

CPS 9539/1 - Supporting information - Cover Letter and Figures

Document Reference: EP20-040(09)--011

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21 December 2021

Attention: Native Vegetation Regulation
Department of Water and Environmental Regulation
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Dear Sir/Madam

CLEARING PERMIT (AREA PERMIT) APPLICATION TO UNDERTAKE BULK EARTHWORKS WITHIN A PORTION OF LOT 9 BROOKTON HIGHWAY, KARRAGULLEN

Overview

Vinci Gravel Supplies Pty Ltd ('the applicant') engaged EmERGE Associates (EmERGE) to provide environmental consultancy services to prepare a clearing permit application for a portion of Lot 9 on Diagram 42350 Brookton Highway, Karragullen (the 'application area'). The total disturbance footprint extends over 5.75 ha. Within this, 4.71 ha of native vegetation will be cleared to enable gravel excavation, the extension of the internal access track and a vehicle compound. This area of native vegetation is the subject of this application.

The application area is bound by broad acre rural land holdings zoned 'General Rural' to the south and west. Existing approved extraction areas (stage 4) are situated immediately west, and Korung National Park and Midgegooroo National Park extend to the north and east. The location and extent of the application area has been shown in **Figure 1**.

The application area (4.71 ha) is divided into stage 5a, 2.82 ha, stage 5b, 1.72 ha, the access road, 0.05 ha, and the vehicle compound, 0.12 ha. Within the quarry, extraction activities will begin at the furthest eastern extent and gradually move in a westerly direction. Progressive rehabilitation works will occur on a yearly basis following the closure of previously extracted areas, with the backslope to be rehabilitated in the first instance so the quarry is less visually prominent. The staged approach also allows for the temporary retention of vegetation for screening purposes during the excavation of stage 5a, before quarrying moves in a westerly direction. The application area consists of:

- 4.71 hectares (ha) of native plant community **CcEmBa**, comprising 4.54 ha in 'very good' condition, 0.006 ha in 'good – very good' condition and 0.16 ha in 'good' condition.
- No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) were recorded within the site or clearing footprint during the detailed flora and vegetation survey.
- No threatened or priority flora species have been identified during recent or previous surveys.

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It is noted that 4.67 ha of potential black cockatoo foraging habitat exists within the application area, comprising a mixture of high and low valued habitat for Carnaby's black cockatoo and Baudin's black cockatoo. Similarly, 4.67 ha of high value habitat is present for the Forest red-tailed black cockatoo.

The following is provided to support a clearing permit application (area permit) pursuant to Part V of the *Environmental Protection Act 1986* (EP Act) and includes the following attachments required by the Department of Water and Environmental Regulation (DWER):

- **Attachment 1** – Signed Clearing Permit Application Form
- **Attachment 2** – Certificate of Title for Lot 9 on Diagram 42350
- **Attachment 3** – Detailed Flora and Vegetation Assessment (Emerge Associates 2021a)
- **Attachment 4** – Level 1 Fauna Assessment (Emerge Associates 2020)
- **Attachment 5** – Targeted Black Cockatoo Habitat Assessment (Emerge Associates 2021c)
- **Attachment 6** – Environmental Management Plan (Emerge Associates 2021b)
- **Email attachments** – a .shp file of the application area has been submitted to DWER as part of the application.

1 INTRODUCTION AND BACKGROUND

The applicant is intending to progress with works to expand the existing gravel quarry within a portion of Lot 9 Brookton Highway, Karragullen, referred to as 'stage 5', and has lodged a Development Approval (DA) and an Extractive Industry Licence (EIL) application with the City of Armadale to continue gravel extraction activities. The entire site encompasses an area of 48.23 ha and is located within the municipality of the City of Armadale, approximately 15 kilometres (km) east of the Armadale town centre. The site has been historically utilised for gravel extraction activities since 1985.

The application area (4.71 ha) is proposed to be cleared to undertake quarrying activities and consists of native vegetation located directly adjacent to, and contiguous with, the existing stage 4 extraction pit to the west.

A total 30.83 ha of native vegetation will be retained within the broader site (referred to as the 'Clearing Avoidance Footprint'). The extent of the clearing area will be clearly defined on the ground before any clearing activities commence to ensure there will be no inadvertent encroachment of disturbance into retained vegetation. The vegetation proposed to be retained comprises native vegetation with high fauna habitat values suitable for numerous conservation significant fauna including the three species of black cockatoo. Rehabilitation of extractive areas will occur progressively and will be revegetated with native species via direct seeding.

The application area is zoned 'Rural' under the Metropolitan Region Scheme (MRS) and 'General Rural (Armadale)' under the City of Armadale's (CoA) Town Planning Scheme No. 4.

2 ENVIRONMENTAL PLANNING AND APPROVALS CONTEXT

Development Approvals

Local and regional planning schemes provide guidance on what types of development and building activities require local government planning approval. Under the City of Armadale TPS No. 4, activities involving the extraction of raw materials are to be addressed as part of a formal development application.

Stage 1 development was approved on 28 October 2003 for an area of 1 ha located along the western portion of the site. Subsequent to this, two additional quarry extraction stages have been approved by the City in June 2015 and April 2016 related to stages 2 and 3. Most recently, the City granted conditional approval for stage 4 of the gravel quarry in April 2018, which extends over 1.52 ha of the south-western portion of the site.

In support of the current application to expand the quarry, the proposal has been advertised, and stakeholders have had the opportunity to comment on the proposal. The proposal was advertised between Monday 5 July 2021 and Friday 30 July 2021. The City of Armadale received a total of 18 submissions (including one late submission), with 15 of these in support of the proposal and three with comments/objections.

DWER provided commentary on 21 July 2021 and identified that a clearing permit is required prior to the removal of native vegetation and the Industry Regulation Guide to Licensing should be referenced. DBCA provided commentary on 5 August 2021 and identified that development approval should ensure implementation of the revised and updated EMP to manage environmental impacts during and following extraction activities.

Historic Clearing Permit

Clearing permit ref. 8273/1 (area permit) was issued by the Department of Water and Environmental Regulation (DWER) on June 2019 pursuant to Part V of the EP Act. The permit approved the clearing of 1.5 ha of native vegetation representing one plant community in a degraded 'condition' (Keighery 1994), comprising *Xanthorrhoea preissii* shrubland over a herb ground layer with occasional emergent *Corymbia calophylla*.

In accordance with the Part V Division 2 of the EP Act, the clearing permit application was advertised on the DWER website on 18 December 2018 until 8 January 2019. No public submissions were received in relation to this application. As a part of the minimisation and mitigation measures, DWER noted the following mitigation and minimisation measures are to be undertaken:

- Clearing will occur on a staged basis to reduce the area of exposed soil as far as practicable.
- Revegetation of approximately 4.9 ha of previously mined cells within the site using a mixture of tube stock and direct seeding using native species of local provenance.
- Topsoil will be removed (approximately 100 mm to 300 mm thick) and stockpiled in windrows for respreading during rehabilitation.
- A *Phytophthora* Dieback Management Plan which outlines management of a dieback infestation within the application area.

Current application

This document has been prepared to support the clearing of native vegetation for the stage 5 quarry expansion. It is noted that the proposed action, which involves the clearing necessary to establish the extraction pit, vehicle access track and machinery compound, and the ongoing process to extract, screen and transport gravel out of the site, has also been referred to the Federal Department of Agriculture, Water and the Environment (DAWE) to determine whether assessment and approval under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required.

3 SUMMARY OF ENVIRONMENTAL CONDITIONS

3.1 Historical clearing

A review of publicly available historical imagery from 1961 onwards indicates that the application area supported intact remnant native vegetation. Between 1965 and 1970, widespread clearing occurred across the wider area of Lot 9, with the southern portion displaying signs of agricultural use (cattle grazing; **Plate 1** and **Plate 2**). Evidence of the creek lines and water body is apparent by 1970, along with several internal access tracks. By 1985, gravel extraction activities began along the western boundary and immediately west of the application area (**Plate 3**). Vegetation established along the boundaries and southern portion of the site by the early 2000s, through what appears to be natural revegetation (**Plate 4**; Landgate 2021).



Plate 1: Aerial photograph of Lot 9 (red) and stage 5 (yellow) in 1965 (Landgate 2021).



Plate 2: Aerial photograph of Lot 9 (red) and stage 5 (yellow) in 1970, post land clearing (Landgate 2021).



Plate 3: Aerial photograph of Lot 9 (red) and stage 5 (yellow) in 1985 showing the emergence of stage 4 activities (Landgate 2021).



Plate 4: Aerial photograph of Lot 9 (red) and stage 5 (yellow) in 2008 showing the regrowth of vegetation (Landgate 2021).

3.2 Site specific surveys

A number of historic terrestrial flora and fauna studies and investigations have occurred across the application area and the broader site (Lot 9 Brookton Highway). These have supported the land use planning approval process to date and aided the understanding of the environmental attributes and values of the site. Specifically, the applicant has undertaken the following technical to support this clearing permit application:

- A detailed flora and vegetation assessment was undertaken in accordance with the Environmental Protection Authority's (EPA's) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) across the application area and broader site on 27 May, 2 June, 11 September, 21 October, 27 October and 12 December 2020 (Emerge Associates 2021a) and is provided as **Attachment 3**.
- A 'level 1' fauna assessment was also undertaken in accordance with the EPA's *Technical Guidance – Terrestrial fauna Surveys* (EPA 2016a) across the application area on 27 May and 2 June 2020 (Emerge Associates 2020) and is provided as **Attachment 4**.
- A targeted black cockatoo field survey and assessment was undertaken in accordance with the EPA's *Technical Guidance – Terrestrial fauna Surveys* (EPA 2016a) and the *Environment Protection and Biodiversity Conservation Act* black cockatoo referral guidelines (DSEWPaC 2012) across the application area and broader site on 11 September, 21 October, 27

November, 8 December and 21 December 2020 (Emerge Associates 2021c) and is provided as **Attachment 5**.

The findings of the recent detailed flora and vegetation assessment, level 1 fauna assessment and black cockatoo survey (Emerge Associates 2020, 2021a; 2021c) is referred to in this clearing permit application from herein, given this provides the most up to date and comprehensive information of the site values. These surveys were taken over the entirety of Lot 9 Brookton Highway, Karragullen. However, the environmental conditions identified through these assessments, pertaining to the application area only, is provided below.

3.3 Flora and vegetation values

Regional vegetation complex mapping extending over the Darling Scarp undertaken by (Hedde *et al.* 1980) delineates the various vegetation complex types which would have occurred across the region prior to European settlement in Western Australia. Based on this mapping, two vegetation complexes have been mapped as occurring within the site, as summarised below and shown on **Figure 2**:

- Dwellingup Complex (D2) – Open forest of *Eucalyptus marginata subsp marginata* – *Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones; and
- Yarragil Complex (Yg1) – Open forest of *Eucalyptus marginata subsp. marginata*- *Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *E. megacarpa* on the valley floors in humid and subhumid zones.

The Dwellingup and Yarragil complexes have 82.50% and 80.95% of their pre-European extents' respectively remaining (Government of Western Australia 2019).

The native vegetation within the application area in 'Good' or better condition, is considered representative of the Dwellingup and Yarragil complexes, extending over 4.71 ha. Similar intact vegetation is also likely to occur within the Korung National Park and Midgegooroo National Parks which supports similar jarrah and marri bushland extending to the north and east of the site and protected through MRS 'Parks and Recreation' reserves.

A flora and vegetation assessment to the standard required of a 'detailed' survey in the Environmental Protection Authority's (EPA's) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) was undertaken over the broader site, encompassing the application area, by Emerge Associates (2021a) (**Attachment 3**). The survey included consideration of whether any conservation significant flora, such as threatened flora species or threatened ecological communities (TECs) listed under the EPBC Act occur within the site.

A search of the Department of Biodiversity, Conservation and Attractions (DBCA) *NatureMap* database was conducted to determine the distribution of flora within a 10 km radius of the site. Separately, a search of the DBCA's threatened and priority ecological communities' database was also undertaken using a 5 km radius, as recommended by DBCA (reference 13-0620EC).

The database search results identified one extinct, 18 threatened and 28 priority flora species as potentially occurring within the site and/or surrounding 10 km area. This list has been further refined to those species known to have habitat preferences aligned with site conditions. As such, only 12 threatened flora species and 28 priority flora species are considered to have potential to occur within the site.

No TEC's or PEC's were identified within the database search as occurring within the site or clearing footprint. This was ground-truthed by the detailed flora and vegetation survey which did not identify any vegetation representative of a TEC or PEC. No threatened or priority flora species have been identified within the application area during previous or recent surveys (Emerge Associates 2021a).

Plant communities identified within the application area are described below and shown in **Figure 3**:

- **CcEmBa** - Open forest *Corymbia calophylla* and *Eucalyptus marginata* with *Allocasuarina fraseriana* over shrubland to tall shrubland *Banksia grandis* and *Bossiaea aquifolium* over

shrubland *Xanthorrhoea preissii* over mixed native herbland *Platysace filiformis*, *Stylidium* spp. and *Scaevola* spp. Extends over 4.71 ha (**Plate 5**).

