity Offset area, particularly along the main perennial creek line where old growth trees occur.

Brown Treecreeper

The Brown Treecreeper was recorded during GHD surveys in 2012, however was not recorded again during bird surveys in 2024. The proposed action will result in a direct impact to the species via the removal of 32.03 ha of native vegetation considered foraging habitat and potentially breeding habitat for this species.

Grey-headed Flying-fox

The species was recorded foraging within the Study Area. However, no camps are recorded within the locality. The nearest mapped Flying-fox camp is located <9 km southwest of the Study Area (Raymond Terrace). The proposed action will result in a direct impact to the species via the removal of a total of 32.03 ha of native vegetation considered representative of foraging habitat for the species.

Large-eared Pied Bat

Large-eared Pied Bat was recorded within the Study Area. There are no caves present on site, therefore the Study Area does not represent suitable breeding habitat and is only considered as foraging habitat for this species. The proposed development will impact on a total of 32.03 ha of native vegetation considered representative of foraging habitat for the species.

New Holland Mouse

The species was not recorded within the Project Site during targeted surveys by WPC in 2024. There are 5 records of the species within the locality, and suitable habitat appears to occur across parts of the Study Area. The proposed action will impact a total of 32.03 ha of native vegetation considered representative of potential habitat for the species.

Yellow-bellied Glider

Surveys conducted within the locality (at Stone Ridge Quarry) in 2018 and 2022 did not detect this species. Surveys conducted on site in 2013 did not detect this species. The project will result in direct impacts to the species through the removal of 32.03 ha of potential foraging habitat for the species.

Stuttering Frog

The proposed action will result in temporary indirect impacts to less than 0.06 ha of native vegetation considered to constitute marginal habitat for the species during construction of a bridge crossing the Seven Mile Creek. Potential indirect impacts include water pollution and sedimentation and weed incursion.

Refer to **Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 1, Pg 45-73** for the full assessment of significance for each of the above listed species.

4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.4.6 Describe why you do not consider this to be a Significant Impact. *

A full significant impact assessment was carried out for each threatened species considered likely to be impacted by the proposed action, in accordance with the Matters of National Environmental Significance - Significant impact guidelines 1.1 (Department of the Environment, 2013). The assessments are contained in full in **Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 1, Pg 45-73.**

Swift Parrot and Regent Honeyeater

The proposed action will only impact potential foraging habitat for both species. The proposed action will not impact on the breeding cycle of Swift Parrot with all breeding for the species occurring in Tasmania and not on mainland Australia. The proposed action is unlikely to impact Regent Honeyeater breeding habitat as no 'important area' mapping occurs within the Study Area. The proposed development is therefore considered unlikely to lead to a long-term decrease in the size of the Swift Parrot or Regent Honeyeater populations.

The vegetation within the Study Area likely provides opportunistic foraging habitat and supplementary foraging areas in times of low nectar resources in core foraging areas. As such, it is unlikely that the 32.03 ha of potential foraging habitat within the Project Site is critical to the survival of these species.

Proposed offset measures will also secure approximately 57.2 ha of similar open forest habitat surrounding the Project Site in-perpetuity. The proposed Project Site will also be rehabilitated, as such there is the potential for these species to utilise the area as foraging habitat once the area is suitably rehabilitated.

Given the above considerations, impact assessment for these species have concluded that the proposed action is unlikely to have a significant impact on these species.

Koala

The proposed action will result in a direct impact to the species via the removal of 11.19 ha of native vegetation considered representative of foraging habitat for the species. The SAT surveys indicate that koalas are moving through the lower-lying areas of the Study Area (such as along creeklines) rather than through the elevated ridgeline and upper slopes where the Project Site is situated. The Seven Mile Creek corridor (creekline and associated riparian habitat) is likely acting as the main movement corridor for koalas to move through the Study Area and will be retained.

During clearing there is the potential for displacement of an individual if the Project Site forms part of its home-range, however the home range of Koalas in the Port Stephens area is estimated to be in the range 80 – 90 ha. While there is the potential to displace one individual, this impact is unlikely to be significant due to the large area of alternative available habitat adjoining the Project Site.

The proposal also has the potential for increased impact to the species from vehicle strikes as there will be an increase in traffic associated with the quarry construction and operation. The proposed development is to incorporate traffic calming measures to reduce the risk of vehicle strike. The proposal would not increase dog numbers in the locality.

