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**LEVEL 1 FAUNA SURVEY
PROPOSED LIME PIT AND ACCESS –
CLEARING PERMIT APPLICATION CPS 8392/1
NULLAKI AND YOUNGS SIDING
CITY OF ALBANY, WESTERN AUSTRALIA**



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Frenesi Pty Ltd

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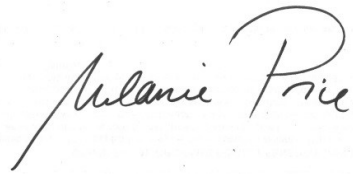
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LIST OF ABBREVIATIONS

AHD	Australian Height Datum
DBCA	Department of Biodiversity, Conservation and Attractions (WA)
DBH	Diameter at Breast Height
DoEE	Department of Environment and Energy (Commonwealth)
DPAW	Department of Parks and Wildlife (WA) (now DBCA)
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
ESA	Environmentally Sensitive Area (as defined in EP Act)
GPS	Global Positioning System
ha	Hectare
km	Kilometre
m	Metre
mm	millimetre
MNES	Matters of National Environmental Significance
PMST	Protected Matters Search Tool
WRP	Western Ringtail Possum

SUMMARY

A Level 1 Fauna Survey with targeted species assessment was undertaken for a proposed lime pit, haul road and emergency access road (Lot 9005 Rock Cliff Circle), Lee Road, Brown Road and Lake Saide Road reserves at Nullaki and Youngs Siding in the City of Albany to determine the status of habitat and presence of significant species (Figure 1). The survey was undertaken in two phases during Winter (23 – 28 July 2018) and Spring (7 – 10 October and 18 October 2019). The clearing permit application is for 15.19 ha which included 8 ha for the proposed lime pit and 7.19 ha associated with the haul road, Lee Road, Brown Road and Lake Saide Road reserves. Detailed design estimates clearing extent in Lee Road, Brown Road and Lake Saide Road to be 4.15 ha.

Fauna Habitat

Fauna habitat, vegetation type and condition are described in Section 5.1 and shown in Figures 2 – 5 and Appendix 1.

Desktop Investigation

The NatureMap database (Department of Biodiversity, Conservation and Attractions (DBCA) 2019) identified 105 fauna species previously recorded within the search area (Appendix 2) including: 100 bird species, 3 species of fish, 1 spider species and 1 reptile species. A report generated by DBCA from the Threatened and Priority Fauna database (3 August 2018; Appendix 3) included all potential threatened and priority species for 20km around the survey area. An enquiry was run on the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (Appendix 4). Nineteen conservation significant species were identified as potentially being in the area or habitat for the species may exist (Table A). Some species listed are unlikely to be impacted due to lack of suitable habitat (e.g. oceanic, migratory etc.) and the likelihood of the presence of other species has been considered.

Targeted Surveys

Targeted surveys were undertaken for the following conservation significant fauna that may occur at the site, based on habitat types present:

- *Calyptorhynchus banksii naso* - Forest Red-tailed Black-Cockatoo;
- *Calyptorhynchus baudinii* - Baudin's Black-Cockatoo;
- *Calyptorhynchus latirostris* - Carnaby's Black-Cockatoo;
- *Pseudocheirus occidentalis* - Western Ringtail Possum; and
- *Zephyrarchaea mainae* - Main's Assassin Spider.

Black Cockatoos

Assessment of the proposed lime pit, haul road and emergency access track indicates that the vegetation is not likely to provide roosting or breeding habitat due to the absence of suitable tree species. While some foraging species such as *Banksia* and *Hakea* are present in these areas, they occur in low numbers and therefore do not represent a significant resource. In addition, because the lime pit area is proposed to be rehabilitated, there is likely to be no net loss of foraging habitat in the medium to long term.

Assessment of Lee Road indicates that vegetation does not support roosting or breeding habitat due to the absence of suitable tree species. One habitat type (Bullich - Agonis - Banksia Woodland) may provide foraging habitat but comprises a small area (0.1 ha). A single Bullich tree in Lee Road had a diameter at chest height of over 50cm but did not contain any hollows.

The eastern section of Brown Road and Lake Saide Road reserves contains 129 trees with diameter at chest height over 50cm diameter (Marri, Jarrah and Karri). None of the trees surveyed contained hollows suitable for use by Black Cockatoos.

Figures 2a to 2f indicate trees which are within the proposed clearing extent with 74 potential habitat trees proposed to be removed (56 to be retained). DBCA mapping (National Maps, 2019) indicate that there is no known roosting or nesting sites for the three species in the survey area or nearby.

Western Ringtail Possums

Four Western Ringtail Possums (WRP) were detected adjacent to Lee Road reserve (one adult and one family group of two adults and one juvenile; Figures 2d and 2f). Two dreys in poor condition were detected in a Peppermint tree on Lee Road which is proposed to be retained (Figure 2d). The area of suitable habitat for WRP proposed to be cleared in the unmade portion of Lee Road reserve is 0.48 ha. Due to the narrow linear nature of the proposed clearing, proximity of other suitable habitat and projected low traffic volumes (during daylight hours) over four months of the year, there is not likely to be a significant impact on the WRP.

For all other areas surveyed, no dreys or other signs of WRP (e.g. scats, scratchings) were present and the nocturnal survey did not detect any WRP.

Main's Assassin Spider

The presence of suspended leaf litter in *Agonis flexuosa* (Peppermint), the spider's favoured habitat was generally absent or sparse. Suspended leaf litter was only detected in suitable volumes for sampling in four locations (proposed lime pit, emergency access track and Lee Road reserve; Figures 2f, 3 and 5). Of the 16 samples taken, no Main's Assassin spiders were detected. It is unlikely that the species is present within the area proposed to be cleared.

Management Recommendations

A management plan has been prepared for the lime pit operations to address risks to fauna habitat, including hygiene, weed and dieback management (Landform Research, 2018). The proposed pit will be cleared in sections with subsequent rehabilitation. Rehabilitation with local native species (including potential foraging species for Black Cockatoos) will result in no net loss of fauna values in the medium to long term.

It is proposed to reduce clearing in Lee Road, Brown Road and Lake Saide Road reserves through minimising the clearing footprint via road design and reduced speed limits. Rehabilitation of areas not required for road structures is desirable. For vegetation to be removed, the following is recommended during construction:

1. Delineate clearing extent (e.g. with picket and tape) and ensure that clearing is only undertaken in nominated areas.
2. Leave logs and dead trees in the road reserve, where appropriate.

3. Reuse trees and vegetation as mulch, for rehabilitation, or other purposes as appropriate.
4. Revegetate areas that are not required to remain clear for road operations. Mulching with removed vegetative material is recommended.

Re-creation of potential nesting areas for the Long-necked Turtle is desirable. This could be achieved through establishment of north facing sand banks (e.g. in northern portion of Lee Road reserve).

1 INTRODUCTION

1.1 BACKGROUND

Aurora Environmental has been commissioned by Frenesi Pty Ltd (the landowner) to undertake a Level 1 Fauna Assessment and targeted fauna survey for a proposed lime pit, haul road, emergency access road on Lot 9005 Rock Cliff Circle, Nullaki and road creation and widening on Lee Road, Brown Road and Lake Saide Road reserves in Youngs Siding in the City of Albany (Figure 1). No fauna surveys have previously been undertaken in the survey area.

This survey considers species listed as threatened under both Western Australian and Australian legislation. The *Biodiversity Conservation Act 2016* provides for species, subspecies or populations of native animals (fauna) to be listed as Specially Protected, Threatened (Critically Endangered, Endangered or Vulnerable) or Extinct in Western Australia. As of 1 January 2019, taking or disturbing of threatened fauna requires Authorisation from the Minister for Environment under Section 40 of the *Biodiversity Conservation Act 2016*. Threatened species are listed in the *Threatened Fauna – Specially Protected Fauna Notice* (Government Gazette, 2018).

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance (MNES). Threatened species area listed on <https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl>.

1.2 THE PROPOSAL

The proposal includes:

- Development of an 8ha lime pit which will be operation for four months per year;
- Use of an existing fire break as a haul road;
- Construction of unmade portions of Lee Road; and
- Upgrading portions of Lee Road, Brown Road and Lake Saide Road to cater for 18 truck movements per day for four months each year.

The clearing permit application is for 15.19 ha which included 8 ha for the proposed lime pit and up to 7.19 ha associated with the haul road, Lee Road, Brown Road and Lake Saide Road reserves. A road design has been approved by the City of Albany. Detailed design estimates clearing extent in Lee Road, Brown Road and Lake Saide Road to be 4.15 ha.

The proposed lime pit will be progressively mined in 2 ha sections with rehabilitation commencing for the mined area after lime resource removal.

1.3 SURVEY AREA

The survey areas are shown in Figures 2 - 5. The proposed lime pit area (8 ha) is within Lot 9005 which comprises 437 ha of native vegetation. The proposed haul road is an existing fire break/ boundary road within Lot 9005 and comprises a linear foot print of approximately 1800 metres (m) (~10m wide). The

construction of a fire emergency access track within Lot 9005 is also proposed (610 m long and up to 20 m wide).

The Lee Road reserve is currently unmade for its western portion of approximately 765 m (average 20 m wide) with a constructed gravel road in its eastern portion (~1,000 m). Brown Road (~474 m long 20 m wide) and Lake Saide Road (2,076 m long with average 20 m width) reserves are currently constructed gravel roads. The extent of proposed clearing is shown in Figures 2 to 5.

1.4 PURPOSE AND SCOPE

The survey has been carried out in accordance with:

- Technical Guidance – Terrestrial Fauna Surveys (Environmental Protection Authority (EPA), 2004, updated 2016) which aligns with Guidance Statement No. 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia to determine the presence of rare, endangered and/or threatened fauna species.
- Department of Environment and Energy (DoEE) guidelines *EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species* (Department of Sustainability, Environment, Water, Population and Communities, 2012).
- DoEE guidelines *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011)
- Licences issued under Wildlife Conservation Regulations 1970 Regulation 17 - Licence to take fauna for scientific purposes (No. 08-002587-1) and the *Biodiversity Conservation Act* (2016) (Fauna Taking (Biological Assessment) Licence BA27000159 and Authorisation to Take or Disturb Threatened Species TFA 2019-0090). Licences are included in Appendix 5.

2 DESKTOP ASSESSMENT

Prior to the commencement of the field survey, a desktop assessment was undertaken to identify relevant environmental information pertaining to the study area and to assist in survey design. The desktop assessment involved a review of:

- General environmental information (climate, soils, topography) relating to the survey area;
- A review of literature to assess the potential habitats present in the survey area (vegetation).
- Existing datasets including previous vegetation mapping of the survey area (Beard 1979), aerial photography, geology, soils and hydrology information to provide background information on the variability of the environment, likely vegetation units, fauna habitats and to identify areas with potential to contain Threatened and Priority listed fauna species.
- The Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap database for fauna species previously recorded within the study area (DBCA, 2018) (Appendix 2);
- Review of DBCA threatened fauna database (Appendix 3);
- DoEE Protected Matters Search Tool (PMST) to identify communities and species listed under the EPBC Act potentially occurring within the study area (DoEE, 2019) (Appendix 4).