- **Revegetation** – planted vegetation: closed shrubland dominated by *Calothamnus quadrifidus*. Extends over 0.007 ha (**Plate 6**).
- **Cleared and non-native vegetation** – Cleared areas and predominantly scattered non-native plants including patches of non-native planted trees. Extends over 1.03 ha (**Plate 7**).



Plate 5: Plant community **CcEmBa** in 'very good' condition



Plate 6: **Revegetation** in 'degraded' condition



Plate 7: **Cleared** in 'completely degraded' condition

Vegetation condition within the application area ranges from ‘very good’ to ‘completely degraded’ using methods from Keighery (1994). The ‘very good’ **CcEmBa** vegetation extends across most of the application area (4.54 ha) and consists of moderate to high density of native vegetation, with the rating reflecting minor signs of disturbance such as patches of bare ground and low weed cover. The remainder of the **CcEmBa** vegetation ranges from a ‘good – very good’ to ‘good’ condition. A small area of the ‘good – very good’ vegetation was identified within the southern portion of the existing access route, comprising a mosaic of small intact patches with moderately intact structure and native species diversity. The remaining ‘good’ **CcEmBa** vegetation is dispersed along the access route and the vehicle compound, with the rating reflecting the altered vegetation structure via historical clearing and weed invasion.

The ‘completely degraded’ vegetation extends over the remainder of the application area (1.03 ha) and consists of bare ground including tracks and the current quarry, with scattered native and non-native plants. The structure of this vegetation is no longer intact, and the area is completely or almost completely without native species (**Figure 4**).

3.4 Fauna values

The *Level 1 Fauna Assessment* (Emerge Associates 2020) prepared in accordance with the EPA’s *Technical Guidance – Terrestrial fauna Surveys* (EPA 2016a), described fauna habitats according to the dominant flora species and vegetation type present, as determined from observations made during the field survey and information provided in the *Detailed Flora and Vegetation Assessment* (Emerge Associates 2021a).

A search of DBCA’s *NatureMap* database was conducted to determine the distribution of fauna within a 10 km radius of the site, in addition to the DBCA’s threatened and priority fauna database (reference no. FAUNA#6347).

The database searches identified a total of 396 fauna species as occurring or potentially occurring within 10 km of the site, of which 34 are conservation significant fauna species, including 15 threatened, nine priority, eight migratory fauna and two other specially protected species.

With regard to specially protected, migratory, priority or threatened fauna species, 14 conservation significant species were considered ‘possible’ to occur in the application area, since potentially suitable habitat for the species in question was identified of marginal quality and/or extent, and the site lies within or close to the known distribution of the species. A further three conservation significant fauna species were ‘recorded’ in the site, as the species in question was positively identified as being present within the site during the field survey. These species have been included in **Table 1** below.

The remainder of the conservation significant fauna species identified in the desktop assessment are not considered likely to occur in the site due to lack of suitable habitat or because the site lies outside of the species known distribution.

Table 1: Conservation significant fauna species

Species	Common name	Level of Significance		Likelihood
		State	EPBC Act	
Birds				
<i>Apus pacificus</i>	Pacific swift	Migratory	Migratory	Possible
<i>Falco peregrinus</i>	Peregrine falcon	Other specially protected species	-	Possible
<i>Motacilla cinerea</i>	Grey wagtail	Migratory	Migratory	Possible
<i>Oxyura australis</i>	Blue-billed duck	Priority 4	-	Possible
<i>Plegadis falcinellus</i>	Glossy ibis	Migratory	Migratory	Possible

Table 1: Conservation significant fauna species (continued)

Species	Common name	Level of Significance		Likelihood
		State	EPBC Act	
<i>Tringa nebularia</i>	Common greenshank	Migratory	Migratory	Possible
<i>Calyptorhynchus banksii naso</i>	Forest red-tailed black cockatoo	Vulnerable	Vulnerable	Recorded
<i>Calyptorhynchus latirostris</i>	Carnaby's black cockatoo	Endangered	Endangered	Recorded
<i>Calyptorhynchus baudinii</i>	Baudin's black cockatoo	Endangered	Endangered	Recorded
Mammals				
<i>Dasyurus geoffroii</i>	Chuditch	Vulnerable	Vulnerable	Possible
<i>Hydromys chrysogaster</i>	Rakali	Priority 4	-	Possible
<i>Isoodon fusciventer</i>	Quenda	Priority 4	-	Possible
<i>Notamacropus irma</i>	Western brush wallaby	Priority 4	-	Possible
<i>Phascogale tapoatafa wambenger</i>	South-western brush-tailed phascogale	Conservation Dependent	-	Possible
Reptiles				
<i>Acanthophis antarcticus</i>	Southern death adder	Priority 3	-	Possible
<i>Ctenotus delli</i>	Dell's skink	Priority 4	-	Possible
Invertebrates				
<i>Kawaniphila pachomai</i>	Grey vernal katydid	Priority 1	-	Possible

Three fauna habitats have been identified within the application area: '**Marri and Jarrah Forest**', '**revegetation**', and '**predominantly cleared area**'. The classification and the area of each habitat is provided in **Table 2** and the extent is shown in **Figure 5**.

Table 2: Fauna habitats identified within the application area.

Fauna habitat classification	Area (ha)
Marri and Jarrah Forest	4.71
Revegetation	0.007
Predominantly cleared area	1.03
TOTAL	5.75

The highest fauna habitat values within the application area are associated with the **Marri and Jarrah Forest** habitat, which contains multiple species known to be consumed by species of black cockatoos and supports a dense understorey, suitable for the chuditch. This habitat was considered likely to provide value to a range of native species including some that are of conservation significance. The remainder of the application area provides low habitat values, due to the presence of cleared and non-native vegetation in a completely degraded condition and supporting a disconnected structure of either few or no native species.

The extent of the **Marri and Jarrah Forest** vegetation within the application area is relatively small (4.71 ha) compared to that within the remainder of Lot 9 (21.58 ha), as well as the local area, particularly the Korung National Park and the Midgegooroo National Park, **Figure 1**.

Black Cockatoo Foraging Habitat

Based on habitat requirements, species distribution and site conditions; all three threatened species of black cockatoo have potential to occur within the application area (referred to herein collectively as 'black cockatoos'):

- *Calyptorhynchus banksii naso* (Forest red-tailed black cockatoo), listed as 'vulnerable' under the EPBC Act and the *Biodiversity Conservation Act 2016* (BC Act).
- *Calyptorhynchus latirostris* (Carnaby's cockatoo), listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus baudinii* (Baudin's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.

A *Targeted Black Cockatoo Habitat Assessment* was undertaken by (Emerge Associates 2021c) and included an assessment of black cockatoo foraging, roosting and breeding habitat values within the application area and wider Lot 9.

The assessment classifies foraging habitat by identifying whether the plant species present are known to be foraged upon by black cockatoo species. Primary food plants are defined as those with historical and contemporary records of regular consumption by a black cockatoo species. Secondary foraging plants are defined as plants that black cockatoos have been recorded consuming occasionally or that, based on their limited extent or agricultural origin, should not be considered a sustaining resource.

The value of foraging habitat is further classified based on the proportion of primary or secondary food plants present within the area, as described below:

- Habitat with a high value has greater than 50% primary food plants
- Habitat with a moderate value has between 10% and 50% primary food plants
- Habitat with a low value has 10% or less primary food plants (this includes areas with 1-100% of secondary food plants, where no primary food plants are mapped)
- Habitat with a nil value has no primary or secondary foraging plants

A total 4.67 ha of foraging black cockatoo habitat has been identified within the application area, which contains vegetation that supports at least one of the three species of black cockatoo. A summary of foraging habitat for all three species within the application area is provided in **Table 3** and further illustrated in **Figure 7**.

Table 3: Proportion of high, moderate and low foraging plants within patches of foraging habitat in the application area

	Black cockatoo species and foraging habitat area (ha)		
	Carnaby	Baudin	Forest red-tailed
High	4.67	4.61	4.67
Moderate	0	0	0
Low	0.002	0.06	0
Total	4.67	4.67	4.67

Forest red-tailed black cockatoos were observed foraging within the site and Baudin's cockatoos were observed adjacent to the site. Foraging evidence (chewed nuts, feathers) attributed to the two aforementioned species of black cockatoo and Carnaby's cockatoo was observed within the site.

Black Cockatoo Habitat Trees

A total of 102 habitat trees were recorded in the site, of which none contained hollows suitable for breeding by black cockatoos. Therefore, the application area does not currently provide breeding habitat for black cockatoos (**Figure 6**).

Black Cockatoo Roosting Habitat

Tall native and non-native trees within the application area have the potential to provide roosting habitat for black cockatoos. A search of the Great Cocky Count Roosting Records (Birdlife 2020) identified one forest red-tailed black cockatoo roosting site 4 km to the west, within the Banyowla Regional Park. No sites were recorded onsite.

During the field survey, no evidence of roosting, such as droppings, moulted feathers or branch clippings were observed within the application area. Given the limited number of larger trees present, black cockatoos are considered unlikely to use the application area for roosting (Emerge Associates 2021c).

Chuditch

Chuditch (*Dasyurus geoffroii*) is listed as a 'vulnerable' species under the BC Act and under the EPBC Act.

The chuditch was historically distributed across the majority of Australia and was known to utilise a range of habitats including woodlands, dry sclerophyll forests, riparian vegetation, beaches, and deserts. The species is considered locally extinct across the Perth region of the Swan Coastal Plain and are now predominantly abundant in areas of contiguous Jarrah forest with small, isolated subpopulations in the WA Wheatbelt and Goldfields regions. The chuditch requires adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive. They can travel long distances and as such, have a large home range. For this reason, they require habitats that are of a suitable size and not excessively fragmented.

A search of *NatureMap* (DBCAs 2020) does not identify any previous records of the chuditch occurring within the site, however a number of historical records (dated pre-1997) occur within 2 km of the site within the Korung National Park to the north and a private landholding 1.5 km to the west. In addition, the species was not directly or indirectly observed during the fauna assessment (Emerge Associates 2020). The chuditch is primarily a nocturnal species, they may be diurnally active during the breeding season (April to July) or when cold, wet weather restricts nocturnal foraging (DEC 2012a). Due to the species solitary and nomadic lifestyle, populations are rarely observed in the wild (DEC 2012a) (DEC 2012b).

Given the species' wide habitat preference, the vegetation present within Lot 9 may provide a potential suitable microhabitat of dense understory and hollow logs. A total 4.71 ha of **Marri and jarrah forest** is identified as potentially suitable for the chuditch, comprising a suitable microhabitat of dense understory and hollow logs, as shown in **Figure 5**. The species may utilise the site on an occasional basis as a transient visitor but are unlikely to rely solely on the habitat within the site, given their large home range (>20,000 ha) and preference for unfragmented, consolidated habitat (DEC 2012a).

4 APPLICATION OF MITIGATION HIERARCHY

In accordance with *A guide to the assessment of applications to clear native vegetation* (DER 2014), the impact mitigation sequence has been considered in order to ensure the environmental impact from the proposed clearing for the project was kept to a minimum.

The purpose of the mitigation hierarchy is targeted to achieve a no net loss, which is defined as the point at which project related impacts are balanced through measures from the hierarchy, so no loss

is incurred, or a net positive impact, whereby the gains are greater than the losses. The hierarchy involves four key actions (Government of Western Australia 2014):

- Avoidance
- Mitigation
- Rehabilitation
- Offset

A summary of the mitigation hierarchy is provided below and addressed with relevance to the EP Act Clearing Principles in **Section 5**.

4.1 Avoidance

Avoidance through site selection involves the relocation of the project site away from areas with high or significant biodiversity and ecological values. Lot 9 Brookton Highway is considered an appropriate location for gravel extraction activities, owing to the presence of a pre-existing gravel pit. Avoidance through project design involves consideration of operational methods and infrastructure, in addition to the project layout. The project has been designed to limit the extent of disturbance by utilising, where possible, existing impacted areas and avoids splitting native vegetation and movement corridors. Avoidance through scheduling involves consideration of seasonal and diurnal patterns of species behaviour including breeding and migratory seasons.

4.2 Mitigation

Where avoidance is not possible, mitigation measures will be undertaken to reduce the duration, intensity and/or extent of impacts on conservation significant species (including direct, indirect and cumulative impacts). The clearing of 4.71 ha of native vegetation representing habitat for the black cockatoo and the chuditch is considered unavoidable due to the location of the gravel resource and the earthworks required to carry out the proposed stage 5 quarry operations and excavation.

An Environmental Management Plan (EMP) (Emerge Associates 2021b) has been prepared in support of the DA and EIL application and addresses the various mitigation measures to be implemented for the relevant environmental factors (**Attachment 6**) which are flora and vegetation, fauna, water and social surroundings.

4.3 Rehabilitation

Rehabilitation of the application area is aimed to return specific biodiversity features to an area following exposure to impacts that cannot be completely avoided or minimised. Rehabilitation efforts will be aimed at restoring the maximum environmental value that is reasonably practicable through revegetation, control of weeds, disease and feral animals.