In light of the above considerations, the impacts of the proposal are unlikely to result in a significant impact to Koala.

South-eastern Glossy-black Cockatoo

No Glossy-black Cockatoos were recorded within the Project Site and the vegetation within the Project Site is characterized as having a low to moderate density of potential feed trees, Black She-oak (*Allocasuarina littoralis*).

Evidence of foraging on She-oaks was found within the Study Area along the ephemeral creek beds to the north and south of the Project Site (**Att 09B_ EPBC Significant Impacts Assessments_WPC, Figure 5, Page 25).** Higher condition habitat also occurs throughout the locality, and potentially within the Biodiversity Offset area, particularly along the main perennial creek line where old growth trees occur.

The total extent of occurrence for the species is 470,000 km2 (i.e. 47,000,000 ha). The proposed action will impact a total of 32.03 ha of habitat, representing < 0.0001 % of suitable habitat for the highly mobile species (nationally) (DCCEEW 2022).

As such, the proposed action is unlikely to lead to a long-term decrease in the size of the population of the South-eastern Glossy -black Cockatoo and is unlikely to have a significant impact on the species.

Brown Treecreeper

The Brown Treecreeper was recorded during bird surveys carried out on the site in 2012, however it was not recorded again during surveys in 2024. The proposed action will result in a direct impact to the species via the removal of 32.03 ha of native vegetation considered foraging habitat and potentially breeding habitat for this species. It is noted however that the species is highly mobile and that similar habitat is present and will be retained throughout the locality as well as within the proposed Biodiversity Offset area in the Study Area. Retention of suitable habitat areas adjoining the impact area will allow individuals to move into surrounding areas if disturbed. Similarly, the proposed action will not impact on the breeding cycle of the species due to the small area of impact and the wider area of suitable habitat surrounding the development. It is also noted that in the long-term, the Project Area will be rehabilitated and will be returned to a condition similar to that present in the Project Area at present.

Taking all of the above factors into consideration, the proposed action is unlikely to result in a significant impact to the Brown Treecreeper.

Grey-headed Flying-fox

The species was recorded foraging within the Study Area. However, no camps are recorded within the locality. The nearest mapped Flying-fox camp is located <9 km southwest of the Study Area (Raymond Terrace). The proposed action will result in a direct impact to the species via the removal of a total of 32.03 ha of native

vegetation considered representative of foraging habitat for the species.

The proposed action will not impact on the breeding cycle of the species as no camps were recorded within the Project Area or locality. The proposed action is therefore not expected to have a significant impact on the species, as it will only result in the medium-term removal of potential foraging habitat over a relatively small area.

Large-eared Pied Bat

Given that there are no caves present on site, therefore the Study Area does not represent suitable breeding habitat. The Grey-headed Flying-fox was not recorded roosting or foraging within the Study Area during field surveys, however, eucalypt species within the Project Site are likely to provide opportunistic foraging resources. The proposed development will impact on a total of 32.03 ha of this potential resource.

Given the relatively small area of suitable habitat for these species that will be removed compared to the extensive areas of suitable habitat in the Study Area and surrounding lands, the minor impediment the development would pose to movement of these species and the management actions proposed, as well as the proposed site rehabilitation measures, it is unlikely that the proposal would result in a significant impact to this species.

New Holland Mouse

Targeted surveys did not detect the New Holland Mouse within the Project Site and while the New Holland Mouse occurs in the locality, no known populations of the species will be impacted. A 32.03 ha area of potential habitat will be impacted, however. Given that similar habitat occurs to the north, south and west of the Project Site, and throughout the locality and that the southern part of the Study Area (which provides similar habitat) will be protected as a stewardship site, the proposed action is considered unlikely to result in a significant impact to the New Holland Mouse.

Yellow-bellied Glider

This species has not been detected within the Project Area. The project will impact 32.03 ha of potential foraging habitat for the species, however similar habitat occurs to the north, south and west of the proposed development, and throughout the locality. Higher quality habitat (mature growth trees) occurs along the Seven Mile Creek within the Study Area. This habitat, as well as second order streams within the Study Area, will continue to provide corridors for native fauna moving through the locality as these areas will be set aside as a Stewardship Site and will remain protected in perpetuity.

Given that the species is highly mobile and that extensive areas of suitable habitat, including movement corridors, will be retained in the Study Area, it is considered that the removal of a relatively small area of potential foraging habitat is unlikely to result in a significant impact to the Yellow-bellied Glider.