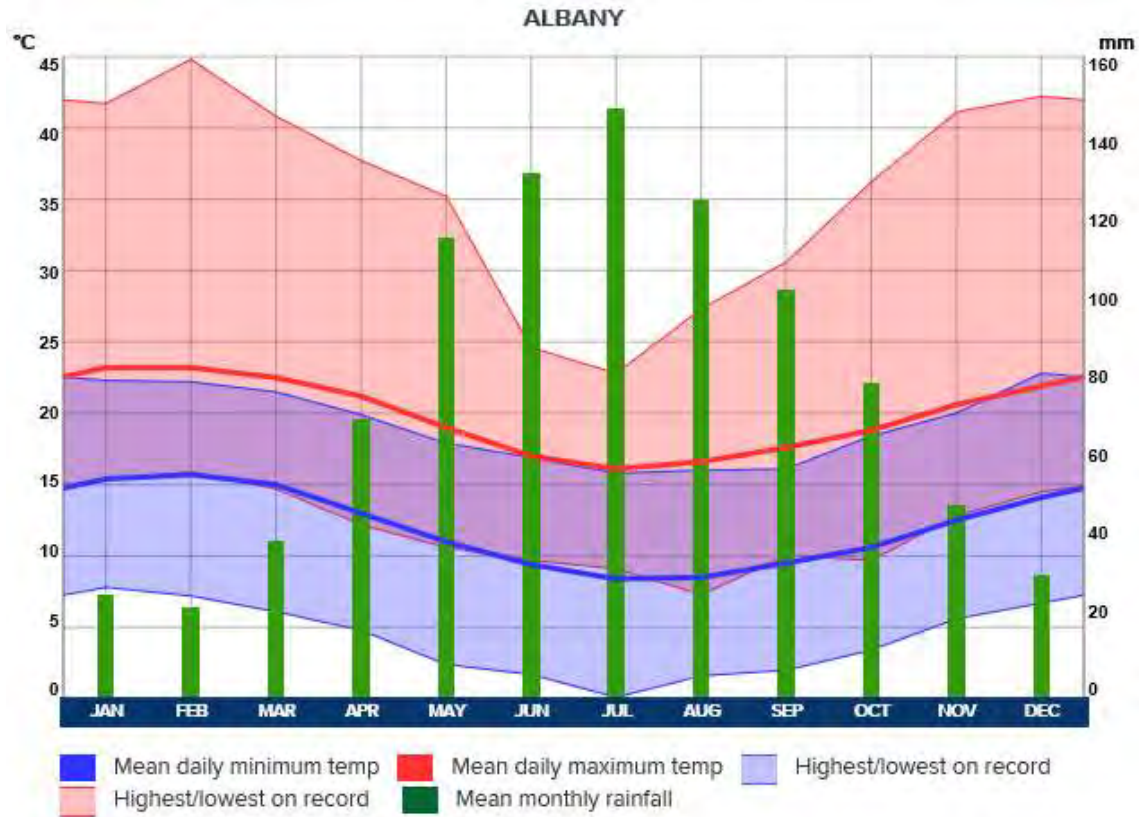
2.1 CLIMATE

The Nullaki locality has a Mediterranean climate characterised by warm summers and cool, wet winters. The average annual temperature and rainfall information for the nearest weather station at Albany airport (approximately 35 km north east of the site) is presented in Plate A. Areas closer to the coast, such as Nullaki are likely to experience lower maximum and higher minimum temperatures due to proximity to the ocean and ocean breezes.

The Albany district has a significant number of cool cloudy days with drizzle or showers. As summarised by the Bureau of Meteorology, (BOM, 2011):

The Southern Ocean is a major factor influencing Albany's climate. The Southern Ocean imparts a moderating influence on Albany through sea breezes in the warmer months and through the effects of a relatively mild and moist air mass at any time of the year. Seasonal variations are mainly due to the north-south movement of sub-tropical ridge. An easterly broad scale flow prevails in summer when the ridge is south of the State. However, the movement of high-pressure cells from west to east along this ridge brings a commonly repeated pattern of wind changes to South Coast locations.

PLATE A: CLIMATE AVERAGES, ALBANY



Source: WeatherZone, 2019; <http://www.weatherzone.com.au/climate/station.jsp?lt=site&lc=9500>

2.2 REGIONAL BIOGEOGRAPHY

The survey area lies within the Southwest Botanical Province and forms part of the Southwest Australian Biodiversity Hotspot, one of 34 internationally recognised biodiversity hotspots (Myers *et al.* 2000). It occurs in the eastern portion of the Warren Interim Bio-geographic Regional Area (IBRA), which runs along the coast from just south of Yallingup to south of the Princess Royal Harbour near Albany (IBRA, 2012).

The Warren bioregion is described as a combination of hills, plateaux and plains and features four main soil types including loamy soils supporting Karri forest; red laterites supporting Jarrah-Marri Forests; leached sandy soils in depressions and as plains supporting Low Jarrah Woodlands and Paperbark/Sedge Swamps, and; holocene marine dunes supporting *Agonis flexuosa* thickets, *Banksia* woodlands and heaths (McKenzie *et al.*, 2002).

2.3 LANDFORM AND SOILS

The proposed lime pit project area comprises an eroded high ridge of interbedded sequences of coastal dunes, of limestone 120 to 140 m, rising to over 160 m Australian Height Datum (AHD) on the highest peaks overlying an undulating Proterozoic granitic basement that outcrops of granite hills in the Denmark - Wilson Inlet area.

The limestone is a calcarenite made from beach sand containing predominantly shell fragments with minor and variable quartz (Landform Research, 2018). The limestone has been lithified and recrystallized on the ridge tops to lift the percentage of calcium carbonate to over 70%. The limestone sequences also include buried soil horizons and recalcified limestone overtopped by younger dunes.

Soils in the proposed lime pit area consist predominantly of grey organic sands in the swales over limestone with white to cream limey sands on the youngest dunes and surfaces. Soils in the Lee Road, Brown Road and western portion of Lake Saide Road reserves areas generally comprise podzols over calcareous sand (Meerup podzols over calcareous sand phase: 254Nk) and on valley floors podzols in siliceous sand (Meerup Podzols in siliceous sands phase: 254NkMRs). The eastern portion of Lake Saide Road reserve comprises gravelly yellow duplex soils (Collis yellow duplex phase: 254Br) (National Map, 2019; Soil Landscape Mapping – Best Available (DPIRD-027).

2.4 HYDROLOGY, WATERCOURSES AND WETLANDS

The proposed lime pit, haul road and emergency access road areas do not support any water courses or wetlands. The lime pit is elevated in the landscape with porous soils. Depth to groundwater is likely to be over 140m (Landform Research, 2016).

The Lee Road reserve has been subject to earthworks in the past, with drainage lines being dug to the north of Lee Road reserve and the soil from the excavation placed in the road reserve. Therefore, the road reserve is more elevated than surrounding ground level and does not appear to be prone to inundation. The area north of Lee Road reserve is characterised by cleared paddocks with high groundwater levels associated with valley floors which are inundated during wetter months. The paddocks that have predominantly been used for growing potatoes and are inundated in winter and spring.

The area to the south of Brown Road contains Lake Saide, which is connected to Wilson Inlet via a constructed drainage system to Menamup Inlet and Youngs Lake.

2.5 LAND USE

The proposed lime pit comprises native vegetation, except for access tracks. The haul road has largely been cleared along the boundary to provide a firebreak and access to a previous lime extraction pit. Privately owned land adjacent to the Lee Road, Brown Road and Lake Saide Road reserves is partly cleared for agricultural purposes. The general area contains a combination of low-lying farmland (some has historically been used for growing potatoes) and more elevated areas used for grazing, horticulture and rural residential pursuits.

The land east of Lot 9005 comprises Crown Reserve 17464 which contains native vegetation and a section of the Bibbulmun Track.

2.6 ENVIRONMENTALLY SENSITIVE AREAS

The nearest environmentally sensitive area (as defined under the *Environmental Protection Act 1986*) is West Cape Howe National Park, 8km to the east of the survey area.

2.7 VEGETATION AND FLORA

The vegetation of the area has been mapped on a broad landscape scale by Beard (1979). This mapping forms part of a state-wide mapping and vegetation classification system based on geographic, geological, soil, climate, structure, life form and vegetation characteristics. Beard (1979) recognised one vegetation system within the survey area; the Torndirrup system and one vegetation association; Shrublands: *Acacia* scrub-heath.

The following vegetation and flora assessments have been undertaken:

- Vegetation Communities Survey – Lot 9005 Rock Cliff Circle, Denmark (Bio Diverse Solutions, 2016).
- Level 1 Flora and Vegetation Survey Report – Proposed Lee Road Alignment, Youngs Siding WA 6330 (Bio Diverse Solutions, 2017).
- Spring Flora survey for Lee Road Reserve and Emergency Access Track (PGV Environmental, 2019).
- Vegetation mapping undertaken of Lee Road, Brown Road and Lake Saide Road by Aurora Environmental (2019a).

The outcomes of these surveys were:

Lot 9005: 112 plant species consisting of 39 families and 70 genera of flora were identified. The most common families were Fabaceae, Cyperaceae, Proteaceae, Myrtaceae and Ericaceae. The flora list includes 103 native species and nine introduced species. One species of priority flora *Banksia sessilis* var *cordata* (Priority 4) was found. Ten vegetation types were identified in the survey area with one type associated with the lime pit area:

- Open Heath: Occurs in swales, flats and on crests of dunes. Where overstorey is present, it consists of low and scattered *Agonis flexuosa*, *Acacia cyclops* or *Banksia attenuata* in flats with low thickets of *Agonis flexuosa* on ridgelines and in swales. The southern areas closest to the coast have a complete absence of overstorey. The understorey consists of a diverse mix of species. The most dominant include: *Hakea varia*, *Allocasuarina humilis*, *Jacksonia horrida*, *Pultenaea reticulata*, *Spyridium globulosum*, *Adenanthos cuneatus* and *Banksia attenuata*. A mix of sedges, herbs and grasses form the basis of the groundcover, some of which include: *Lyginia imberbis*, *Lyginia barbata*, *Lepidosperma squamatum*, *Desmocladius flexuosus*, *Hypolaena exsulca* and *Opercularia hispidula*.

Lee Road Reserve: A field survey of a Lee Road reserve and part of Reserve 17464 indicates that there are 75 plant species in the area, consisting of 33 families and 59 genera (Bio Diverse Solutions, 2017). The most common families were Asteraceae, Fabaceae, Proteaceae, Ericaceae, Poaceae, Restionaceae, and Cyperaceae. This list includes 63 native species and 11 introduced species. *Banksia sessilis* var *cordata* (Priority 4) was the only Priority species to be positively identified within the survey area. The following vegetation types have been identified in the Lee Road reserve area (See Figures 2d to 2f):

- Bullich *Agonis* Woodland: Occurs in protected swales, slopes, crests and flats on brown loamy sand along ridges and grey sand on the lower profiles. The overstorey has occasional *Eucalyptus*

megacarpa. The midstorey consists of *Agonis flexuosa* and the occasional *Banksia littoralis*. The understorey is often dense and dominated by smaller *Agonis flexuosa*, *Bossiaea linophylla*, *Spyridium globulosum*, *Hibbertia cuneiformis*, *Leucopogon propinquus*, *Leucopogon parviflorus* and climbing herbs such as *Muehlenbeckia adpressa* and *Cassytha racemosa*. The ground cover is dominated by a variety of sedges and grasses.

- Open Heath: Occurs in swales, flats and on crests of dunes. Where overstorey is present, it consists of low and scattered *Agonis flexuosa* with low thickets of *Agonis flexuosa* on ridgelines and in swales. The understorey includes: *Acacia cyclops*, *Agonis flexuosa*, *Jacksonia horrida*, *Leucopogon propinquus*, *Leucopogon obovatus*, *Pultenaea reticulata* and *Spyridium globulosum*. A mix of sedges, herbs and grasses form the basis of the groundcover, some of which include: *Lyginia barbata*, *Lyginia imberbis*, *Desmocladius flexuosus*, *Schoenus subfascicularis* and *Opercularia hispidula*.

Brown Road Reserve:

- Yate and Agonis Woodland: *Eucalyptus cornuta* over *Agonis flexuosa* with *Lepidosperma gladiatum*, *Desmocladius flexuosus* and **Psoralea pinnata*.
- Wattie and Melaleuca Woodland: *Taxandria juniperina* over *Melaleuca sp.* with *Lepidosperma gladiatum*.
- Marri and Jarrah Woodland: *Corymbia calophylla* and *E. marginata* over *Agonis flexuosa*. Weedy understorey.

Lake Saide Road Reserve:

- Marri and Jarrah Woodland: *Corymbia calophylla* and *Eucalyptus marginata* over *Agonis flexuosa*. **Psoralea pinnata* and grassy weeds in understorey.
- Karri, Marri and Jarrah Forest: *Eucalyptus diversicolor* with *Corymbia calophylla* and *Eucalyptus marginata* over *Agonis flexuosa*. **Psoralea pinnata* and grassy weeds in understorey.

2.8 FAUNA DIVERSITY

A NatureMap database search was undertaken for an area significantly greater than the survey area to ensure adequate representation of species that may be present. However, this includes species associated with habitats not present in the survey area. The NatureMap database search return identified 105 fauna species previously recorded within the search area including: 100 bird species, 3 species of fish, one spider and one reptile species (Appendix 2).

2.9 CONSERVATION SIGNIFICANT FAUNA

The EPBC Act Matters of National Environmental Significance (MNES), DBCA Threatened Fauna Database and *NatureMap* database identified the presence, or potential presence of 19 conservation significant fauna species within 20 km of the survey area (Table A), excluding those species that are exclusively marine or migratory/marine or where there is no suitable habitat present within the survey area.

Based on the desktop assessment, including consideration of vegetation types, habitat and the range of conservation significant fauna, it was decided that the study area be subject to targeted surveys for the following species:

- *Pseudocheirus occidentalis* - Western Ringtail Possum
- *Calyptorhynchus banksii naso* - Forest Red-tailed Black-Cockatoo
- *Calyptorhynchus baudinii* - Baudin's Black-Cockatoo
- *Calyptorhynchus latirostris* - Carnaby's Black-Cockatoo
- *Zephyrarchaea mainae* - Main's Assassin Spider

The extent and habitat requirements of these species are documented below. The field portion of the survey included targeted searches for these species and their habitat as described in Section 3.