Clearing of native vegetation will occur progressively associated with extraction stages and rehabilitated in alignment with the EMP's *Rehabilitation and Decommissioning programme* (Emerge Associates 2021b). A total 13.43 ha of native revegetation will be established within the site which will ultimately establish potential breeding and foraging habitat for a number of conservation significant flora and fauna, including Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo. This incorporates the 5.01 ha of native revegetation previously condition under Clearing Permit 8273-1 for stage 4 of the quarry. The remaining 8.42 ha comprises additional revegetation areas (i.e. not already required as part of previous approvals), with 4.99 ha of the stage 5 expansion, and 3.43 ha across the stage 3 quarry and previously disturbed areas of the site, collectively to counterbalance the residual impact of the stage 5 expansion area (**Figure 10**).

4.4 Offset

Environmental offsets address significant environmental impacts that remain after on-site avoidance and mitigation measures have been undertaken. According to Principle Two of the *WA Environmental Offsets Policy* (Government of Western Australia 2014); while environmental offsets may be appropriate for significant residual impacts or risks, they will not be applied to minor

environmental impacts (i.e. where the residual impact is not considered to be significant, no offset will be required). Environmental offsets will only be applied where the residual impacts of a project are determined to be significant, after avoidance, minimisation and rehabilitation have been pursued.

The proponent has applied the first three steps in the mitigation hierarchy; Avoid, Minimise and Rehabilitate in the design and future operation of the proposed gravel quarry expansion to reduce the environmental impact and therefore the residual impacts. The requirement for environmental offsets has been considered unnecessary, as the project will have no significant residual impacts. The application of the mitigation hierarchy has been demonstrated under each of the ten clearing principles as far as they are relevant to the proposed expansion in **Section 5** below.

5 RESPONSE TO EP ACT CLEARING PRINCIPLES

When assessing clearing permit applications, DWER has regard to the ten clearing principles contained in Schedule 5 of the EP Act so far as they are relevant to the matter under consideration.

In support of this area permit clearing application, we have considered and responded to the ten clearing principles in the following sections.

5.1 Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.

5.1.1 Flora and Vegetation

Based on the results of the flora and vegetation assessment (Emerge Associates 2021a), the site has been exposed to a history of anthropogenic disturbances within the last 50 years due to the mixture of agricultural and gravel extraction land uses. The broader site contains seven native plant communities comprising approximately 150 species, whilst the clearing permit application will necessitate the removal of one native plant community comprising approximately 91 species, in addition to cleared and revegetation areas associated with non-native and/or planted vegetation, as described in **Table 4**.

Table 4: Extent of flora and vegetation conditions within the proposed stage 5 quarry footprint and across the remainder of the site

Plant Community	Vegetation Condition	Clearing Footprint (ha)	Entire site (ha)	% of vegetation removed
CcEmBa	Very Good	4.54	12.93	36.64%
	Good – Very Good	0.006	6.99	0.09%
	Good	0.16	4.24	3.78%
	Degraded	0	2.10	0%
Revegetation	N/A	0.007	1.81	0.39%
Cleared and non-native	Completely degraded	1.03	12.44	8.28%

As outlined above, the clearing permit application will necessitate the removal of 4.54 ha of native plant community **CcEmBa** in ‘very good’ condition, supporting moderate to high cover of native species and low weed cover. The remainder of the clearing permit application area (18%) comprises **cleared and non-native vegetation** (1.03 ha) in ‘completely degraded’ condition, in addition to **revegetation** (0.007 ha). These latter areas do not comprise an intact native plant community, attributed to the extensive historical clearing and weed invasion. Furthermore, the application area is not located within a national biodiversity hotspot, as identified by the Threatened Species Scientific Committee (Douglass 2019). Therefore, its removal is not considered to impact on a plant community of high biological diversity (Emerge Associates 2021a).

In the context of the broader local and regional area, the removal of 4.71 ha of potential habitat constitutes a small proportion of the intact Yarragil and Dwellingup vegetation complexes (which also provides intact potential chuditch habitat) extending over the Darling Scarp. This intact vegetation is also likely to occur within the Korung National Park and Midgegooroo National Parks which supports similar jarrah and marri bushland. As such, the vegetation to be cleared is no more or less biodiverse than the large areas of similar vegetation.

No priority or threatened flora species were observed within the application area. Overall, the flora species diversity within the application area is lower than what would be expected if the land had not been subject to the high levels of disturbance and modification observed.

As outlined in the assessment report (Emerge Associates 2021a), the methodology, timing and level of effort applied during the flora, vegetation and fauna surveys were considered to be suitable for the application area and did not limit the survey outcomes. As such, the survey outcomes are considered suitable to assess the level of biodiversity within the application area.

5.1.2 Application of Mitigation Hierarchy

5.1.2.1 Avoid

As part of the development process numerous alternative locations were initially considered. The land situated to the east and south of the current proposal were identified to contain gravel resource, however, due to the presence of granite outcrop plant communities in ‘excellent’ condition and the ephemeral Stinton’s Creek, these areas have been avoided.

The utilisation of the land directly adjacent to the stage 4 quarry has been chosen to specifically avoid further fragmentation of contiguous remnant vegetation within the broader site and thus avoids splitting native vegetation and movement corridors. The location of the application area allows for the utilisation of already disturbed land, including the existing internal access track (**Figure 1**). Furthermore, those areas containing higher biodiversity, such as the areas of granite outcrop which are in excellent condition, have been avoided to ensure preservation of the community. Whilst 91 species are proposed to be removed, the broader Lot 9 will ensure the perpetuation of 150 species, an outcome that will ensure the current level of biodiversity is not negatively impacted.

5.1.2.2 Mitigate

The extent and intensity of the impacts will be mitigated through the preservation of the remaining native vegetation onsite, and the implementation of various measures to prevent unauthorised clearing, as well as the spread of invasive weed species and *Phytophthora* dieback from the application area to the wider site. The **CcEmBa** community is well reserved locally outside of the proposed application area and within the clearing avoidance footprint. A total 21.47 ha of **CcEmBa** is situated along the eastern periphery and south-western portion of the broader site (Lot 9), along with six other native plant community types in ‘degraded’ to ‘excellent’ condition.

The proposed mitigation strategies relevant to the health of the surrounding vegetation has been summarised in **Table 5**.

Table 5: Mitigation measures to protect health and biodiversity of the surrounding vegetation

Impact	Mitigation	Purpose
Vegetation	Native vegetation to be retained will be visibly delineated on site according to the clearing avoidance areas.	No clearing of this vegetation is permitted, to preserve the native vegetation in the wider Lot 9.
Dieback and Weeds	Access within the quarry area will be controlled. No soil and/or vegetation should be brought to the site apart from that to be used in rehabilitation. Those used in rehabilitation should be free from weeds and dieback.	This will prevent disturbance to vegetation and weed/dieback invasion.

Table 5: Mitigation measures to protect health and biodiversity of the surrounding vegetation (continued)

Impact	Mitigation	Purpose
	Excavated materials that require stockpiling (topsoil and overburden) from the Stage 5 quarry area shall not be removed from the quarry. This material will be stockpiled within the vicinity of excavation.	This will prevent the potential spread of dieback out of the quarry.
	Pre-disturbance dieback survey shall be undertaken within the stage 5 quarry region.	To confirm phytophthora dieback is not dormant within material in the application area.
	Restrict access to areas outside the quarry operations.	To reduce the spread of weeds and dieback into or out of the site.
	Any identified WoNS will be given priority and removed promptly. All WoNS have an individual strategic management plan, which will be adhered to.	To mitigate negative impacts on rehabilitated areas and nearby native vegetation.

5.1.2.3 Revegetation

In accordance with the EMP (Emerge Associates 2021b) a total 13.43 ha of native revegetation will be established within the site, 8.42 ha of which is not already required as part of previous approvals to counterbalance the residual impact of the stage 5 expansion site. As listed in **Table 6** below, the revegetation activities will establish a dense groundcover and shrub species from seeds of the local providence.

The revegetation of the site will provide corridors, avoiding any gaps in otherwise homogenous habitat, leading to more suitable and larger areas of habitat to the north and east of the site. Revegetation activities are further detailed in Section 6 of the EMP (Emerge Associates 2021b) (**Attachment 6 – Environmental Management Plan**).

Table 6: Revegetation plant species list

Form	Species
Groundcovers	<i>Hardenbergia comptoniana</i> <i>Kennedia coccinea</i> <i>Orthrosanthus laxus</i> <i>Dampiera linearis</i> <i>Burchardia congesta</i> <i>Clematis pubescens</i> <i>Kennedia prostrata</i> <i>Conostylis aculeata</i>
Shrubs	<i>Allocasuarina humilis</i> <i>Calothamnus quadrifidus</i> <i>Hakea amplexicaulis</i> <i>Hakea lissocarpa</i> <i>Mirbelia dilatata</i> <i>Hakea petiolaris</i> <i>Acacia drummondii</i> <i>Acacia huegelii</i> <i>Acacia preissiana</i> <i>Hemiandra pungens</i> <i>Hibbertia racemosa</i> <i>Acacia lateriticola</i> <i>Acacia pulchella</i>
Trees	<i>Eucalyptus patens</i> <i>Eucalyptus lane-poolei</i> <i>Eucalyptus laeliae</i> <i>Eucalyptus wandoo</i> <i>Corymbia calophylla</i>

5.1.2.4 Residual Impact

In consideration of the above mitigation and rehabilitation measures, there is not likely to be a significant residual impact and therefore clearing is not at variance with Principle (a) and an offset is not required.

5.2 Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia

As outlined above, the fauna assessment (Emerge Associates 2020) concluded that fauna habitat values within the application area are generally high, potentially providing value to a range of native species, including the conservation significant black cockatoos, as well as the five mammal, two reptile and one insect species noted in **Table 1**.

5.2.1 Overview of habitat values

Within the application area, the highest fauna habitat values are associated with the **Marri and Jarrah Forest** habitat, which comprises 81.84% of the application area. In particular, where this vegetation remains in ‘good’ condition, it provides a cover of native trees and shrubs, dense ground cover and contains microhabitats such as logs, rocks and leaf litter.

The forest red-tailed black cockatoo was observed actively foraging within the broader Lot 9, and secondary foraging evidence (chewed marri, jarrah, tuart or banksia fruits) was identified for Carnaby’s black cockatoo, Baudin’s black cockatoo and the Forest red-tailed black cockatoo within the site. A record of these species within the site was anticipated as the wider local area contains extensive areas of habitat known to be utilized by the species. Hence, clearing within the application area is unlikely to have a significant impact upon the potential habitat of the three black cockatoo species within the site and wider area.

The chuditch was neither directly nor indirectly identified within the broader Lot 9. Given the extensive range of the species, the impacts on the Chuditch have not been considered as part of this assessment.

5.2.2 Black cockatoo foraging habitat

Foraging habitat is classified as primary or secondary foraging habitat, by identifying those plant species known to be foraged upon by the black cockatoos. Within the wider site, primary foraging plants predominately comprise of marri, jarrah and *Banksia grandis* (bull banksia), whilst secondary foraging plants comprise primarily *Xanthorrhoea preissii* (grass trees) and *Grevillea manglesii* subsp. *manglesii* as well as scattered individuals of *Eucalyptus camaldulensis* (river gum) (Emerge Associates 2021c).

The value of foraging habitat is further classified into ‘high’, ‘medium’, and ‘low’ categories, based on the proportion of primary and secondary foraging habitat mapped within the area.

The application area supports 4.67 ha of foraging habitat for Carnaby’s black cockatoo, Baudin’s black cockatoo, and the Forest red-tailed black cockatoo. The extent of the proposed clearing impact has been further described in **Table 7** and shown in **Figure 7**.

Table 7: Extent of black cockatoo foraging habitat conditions within the proposed stage 5 quarry footprint and across the remainder of the site

	Black cockatoo species and foraging habitat area (ha)								
	Carnaby’s			Baudin’s			Forest red-tailed		
	Clearing Footprint (ha)	Entire site (ha)	% removed	Clearing Footprint (ha)	Entire site (ha)	% removed	Clearing Footprint (ha)	Entire site (ha)	% removed
High	4.67	23.41	19.95	4.61	22.85	20.18	4.67	23.46	19.95
Medium	N/A	0.26	0	N/A	0.30	0	N/A	0.26	0
Low	0.002	5.34	0.04	0.06	3.66	3.70	N/A	1.25	0
Total	4.67	29.01	16.10	4.67	26.81	17.42	4.67	24.97	18.70

The black cockatoo habitat quality score for the site was determined to be seven out of ten (moderate - high) for all three species of black cockatoo, due to the presence of a high proportion of foraging habitat within the site and abundant foraging evidence. The full results and methodology of the foraging habitat quality assessment is provided in **Attachment 4**.