Stuttering Frog

Stuttering Frog are known to occur in three locations south of Sydney and in the Dorrigo region in the north-east of NSW. Bionet shows the closest record of an individual at Sugarloaf State Conservation Area approximately 34 km south-west of the Project Site. Targeted Surveys on-site detected no individuals.

Given that the proposed action will only result in temporary indirect impacts to less than 0.06 ha of native vegetation considered to constitute marginal habitat for the species, the proposal is unlikely to result in significant impacts to this species. Furthermore, the implementation of a Biodiversity Management Plan along with a Water Management Plan will add control measures to minimise indirect impacts and prevent the spread of invasive species and disease, as well as to protect the stream from contaminants, pollution and excess sediment and nutrients.

4.1.4.7 Do you think your proposed action is a controlled action? *

No

4.1.4.9 Please elaborate why you do not think your proposed action is a controlled action. *

A controlled action has, or will have, a significant impact on protected matters. Results of the significant impact assessment (**Att 9B_ EPBC Significant Impacts Assessments_WPC, Appendix 1, Pg 45-73**) determined that the proposed action will not have a significant impact on protected matters and therefore the proposed action is not a controlled action.

4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

See **Att 07A_ Revised Biodiversity Assessment Report_Kleinfelder, Stage 2, Pg 39-45** for a detailed description of avoidance and mitigation measures to be implemented as part of this Project. A list of the final set of management plans that are required (to be developed prior to operation), to mitigate the impacts of the development, are included within the NSW Development Consent (**Attachment 1**).

The proposed avoidance and mitigation measures are summarised below:

Impact Avoidance

Options for the layout of the proposed development and associated infrastructure (haulage road) were reviewed in consideration of the biodiversity values identified within the Study Area, including the extent and condition of native vegetation, threatened species habitat (i.e. Koala and BC Act listed Southern Myotis), connectivity, the intent and location of regional biodiversity corridors, natural drainage of the site and the occurrence of key habitat features, such as hollow-bearing trees, wetlands, and watercourses. The proposed development site has been selected to avoid and retain the following biodiversity values:

- The retention of 57.2 ha of native vegetation (approximately 63%) within the Study Area, proposed to be secured under a stewardship site agreement as part of the offset to provide in-perpetuity protection and management of this native vegetation and threatened species habitat. Note. The final area of the Biodiversity Stewardship Agreement Site will be subject to considerations during the final

- Being positioned to avoid the 2nd and 3rd order streams and the associated riparian buffers in the study area, with the exception of a small area for the proposed haul road. A new bridge or culvert crossing is proposed to be constructed over Seven Mile Creek.

- Being positioned to avoid the majority of suitable Koala habitat in the study area (approximately 79%). These retained areas of suitable Koala habitat (41.40 ha) would be protected and managed in-perpetuity under a biobanking agreement.

- Being positioned to avoid the majority of Southern Myotis breeding habitat in the study area (approximately 67%). These retained areas of Southern Myotis habitat (33.03 ha) would be protected and managed in-perpetuity under a stewardship site agreement.

The proposed development would not impact on any threatened ecological communities (TECs), critical habitat, riparian areas of 4th order or higher, important wetlands, estuaries, or state significant biodiversity links.

Impact Minimisation

Impacts of the proposed development will be minimised by a range of management plans that once implemented will minimise the effects of the activity on the environment within and adjoining the proposed activity.

The management plans aim to provide protocols to minimise impacts to wildlife and protect vegetation within the development site during construction and operations, via pre-clearing fauna surveys, vegetation and hollow-bearing tree clearing protocols, fauna translocation, and weed control. They will include measures focusing on Koala such as the koala underpass installation, pre-clearing koala surveys, exclusion zones with time for any detected koalas to self-relocate and improvement of koala habitat where reasonable and feasible.