TABLE A: POTENTIAL CONSERVATION SIGNIFICANT SPECIES

SPECIES	STATUS: BIODIVERSITY CONSERVATION Act 2016, WILDLIFE CONSERVATION (SPECIALLY PROTECTED FAUNA) NOTICE 2018	STATUS: EPBC ACT	COMMENT
<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo)	Endangered	Endangered	Database indicates that the survey area may contain suitable habitat for this species.
<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo)	Endangered	Endangered	Database indicates that the survey area may contain suitable habitat for this species.
<i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black-Cockatoo, Karrak)	Vulnerable	Vulnerable	Database indicates that the survey area may contain suitable habitat for this species.
<i>Falco peregrinus</i> (Peregrine Falcon)	Other specially protected fauna		Species may utilise the area but is unlikely to rely on the survey area as the species forages across a large area.
<i>Psophodes nigrogularis</i> subsp. <i>nigrogularis</i> (Western Whipbird (western heath))	Endangered		The species is unlikely to utilise the survey area as it does not contain 'long unburnt' habitat consistent with 'dense heath-like shrubby thickets' on coastal dunes, and mallee woodland or shrubland with an open upperstorey above a dense shrubby understorey. DoE (2018a) indicates that the species is mostly confined to Two Peoples Bay Nature Reserve.
<i>Pandion haliaetus</i> (Osprey)	Migratory birds protected under an international agreement	Migratory Wetlands Species	Species may fly by but is unlikely to rely on the survey area.
<i>Merops ornatus</i> (Rainbow Bee-eater)		Listed Marine Species	Species possibly in the survey area but is unlikely to rely on it.
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)		Listed Marine Species	Species may fly by but is unlikely to rely on the survey area.
<i>Leipoa ocellata</i> (Malleefowl)	Vulnerable	Vulnerable	The Malleefowl occurs in scrubland and woodland dominated by mallee and wattle species (Department of Environment, DoE, 2019a) and is unlikely to occur in the survey area.

SPECIES	STATUS: BIODIVERSITY CONSERVATION Act 2016, WILDLIFE CONSERVATION (SPECIALLY PROTECTED FAUNA) NOTICE 2018	STATUS: EPBC ACT	COMMENT
<i>Pezoporus flaviventris</i> (Western Ground Parrot)	Critically Endangered	Critically Endangered	The species only known in more recent times from Waychinicup-Manypeaks, Fitzgerald River National Park and Cape Arid National Park. Further declines have meant that the species is only found in the south-eastern part of Cape Arid National Park and adjacent areas of Nuytsland Nature Reserve. There are thought to be no more than 150 birds left in the wild (DBCA, 2019). The species is unlikely to be present in the survey area.
<i>Phascogale tapoatafa wambenger</i> (South-western brush-tailed Phascogale, Wambenger)	Schedule 6—Fauna that is of special conservation need as conservation dependent fauna		This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. Records are less common from wetter forests (DBCA, 2019b). The species may occur in the survey area.
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)	Critically Endangered	Critically Endangered	Database indicates that the area may contain habitat suitable for this species.
<i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)	Vulnerable	Vulnerable	Database indicates that the area may contain habitat suitable for this species. NatureMaps indicates that there are no recent records for this species in the Albany area. The species is unlikely to be found in the survey area.
<i>Parantechinus apicalis</i> (Dibbler)	Endangered	Endangered	Dibblers prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more. In some locations, the presence of Proteaceous and Myrtaceous flowering shrubs may also be important. The species is not likely to be found in the survey area.
<i>Hydromys chrysogaster</i> (Water-rat, Rakali)	Priority 4		The lime pit area does not contain habitat suitable for this species. The area adjacent to Lee Road and Brown Road reserves may contain suitable habitat. However, these areas will not be cleared.
<i>Setonix brachyurus</i> (Quokka)	Vulnerable	Vulnerable	The Quokka is a habitat specialist. In the south of its range, quokkas are strongly linked to complex vegetation structure (minimum of three layers), low densities of woody debris and habitat patchiness (between 0 and 450 m to an alternative vegetation age). The Quokka also has relatively high water requirements, which necessitates close proximity to fresh water throughout the year and the species is

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SPECIES	STATUS: BIODIVERSITY CONSERVATION Act 2016, WILDLIFE CONSERVATION (SPECIALLY PROTECTED FAUNA) NOTICE 2018	STATUS: EPBC ACT	COMMENT
			often present in riparian and swamp habitat (DoE, 2019b). There is a low possibility that the species occurs in the survey area.
<i>Nannoperca pygmaea</i> (Little Pygmy Perch)	Endangered		The survey area does not contain habitat suitable for this species.
<i>Nannatherina balstoni</i> (Balston's Pygmy Perch)	Vulnerable	Vulnerable	The survey area does not contain habitat suitable for this species.
<i>Zephyrarchaea mainae</i> (Main's Assassin Spider)	Threatened - Rare or likely to become extinct		Database indicates that the species has been found in nearby coastal areas. if suitable habitat is present in the survey area, the species may be found in the survey area.

Note: Government Gazette (2018) Wildlife Conservation (Specially Protected Fauna) Notice 2018. Appendix 4: MNES report (DoEE, 2019). Conservation Codes for WA are included in Appendix 6.

2.10 CARNABY'S BLACK COCKATOO

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is endemic to and widespread in the south-west of Western Australia and occurs mostly in the Wheatbelt (areas with between 300mm and 750mm of rainfall annually) and wetter regions including the Swan Coastal Plain and South Coast (DoE, 2018b). It occupies an area between 32,000km² and 60, 525km² (Department of Parks and Wildlife, DPAW, 2013).

Its habitat mostly comprises uncleared or remnant native eucalypt woodlands, especially those that contain Salmon Gum (*E. salmonophloia*) and Wandoo, and in shrubland or kwongan heathland dominated by *Hakea*, *Banksia* and *Grevillea* species.

Breeding habitat (or sites) encompasses those areas that contain suitable nest trees within the range of the species. Breeding activity is restricted to eucalypt woodlands mainly in the semi-arid and sub-humid interior (records from Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning) (DoE, 2018b). Breeding records indicate that this species is currently expanding its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart (*E. gomphocephala*) forests of the Swan Coastal Plain, including Yanchep area, Lake Clifton and near Bunbury (DoE, 2018b).

The birds nest in large hollows in tall, living or dead eucalypts, mainly smooth-barked Salmon Gums and Wandoo, although other tree species have also been reported (DPAW, 2013). Suitable hollows can take from 120–150 years to develop. A map prepared by DoEE using modelling techniques (Department of Sustainability, Environment, Water, Population and Communities, 2012) indicates that the Nullaki and Youngs Siding are within the breeding range of the species. However, Birdlife Australia (2018; Plate B) indicates that the birds are not known to breed in the area but may use the area for foraging and roosting in summer months. It is noted by DoEE (Department of Sustainability, Environment, Water, Population and Communities, 2012) that birds may be starting to breed at new locations such as the Jarrah - Marri forests and coastal Tuart forest south of Perth (DPAW, 2013).

During the non-breeding season, when most of the cockatoos migrate to the mid-west coast, Swan Coastal Plain and South Coast (DPAW, 2013), they roost in tall native or introduced eucalypts, and occasionally in Marri and pines. Species known to be used for roosting include Flat-topped Yate (*E. occidentalis*), Salmon Gum, Wandoo, Karri, Blackbutt, Tuart, Blue Gum (*E. globulous*, introduced), *Pinus radiata* and *P. pinaster* (DoE, 2018b).

This species is threatened due to the high level of clearing of native vegetation in the Wheatbelt. Carnaby's black-cockatoos will traverse open space but may not use forage resources isolated from roosting habitat by long stretches of cleared agricultural land. A lack of connectivity between patches is "strongly implicated in the failure of Carnaby's cockatoo to survive in heavily cleared and fragmented rural landscapes" (DoE, 2018b). Corridors with breaks of less than 4 km between other foraging, commuting, breeding and roosting sites are considered important to allow the birds to move between areas.

NatureMaps indicates that this species has been recorded in the Nullaki and Young Sidings areas. The MNES database indicates that the survey area could contain habitat suitable for the species.

PLATE B: DISTRIBUTION OF CARNABY'S COCKATOO



Source: <http://www.birdlife.org/datazone/speciesfactsheet.php?id=1391>

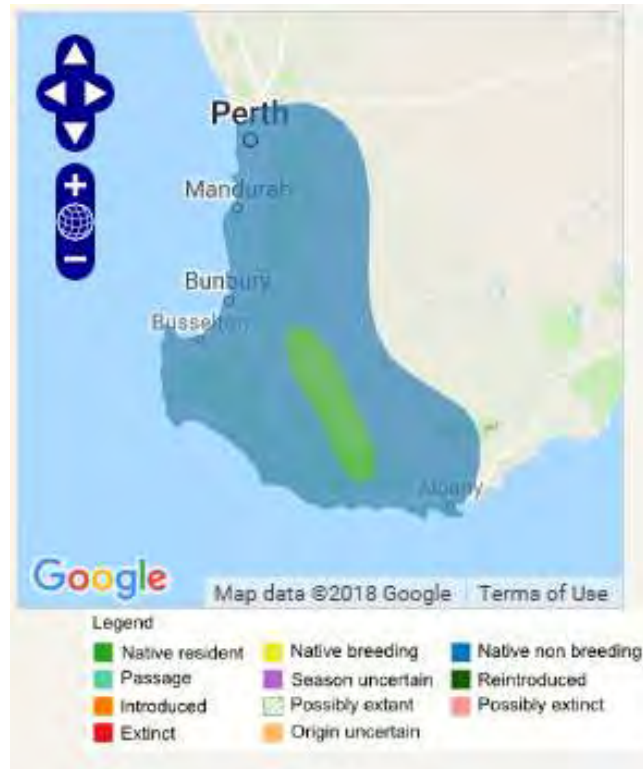
2.11 BAUDIN'S BLACK COCKATOO

Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) is listed as Vulnerable under the *EPBC Act 1999* which means the species is facing a high risk of extinction in the wild (DoE, 2018c).

This Cockatoo is found only in the south-west of Western Australia and generally bounded by the 750mm rainfall isohyet (Albany, Gidgegannup and up to Mundaring and inland to the Stirling Ranges and Boyup Brook). Breeding has been recorded between Nornalup, northward to near Bridgetown, Lowden and Harvey (DoE, 2018c). Habitat comprises heavily forested areas dominated by Marri and other Eucalyptus species (particularly Karri and Jarrah). The distribution of the species comprises 40,000km² (DoE, 2018c) as shown in Plate C (Birdlife Australia, 2018).

Baudin's Cockatoo nests in hollows in mature trees such as Marri, Karri, Jarrah and Wandoo in the lower south-west of Western Australia (DoE, 2018b). Breeding has been recorded in the far south of the range, in an area extending from Nornalup northward to near Bridgetown, or sometimes further north to Lowden and Harvey (DoE, 2018c). Baudin's Black-Cockatoo roosts are generally located in the tallest trees in or near riparian environments or permanent water (DoE, 2018c).

PLATE C: DISTRIBUTION OF BAUDIN'S BLACK COCKATOO



Source: <http://www.birdlife.org/datazone/speciesfactsheet.php?id=1390>

Loss of habitat and forest management practices (not maintaining older trees) has previously impacted on the species. While the threat from habitat loss has largely abated in recent times (DoE, 2018c) there has been an ongoing decline in population numbers due to illegal shooting and competition for nesting hollows with feral bees, compounded by a low annual reproductive rate.

NatureMaps indicates that this species has been recorded in the Nullaki and Youngs Siding areas. The MNES database indicates that the area could contain habitat suitable for the species.

2.12 FOREST RED-TAILED BLACK-COCKATOO

The Forest Red-Tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) is a sub-species endemic to the south west of Western Australia and has been recorded from Gingin in the north and east to Mt Helena, Christmas Tree Well, West Dale (rarely to Brookton), North Bannister (rarely to Wandering) Mt Saddleback, Kojonup, Rocky Gully, upper King River and east to the Green Range (DoE, 2018c; Plate D). The current distribution is estimated to be 52,198km² (DoE, 2018d). The species inhabits dense Jarrah, Karri and Marri forests in areas that receive more than 600mm average rainfall annually (DoE, 2018d).