However, there is large amounts of potential foraging habitat within local and regional proximity to the application area. The Korung National Park and Midgegooroo National Park situated to the north and east, respectively, comprise extensive areas of potential foraging habitat. Due to the existing edge effects and minimal amount of foraging habitat present within the site, it is unlikely that the removal of 4.71 ha will fragment an existing foraging source, nor represent a key local or regional resource for the species. Specifically, 10,451 ha of potential Carnaby's black cockatoo foraging habitat is mapped within 6 km of the site, which is equivalent to the area of potential Forest red-tailed foraging habitat. This equates to 0.045% of habitat loss for each of those species. The habitat present within the broader area is illustrated within **Figure 8**. Given that significant areas of foraging habitat are located within 6 km of the application area, it is not likely that cumulative impacts would result in significant local impacts to the extent that the occurrence of the species locally would be affected.

5.2.3 Black cockatoo breeding and roosting habitat

A total of 102 habitat trees are recorded within the application area with a diameter at breast height (DBH) of ≥ 50 cm, none of which contain a suitable hollow for breeding indicating the area is not a breeding location for either of the three species of black cockatoos (**Figure 6**). A total of 366 habitat trees, two of which contain a suitable hollow representative of a breeding habitat, are present within the clearing avoidance footprint (**Figure 9**).

The black cockatoo breeding habitat quality score for the broader Lot 9 was determined to be five out of ten (moderate) for Carnaby's black cockatoo and Forest red-tailed black cockatoo. This is primarily due to the presence of active, historical, or potential nesting sites within 6 – 12 km, along with potential foraging habitat within a radius of 6 km. However, this overestimates the breeding value of the application area as this incorporates the overall score for Lot 9, rather than the significantly smaller application area. No breeding habitat score was assigned for Baudin's cockatoo as the site is located outside of its known breeding range. As there are no known breeding locations within the vicinity of the application area, it is not considered to support breeding habitat significant to the black cockatoo species, as discussed within the *Level 1 Fauna Assessment* (Emerge Associates 2020).

Whilst native and non-native trees within the application area have the potential to provide roosting habitat for black cockatoos, no roosts or secondary evidence of roosting was observed during the field surveys. Given that there are large areas of better-quality vegetation located north and east of the clearing permit, the application area is not considered to support a significant habitat for a metapopulation. A database search through BirdLife Australia (2021) further identifies 21 roost sites within 12 km of the site, none of which are detected within the application area (**Figure 8**). Due to this, the black cockatoo roosting habitat quality score was calculated as two out of ten (low).

5.2.4 Application of Mitigation Hierarchy

5.2.4.1 Avoid

The application area will avoid 30.83 ha of native vegetation which represents suitable habitat for a number of conservation significant fauna (referred to as the 'Clearing Avoidance Area'), as shown in **Figure 9**. The extent of the clearing area will be clearly defined on the ground before any clearing activities commence to ensure there will be no inadvertent encroachment of disturbance into retained vegetation. This vegetation supports high fauna habitat values, including:

- A total 366 black cockatoo habitat trees, two with suitable hollows
- At least 22.14 ha of BC foraging habitat, 24.34 ha of CC foraging habitat and 20.30 ha of FRTBC foraging habitat.

Impacts may be avoided to conservation significant species by understanding and taking into account seasonal and diurnal patterns of species behaviour (ie. key breeding or migration seasons). Baudin's black cockatoo breed in the southern part of their range, near Wellington Dam, east to Kojonup and south to Albany over August to December. Carnaby's black cockatoo has been known to fly to the southwest interior and some coastal areas from Yanchep-Margaret River to breed from late winter to summer over July to December. Unlike the other two species, Forest Red-tailed black cockatoos can breed at almost any time of year.

To minimise the risk of disturbing active black cockatoo nesting hollows within the broader site and surrounding areas, clearing will be undertaken outside of the main breeding season where possible for Carnaby's black cockatoo and Baudin's black cockatoo to cause the least possible disruption to these species.

5.2.4.2 Mitigate

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained within the native vegetation proposed to be retained and adjacent conservation areas, the measures presented within **Table 8** are to be applied during site works.

Table 8: Mitigation measures for conservation significant species

Impact	Mitigation	Purpose
Native Fauna	A pre-disturbance fauna inspection will be undertaken 1-2 days before clearing.	To ensure there are no active black cockatoo breeding nests.
	Clearing is to be undertaken outside of the main bird breeding season (spring).	To minimise the risk of disturbing active bird nests.
	An experienced fauna specialist will be present as a fauna spotter during clearing of vegetation, in areas to be cleared, and areas just cleared.	To identify the presence of bird or marsupial species in trees and more common ground dwelling fauna species, such as small mammals, lizards and snakes. If encountered, these animals will be assisted to disperse to nearby vegetation, if appropriate, or translocated.
	As far as practical, clearing will be completed in a single direction without creating patches of vegetation.	To ensure that fauna do not become trapped and injured during works.
Pest Fauna	A 1.5 m high fence composed of steel star pickets with rammed in corner assemblies along the perimeter of revegetation areas.	Maintain and control herbivorous fauna (i.e kangaroos and rabbits) entering these zones.

5.2.4.3 Revegetation

In accordance with the EMP (Emerge Associates 2021b) and **Table 6** rehabilitation measures will focus on improving degraded or removed conservation significant fauna habitat following exposure to impacts that cannot be completely avoided or minimised. The area of land to be rehabilitated within the site will counterbalance the clearing within the application area. A total 4.67 ha of habitat will be removed in comparison to the 8.19 ha to be revegetated with black cockatoo roosting, breeding and foraging habitat.

The Carnaby's cockatoo are known to feed on seeds, flowers, and nectar of native proteaceous plant species. The specific intention of the revegetation activities is to establish foraging habitat through planting several known foraging species from the local province, including *Eucalyptus patens*, *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus wandoo*, *Hakea petiolaris* and *Hakea lissocarpa*, with many of these species additionally provided nesting and roosting opportunities (Groom 2011).

Baudin's cockatoo feed on the seeds and flowers of marri, along with the seeds of jarrah, cultivated apples and pears, *Banksia* and *Hakea* species, in addition to insect larvae. The specific intention of

the revegetation activities is to establish foraging habitat through planting several known foraging species from the local province, including *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus wandoo* and *Hakea lissocarpha* (DBCA 2017b).

The diet of the Forest red-tailed black cockatoo is primarily (90%) comprised of marri seeds and jarrah fruit, and frequently forage karri, sheoak and snottygobble species. The specific intention of the revegetation activities is to establish foraging habitat through planting several known foraging species from the local province, including *Eucalyptus patens* (blackbutt), *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus wandoo* and *Allocasuarina humilis* (DBCA 2017a).

Based on the species selected, it is expected that shrubs would mature (flower and fruit) and provide foraging habitat for black cockatoos within approximately three to five years. Trees would be expected to provide a foraging resource for black cockatoos from around five to seven years. Noting that these timeframes would be the initial flowering and fruiting and abundance would increase with maturity. Revegetation activities are further detailed in Section 6 of the EMP (Emerge Associates 2021b) (**Attachment 6 – Environmental Management Plan**).

5.2.4.4 Residual Impact

Given the extent of proposed clearing and modification of vegetation; the extensive availability of habitat at both a local and regional scale in proximity to the site; and the proposed revegetation works; the impact of the disturbance footprint on the black cockatoos are not considered significant and thus, an offset is not required.

Clearing is not considered to be at variance with principle (b).

5.3 Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

A flora and vegetation assessment (Emerge Associates 2021a) was undertaken within the application area over multiple site visits between May 2020 and December 2020. The assessment included consideration of whether any conservation significant flora, such as threatened flora species or TEC's listed under the EPBC Act occur within the application area.

No threatened or priority flora species have been identified during the field surveys. The survey included targeted searches of threatened flora during the primary flowering period (spring), therefore the presence or absence of any threatened flora species is considered sufficient based on the site conditions and survey efforts. In addition, there are no previous records of threatened flora previously recorded within the application area.

As no threatened flora have been identified within the application area, nor is it likely that any threatened flora will occur, an offset is not required.

Clearing is not considered to be at variance with Principle (c).

5.4 Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

The detailed field sampling and assessment undertaken between May 2020 and December 2020 (Emerge Associates 2021a) did not identify any TEC's or PEC's within the application area, nor within the wider site of Lot 9, Brookton Highway.

Furthermore, a desktop assessment through the DBCA's threatened and priority ecological communities' database was also undertaken using a 5 km radius, as recommended by DBCA (reference 13-0620EC). The results of which concluded that the application area does not intersect with any known mapped TEC's or PEC's.

As no threatened ecological communities or priority ecological communities have been identified within the application area, nor is it likely that any will occur, the proposed clearing is not considered to be at variance with Principle (d).

5.5 Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The application area is contained within the 'JF1' or northern jarrah forest subregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA) (Environment Australia 2000). The subregion is characterised as *Eucalyptus marginata* (jarrah) – *Corymbia calophylla* (marri) forest on laterite gravels with *Eucalyptus wandoo* – marri woodlands in the eastern part (Beard 1990).

Vegetation complex mapping extending over the Darling Scarp undertaken by DBCA (2019) indicates that the application area occurs across two vegetation complexes. The 'Dwellingup complex (D2)' comprises the majority of the application area, extending from the south-western portion to the north-eastern corner and is characterised by an open forest of *Eucalyptus marginata subsp. marginata* – *Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones. The 'Yarragil complex (Yg1)' expands across the remainder of the application area in the south-west and is characterised by open-forest of *Eucalyptus marginata subsp. marginata* – *Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *E. megacarpa* on the valley floors in humid and subhumid zones (**Figure 2**). Native vegetation within the application area in a 'good' or better condition is considered representative of the Dwellingup complex.

The 'Dwellingup complex' has 82.50% of its pre-European extent remaining on the Darling Plateau and the 'Yarragil complex' has 80.95% remaining (Government of Western Australia 2018). The Environmental Protection Authority's (EPA) (2008) *Guidance Statement No. 33. Environmental Guidance for Planning and Development* identified a standard level of native vegetation retention of at least 30% of the pre-clearing extent of the vegetation complex in a bioregion. Therefore, the Dwellingup and Yarragil percentages exceed the 30% EPA threshold for unconstrained areas of the Perth and Peel regions (EPA 2008).

The proposed clearing of 4.55 ha of D2 and 1.20 ha of Yg1 is not considered to be significant given the large amount of available vegetation at a local and regional scale. Therefore, an offset is not required. Clearing is not thought to be at variance to principle (e).

5.6 Principle (f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

The detailed flora and vegetation survey (Emerge Associates 2021a) confirmed that the application area contains no vegetation growing in, or in association with, wetlands or water courses.

This is further supported by the *Geomorphic Wetlands of the Swan Coastal Plain* (Locate 2021) dataset which indicates that no wetland features occur within the application area.

The head of a tributary of the ephemeral Stinton's Creek is located approximately 30 m south of the proposed quarry expansion and flows in a south-westerly direction as shown in Figure 2. The tributary remains dry for the majority of the year. No activities associated with the gravel extraction operation have previously disturbed the bed or banks of the tributary. Various fauna species may utilise the waterbody and fringing vegetation within this region, including the black cockatoo conservation significant species.

5.6.1 Application of Mitigation Hierarchy

5.6.1.1 Avoid

The *Operational policy 4.3: Identifying and establishing waterways foreshore areas* (DoW 2012) recommends a foreshore area width of 30 metres for waterways and 50 metres for estuaries to prevent the disturbance to riparian vegetation, as shown in **Figure 9**. No clearing of this vegetation will be permitted, and diversion banks will be constructed to allow clean surface water to return to the Stinton Creek, ensuring the environmental values are maintained. In addition, no machinery or support vehicles will enter the waterway avoidance area. This will ensure the environmental values of local conservation and buffer areas are maintained and ensure no disturbance activities will occur within this area during the excavation activities.

5.6.1.2 Mitigate

The management of surface water runoff from the proposed expansion, including management of uncontrolled surface water runoff into the tributary and potential erosion and sedimentation impacts have been addressed through the preparation of an Environmental Management Plan (EMP) to support the Stage 5 DA. The EMP has incorporated a Stormwater and Erosion Management Plan outlining the mechanisms to control uncontrolled surface water runoff to the Stinton's Creek tributary, to ensure existing surface water flow patterns are maintained. On this basis, pollutant transport, erosion and sedimentation as a result of the application area clearing is not expected to cause a significant residual impact.

5.6.1.3 Residual Impact

As there will be no impacts to wetlands or watercourses located adjacent to the application area, specifically Stinton's creek, with the proposed management measures, an offset is not required.

Clearing of the application area is not considered to be at variance to principle (f).

5.7 Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

The assessment of land degradation has identified two potential risks associated with the proposed clearing activity.

An examination of mapping supplied by the Department Primary Industries and Regional Development (DPIRD) based on the Environmental Geology Series mapping produced by Gozzard (2011) indicates that the application area is underlain by the following soils, as shown in **Figure 2**:

- Yg1 - Gently to moderately inclined slopes with moderately well drained yellow duplex soils, and yellow and brown massive earths.
- DW2 - Very gently to gently undulating terrain with well drained, shallow to moderately deep gravelly brownish sands.
- Cooke - Crests and upper slopes dominated by granite outcrop and very shallow yellow duplex soils, and yellow and brown massive earths.

Soil landscape mapping indicates that the majority of the application area is identified as sand (DPIRD 2019). Due to the features of this soil, the key risk for land degradation is wind and soil erosion, which have been summarised below. Further details of land management have been provided within the EMP (**Attachment 6**), provided as part of the Development Application.