The NSW Development Consent (**Att 01_Development consent Eagleton Quarry Project SSD 7332**) requires the development and implementation of the following comprehensive management plans, applicable to minimising impacts on Biodiversity:

Biodiversity Management Plan

Condition B47. The Applicant must prepare a Biodiversity Management Plan for the development. This plan must:

(a) be prepared by suitably qualified and experienced person/s:

(b) be prepared in consultation with BCS and Council:

(c) describe the short, medium, and long-term measures to be undertaken to:

(i) implement the Biodiversity Offset Strategy; and

(ii) manage the remnant vegetation and fauna habitat on the site;

(d) include a detailed description of the measures to be implemented on the site to:

(i) enhance the quality of existing vegetation, vegetation connectivity and fauna habitat, including through the assisted regeneration and/or targeted regeneration of appropriate canopy, sub-canopy. understorey and ground strata;

(ii) ensure the Koala underpass required by condition 844(b) is designed in consultation with a suitably qualified and experienced koala expert/s:

(iii) maximise the salvage of resources within the approved disturbance area including tree hollows, vegetative and soil resources for beneficial reuse on site including fauna habitat enhancement:

(iv) minimise impacts on tree hollows where reasonable and feasible;

(v) minimise impacts on fauna including undertaking pre-clearance surveys;

(vi) manage potential indirect impacts on threatened plant and animal species;

(vii) introduce naturally scarce fauna habitat features such as den structures, nest boxes and salvaged tree hollows, and promote the use of these introduced habitat features by threatened fauna species;

(viii) monitor and protect vegetation and fauna habitat outside the approved disturbance area, including within riparian corridors and downstream aquatic environments;

(ix) establish and/or retain vegetation screening to minimise the visual impacts of the development on surrounding receivers;

(x) Control weeds. and feral pests, with consideration of actions identified in relevant threat abatement plans;

(xi) manage the collection and propagation of seed;

(xii) control unrestricted access: and

(xiii) manage bushfire hazards;

(e) include a seasonally-based program to monitor and report on the effectiveness of biodiversity measures, and any progressive improvements that could be implemented to improve biodiversity outcomes;

(f) include an adaptive management plan for groundwater dependent ecosystems that:

(i) is based on a Before After Control Impact (BACI) design to determine baseline conditions and identify any quarrying-related impacts in the vicinity of the site;

(ii) provides details of the baseline plot data for groundwater dependent ecosystems including vegetation composition, structure and health, and any candidate threatened species associated with the community;

{iii) provides for the collection of groundwater level monitoring data (monthly) to detect any shallow groundwater drawdown during quarrying operations;

(iv) provides details of the offsetting regime that would be implemented in accordance with the Biodiversity Offsets Scheme of the BC Act if a change (partial or full direct impacts) in vegetation is detected and found to be caused by groundwater drawdown associated with the development and

(g) include details who would be responsible for monitoring, reviewing, and implementing the plan.

Condition B48. The Applicant must not commence construction of the access road or quarrying operations until the Biodiversity Management Plan is approved by the Planning Secretary.

Condition B49. The Applicant must implement the adopted Biodiversity Management Plan.

Conditions B50 to B58 of the Development Consent relate to the rehabilitation of the development. These conditions specify the rehabilitation objectives, require progressive rehabilitation and minimising disturbance at any one time, the preparation of a Rehabilitation Management Plan and commitment of a Rehabilitation Bond to provide for the rehabilitation of the site in event of the failure of the applicant.

4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

The requirements for Biodiversity Offsets for the Project are set out in Condition B43 to B46 of the NSW Development Consent (**Att 1**). These are summarised below:

B43. Requires the retirement of both ecosystem and species credits, being:

- 1836 credits for PCT: HU804 Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest;
- 291 credits for Koala; and
- 362 credits for Southern Myotis.

These credits numbers are as per the previous Biobanking Assessment Methodology and will likely need to be converted to the reasonably equivalent biodiversity credits within the meaning of the NSW BC Act.

B44. Requires the protection of riparian corridors around the disturbance footprint and a Koala underpass under Seven Mile Creek.

B45. Specifies that at least part of the Biodiversity Credits required to be retired for the development are sort from an onsite Biodiversity Stewardship Site that covers an area of 60.83 ha. It should be noted, that an amendment will be sort for this condition as only 57.2 ha is available for a potential stewardship site and, this area may be subject to further reduction during the creation of the Stewardship Site based on practical limitations associated with boundaries, fencing and development site buffers as required under the Biodiversity Offsets Scheme. It is the Applicants intent to establish the largest reasonable and feasible Biodiversity Stewardship Site on the land in consultation with the NSW BCS.

B46. Requires the Applicant suitably fund the establishment of the onsite Biodiversity Stewardship Site.