While there are no definitive maps of breeding areas, studies indicate that this cockatoo generally breeds in Marri, Jarrah, Blackbutt and Bullich (*E. megacarpa*) and Wandoo (DoE, 2018d). Nests are generally large, deep hollows with a broad floor and located high up in large 'veteran' trees. In Marri, the nest hollows of the Forest Red-tailed Black Cockatoo range from 8-14 m above ground, the

entrance is 12–41 cm in diameter and the depth is 1-5 m (Department of Environment and Conservation, 2008).

PLATE D: DISTRIBUTION OF FOREST RED-TAILED BLACK COCKATOO



Source: DoEE (2018) http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=67034

Key threats to the Forest Red-tailed Black Cockatoo are habitat loss, nest hollow shortage and competition for available nest hollows from other species, injury or death from the European Honeybee (*Apis mellifera*), illegal shooting and fire (DoE, 2018d).

NatureMaps indicates that this species has been recorded in the Nullaki and Young Siding areas. The MNES database indicates that the area could contain habitat suitable for the species.

2.13 WESTERN RINGTAIL POSSUM

The Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) has a patchy distribution from the Collie River to Two Peoples Bay in Western Australia, occurring most commonly in coastal or near coastal forest (DoE, 2018e). While populations of the species on the south west coast of Western Australia appear to prefer a habitat preference for Peppermint trees (*Agonis flexuosa*) (DoE, 2018e), recent studies indicate that the Albany urban population of WRP have a habitat preference for Sheoak (*Allocasuarina fraseriana*), Marri (*Corymbia calophylla*) and Eucalypt (*Eucalyptus marginata* and *E. staeri*) woodlands (Bader *et al.*, 2019). Habitat use may affect densities due to diet and structural factors (Gilfillan, 2008).

In urban areas possums feed on introduced garden species (DPAW, 2017) and captive animals fed on peppermint leaves show a preference for fresh, young green leaves rather than red leaves (Ellis and Jones, 1992). Jones *et al.* (1994) also found that the highest density populations were near-coastal, and associated with abundant Peppermint trees with a high continuity of either the canopy or mid-strata, but that many areas with abundant *A. flexuosa* did not support WRPs.

The most inland population of WRP occurs at Perup. The species has been recorded as far north as Dawesville and as far east as Eucla. In the towns of Busselton and Dunsborough, some urban or developed areas support viable populations. Other populations in urban or semi-urban areas occur at

Augusta and Albany (Jones *et al.*, 1994). The post-1995 range of the WRP has been calculated at 7,155km² (DoE, 2018e).

Processes threatening the occurrence and geographical extent of the species include clearing and habitat fragmentation, urbanisation, fox and cat predation, harvesting of plantation forests, altered fire regimes, road kill, drought, disease and competition with Brush-tail Possums (DoEE, 2018).

NatureMap records indicated that there are no records of WRP in the Nullaki area (Appendix 2). The MNES database indicates that the area could contain habitat suitable for the species.

2.14 MAIN'S ASSASSIN SPIDER

Main's Assassin Spider (*Zephyrarchaea mainae*) is listed as Division 6 – Vulnerable Invertebrate in the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

The species is known from only a narrow coastal strip on the south coast, from William Bay west of Denmark to Gull Rock east of Albany (Rix and Harvey, 2012). *Z. mainae* requires a specific habitat within the undergrowth of moderately dense Peppermint (*Agonis*) stands where it inhabits shaded, long unburnt groves with an understorey of sedges (*Lepidosperma*), grasses and 'wiry' herbs (Restionaceae). Its microhabitat within these Peppermint groves is the elevated leaf-litter layer which collects amongst the crowns, branches and foliage of the understorey plants (Rix and Harvey, 2012).

NatureMaps indicates that *Z. mainae* has been found in Crown Reserve 17464 east of Lot 9005 and to the south of the various road reserves in the survey area (Appendix 2).

3 RECONNAISSANCE AND FIELD SURVEY METHODOLOGY

The area of investigation included the proposed lime pit footprint, haul road, emergency access track on Lot 9005 and Lee Road, Brown Road and Lake Saide Road reserves (Figure 1). Surveys were undertaken by Melanie Price of Aurora Environmental, an experienced environmental scientist and qualified zoologist with an experienced field assistant.

3.1 FAUNA HABITAT ASSESSMENT

A fauna habitat assessment was undertaken to document the type, condition and extent of habitats within the survey area. Vegetation, landform and soils units present at the subject site have been used to define broad fauna habitat types. The following information was recorded:

- Habitat structure (e.g. vegetation type, presence/absence of structural layers such as ground cover and mid storey).
- Presence/absence of refuge including: density of ground covers, fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge.
- Presence/absence of waterways including type, extent and habitat quality within any waterway.
- Location of the habitat within the survey area in comparison to the habitat within the surrounding landscape.
- Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey area.
- Current land use and disturbance history.
- Evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance.
- Evaluation of the likelihood of occurrence of conservation significant fauna within the habitat (based on presence of suitable habitat).
- Vegetation condition based on Thackway and Leslie (2006, Appendix 7).

A representative photograph of each habitat type.

3.2 BLACK COCKATOO HABITAT ASSESSMENT

Habitat used by black cockatoos have been placed into three categories by DoEE (Department Sustainability, Environment, Water, Population and Communities, 2012) as shown in Table B:

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

A habitat assessment of the proposed lime pit and haul road areas was carried out on 23 and 27 July 2018. Additional survey work was undertaken between 7 – 18 October 2019 for the emergency access

track and Lee Road, Brown Road and Lake Saide Road reserves. Survey areas are shown in Figures 2 – 5.

TABLE B: HABITATS USED BY BLACK COCKATOOS

HABITAT	BAUDIN'S	CARNABY'S	FOREST RED-TAILED
Breeding	Generally, in woodland or forest, but may also breed in former woodland or forest now present as isolated trees. Nest in hollows in live or dead trees of karri (<i>Eucalyptus diversicolor</i>), marri (<i>Corymbia calophylla</i>), wandoo (<i>E. wandoo</i>) and tuart (<i>E. gomphocephala</i>).	Generally, in woodland or forest, but also breeds in former woodland or forest now present as isolated trees. Nest in hollows in live or dead trees of salmon gum (<i>E. salmonophloia</i>), wandoo, tuart, jarrah (<i>E. marginata</i>), flooded gum (<i>E. rudis</i>), york gum (<i>E. loxophleba</i> subsp. <i>loxophleba</i>), powderbark (<i>E. accedens</i>), karri and marri.	Generally, in woodland or forest, but may also breed in former woodland or forest now present as isolated trees. Nest in hollows in live or dead trees of marri, karri, wandoo, bullich (<i>E. megacarpa</i>), blackbutt (<i>E. patens</i>), tuart and jarrah.
Night roosting	Generally, in or near riparian environments or other permanent water sources. Jarrah, marri, flooded gum, blackbutt (<i>E. patens</i>), tuart, and introduced eucalypts including blue gum (<i>E. globulus</i>), and lemon scented gum (<i>Corymbia citriodora</i>).	Generally, in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate (<i>E. occidentalis</i>), salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced pines.	Tall jarrah, marri, blackbutt, tuart and introduced eucalypt trees within or on the edges of forests.

Source: Department of Sustainability, Environment, Water, Population and Communities (2012).

Breeding Habitat

Assessment of black cockatoo breeding habitat involves the identification of all suitable breeding trees species within the survey area that have a diameter at breast height (DBH) of over 50cm. If present, the DBH of each tree is estimated using a pre-made 50 cm gauge. The location of each tree identified as being over the threshold DBH is recorded with a GPS and details on tree species, number and size of hollows (if any) noted. The location of trees observed to contain hollows (of any size/type) are recorded using a GPS. Target tree species include Marri, Jarrah and Karri or any other endemic *Corymbia/Eucalyptus* species of a suitable size that is present. Peppermints, *Banksia*, Sheoak and Melaleuca tree species (for example) are not assessed as they typically do not develop hollows that are used by black cockatoos.

For the purposes of this survey a tree containing a potential cockatoo nest hollow is defined as:

Any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) suitable for occupation by black cockatoo for the purpose of nesting/breeding. Hollows that had an entrance greater than about 12cm in diameter and would allow the entry of

a black cockatoo into a suitably orientated and sized branch/trunk, will be recorded as a ‘potential nest hollow’. Identified hollows are examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). The calls of chicks were also listened for, if a suitable hollow is present.

3.2.1 Foraging Habitat

Foraging habitat is described in Table C. The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey is recorded, if present. The nature and extent of potential foraging habitat present is also documented irrespective of the presence of any actual foraging evidence.

TABLE C: FORAGING DESCRIPTION FOR THREE SPECIES OF BLACK COCKATOO

HABITAT	BAUDIN’S	CARNABY’S	FOREST RED-TAILED
Foraging	Eucalypt woodlands and forest, and proteaceous woodland and heath. During the breeding season feed primarily on native vegetation, particularly Marri (<i>Corymbia calophylla</i>). Outside the breeding season, may feed in fruit orchards (mostly apple and pear, but also persimmon) and tips of <i>Pinus</i> spp.	Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as <i>Banksia</i> spp., <i>Hakea</i> spp. and <i>Grevillea</i> spp. Forages in pine plantations (<i>Pinus</i> spp.), eucalypt woodland and forest that contains foraging species. Also, individual trees and small stands of these species.	Jarrah and Marri woodlands and forest, and edges of Karri (<i>Eucalyptus diversicolor</i>) forests including Wandoo (<i>E. wandoo</i>) and Blackbutt (<i>E. patens</i>), within the range of the subspecies.
Foraging: common food items	Mostly marri (seeds, flowers, nectar and grubs) and proteaceous trees and shrubs. Also other native seeds and introduced fruits; insects and insect larvae; pith of kangaroo paw (<i>Anigozanthos flavidus</i>); juice of ripe persimmons; tips of <i>Pinus</i> spp. and seeds of apples and pears.	Seeds, flowers and nectar of native proteaceous plant species (for example, <i>Banksia</i> spp., <i>Hakea</i> spp. and <i>Grevillea</i> spp), eucalypts and <i>Callistemon</i> . Also seeds of introduced species including <i>Pinus</i> spp., <i>Erodium</i> spp., wild radish, canola, almonds and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons.	Mostly seeds of marri and jarrah, also <i>Eucalyptus caesia</i> , illyarrie (<i>E. erythrocorys</i>) and some introduced eucalypts such as river red gum (<i>E. camaldulensis</i>) and flooded gum (<i>E. grandis</i>), <i>Allocasuarina</i> cones, fruits of snottygobble (<i>Persoonia longifolia</i>) and mountain marri (<i>Corymbia haematoxylon</i>). On the Swan Coastal Plain, often feed on introduced cape lilac (<i>Melia azedarach</i>).

Source: Department of Sustainability, Environment, Water, Population and Communities, 2012

3.2.2 Night Roosting Habitat

Direct and indirect evidence of black cockatoos roosting within trees on site is noted if observed (e.g. branch clippings, droppings or moulted feathers). This included a dusk survey prior to commencement of the nocturnal WRP survey aimed at observing any actual roosting activity at the time of the survey.

3.3 WESTERN RINGTAIL POSSUM SURVEY

3.3.1 Daytime Survey

Day time surveys were undertaken to locate and record dreys, obvious tree hollows, scats and individual WRPs. These surveys were undertaken for the proposed lime pit and haul road on the 23 and 27 July 2018. The emergency access track and Lee Road, Brown Road and Lake Saide Road reserves were surveyed between 7 and 10 October 2019. The day time surveys involved traversing the survey area on foot.

3.3.2 Night Time Survey

Night time surveys with spotlighting to locate and record individual WRPs was carried out. The proposed lime pit and haul road was surveyed on the 28 July 2018 between 5:30pm and 9pm. The emergency access track and Lee Road, Brown Road and Lake Saide Road reserves were surveyed at night between 7 and 10 October 2019. This involved searching along the made and unmade road reserves, on foot and in a vehicle, using a LED head torch. The spotlighting also had the potential to identify the presence of other nocturnal mammal species.

3.3.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the survey area are provided based on observations made during the site surveys.

3.4 MAIN'S ASSASSIN SPIDER

The proposed lime pit and haul road areas were assessed on 23 and 27 July 2018. The emergency access track, Lee Road, Brown Road and Lake Saide Road reserves were assessed for potential habitat between 7 and 10 October 2019. The survey was undertaken to determine the presence of suspended leaf litter under *Agonis flexuosa* stands. Although potential habitat was limited, small portions of potentially suitable habitat were identified and a DBCA license was sought and granted on 17 October 2019. Assessment was undertaken by Melanie Price on 18 October 2019. Melanie has previously been trained by Dr Mark Harvey (WA Museum) in sampling techniques and the identification of Main's Assassin Spider.