5.7.1 Application of Mitigation Hierarchy

5.7.1.1 Mitigate

To mitigate adverse wind erosion within the proposed application area, various controls and measures will be enacted during site operations. Surface stabilisation and erosion control will be applied during clearing, including the utilisation of existing access tracks wherever possible, clearing activities are to be conducted during fine weather (not adverse and extreme weather events), either level or gently sloping areas will be selected as stockpile sites to minimise erosion, and a water truck will be operating onsite to wet down fine material.

To mitigate adverse soil erosion within the proposed application area, catch drains will be constructed to capture runoff and divert the water back into the quarry area for infiltration. Diversion banks and contour drains will be additionally constructed upslope of disturbed areas to allow clean surface water to return to the Stinton Creek, located 30 m south of the proposed quarry.

5.7.1.2 Rehabilitate

The application area will be rehabilitated using various native trees, shrubs, and herbs, as described above in **Table 6**.

5.7.1.3 Residual Impact

The proposed action is not expected to cause appreciable land degradation, as areas will largely be covered by vegetation and therefore, an offset is not required. The clearing of native vegetation is not considered to be at variance to principle (g).

5.8 Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Intact native vegetation is present immediately north of the site (Korung National Park, 6344 ha) and immediately east of the site (Midgegooroo National Park, 2492 ha) (**Figure 1**) (DPaW 2016).

5.8.1 Application of Mitigation Hierarchy

5.8.1.1 Avoid

These conservation reserves are separated to onsite activities through existing firebreaks, fencing and contiguous vegetation in 'very good' and 'excellent' condition to the east, and 'very good' and 'degraded' condition to the north.

5.8.1.2 Mitigate

The EMP has been prepared to outline the environmental management procedures to be implemented by the applicant for the proposed onsite activities, and to mitigate any indirect impacts resultant from the quarry works. Section 6 of the EMP provides a rehabilitation and decommissioning program in accordance with the requirements of the *City of Armadale Extractive Industries Local Law* (City of Armadale 2000).

Clearing areas will be clearly demarcated to ensure no inadvertent disturbance or unauthorised access into these areas occurs. *Phytophthora* dieback and weed management (particularly those listed as a Weed of National Significance (WoNS)) will be undertaken within the application area to ensure there is no degradation of the neighbouring conservation reserves.

Weeds will be controlled either through chemical application (spraying, wiping or pasting), or via non-chemical application (manual removal, soil scalping, oil cultivation or mulching). Any identified WoNS will be given priority and removed promptly, to mitigate negative impacts on rehabilitated areas and nearby native vegetation. All WoNS have an individual strategic management plan, which will be adhered to.

Whilst there is no evidence of *phytophthora* dieback infestation within the application area, it has historically been present within the adjacent stage 4 extraction area and therefore could be dormant within material. Prior to the commencement of the stage 5 quarrying works, a pre disturbance dieback survey shall be undertaken. Furthermore, hygiene procedures will be adopted during excavation in stage 5a and 5b to ensure that incidence of dieback is not increased. These procedures will include the cleaning of all vehicles and machinery of mud, soil and plant material prior to site entry and exit (as reasonably possible) and restricting access to areas outside the quarry operations.

5.8.1.3 Residual Impact

With the proposed management measures, the clearing of vegetation is unlikely to impact upon the environmental values of the nearby conservation areas, and thus an offset is not required.

Clearing is not considered to be at variance to principle (h).

5.9 Principle (i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Deterioration in quality of surface water or underground water can occur as a result of activities that result in sedimentation, increased nutrient levels, changes to pH (through acid sulphate soils), salinity or changes in water regimes of groundwater dependent ecosystems.

Acid sulphate soil (ASS) risk mapping prepared by DWER (2021) indicates that the application area does not fall within the extent of the mapping. ASS risk mapping does not extend over the Darling Scarp primarily due to the lack of ASS forming soil types, which are characteristic of well drained sandy soils. The Yarragil (Yg1) and Dwellingup 2 Phase (DW2) soil units mapped as occurring within the application area are free-draining sandy soils and are consequently unlikely to experience waterlogged conditions prone to forming ASS.

Based on the *Annual Environmental Audit* (Accendo 2019), groundwater is expected to be in excess of 15 m from the natural surface level, increasing in depth in an easterly direction. During previous excavation activities, groundwater has not been encountered.

5.9.1 Application of Mitigation Hierarchy

5.9.1.1 Avoid

The ephemeral Stinton Creek is situated south of the application area and disturbance of the seasonally waterlogged soils may present an ASS risk. However, due to the establishment of the waterway avoidance area, the proposed expansion evades the Stinton Creek tributary and will not cause any disturbance to the riparian vegetation, nor the creek bed and its banks. Two additional watercourses extend farther south and in the wider site. However, these non-perennial watercourses are beyond the proposed expansion area, approximately 100 m south of the vehicle compound and 275 m south of the application area.

5.9.1.2 Mitigate

As outlined above, through the mitigation measures to be employed during clearing (dust suppression and surface stabilisation where required); and the long-term management of exposed surfaces post-clearing (through revegetation, including stormwater management) is not likely to cause a deterioration in water quality.

5.9.1.3 Residual Impact

As no potential contaminants will be brought into the application area from the proposed clearing, the proposal is unlikely to have an effect on the quality of surface or underground groundwater. Due to this, an offset does not need to be considered.

The clearing is not considered to be at variance with principle (i).

5.10 Principle (j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

The application area is located within an area that is mapped as having predominantly sandy gravel.

A review of publicly available data and site-specific investigations did not identify any environmental factors that would increase the incidence of flooding, as discussed below:

- The site is elevated and is well drained with good potential for surface water management.
- The application area is not mapped as occurring within a floodplain area (DWER 2020).

The ephemeral Stinton Creek is situated onsite approximately 30 m south of the proposed application area and flows south-westerly to a dam in the central southern portion of the wider site. A waterway 'avoidance area' has been established either side of the Stinton Creek tributary to a width of 30 m, as per the *Operational policy 4.3: Identifying and establishing waterways foreshore areas* (DoW 2012) for foreshore areas. No clearing of this vegetation will be permitted, and diversion banks will be constructed to allow clean surface water to return to the Stinton Creek, ensuring the environmental values are maintained.

Two additional watercourses extend further south of the application area. However, these non-perennial watercourses are beyond the proposed expansion area, approximately 100 m south of the vehicle compound and 275 m south of the application area.

The proposed removal of native vegetation within the application area will not cause or exacerbate an incidence of flooding within the site or broader area and therefore, an offset is not required.

The clearing is not considered to be at variance with Principle (j).

6 SUMMARY AND CLOSING

A summary of the response to each clearing principle has been provided within **Table 9** below.

Table 9: Summary and response to the clearing principles

Clearing principle	Response to clearing permit principle
Principle (a)	The proposed clearing of 4.71 ha of native vegetation will unavoidably remove highly diverse flora habitat within the application area. The removal of this vegetation, however, constitutes a small portion of the intact Yarragil and Dwellingup vegetation complexes extending over the Darling Scarp, in addition to those that occur within the nearby Korung National Park and Midgegooroo National Park, which supports similar jarrah and marri bushland. As such, the vegetation to be cleared is no more or less biodiverse than the large areas of similar vegetation surrounding the site.
Principle (b)	<p>Within the application area, there is 4.67 ha of suitable foraging habitat for the Carnaby's black cockatoo, Baudin's black cockatoo, and the Forest red-tailed black cockatoo. However, there is large amounts of potential foraging habitat within local and regional proximity to the application area. The regional area supports 10,451 ha of potential Carnaby's and Forest red-tailed black cockatoo foraging habitat within 6 km radius. Due to the amount of foraging habitat in the broader area, including the broader Korung and Midgegooroo National Park, it is unlikely these species are reliant on vegetation within the clearing permit area. In addition, it is noted that 366 habitat trees, two of which contain a suitable hollow representative of a breeding habitat, are present within the clearing avoidance footprint. This will ensure that there is the retention of a foraging and potential breeding habitat for the black cockatoo species within the wider site (Lot 9).</p> <p>Furthermore, revegetation is proposed to occur. A total 13.43 ha of native revegetation will be established within the site which will ultimately establish potential breeding and foraging habitat for a number of conservation significant flora and fauna, including Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo. Based on the vegetation selected, it is expected that it would take between three and seven years from initial establishment for the revegetation to provide black cockatoo foraging habitat value, noting that abundance would increase with maturity. This incorporates the 5.01 ha of native revegetation previously conditioned under Clearing Permit 8273-1 for stage 4 of the quarry. The remaining 8.42 ha comprises additional revegetation areas (i.e. not already required as part of previous approvals), with 4.99 ha of the stage 5 expansion, and 3.43 ha across the stage 4 quarry and previously disturbed areas of the site, collectively to counterbalance the residual impact of the stage 5 expansion site.</p>
Principle (c)	No threatened or priority flora species were recorded within the application area as part of several flora surveys.
Principle (d)	No state-listed threatened ecological communities were identified within the application area.
Principle (e)	The vegetation complex identified within the application area exceeds the 30% EPA threshold for unconstrained areas. Therefore, the vegetation within the application area is not representative of a significant constituent of a vegetation complex.
Principle (f)	The flora and vegetation assessment did not identify any groundwater dependent vegetation, nor was any riparian vegetation identified within the application area. A watercourse (Stinton Creek) is situated approximately 30 m south of the application area. As per the <i>Operational policy 4.3: Identifying and establishing waterways foreshore areas</i> , clearing will not occur within 30 m of the tributary.
Principle (g)	The proposed clearing will not cause appreciable land degradation. Wind erosion and soil erosion are the primary concerns for the application area, and the proposed management measures will reduce potential for this to occur.
Principle (h)	The proposed clearing of vegetation is unlikely to impact the environmental values of the nearby Korung National Park and Midgegooroo National Park.

Table 9: Summary and response to the clearing principles (continued)

Clearing principle	Response to clearing permit principle
Principle (i)	The proposed clearing is not considered to pose a risk in terms of the deterioration of surface or groundwater.
Principle (j)	The proposed clearing is not likely to cause or exacerbate a risk of flooding.

It is suggested that the proposed clearing is consistent with the EP Act Clearing Principles, as detailed in this letter.

The avoidance options that have been utilised include restricting the bulk earthworks to the application area. Whilst this area has high fauna habitat values and a suitable vegetation condition, this is considered to be limited when compared to other areas of the broader site.

In addition to the above avoidance options that have been utilised, rehabilitation of the proposed clearing will occur through native vegetation replanting within the application area, as well as areas that have undergone historical disturbance. A total 13.43 ha of native revegetation will be established within the site which will ultimately establish potential breeding and foraging habitat for a number of conservation significant flora and fauna, including Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo. This incorporates 8.42 ha of additional revegetation areas (i.e. not already required as part of previous approvals), with 4.99 ha of the stage 5 expansion, and 3.43 ha across the stage 4 quarry and previously disturbed areas of the site, collectively to counterbalance the residual impact of the stage 5 expansion site.

Should you have any questions regarding the content of this letter, please do not hesitate to contact the undersigned.

Yours sincerely
Emerge Associates

Sarah Beukes

ENVIRONMENTAL CONSULTANT

cc: Leon Vinci
Aaron Lohman

Encl: Figure 1: Application Area Location and Quarry Staging Plan
Figure 2: Vegetation Complex Mapping
Figure 3: Plant Communities
Figure 4: Vegetation Condition
Figure 5: Fauna Habitat
Figure 6: Black Cockatoo Habitat Trees
Figure 7: Potential Black Cockatoo Foraging Habitat
Figure 8: Black Cockatoo Habitat Context
Figure 9: Avoidance Area
Figure 10: Rehabilitation Area
Attachment 1 – Signed clearing permit application form (Form C1)
Attachment 2 – Certificate of Title for Lot 9 on Diagram 42350
Attachment 3 – Detailed Flora and Vegetation Assessment (Emerge Associates 2021a)
Attachment 4 – Level 1 Fauna Assessment (Emerge Associates 2020)
Attachment 5 – Targeted Black Cockatoo Habitat Assessment (Emerge Associates 2021c)
Attachment 6 – Environmental Management Plan (Emerge Associates 2021b)
Email attachments – a .shp file of the application area has been submitted to DWER as part of the application.

General References

City of Armadale 2000, *Extractive Industries Local Law*.

department of biodiversity Conservation and Attractions (DBCA) 2017a, *Fauna Profile - Forest red-tailed black cockatoo *Calyptorhynchus banksii naso**, Perth, Western Australia.

Department of Biodiversity Conservation and Attractions (DBCA) 2017b, *Fauna Profile: Baudin's cockatoo *Calyptorhynchus baudinii**, Perth, Western Australia.

Department of Biodiversity Conservation and Attractions (DBCA) 2019, *Vegetation Complexes - South West forest region of Western Australia (DBCA-047)*, Kensington.

Department of Environment and Conservation (DEC) 2012a, *Chuditch (*Dasyurus geoffroii*) National Recovery Plan - Wildlife Management Program No. 54*.