The background to the biodiversity offset strategy is detailed in **Att 07A_ Revised Biodiversity Assessment Report_Kleinfelder, Stage 2, Appendix 2, Pg 50** and is summarised below:

Stewardship Site

The Onsite Offset Site is proposed with native vegetation covering an area of 57.2 ha. The Stewardship Site will be managed in perpetuity consistent with the NSW Biodiversity Offset Scheme and must be established and funded by the Applicant. The Applicant is not required to retire all credits generated from this Stewardship Site for the Eagleton Quarry, although it is likely in its financial interest to do so.

Two Plant community Types are present within the Offset Site that will generate Ecosystem Credits (note these credit types are under the previous Biobanking Assessment Methodology, and will likely vary in number and type the final Stewardship Site Agreement):

- HU804 Spotted Gum - Broad-leaved Mahogany – Red Ironbark shrubby open forest. This area has potential to generate 533 Ecosystem Credits.
- HU798 White Mahogany - Spotted Gum – Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley (moderate-good) generating 63 credits.

Species credits that can be generated include:

- Koala (*Phascolarctos cinereus*) Species Credits generated onsite: 294
- Southern Myotis (*Myotis macropus*) Species Credits generated onsite: 235

Additional Credit Requirements

The proposed onsite offset site is likely to satisfy a high proportion of the biodiversity credits required at the development site, however, where there is a shortfall in the credits established onsite, these will be sort from the credit market or payment into the Biodiversity Conservation Fund consistent with the Biodiversity Offsets Scheme.

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species	Common name
No	No	Actitis hypoleucos	Common Sandpiper
No	No	Apus pacificus	Fork-tailed Swift
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Calidris melanotos	Pectoral Sandpiper
No	No	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
No	No	Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo
No	No	Gallinago hardwickii	Latham's Snipe, Japanese Snipe
No	No	Hirundapus caudacutus	White-throated Needletail
Yes	No	Monarcha melanopsis	Black-faced Monarch
No	No	Motacilla flava	Yellow Wagtail
Yes	No	Myiagra cyanoleuca	Satin Flycatcher
No	No	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
Yes	No	Rhipidura rufifrons	Rufous Fantail
No	No	Symposiachrus trivirgatus	Spectacled Monarch

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.5.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

A protected matters search (**Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 3, Pg 104-121**) was undertaken with potential for 19 migratory species to occur within the development.

Three species were assessed as having a moderate to high likelihood of occurrence within the Study Area (**Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 2, Pg 74-103**).

Two of these species were recorded in the Study Area during surveys: Rufous Fantail and Satin Flycatcher.

A total of 32.03 ha of native vegetation considered foraging habitat for these species will be impacted, resulting in direct impacts to foraging habitat for these species.

4.1.5.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.5.6 Describe why you do not consider this to be a Significant Impact. *

The proposed action will directly impact on 32.03 ha of foraging habitat for Black-faced Monarch, Rufous Fantail and Satin Flycatcher. The proposed action would not substantially modify the ground or surface water hydrology within the vegetation to be retained in the study area, and it is unlikely that there will be modification to any areas of retained habitat for this species due to the proposed action.

The proposal would reduce habitat connectivity for these species within the study area. However, the proposed development will incorporate corridors in the central and north-east parts of the study area to maintain connectivity. The vegetation to be retained in the southern part of the study area will remain well connected to adjoining vegetation. As such, the proposal is considered unlikely to isolate or substantially fragment any important habitat for these species in the study area.

The proposed action would not result in any invasive species becoming established in areas of important habitat for these migratory species. The majority of the vegetation to be retained in the study area is proposed to be secured under a stewardship site agreement. Implementation of a vertebrate pest management plan is required under this agreement, which would ensure potential impacts from vertebrate pests in the study area are managed.

Given the relatively large areas of habitat adjoining the study area and as the majority of vegetation in the study area will be retained, including corridors to facilitate movement to the north, it is unlikely that the proposed action will disrupt the lifecycle of an ecologically significant proportion of the population of these species.

The proposed action is thus not expected to have a significant impact on the species. The full impact assessment for these species is included in (**Att 09B_ EPBC Significant Impacts Assessments_WPC, Appendix 1, Pg 45-73**).

4.1.5.7 Do you think your proposed action is a controlled action? *

No

4.1.5.9 Please elaborate why you do not think your proposed action is a controlled action. *

The proposed action will result in the loss of 32.03ha of foraging habitat, and retain over 57ha, within a broader connected area of habitat, as such the Proposed Action will not:

- Substantially modify, fragment, destroy, alter or isolate important habitat for the species.
- Result in an invasive species becoming established.
- Seriously disrupt the lifecycle of the migratory species.