Guided by a standard operating procedure (Aurora Environmental, 2019b), sampling comprised placing a sieve on a sorting tray which is placed beneath suspended leaf litter, with litter shaken into the tray and sorted to locate spiders. Spiders were examined using a jeweller's magnifying visor. No trapping or wet pit falling was conducted as part of this assessment. All survey work was conducted according to DBCA licenses (Number 08-002587-1, BA27000159 and TFA 2019-0090; Appendix 5).

Other Observations

Opportunistic observations of habitat and fauna were undertaken throughout the survey.

4 SURVEY LIMITATIONS

4.1 DESKTOP LIMITATIONS

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species in the area. The records from the DBCA searches of threatened flora and fauna provide more accurate information for the general area. However, some records of collections, sightings or trappings cannot be dated and often misrepresent the current range of threatened species.

Seasonal sampling has not been carried out as part of this fauna assessment. The conclusions presented are based on information from Western Australian and Commonwealth databases, field data and the environmental monitoring carried out over a limited period of time. Therefore, the data and interpreted outcomes are indicative of the environmental conditions on the site at the time of the field assessment, as interpreted by an experienced zoologist. It is recognised that site conditions may change over time.

4.2 FIELD SURVEY LIMITATIONS

The EPA (2016a) Technical Guide states flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table D. Based on this assessment, the present survey effort has not been subject to any constraints which affect the thoroughness of the assessment and the conclusions which have been formed.

TABLE D: FIELD SURVEY LIMITATIONS

ASPECT	LIMITATION	COMMENT
Sources of information and availability of contextual information.	Nil	Adequate information is available for the survey area, this includes broad scale (1:250,000) mapping by Beard (1979) and digitised by Shepherd <i>et al.</i> (2002), plus vegetation and flora survey (Bio Diverse Solutions, 2016 and 2017) and other studies (Aurora Environmental, 2019 and PGV Environmental 2019).
Scope (what life forms were sampled etc.)	Nil	Following desktop review, reconnaissance and field surveys targeted conservation significant fauna most likely to be present in the survey area.
Proportion of fauna identified, recorded and/or collected	Minor	The fauna survey was undertaken in July 2018 and October 2019 and comprised a reconnaissance and targeted survey. The fauna assessment sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Cryptic species would not have been identified during a reconnaissance survey and seasonal variation within species often requires targeted surveys at a particular time of the year. The fauna assessment was aimed at identifying habitat types and conservation significant terrestrial vertebrate fauna likely to be utilising the survey area. Targeted survey/sampling for Black Cockatoo habitat, WRP and Main's Assassin Spider occurred.

ASPECT	LIMITATION	COMMENT
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	Adequate coverage of the survey area was undertaken.
Mapping reliability	Nil	The vegetation was mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard, 1979) and field data and more detailed vegetation mapping, where available. Data was recorded in the field using hand-held GPS tools. Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The GPS units used for this survey are accurate to within ± 5 metres on average. Therefore, the data points consisting of coordinates recorded from the GPS may contain slight inaccuracies.
Timing/weather/season/cycle	Minor	<p>The fauna survey was conducted during winter (23 – 28 July 2018) and Spring (7 – 10 October and 18 October 2019).</p> <p>The weather conditions during the field survey included:</p> <ul style="list-style-type: none"> • 23 July 2018: Min: 10°C, Max: 16.9°C Rainfall: 13.6mm • 27 July 2018: Min: 10°C, Max: 16.9°C Rainfall: 2.0mm • 28 July 2018: Min: 11.4°C Max: 14.2°C Rainfall: 6mm. • 7 October 2019: Min: 10 °C, Max: 16.7 °C, Rainfall: 2mm • 8 October 2019: Min: 7.7 °C, Max: 22.2°C, Rainfall: 0mm • 9 October 2019: Min: 10.4°C, Max: 22.1°C, Rainfall: 0mm • 10 October 2019: Min: 11.5°C, Max: 25.7°C, Rainfall: 0.2mm • 18 October 2019: Min 10.5 °C, Max: 16.4 °C, Rainfall: 1.2mm <p>Weather conditions listed here are for the closest weather station at Albany Airport (Weatherzone, 2019).</p> <p>Note: Conditions were dry and fine during evening spotlighting.</p> <p>The weather conditions recorded during the survey periods are considered unlikely to have negatively impacted upon the fauna survey.</p> <p>The survey timing is considered appropriate for the flora and fauna field survey.</p>
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	The proposed lime pit area and emergency access road is relatively undisturbed except for some tracks. The haul road is already cleared, but may need to be widened. The vegetation in the unmade portion of Lee Road reserve ranges in condition from Excellent to Good with some areas with weedy understorey. The constructed portions of Lee Road, Brown Road and Lake Saide Road reserves contain a formed gravel

ASPECT	LIMITATION	COMMENT
		road. Road edges are in various conditions ranging from Good condition to Totally Degraded condition.
Intensity (in retrospect, was the intensity adequate)	Nil	The survey area was sufficiently covered by the zoologist during the survey.
Resources	Nil	Adequate resources were employed during the field survey. 23 – 28 July 2018: 15-person hours were spent undertaking the day time survey and 10-person hours were spent doing the evening spotlighting. 7 – 10 October 2019: 34.25 person hours for daytime survey and 14.5 person hours for evening spotlighting.
Access restrictions	Minor	Where possible the survey area was accessed on foot and traversed by vehicle.
Experience levels	Nil	The zoologist who executed the survey is suitably qualified and experienced with a Bachelor of Science (Honours) Zoology from the University of Western Australia

5 RESULTS AND DISCUSSION

5.1 FAUNA HABITAT

Vegetation and fauna habitat in the survey area is shown in Figures 2 - 5 and Appendix 1, comprising:

Lot 9005 Lime Pit

Open Heath: Shrubland comprising *Spyridium globulosum*, *Scaevola nitida*, *Acacia hastulata*, *Pultenaea reticulata*, *Hakea varia* and *Anarthria prolifera* with occasional emergent *Agonis flexuosa* with *Lepidosperma* sp. on crests and in swales.

Anecdotal evidence (landowner) suggests that the Lot 9005 area was last burnt in 1994 and had previously been burnt frequently (every five years) to provide fodder for livestock grazing.

The habitat types surveyed in the proposed lime pit area are well represented across the Nullaki Peninsula. The temporary clearing of the lime pit (8ha) is not likely to contribute to fragmentation or ongoing significant loss of habitat if management activities outlined in *Excavation – Rehabilitation Management Plan*, (Landform Research, 2018) are undertaken.

Lot 9005 Haul Road

- Agonis Woodland: Dominated by tall *Agonis flexuosa* with occasional *Eucalyptus cornuta* with *Taxandria parviceps*, *Pultenaea reticulata* with *Banksia attenuata* and *B. grandis*.
- Taxandria Woodland: Open Woodland with overstorey dominated by *Taxandria juniperina* with sparse *Agonis flexuosa* with understorey of *Olearia axillaris* and *Spyridium globulosum* with *Spyridium globulosum*, *Adenanthos* sp. *Banksia attenuata*, *Pultenaea reticulata*, *Hakea varia*.
- Open Heath: Where overstorey present, scattered *Agonis flexuosa*, *Acacia* sp. and *Banksia attenuata*.

Lot 9005 Emergency Access Track

- Open Heath: Shrubland comprising low and scattered *Agonis flexuosa* with *Spyridium globulosum*, *Acacia cyclops*, *Jacksonia horrida*, *Pultenaea reticulata* over *Lyginia barbata*, *L. imberbis*, *Desmocladius flexuosus*, *Schoenus subfascicularis* and *Opercularia hispidula*.

Lee Road Reserve

- Open Heath: Shrubland comprising low and scattered *Agonis flexuosa* with *Spyridium globulosum*, *Acacia cyclops*, *Jacksonia horrida*, *Pultenaea reticulata* over *Lyginia barbata*, *L. imberbis*, *Desmocladius flexuosus*, *Schoenus subfascicularis* and *Opercularia hispidula*.
- Bullich – Banksia Woodland: *Eucalyptus megacarpa*, *Banksia littoralis* and *Agonis flexuosa* with *Xanthorrhoea preissii*, *Spyridium globulosum*, **Psoralea pinnata*, *Acacia pulchella* and *Pultenaea reticulata*.
- Bullich – Agonis Woodland: *Eucalyptus megacarpa* and *Agonis flexuosa* with *Bossiaea linophylla* and *Spyridium globulosum* over sedges and grasses. Some herbaceous weeds present.

- Agonis – Yate Woodland: *Agonis flexuosa* with occasional *E. cornuta* with understorey of *Pteridium esculentum*, *Lepidosperma gladiatum*. Some grassy weeds present.

Brown Road Reserve

- Yate and Agonis Woodland: *Eucalyptus cornuta* over *Agonis flexuosa* with *Lepidosperma gladiatum*, *Desmocladius flexuosus* and **Psoralea pinnata*.
- Wattie and Melaleuca Woodland: *Taxandria juniperina* over *Melaleuca sp.* with *Lepidosperma gladiatum*.
- Marri and Jarrah Woodland: *Corymbia calophylla* and *E. marginata* over *Agonis flexuosa*. Weedy understorey.

Lake Saide Road Reserve

- Marri and Jarrah Woodland: *Corymbia calophylla* and *Eucalyptus marginata* over *Agonis flexuosa*. **Psoralea pinnata* and grassy weeds in understorey.
- Karri, Marri and Jarrah Forest: *Eucalyptus diversicolor* with *Corymbia calophylla* and *Eucalyptus marginata* over *Agonis flexuosa*. **Psoralea pinnata* and grassy weeds in understorey.

5.2 BLACK COCKATOO HABITAT ASSESSMENT

5.2.1 Black Cockatoo Breeding Habitat

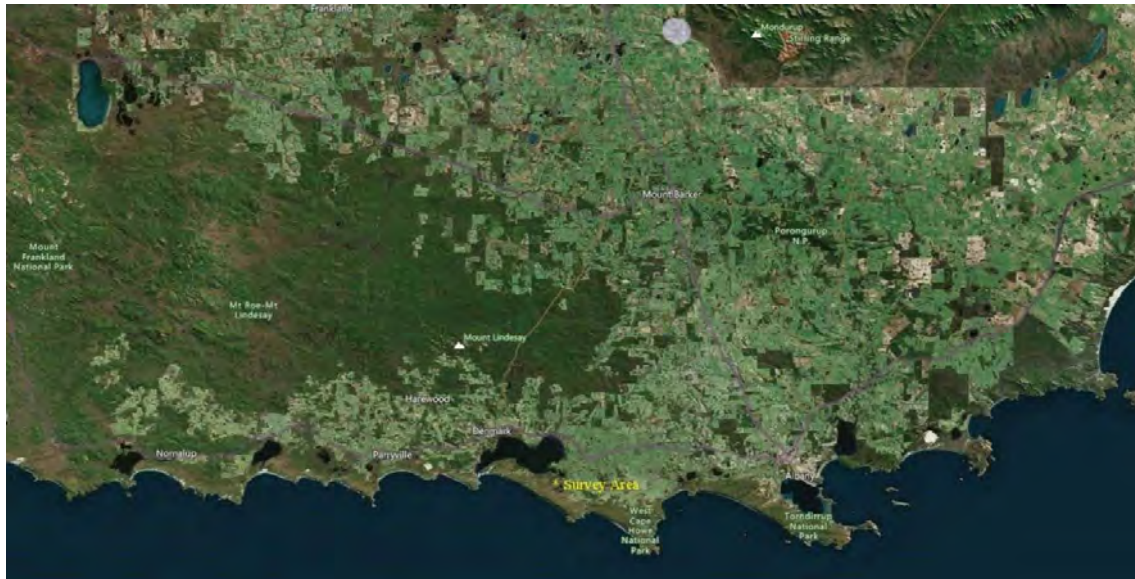
Trees considered potentially suitable for black cockatoos to use as nesting habitat (using DoEE criteria – Department of Sustainability, Environment, Water, Population and Communities, 2012) were not observed in the following areas as the habitat did not contain trees that form hollows:

- Lime pit area.
- Haul Road.
- Emergency access road.

As shown in Figures 2a – 2f and Appendix 8, Lee Road, Brown Road and Lake Saide Road reserves contain 130 trees with a diameter at chest height of greater than 50cm, comprising Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Karri (*E. diversicolor*), Bullich (*E. megacarpa*) and dead trees. While the trees met the criteria for habitat trees outlined in *EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species* (DSEWPaC, 2012) and several trees had small hollows or incipient hollows, no trees with hollows suitable for Black Cockatoos were observed. Of the 130 trees recorded, 56 will not be impacted as they are outside the proposed clearing extent required for the road upgrade. Seventy-four potential habitat trees proposed to be removed comprise 16 Karri, 47 Marri, 5 Jarrah, 1 Bullich and 5 dead trees.