Department of Environment and Conservation (DEC) 2012b, *Fauna Profile: Chuditch *Dasyurus geoffroii**, Perth, Western Australia.

Department of Environment Regulation (DER) 2014, *A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the Environmental Protection Act 1986*, Perth.

Douglass, L., Booth, C., Kennedy, S., and Turner, J. 2019, *An Extraordinary Natural Legacy: An assessment and recommendations for the proposed expansion of Western Australia's conservation reserve system*, Commissioned by the Pew Charitable Trusts. Centre for Conservation Geography.

Department of Water (DoW) 2012, *Operational policy 4.3: Identifying and establishing waterways foreshore areas*, Perth.

Department of Parks and Wildlife (DPaW) 2016, *2015-16 Annual Report*, Western Australia.

Department of Primary Industries and Regional Development (DPIRD) 2019, *Soil Landscape Mapping - Best Available (DPIRD-027)*, Perth, WA.

Department of Sustainability Environment Water Populations and Communities (DSEWPac) 2012, *EPBC Act referral guidelines for three threatened black cockatoo species*, Commonwealth of Australia, Canberra.

Department of Water and Environmental Regulation (DWER) 2020, *FPM 1 in 100 (1%) AEP Floodplain Development Control Area (DWER-003)*.

Emerge Associates 2020, *Level 1 Fauna Assessment - Lot 9 Brookton Highway, Karragullen*, EP20-040(04)--003 MS, Version 1.

Emerge Associates 2021a, *Detailed Flora and Vegetation Assessment - Lot 9 Brookton Highway Karragullen*, EP20-040(04)--002 RAW, 1.

Emerge Associates 2021b, *Environmental Management Plan - Lot 9 Brookton Highway, Karragullen* EP20-040(12)--007 BRB, 1.

Emerge Associates 2021c, *Targeted Black Cockatoo Assessment Lot 9 Brookton Highway, Karragullen*, EP20-040(05)--009A SCM, Version A.

Environmental Protection Authority (EPA) 2008, *Environmental Guidance for Planning and Development - Guidance Statement No. 33*, Western Australia.

Environmental Protection Authority (EPA) 2016a, *Technical Guidance - Terrestrial Fauna Surveys*, Perth.

Environmental Protection Authority (EPA) 2016b, *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, Perth.

Government of Western Australia 2014, *WA Environmental Offsets Guidelines*.

Government of Western Australia 2019, *2018 South West Vegetation Complex Statistics. Current as of March 2019*, WA Department of Biodiversity, Conservation and Attractions, Perth.

Gozzard, J. 2011, *Sea to scarp - geology, landscape, and land use planning in the southern Swan Coastal Plain*, Geological Survey of Western Australia.

Groom, C. 2011, *Plants Used by Carnaby's Black Cockatoo*, Department of Environment and Conservation, Perth.

Hedde, E. M., Loneragan, O. W. and Havel, J. J. 1980, 'Vegetation Complexes of the Darling System Western Australia', in Department of Conservation and Environment (ed.), *Atlas of Natural Resources Darling System Western Australia*, Perth.

Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

Online References

Department of Agriculture, Water and the Environment (DAWE) 2020, *Protected Matters Search Tool*, viewed 3 August 2021, <<https://www.environment.gov.au/epbc/protected-matters-search-tool>>.

Department of Biodiversity, Conservation and Attractions (DBCA) 2020, *NatureMap*, viewed 3 August 2021, <<https://naturemap.dbca.wa.gov.au/>>.

Landgate 2021, *Map Viewer*, viewed 3 August 2021, <<https://maps.landgate.wa.gov.au/maps-landgate/registered/>>.

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Figures

Figure 1: Application Area Location and Quarry Staging Plan

Figure 2: Vegetation Complex Mapping

Figure 3: Plant Communities

Figure 4: Vegetation Condition

Figure 5: Fauna Habitat

Figure 6: Black Cockatoo Habitat Trees

Figure 7: Black Cockatoo Foraging Habitat

Figure 8: Black Cockatoo Habitat Context

Figure 9: Avoidance Area

Figure 10: Rehabilitation Area

CPS 9539/1 - Application Area Location and Quarry Staging Plan

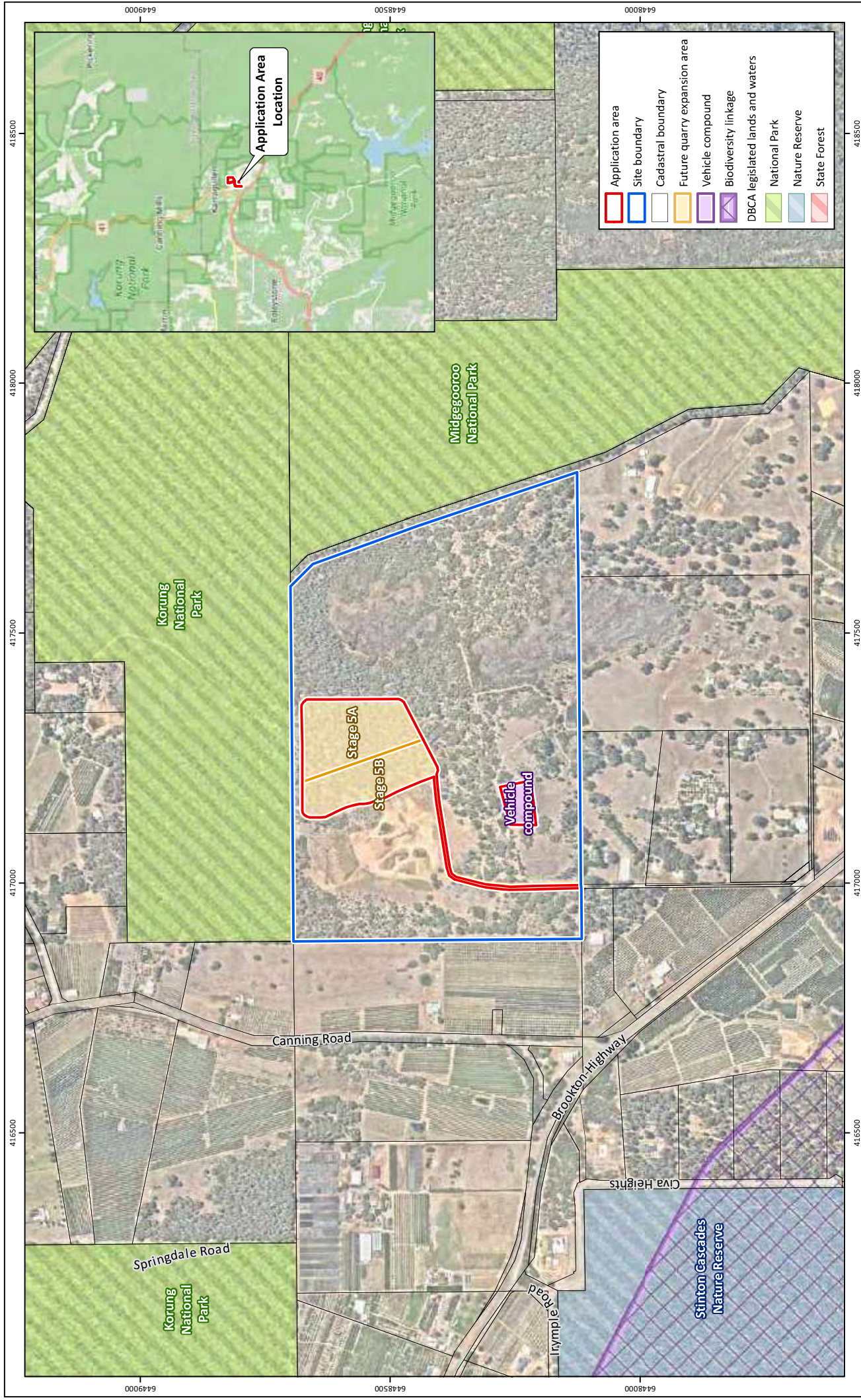


Figure 1: Application Area Location and Quarry Staging Plan

Project: Clearing Permit (Area Permit)
Lot 9 Brookton Highway, Karragullen

Client: Vncl Gravel Supplies Pty Ltd

Plan Number: EP20-040(09)-F66

Drawn: GAR

Date: 24/06/2021

Checked: SIB

Approved: JDH

Date: 17/12/2021

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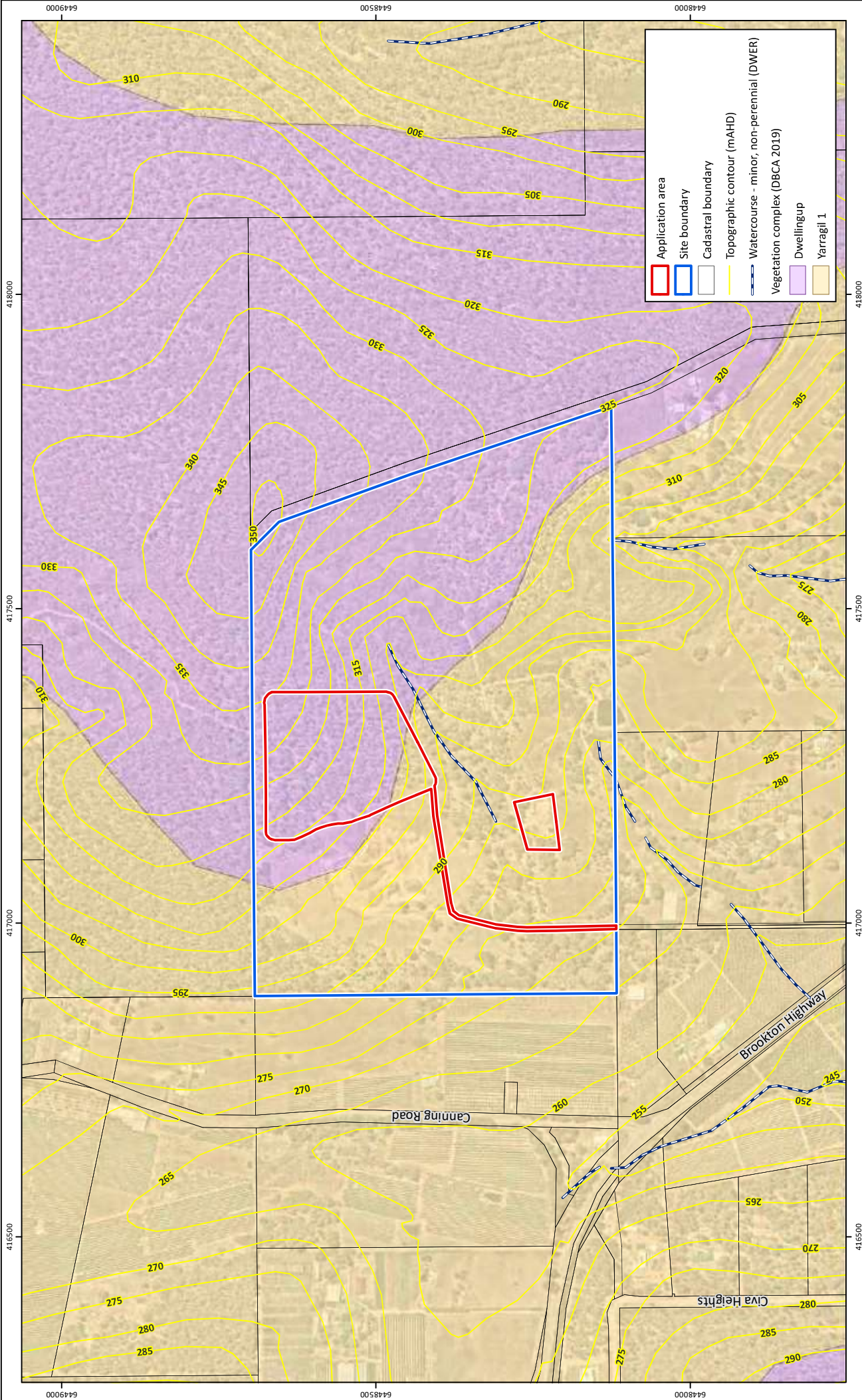
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GDA 1994 MGA Zone 50

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used (Landgate (2021)). Nearmap imagery date: 27/02/2021.