On the basis of the above, the proposed action is not considered to result in a Significant Impact and is not considered a Controlled Action.

4.1.5.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

The Proposed Action has been developed to target the area of highest value (i.e. material type and quantity) hard rock resource resulting in the avoidance of residual vegetation within the Subject Land.

Mitigation measures to minimise the impacts on migratory species will be developed within the Biodiversity Management Plan required under the NSW Development Consent. This is required to include measures such as minimising impacts on fauna to managing pests and bushfire hazards.

Refer **Att 09B_ EPBC Significant Impacts Assessments_WPC, Section 3, Pg 31-37.**

4.1.5.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

The Proposed Action includes the implementation of a Biodiversity Offsets Strategy, in short this includes:

- Retire the required amount of credits consistent with the NSW Biodiversity Offsets Scheme prior to impacting on biodiversity values.
- Establishment of a Biodiversity Stewardship Site on residual lands within Subject Land, this is estimated at approximately 57.2ha, though will be subject to finalisation in the establishment of the offset area.

Refer **Att 09B_ EPBC Significant Impacts Assessments_WPC, Section 4 & 5, Pg 38-42.**

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action will not have a direct or indirect impact on this matter.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located in proximity of this matter and the proposed action is not of a scale or intensity that will have a measurable direct or indirect impact on this matter.

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located in proximity of this matter and the proposed action is not of a scale or intensity that will have a measurable direct or indirect impact on this matter.

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not a coal mine or coal seam gas development.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located in proximity of this matter and the proposed action is not of a scale or intensity that will have a measurable direct or indirect impact on this matter.

4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action is not located in proximity of this matter and the proposed action is not of a scale or intensity that will have a measurable direct or indirect impact on this matter.

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

None

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

Alternatives were considered within the original EIS (refer to Section 3.4 – Page 24, of **Att 05A_Eagleton Quarry EIS - Main Report_JBA, a** an evaluation of the alternatives is considered below:

1. **Not proceeding with the development**: This alternative is not considered appropriate as there is an identified demand for the product. It has been identified that growth in the Lower Hunter is expected to include the addition of 115 000 dwellings this alone will create the demand for in excess of 20MT (Lower Hunter's population growth for the next 20 years has been forecast by the NSW Department of Planning and Environment and is documented within the *Hunter Regional Plan 2036*). Failure to proceed with the proposed quarry would result in a scarcity of products, price increases and additional haulage costs to the construction industry and its downstream consumers.
2. **Alternative Quarry Layout**: The proposed quarry layout has been optimised to consider site constraints and opportunities. Alternative layouts were dismissed due to non-conformant management of constraints and negative environmental impacts. The proposed layout and sequence of expansion limits impacts and provides a complying outcome for primary constraints including surface water, groundwater, noise impacts, ecology and air quality. The aforementioned environmental issues informed the ultimate quarry design and reflect the overall Eagleton Rock quarry philosophy which is to minimise off-site impacts by operating with maximum efficiency and minimal environmental footprint. In addition to potential primary constraints the quarry layout and in particular the processing area will provide an efficient point of sale from the processing plant eliminating double handling of material and excessive stockpile storage areas. An outline of the key alternatives that were considered:
    - Lateral extent of quarry: The lateral extent of the quarry has the potential to extend to the north, south, east and west. However, to the north, south and east this would intercept creek lines that convey broader catchments and more important habitat for Koala. Extension to the west is limited by land ownership boundaries. The adopted area was considered appropriate given the above considerations, both from a operational feasibility and environmental values.
    - Vertical extent of quarry: The quarry has been currently limited to 45m AHD, the intent of this level is to result in a final land form that is free draining, and to minimise the potential for interaction with the baseflow in the adjacent Seven Mile Creek. It is noted the Boral Seaham Quarry and proposed ARDG Quarry are currently or propose substantially lower pit floors.
    - The method of extraction: There are limited alternatives for the actual methods of extraction given hard rock resources require blasting and excavation. However, to minimise impacts on nearby properties the sequencing of extraction has been adopted to ensure the quarry maintains a protective noise barrier to the south of the extractive location to reduce noise.
    - Rate of Extraction: The rate of extraction was chosen to satisfy what is currently considered the most appropriate rate given traffic, noise and dust assessments. Higher and lower rates were considered during design, but 600kt was chosen given it is environmentally feasible.
3. **Alternative Quarry Access:** The quarry access can be divided into four components, alternatives considered are outlined below:
    - Between quarry pit and Barleigh Ranch Way: This section of access is relevant to this Referral. Variations to this access considered the interactions with the adjoining landscape business and the crossing of Seven Mile Creek. The adopted path was considered the most appropriate to avoid disruption to the existing business. A bridge was considered an improved option to cross Seven Mile Creek to maintain flows and also enable an effective Koala underpass
    - Barleigh Ranch Way: This is a public road way, it is not part of the Referral. No practical alternatives exist.
    - Between Barleigh Ranch Way and Italia Road: This section is not part of the Referral, however several alternatives were considered. The quarry was initially proposed to be accessed via a private road located partially outside of the existing easement. This access would have resulted in road construction works. The existing right of carriageway for several properties surrounding the quarry site will instead be upgraded and relocated to the east of the original location given negotiations with the landowner. This right of carriage way will ultimately be upgraded to a public road or of an equivalent standard. Its construction was approved by Port Stephens Council.