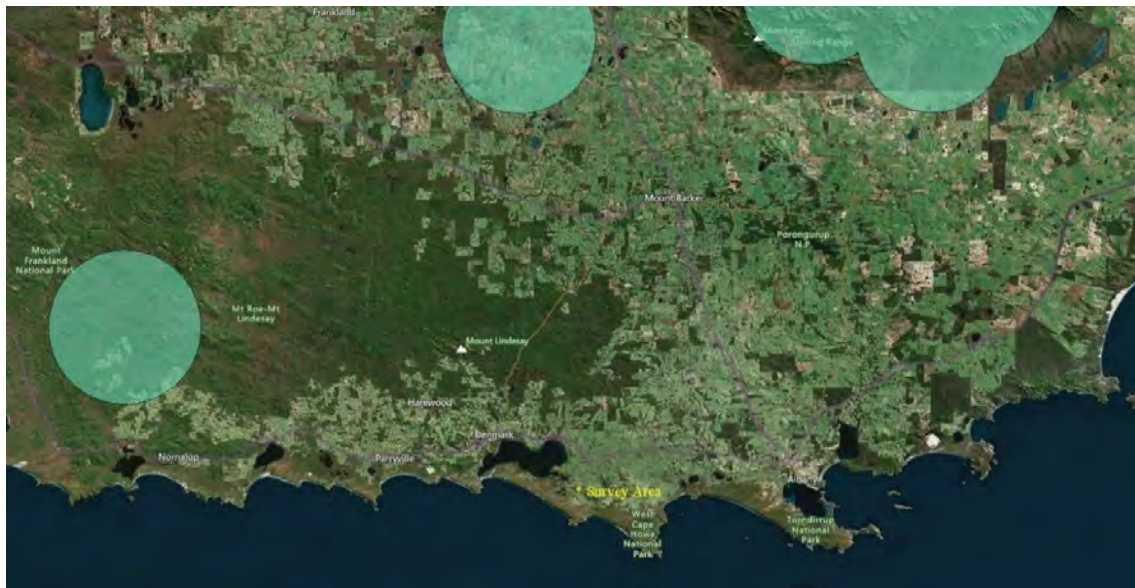
Mapping prepared by DBCA indicates that the nearest nesting sites for white tail black cockatoos is in the Stirling Ranges (80km north-east; Plate E) and Mount Frankland National Park/ Mount Roe - Mount Lindsay National Parks (60 km north-west; Plate F).

PLATE E: BLACK COCKATOO BREEDING SITES (BUFFERED)



Source: National Maps, 2019 (DBCA-063)

PLATE F: CARNABYS CONFIRMED BREEDING



Source: National Maps, 2019 (DBCA-054)

5.2.2 Black Cockatoo Foraging Habitat

When nesting, black cockatoos will generally forage within a 6 – 12 km radius of their nesting site. Following breeding, birds assemble into flocks and move across the landscape searching for food, usually foraging within 6 km of a night roost. Because of this mobility, potential for reduced seed set and flowering due to drought, and the irregular or infrequent flowering and fruiting patterns of many

of their food sources, large areas of foraging habitat are required to support black cockatoo populations. Table C indicates the preferred foraging habitat for each cockatoo species.

The vegetation of the proposed lime pit, Haul Road and Emergency Access Road areas are in excellent condition but contain few species which provide high quality foraging for the three species of black cockatoos. Popular foraging species such as Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Sheoak (*Allocasuarina fraseriana*) and Balga (*Xanthorrhoea species*) are absent. Other foraging species (e.g. *Banksia* and *Hakea*) are present, but in low numbers.

Lee Road reserve contains a small portion of Bullich - Banksia woodland which supports foraging species (2,000 m²). Brown Road and Lake Saide Road reserves also contain suitable foraging species such as Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*). No signs of Black Cockatoos were recorded (such as chewed fruits or bark stripped from trees).

While some foraging habitat is present, the area to be removed is unlikely to significantly impact the three species of Black Cockatoo to the extent that the species would decline. In addition, there are large areas of foraging habitat in the coastal and inland areas of Denmark and Albany. DBCA mapping indicates that potential feeding areas for Carnaby's Black Cockatoos comprises Jarrah forest inland from the coast (Plate G). There are significant areas of Jarrah forest within 15km, including Denmark Catchment State Forest, Mount Lindesay National Park and other potential foraging habitat (Quarram Nature Reserve, William Bay National Park, West Cape Howe National Park and coastal reserves managed by the City of Albany). The Nullaki Peninsula is largely uncleared, with retention of significant tracts of native vegetation required in the City of Albany Local Planning Scheme No. 1.

5.2.3 Black Cockatoo Roosting Habitat

The trees generally favoured by black cockatoos for roosting are included in Table E.

TABLE E: NIGHT ROOSTING HABITAT

BAUDIN'S	CARNABY'S	FOREST RED-TAILED
Generally, in or near riparian environments or other permanent water sources. Jarrah, marri, flooded gum, Blackbutt <i>E. patens</i> , tuart, and introduced eucalypts including blue gum <i>E. globulus</i> , and lemon scented gum <i>Corymbia citriodora</i> .	Generally, in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate <i>E. occidentalis</i> , salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced pines.	Tall jarrah, marri, blackbutt, tuart and introduced eucalypt trees within or on the edges of forests.

Source: Department of Sustainability, Environment, Water, Population and Communities, 2012

No potential roosting trees were identified in the proposed lime pit, haul road or Emergency Access Road during the survey due to the generally low nature of the vegetation.

Tall (greater than 20m) Karri (*Eucalyptus diversicolor*), Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) trees are present on Brown Road and Lake Saide Road (Figure 2 and Appendix 8). No evidence of roosting was observed. Due to existing use of the road, it is unlikely that these trees would offer a significant resource for roosting.

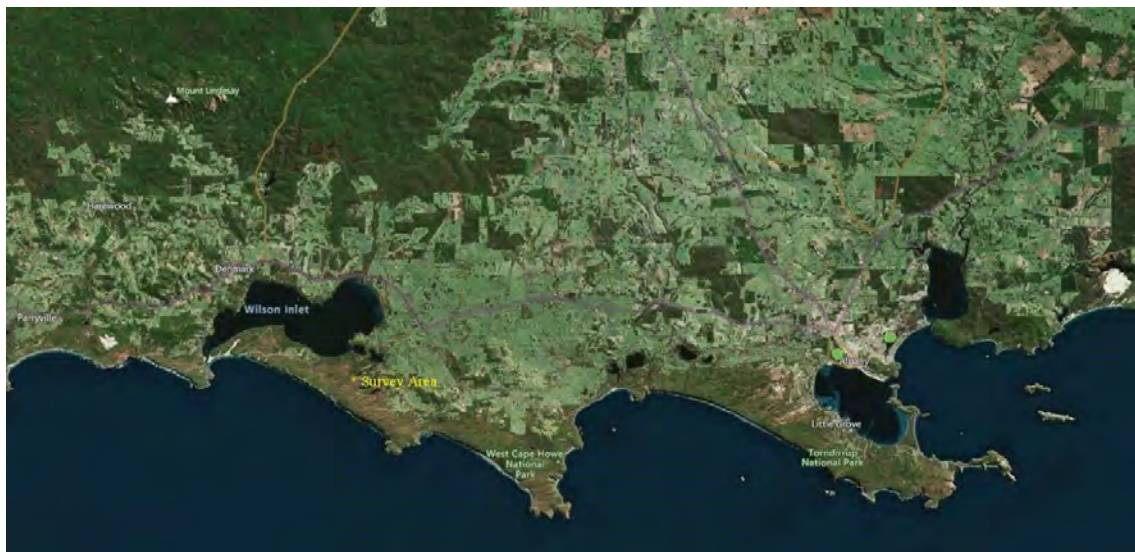
A review of available data (National Maps DBCA, 2019; DBCA-064) indicates that there are roost sites for Black Cockatoos at Lowlands, Torbay and Kronkup (Plate G) with confirmed roosting sites for Carnaby’s Black Cockatoos in Albany (Plate H). There are no known roost sites mapped for Youngs Siding or Nullaki. Removal of the proposed trees is unlikely to significantly impact on the roosting of the three species of Black Cockatoo.

PLATE G: BLACK COCKATOO ROOSTING SITES (BUFFERED)



Source: National Maps, 2019 (DBCA-064)

PLATE H: CARNABY’S CONFIRMED ROOST SITES



Source: National Maps, 2019 (DBCA-050)

5.3 WESTERN RINGTAIL POSSUM

No traces of WRP were identified in the proposed lime pit, haul road or emergency access road areas (Lot 9005) (including scats, other evidence or evening spotlighting).

Two dreys (in poor condition) were located on Lee Road (Figure 2d) in a tree that will be retained. One WRP was observed adjacent to the unmade portion of Lee Road (Figure 2f) and three individuals were located adjacent to the eastern end of Lee Road during the night time spotlighting (Figure 2d). The Lee Road reserve areas containing *Agonis* Woodland or Bullich *Agonis* Woodland would generally be considered suitable habitat to support WRP. In total, 0.48 ha of this habitat is proposed to be cleared on the unmade portion of Lee Road. Open Heath areas are generally either marginal or not preferred habitat due to a lack of interconnected trees.

5.4 MAIN'S ASSASSIN SPIDER

Main's Assassin Spider (MAS) inhabits Peppermint (*Agonis*) coastal habitats where it favours shaded, long unburnt groves with an understorey of sedges (*Lepidosperma*), grasses and 'wiry' herbs (Restionaceae). Its microhabitat within these Peppermint groves is the elevated leaf-litter layer which collects amongst the crowns of the understorey plants (Rix and Harvey, 2009). While this habitat type is present in the survey area, suspended leaf litter was absent, except for one location in the proposed lime pit (7 samples), five locations in the proposed emergency access track (6 samples) and two locations in the unmade portion of Lee Road (3 samples) (Figures 2f, 3 and 5). Of the 16 samples sieved, a number of species of spider were observed and released during the site reconnaissance. However, none had features that were characteristic of Main's Assassin Spider.

Anecdotal evidence suggests that Lot 9005 was last burnt in 1994 but had been subject to repeated frequent burn at approximately 5-year intervals for decades before that, in order to encourage feed for sheep which were grazed in the area. This may explain why there is an almost complete absence of suspended leaf litter underneath stands of *Agonis flexuosa*. Brown and Lake Saide Road reserves did not contain habitat suitable for MAS.

The survey indicates that Main's Assassin Spider is unlikely to occur within the area proposed to be cleared.

5.5 OTHER SPECIES

Three Southwestern Snake-necked Turtles or Long Necked Turtles (*Chelodina colliei*) were observed in Lee Road reserve (Figures 2d, 2e and 2f). The species is usually active in Spring and Summer as females seek nesting sites. This species is not listed as threatened or endangered in Western Australian or Australia, although the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2019) indicates that the species is 'near threatened'. Although the species spends much of its time in freshwater and seasonal wetlands, from October to February the females actively seek nesting sites (sandy areas) to lay eggs. One possible nesting site comprising a north facing sand bank is within Lee Road reserve (Figure 2f).

Other common species which were detected as part of the survey included:

- New Holland Honeyeater (*Phylidonyris novaehollandiae*);

- Kookaburra (**Dacelo novaeguineae*);
- Western Grey Kangaroo (*Macropus fuliginosus*);
- Motorbike Frog (*Litoria moorei*).

Nocturnal species such as Chuditch and Phascogale were not detected during spotlighting.

6 ENVIRONMENTAL APPROVALS AND MANAGEMENT

This section provides advice on potential environmental approvals and referrals required, based on the ecological values identified within the survey area. The survey area is currently being assessed for a clearing permit under Part V of the *Environmental Protection Act 1986*.

6.1 FEDERAL GOVERNMENT

MNES are factors that are protected under the EPBC Act. Referral to DoEE under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any MNES as described in *Significant Impact Guidelines 1.1* (DoE, 2013). Table F shows an assessment of this Project against the MNES listed under the EPBC Act.