	Application area
	Site boundary
	Cadastral boundary
	Topographic contour (mAHD)
	Watercourse - minor, non-perennial (DWER)
	Vegetation complex (DBCA 2019)
	Dwellingup
	Yarragil 1

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Metres

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GDA 1994 MGA Zone 50



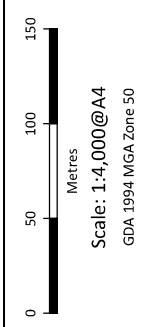
Plan Number: EP20-040(09)-F67
 Drawn: GAR
 Date: 24/06/2021
 Checked: SIB
 Approved: JDH
 Date: 17/12/2021

Figure 2: Vegetation Complex Mapping

Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen

Client: Vncl Gravel Supplies Pty Ltd

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used



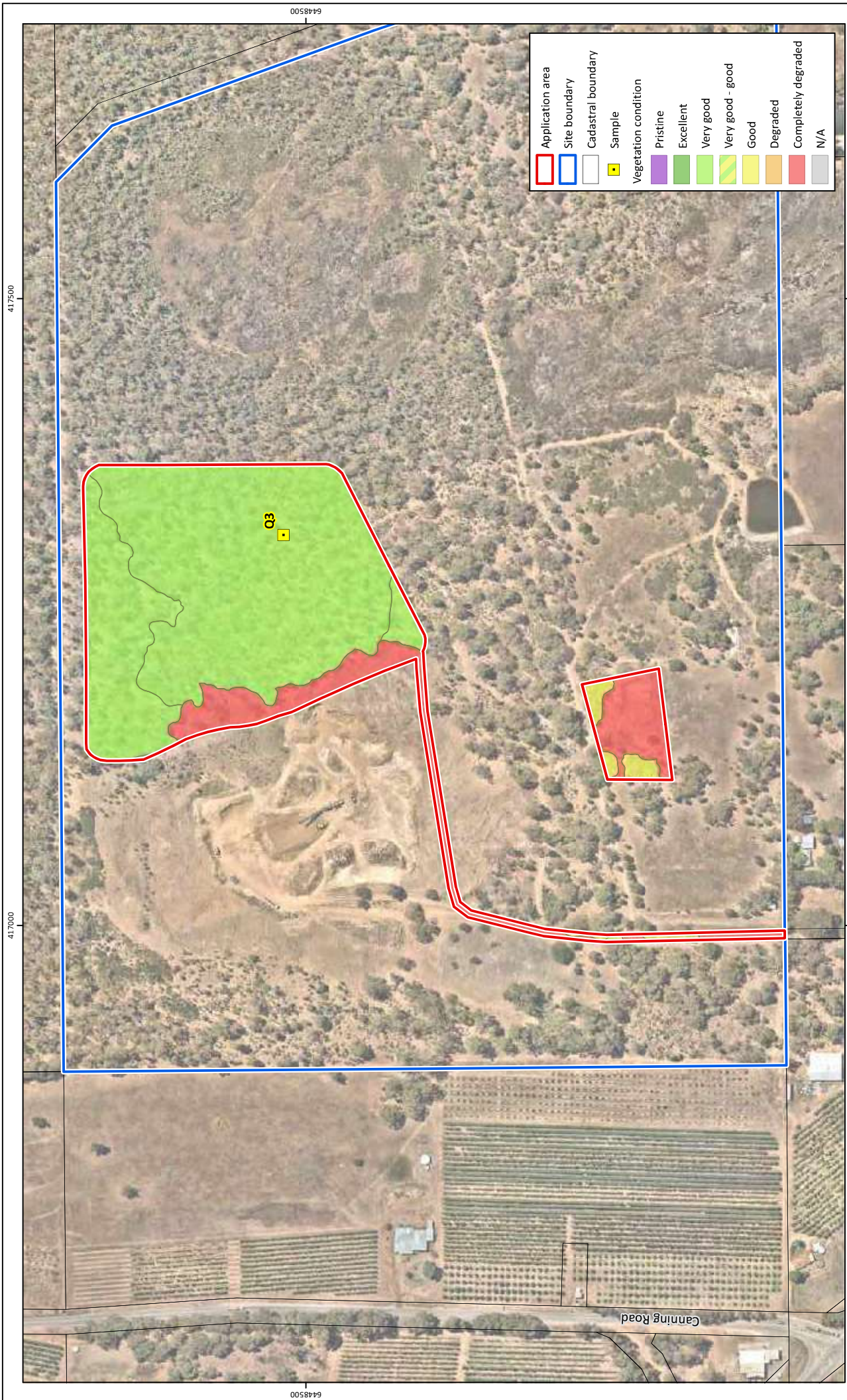
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Date: 24/06/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021

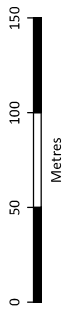
Figure 3: Plant Communities

Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen
Client: VincI Gravel Supplies Pty Ltd

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used



	Application area
	Site boundary
	Cadastral boundary
	Sample
Vegetation condition	
	Pristine
	Excellent
	Very good
	Very good - good
	Good
	Degraded
	Completely degraded
	N/A



Scale: 1:4,000@A4
GDA 1994 MGA Zone 50



Plan Number: EP20-040(09)-F69
Drawn: GAR
Date: 24/06/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021

Figure 4: Vegetation Condition

Project: Clearing Permit (Area Permit)
Lot 9 Brookton Highway, Karragullen
Client: VincI Gravel Supplies Pty Ltd

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Drawn: GAR
Date: 24/06/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021

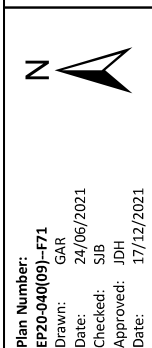
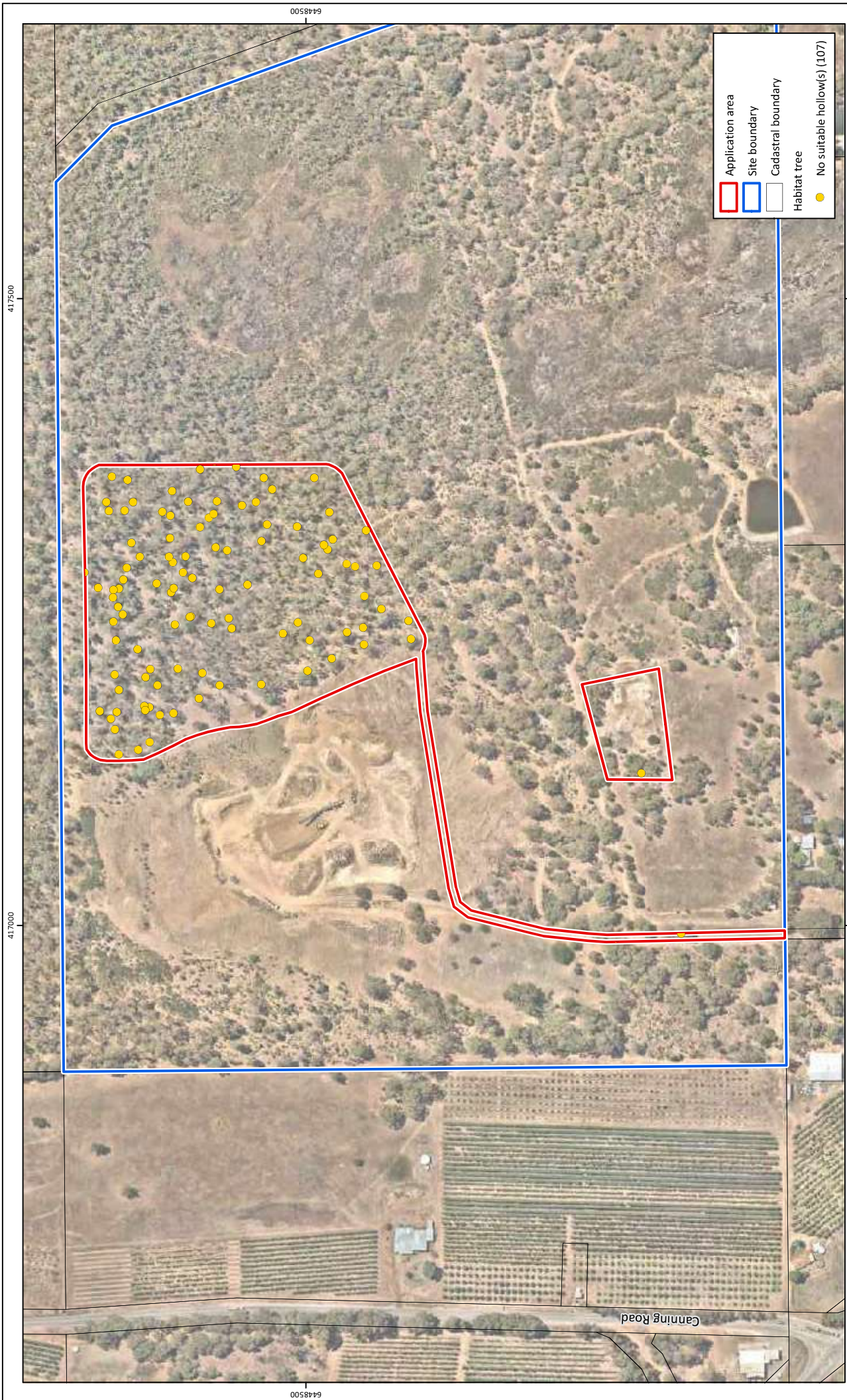


Figure 5: Fauna Habitat

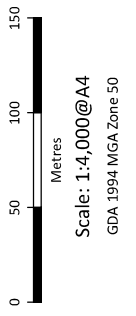
Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen

Client: VincI Gravel Supplies Pty Ltd

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used



- Application area
- Site boundary
- Cadastral boundary
- Habitat tree
- No suitable hollow(s) (107)

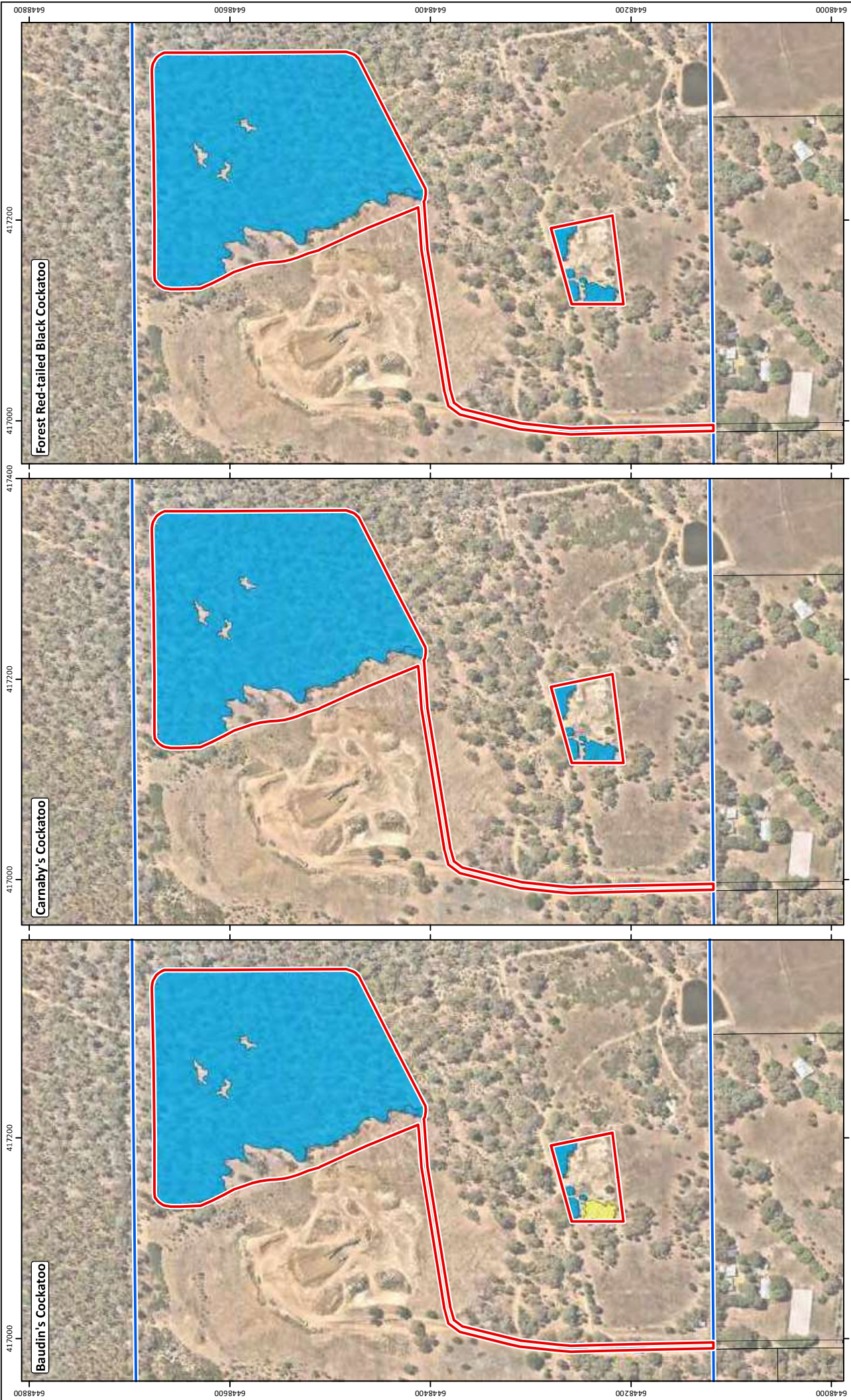


Plan Number: EP20-040(09)-F72
Drawn: GAR
Date: 24/06/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021

Figure 6: Black Cockatoo Habitat Trees

Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen
Client: Vncl Gravel Supplies Pty Ltd

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used



Baudin's Cockatoo

Carnaby's Cockatoo

Forest Red-tailed Black Cockatoo

Figure 7: Black Cockatoo Foraging Habitat

Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen
Client: Vncl Gravel Supplies Pty Ltd