- Italia Road onto the Pacific Highway: This section is not part of the referral. However several alternatives were considered in consultation with the NSW roads authority. The adopted option is the construction of a left turn acceleration lane to be constructed in conjunction with other quarries in the area. This is being assessed and approved under a separate local development approval. Extensive details about the various options considered are available on the NSW Major Projects Website

On the basis of the above, the proposed quarry Project presented in this Referral is considered to represent the most suitable foot print based on the availability of the resource and environmental considerations and extraction rate based on noise dust and traffic considerations suitable for the Subject Land and surrounding environment.

During construction and operational activities, some alternative options may be available for consideration, these matters would be determined through the development of site specific management plans and onsite construction and operational experience. Measures developed within management plans are required to seek to minimise impacts to flora and fauna (including MNES) where feasible and may include changes to construction and operational timeframes or processes based on measures such as the avoidance of clearing during particular breeding periods where an avoidable risk is identified.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 01_Development consent Eagleton Quarry Project SSD 7332.pdf NSW Development Consent	08/07/2024	No	High
#2.	Document	Att 02A_Eagleton Quarry_Site Layout_Wedgetail 202407.pdf Eagleton Quarry Site Layout	07/02/2024	No	High
#3.	Document	Att 02B_Eagleton Quarry_Site Plans_Kleinfelder 201708.pdf Quarry Plan set from 2017 Response to Submissions	03/08/2017	No	Low or uncertain
#4.	Document	Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI.pdf NSW DPHI Assessment Report	01/04/2024	No	High
#5.	Document	Att 03B_Statement of Reasons for Decision Eagleton Quarry Project SSD 7332 IPC.pdf NSW IPC Statement of Reasons for Decision	08/07/2024	No	High

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI.pdf NSW DPHI Assessment Report	31/03/2024	No	High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI.pdf NSW DPHI Assessment Report	31/03/2024	No	High
#2.	Document	Att 04_SocialValuesReview Kleinfelder 2017.pdf Social Values Review, an Appendix to the NSW Response to Submissions Report	12/10/2017	No	Low or uncertain
#3.	Document	Att 05B_Response to Submissions 2017_Main Report_JBA.pdf Response to Submissions Report	13/10/2017	No	Low or uncertain
#4.	Document	Att 06_ACHIA_McCardle Cultural Heritage.pdf Aboriginal Cultural Heritage Impact Assessment	13/09/2017	No	Low or uncertain

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 01_Development consent Eagleton Quarry Project SSD 7332.pdf NSW Development Consent	07/07/2021	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 03A_Eagleton Quarry Assessment Report_Recommendation_DPHI.pdf NSW DPHI Assessment Report	31/03/2024	No	High
#2.	Document	Att 09A_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report	11/09/2024	No	High

3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09A_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report	10/09/2024	No	High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 07A_Revised Biodiversity Assessment Report_Kleinfelder.pdf 2017 Biodiversity Assessment Report	17/07/2017	No	Low or uncertain
#2.	Document	Att 09A_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report	10/09/2024	No	High
#3.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	11/09/2024	No	High