TABLE F: ASSESSMENT OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

MATTER OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	TRIGGERS FOR REFERRAL	COMMENT AND NEED FOR REFERRAL TO DEE UNDER EPBC ACT
Listed Threatened Species:	Clearing of any known nesting tree.	No trees with suitable hollows are present in the survey area.
Carnaby's Black Cockatoo (Endangered) Forest Red-tailed Black Cockatoo (Vulnerable) Baudin's Black Cockatoo (Vulnerable)	Clearing or degradation of any part of a vegetation community known to contain breeding habitat.	No known breeding habitat is present. 130 trees with diameter of greater than 50cm at chest height are present in the survey area of which 74 are proposed to be cleared. However, none contain hollows suitable for Black Cockatoos.
	Clearing of more than 1 ha of quality foraging habitat.	Foraging habitat is marginal due to low numbers of preferred foraging species in the proposed lime pit area, haul road and emergency access road and Lee Road. Brown Road and Lake Saide Road reserves contain Marri and Jarrah trees which can provide food for the three species. However, there was no evidence of foraging. There are large areas (greater than 500 ha e.g. Nullaki Peninsula, Denmark Water Catchment, West Cape Howe National Park and Mt Lindesay National Park) of foraging habitat within 15 km of the survey area. The lime pit area (8 ha) will be progressively rehabilitated upon completion of each stage of mining, so there will not be a permanent loss of habitat associated with that area.
	Clearing or degradation (including pruning of top canopy) of a known roosting project area.	No known roosting areas have been recorded in the survey area (National Maps, 2019). Roosting is not likely to occur in the survey areas

MATTER OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	TRIGGERS FOR REFERRAL	COMMENT AND NEED FOR REFERRAL TO DEE UNDER EPBC ACT
		due to lack of suitable roosting trees and proximity to existing actively used roads.
	Creating a gap or greater than 4 km between patches of Black Cockatoo habitat breeding, foraging or roosting.	Not applicable.
	Uncertainty: Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat.	Not applicable.
Western Ringtail Possum (Critically Endangered)	<p>An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:</p> <ul style="list-style-type: none"> • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into two or more populations • adversely affect habitat critical to the survival of a species • disrupt the breeding cycle of a population • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or 	<p>Four WRP were detected adjacent to Lee Road reserve (outside the area proposed to be cleared). The numbers of individuals recorded indicates the species is present in the area at low densities. 0.48ha of potential WRP habitat is proposed to be cleared in the unmade portion of Lee Road. Due to the narrow linear nature of the proposed clearing (less than 20m width), the presence of suitable habitat adjacent to the road reserve and retained connectivity in the area, the clearing will not have a significant impact on the WRP population.</p> <p>Future traffic in the area will comprise a low number of vehicles which will use the area only during daylight hours for four months of the year and therefore be unlikely to significantly impact on WRP.</p> <p>The clearing is not likely to lead to a long term decrease in the size of the WRP population or reduce the occupancy of the area. The current population will not be fragmented into two or more populations. The clearing will not adversely affect habitat critical to the survival of WRP. The clearing will not modify, destroy, remove isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The clearing will not result in invasive species or disease being introduced to the detriment of WRP. The clearing will not interfere with the recovery of the species as outlined in Western Ringtail Possum (<i>Pseudocheirus occidentalis</i>) Recovery Plan (Department of Parks and Wildlife, 2017).</p>

MATTER OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	TRIGGERS FOR REFERRAL	COMMENT AND NEED FOR REFERRAL TO DEE UNDER EPBC ACT
	<p>critically endangered species' habitat</p> <ul style="list-style-type: none"> • introduce disease that may cause the species to decline, or • interfere with the recovery of the species. 	

Based on the assessment, survey and application of significant impact guidelines, it is considered that referral under the EPBC Act is not required.

6.2 WESTERN AUSTRALIAN GOVERNMENT

6.2.1 Environmental Protection Authority

Proposals which may have a significant environmental impact are required to be referred to the EPA under Section 38 of the EP Act. In deciding whether a proposal will be subject to the formal environmental impact assessment process, the EPA considers the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

In January 2017, the lime pit proposal was referred to the EPA who decided to 'Not Assess' under Section 39A. The explanation of the decision was:

The proposal is to re-establish a lime extraction pit and infrastructure on the Nullaki Peninsula. The extent of the clearing footprint is relatively small and the potential impacts have been reduced by utilising cleared and degraded areas. The proposal will impact 11.22 ha of native vegetation which are common communities in the region. The EPA considers that the proposal is unlikely to have a significant impact on the environment and does not warrant formal assessment. The potential environmental impacts of the proposal on native vegetation clearing can be effectively and appropriately assessed under Part V Division 2 of the Act (Clearing). Matters of noise, dust and vehicle movements, including on the Bibbulmun Track, should be considered by the City of Albany as part of its planning process.

The public record of the decision is included in Appendix 9.

The assessment of Lee Road, Brown Road and Lake Saide Road reserves was not included in the 2017 EPA assessment.

6.2.2 Department of Water and Environmental Regulation

Clearing of native vegetation is administered by the Department of Water and Environmental Regulation and requires a clearing permit under Part V of the EP Act, except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004* and not in an Environmentally Sensitive Area.

When preparing a native vegetation clearing application an assessment of the survey area against the ‘Ten Clearing Principles’ is undertaken to determine whether the Project is likely to be at variance to the Principles. The Ten Clearing Principles aim to ensure that potential impacts resulting from removal of native vegetation can be assessed in an integrated way. The clearing principles that relate to fauna are included in Table G with an assessment response based on the survey outcomes described in this document.

TABLE G: ASSESSMENT AGAINST CLEARING PRINCIPLES THAT RELATE TO FAUNA

CLEARING PRINCIPLE	ASSESSMENT RESPONSE
<p>a) – Native vegetation should not be cleared if it comprises a high level of biological diversity</p>	<p>10 vegetation/ fauna habitat types were recorded in the survey area (Section 5.1). A search of the <i>NatureMap</i> database (DBCA, 2019) for a foot print covering most of the Nullaki Peninsula and Youngs Siding area identified 105 fauna species previously recorded within an area including: 100 bird species, 3 species of fish, 1 spider and 1 reptile species.</p> <p>The desktop survey indicated that the area contains numerous vegetation and habitat types which may support a moderate range of flora and fauna species, potentially including conservation significant species. Targeted surveys for selected conservation species indicated:</p> <ul style="list-style-type: none"> • The area is not likely to contain Main’s Assassin Spider. • Breeding habitat for Black Cockatoos is not present. • Foraging habitat in Lot 9005 is marginal due to lack of suitable plant species. • Impacts on foraging habitat in Lee Road, Brown Road and Lake Saide Road reserves has been minimised due to retention of the Marri and Jarrah, where possible. Of the 130 habitat trees identified, only 74 are proposed to be cleared with 56 retained. <p>The proposed lime pit area to be cleared comprises 8 ha (lime pit) which is part of a much larger area of similar habitat which will be retained. In addition, the proposal will not result in permanent clearing of the lime pit area, with management and progressive rehabilitation to return the site to native vegetation upon completion of mining for each stage.</p> <p>The unmade portion of Lee Road reserve proposes to clear less than 0.5 ha of Bullich – <i>Agonis</i> Woodland and <i>Agonis</i> vegetation. Due to the narrow linear nature of the clearing in the access roads, impacts on WRP will be minimal.</p> <p>The proposal is not considered to be at variance with this clearing principle.</p>
<p>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 WA</p>	<p>The targeted fauna survey indicates that with appropriate management, the areas proposed to be cleared will not significantly impact:</p> <ul style="list-style-type: none"> • Three species of Black Cockatoo; • WRP; or • Main’s Assassin Spider. <p>The proposal is not considered to be at variance with this clearing principle.</p>
<p>h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the</p>	<p>Management measures are proposed to minimise risks to conservation values both on site and in nearby conservation areas, including dieback and weed hygiene, dust and erosion management and rehabilitation.</p> <p>The closest part of the conservation estate is West Cape Howe National Park which is 8 km to the east. The clearing is not likely to impact on this area.</p>

environmental values of any adjacent or nearby conservation area.	The clearing is not considered to be at variance with this clearing principle.
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6.3 MANAGEMENT RECOMMENDATIONS

The clearing permit application is for 15.19 ha which included 8 ha for the proposed lime pit and 7.19 ha associated with the haul road, Lee Road, Brown Road and Lake Saide Road reserves.

The proposed lime pit area comprises 8 ha, which will be progressively cleared (2 ha at a time) and rehabilitated after lime resource removal. Operations and management of the lime pit and associated access ways are outlined in an *Excavation and Rehabilitation Management Plan* (Landform Research, 2018). The plan addresses the following issues, many of which will reduce impacts on fauna and habitat values:

- Groundwater quality and quantity protection;
- Land surface stabilisation and interim rehabilitation, including erosion mitigation and topsoil management;
- Waste management;
- Dust management;
- Dieback management;
- Weed management;
- Contours and final ground surface levels;
- Fire management;
- Site security;
- Transport; and
- Conservation Issues.

Rehabilitation of the lime pit area with local native plant species, including those that provide foraging opportunities for Black Cockatoos are likely to lead to no net loss of fauna habitat, if implemented with target goals for species richness and density.

Preparation of an operation management plan will assist in day to day management of fauna issues during the life of the lime pit and should address actions to mitigate:

- Direct and indirect impacts;
- Fauna injury (e.g. due to vehicle movements);
- Reduction of risk of inadvertent trapping of native fauna in open excavations.

Overall the proposed lime pit operation is considered to be manageable in terms of impacts on fauna due to proposed management implementation and its relatively small footprint in a much larger vegetated area.

Clearing within Lee Road, Brown Road and Lake Saide Road reserves has been minimised by reducing speed limits and containing the clearing footprint within road reserve boundaries. Fifty six of 130 habitat trees identified will be retained within road reserves. The road design is required to meet standards suitable for haul truck movements.

Other recommended measures to reduce impacts include:

- Delineate clearing extent (e.g. with picket and tape) and ensure that clearing is only undertaken in nominated areas.
- Leave logs and dead trees in the road reserve, where appropriate.
- Reuse trees and vegetation as mulch, for rehabilitation, or other purposes as appropriate.
- Revegetate areas that are not required to remain clear for road operations. Mulching with removed vegetative material is recommended.
- Re-creation of Long-necked Turtle nesting areas may be possible through depositing sand banks along the northern edge of Lee Road, adjacent to seasonally inundated areas.

7 REFERENCES

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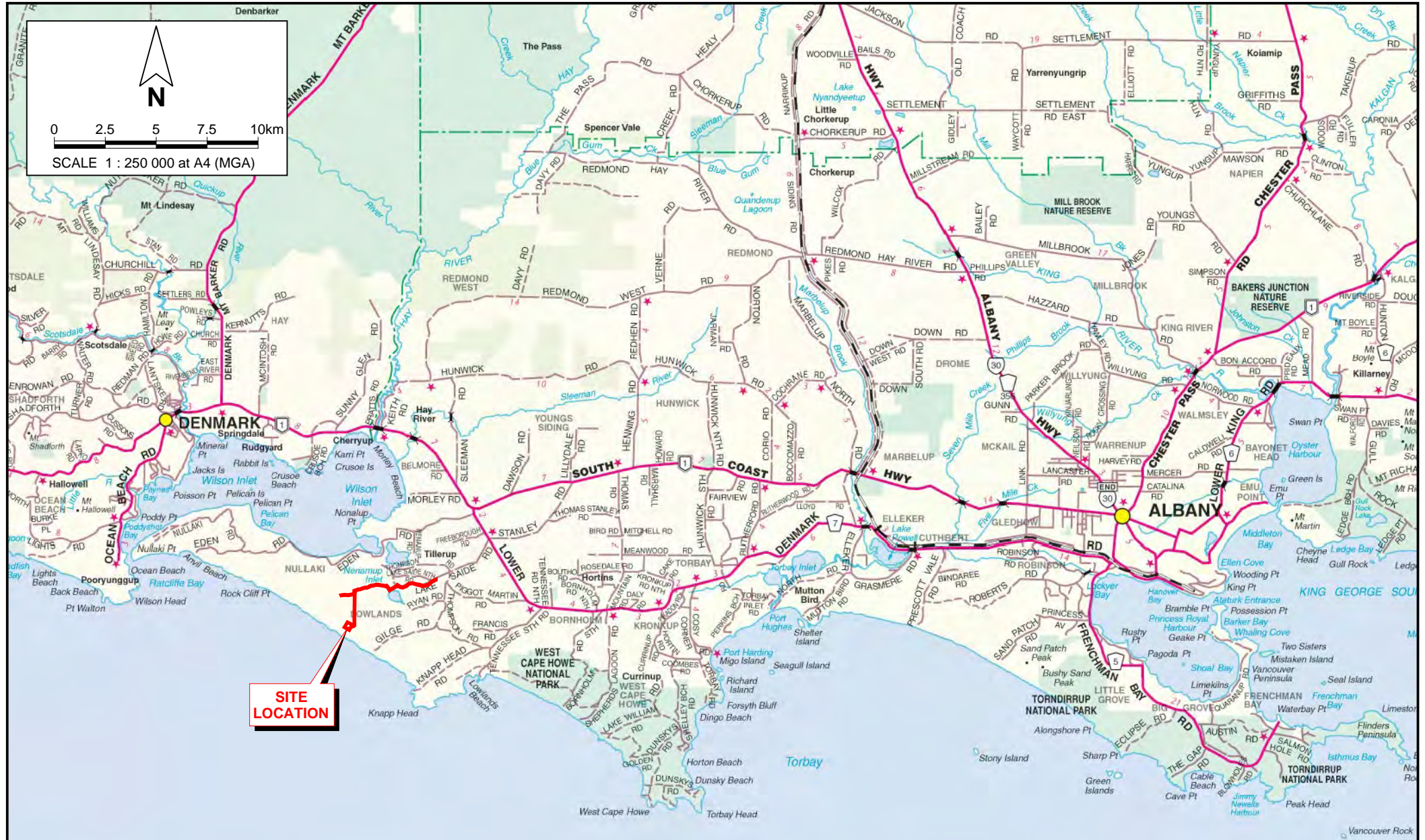
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FIGURES