- Application area
- Site boundary
- Cadastral boundary
- Foraging habitat value
 - High
 - Moderate
 - Low

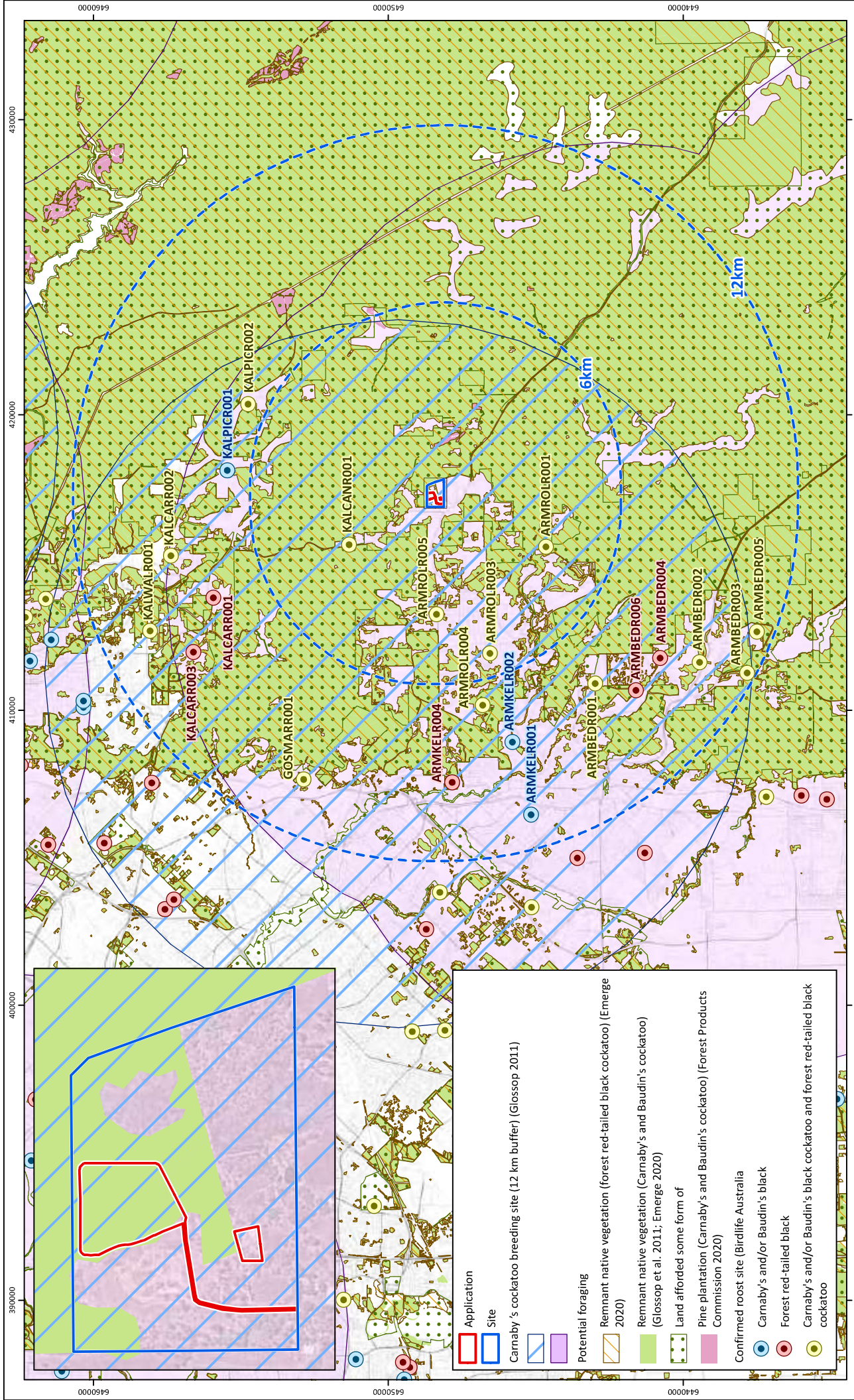
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Drawn: GAR
Date: 24/06/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021



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 Scale: 1:5,000@A4
 GDA 1994 MGA Zone 50



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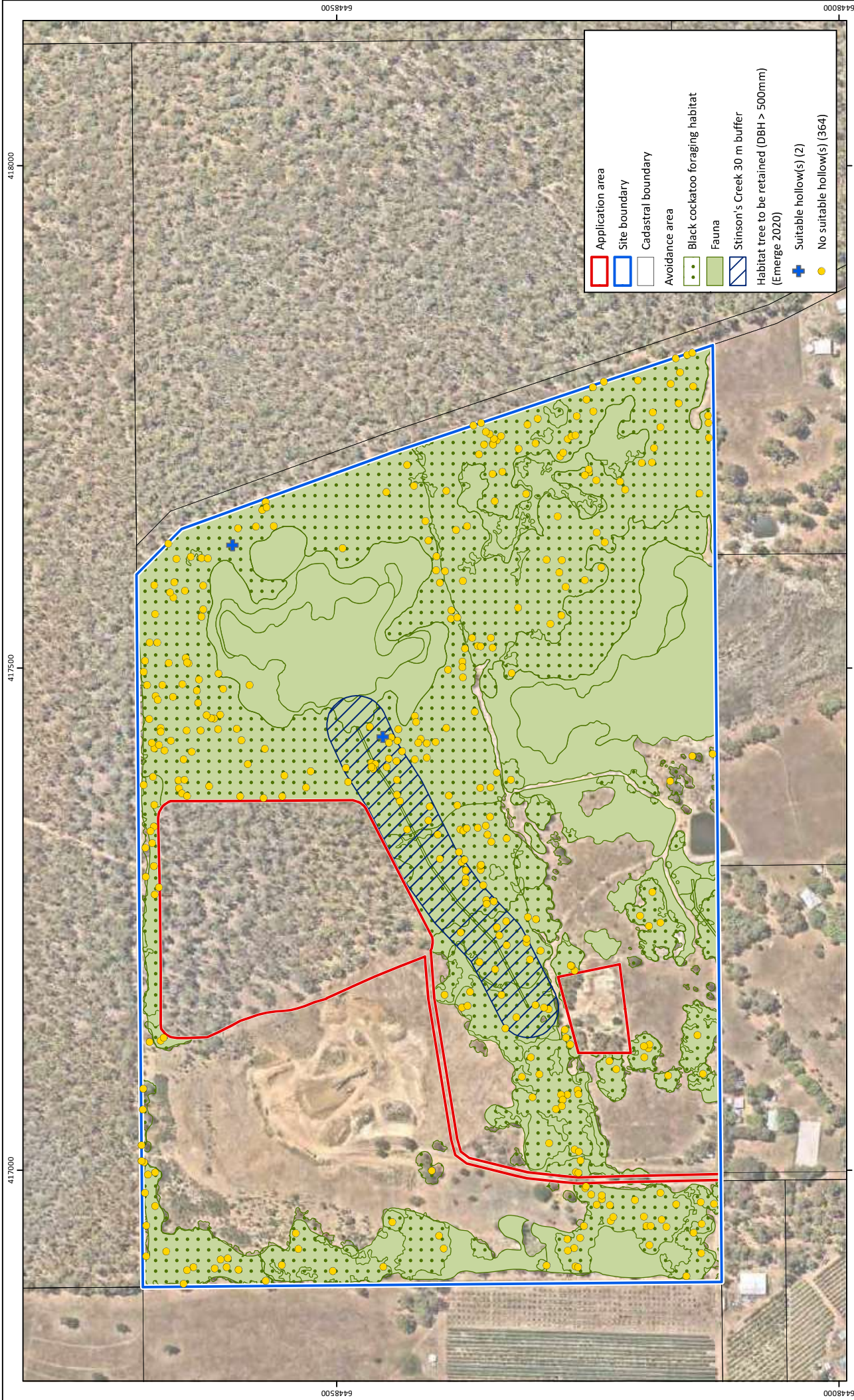
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Plan Number: EP20-040(09)-F76
Drawn: GAR
Date: 24/06/2021
Checked: SIB
Approved: JDB
Date: 17/12/2021

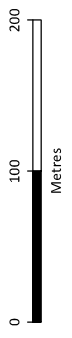
Project: Clearing Permit (Area Permit)
 Lot 9 Brookton Highway, Karragullen
Client: Vncl Gravel Supplies Pty Ltd

Figure 8: Black Cockatoo Habitat Context

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used ©Landgate (2020). Nearmap Imagery date: 03/03/2020



	Application area
	Site boundary
	Cadastral boundary
Avoidance area	
	Black cockatoo foraging habitat
	Fauna
	Stinson's Creek 30 m buffer
Habitat tree to be retained (DBH > 500mm) (Emerge 2020)	
	Suitable hollow(s) (2)
	No suitable hollow(s) (364)



Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

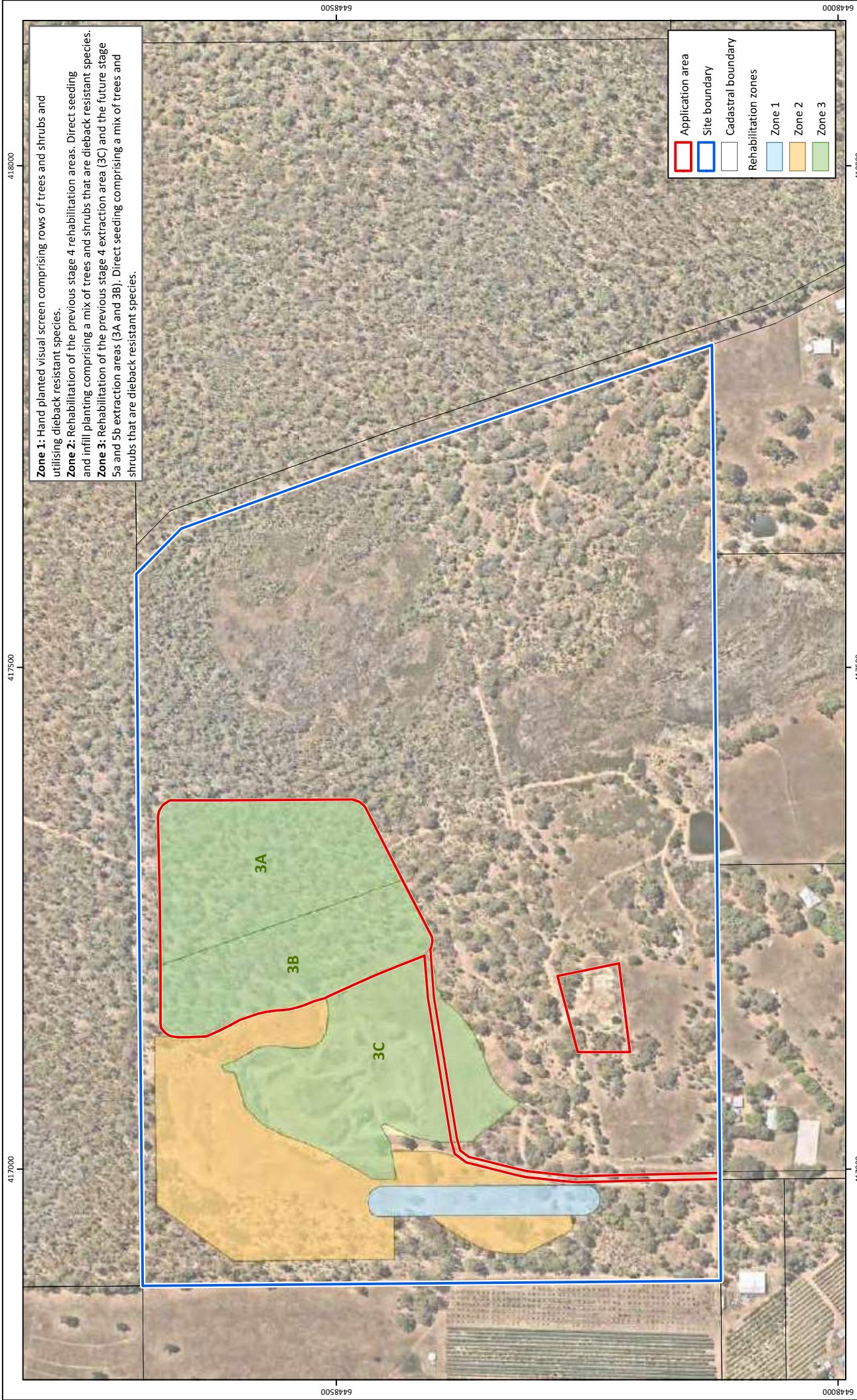


Plan Number: EP20-040(09)-F77
Drawn: GAR
Date: 15/07/2021
Checked: SIB
Approved: JDH
Date: 17/12/2021

Figure 9: Avoidance Area

Project: Clearing Permit (Area Permit)
Lot 9 Brookton Highway, Karragullen
Client: Vncl Gravel Supplies Pty Ltd

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Figure 10: Rehabilitation Area

Project: Clearing Permit (Area Permit)
Lot 9 Brookton Highway, Karragullen

Client: Vncl Gravel Supplies Pty Ltd

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