3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 06_ACHIA_McCardle Cultural Heritage.pdf Aboriginal Cultural Heritage Impact Assessment	12/09/2017	No	Low or uncertain
#2.	Document	Att 10 AHIMS SearchResult October2024.pdf Results of search in the Aboriginal Heritage Information Management System database in October 2024	09/10/2024	No	High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 07A_Revised Biodiversity Assessment Report_Kleinfelder.pdf 2017 Biodiversity Assessment Report	16/07/2017	No	Low or uncertain
#2.	Document	Att 07B_AquaticEcology June2017.pdf Aquatic Ecology Assessment	19/06/2017	No	Low or uncertain
#3.	Document	Att 08A_Water Assessment Umwelt 2016.pdf Water Assessment (Umwelt 2016)	01/10/2016	No	Low or uncertain
#4.	Document	Att 08B_RTS Appendix C_ Revised Water Assessment SLR 2017.pdf Revised Water Assessment SLR 2017	04/08/2017	No	Low or uncertain
#5.	Document	Att 08C_Appendix M_ Groundwater Clarification Kleinfelder2017.pdf Clarification for Eagleton Quarry Groundwater Modelling	28/09/2017	No	Low or uncertain

4.1.3.2 (Ramsar Wetland) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 08B_RTS Appendix C_ Revised Water Assessment SLR 2017.pdf Revised Water Assessment SLR 2017	03/08/2017	No	Low or uncertain

4.1.3.3 (Ramsar Wetland) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 08B_RTS Appendix C_ Revised Water Assessment SLR 2017.pdf Revised Water Assessment SLR 2017	03/08/2017	No	Low or uncertain

4.1.3.10 (Ramsar Wetland) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 08B_RTS Appendix C_ Revised Water Assessment SLR 2017.pdf Revised Water Assessment SLR 2017	03/08/2017		Low or uncertain

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09A_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report	10/09/2024	No	High
#2.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.4.6 (Threatened Species and Ecological Communities) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.4.9 (Threatened Species and Ecological Communities) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 01_Development consent Eagleton Quarry Project SSD 7332.pdf NSW Development Consent	07/07/2024	No	High
#2.	Document	Att 07A_Revised Biodiversity Assessment Report_Kleinfelder.pdf 2017 Biodiversity Assessment Report	16/07/2017	No	Low or uncertain

4.1.4.11 (Threatened Species and Ecological Communities) Proposed offsets relevant to avoidance or mitigation measures

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 01_Development consent Eagleton Quarry Project SSD 7332.pdf NSW Development Consent	07/07/2024	No	High
#2.	Document	Att 07A_Revised Biodiversity Assessment Report_Kleinfelder.pdf 2017 Biodiversity Assessment Report	16/07/2017	No	Low or uncertain

4.1.5.2 (Migratory Species) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.5.6 (Migratory Species) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence

#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.5.10 (Migratory Species) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.1.5.11 (Migratory Species) Proposed offsets relevant to avoidance or mitigation measures

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 09B_ EPBC Significant Impacts Assessments_WPC.pdf EPBC Significant Impact Assessment Report (Part 2 of 2)	10/09/2024	No	High

4.3.8 Why alternatives for your proposed action were not possible

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 05A_Eagleton Quarry EIS - Main Report_JBA.pdf Environmental Impact Statement 2017	27/01/2017	No	Low or uncertain

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

ABN/ACN	640388683
Organisation name	WEDGETAIL PROJECT CONSULTING PTY LTD
Organisation address	27 Groves Road, Bennetts Green, NSW 2290
Representative's name	Jonathan Berry
Representative's job title	Principal Advisor
Phone	0421 440 139
Email	jberry@wedgetail.com.au
Address	27 Groves Road, Bennetts Green, NSW 2290

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Jonathan Berry of WEDGETAIL PROJECT CONSULTING PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

✔ Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	607606020
Organisation name	EAGLETON ROCK SYNDICATE PTY LIMITED
Organisation address	2300 NSW
Representative's name	Darren Williams
Representative's job title	Business Manager for Eagleton Rock Syndicate
Phone	0429 877 704
Email	darren@arbus.com.au
Address	PO Box 1011, Newcastle NSW 2300

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Darren Williams of EAGLETON ROCK SYNDICATE PTY LIMITED**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

✔ Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

- [x] Check this box to indicate you have read the referral form. *

- [x] I would like to receive notifications and track the referral progress through the EPBC portal. *

- [x] I, **Darren Williams of EAGLETON ROCK SYNDICATE PTY LIMITED**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

- [ ] I would like to receive notifications and track the referral progress through the EPBC portal. *