Frenesi Pty Ltd
 LEVEL 1 FAUNA ASSESSMENT CLEARING PERMIT APPLICATION CPS 8392/1
 LEE ROAD, YOUNGS SIDING, ALBANY WA

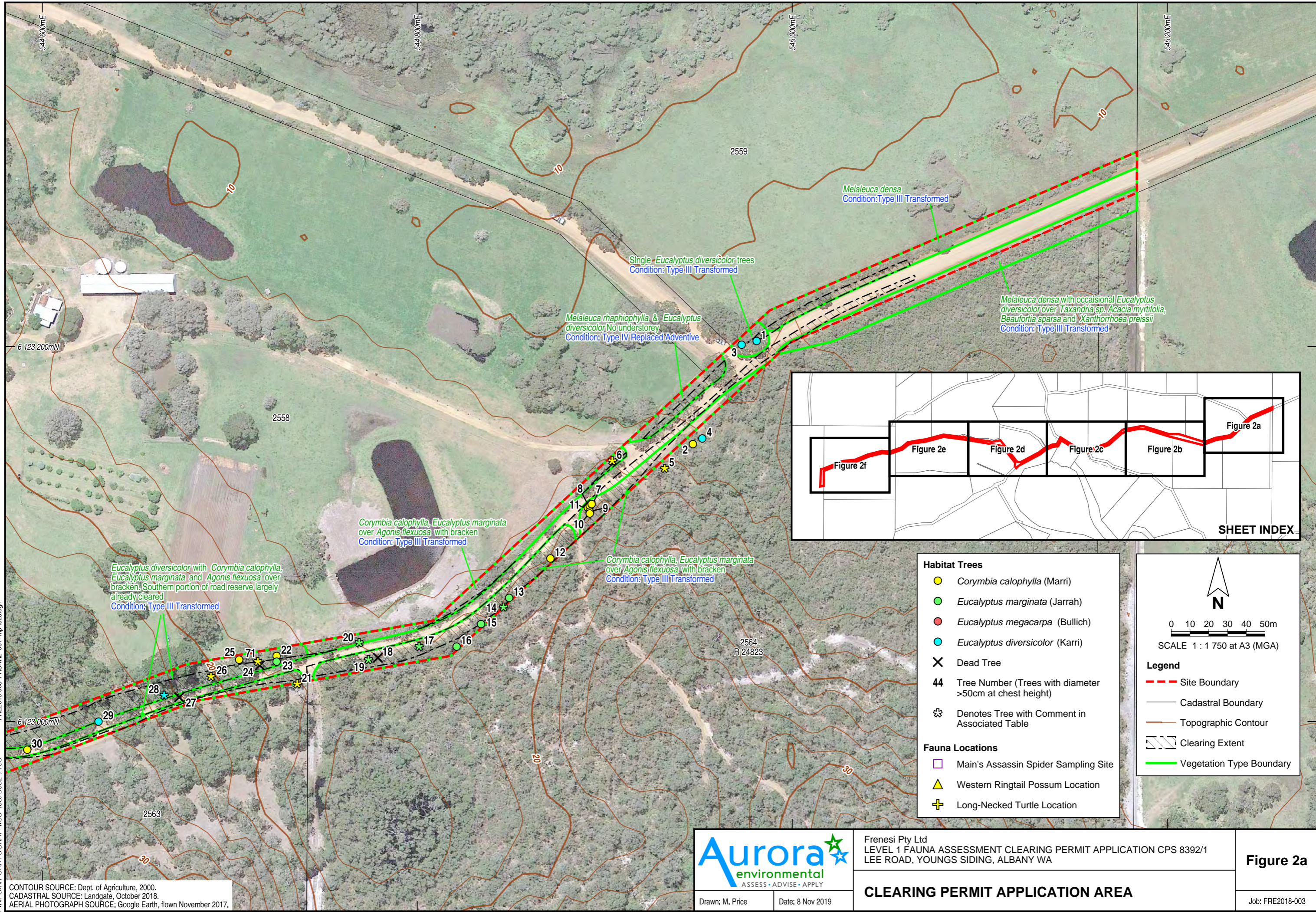
Figure 1

REGIONAL CONTEXT

Drawn: M. Price

Date: 30 Oct 2019

Job: FRE2018-003



Melaleuca densa
Condition: Type III Transformed

Single *Eucalyptus diversicolor* trees
Condition: Type III Transformed

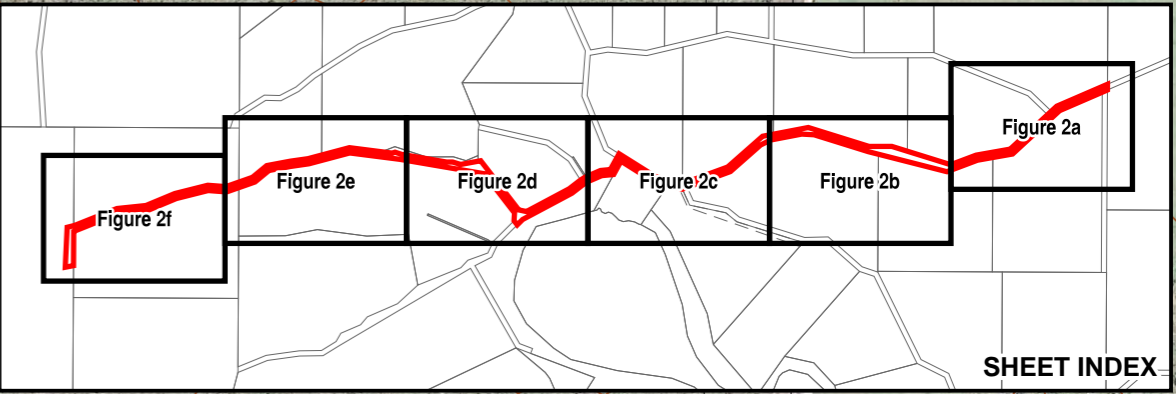
Melaleuca raphiophylla & *Eucalyptus diversicolor* No understorey
Condition: Type IV Replaced Adventive

Melaleuca densa with occasional *Eucalyptus diversicolor* over *Taxandria* sp. *Acacia myrtifolia*, *Beaufortia sparsa* and *Xanthorrhoea preissii*
Condition: Type III Transformed

Corymbia calophylla, *Eucalyptus marginata* over *Agonis flexuosa* with bracken
Condition: Type III Transformed

Corymbia calophylla, *Eucalyptus marginata* over *Agonis flexuosa* with bracken
Condition: Type III Transformed

Eucalyptus diversicolor with *Corymbia calophylla*, *Eucalyptus marginata* and *Agonis flexuosa* over bracken. Southern portion of road reserve largely already cleared
Condition: Type III Transformed



SHEET INDEX

- Habitat Trees**
- *Corymbia calophylla* (Marri)
 - *Eucalyptus marginata* (Jarrah)
 - *Eucalyptus megacarpa* (Bullich)
 - *Eucalyptus diversicolor* (Karri)
 - ✕ Dead Tree
 - 44 Tree Number (Trees with diameter >50cm at chest height)
 - ✱ Denotes Tree with Comment in Associated Table
- Fauna Locations**
- Main's Assassin Spider Sampling Site
 - ▲ Western Ringtail Possum Location
 - ⊕ Long-Necked Turtle Location

N

0 10 20 30 40 50m

SCALE 1 : 1 750 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Topographic Contour
- Clearing Extent
- Vegetation Type Boundary

FRE2018-003_FAUNA2_001_mpf-02a.dgn
PINPOINT CARTOGRAPHICS (08) 9562 7136

CONTOUR SOURCE: Dept. of Agriculture, 2000.
CADASTRAL SOURCE: Landgate, October 2018.
AERIAL PHOTOGRAPH SOURCE: Google Earth, flown November 2017.

Aurora environmental
ASSESS • ADVISE • APPLY

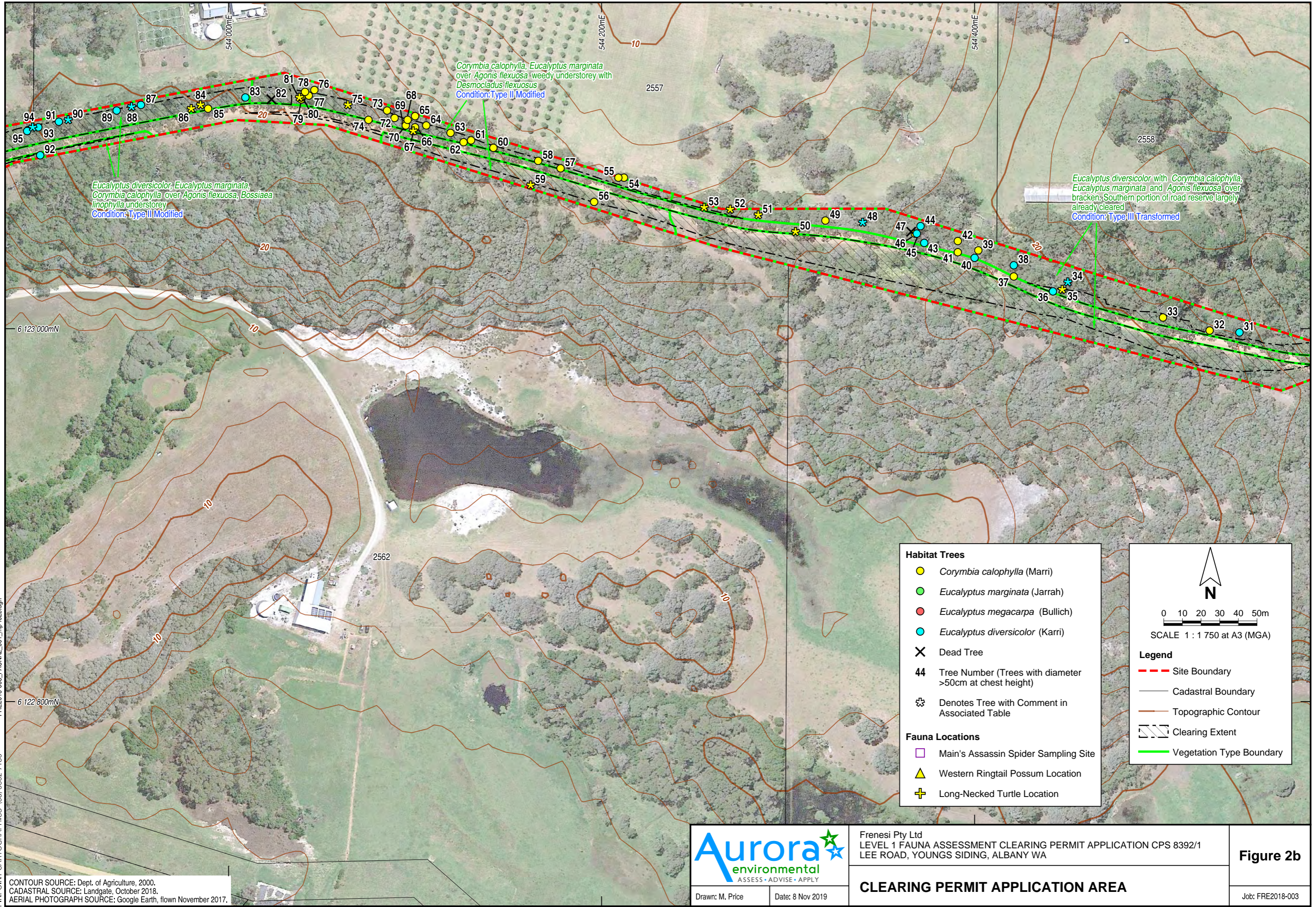
Drawn: M. Price Date: 8 Nov 2019

Frenesi Pty Ltd
LEVEL 1 FAUNA ASSESSMENT CLEARING PERMIT APPLICATION CPS 8392/1
LEE ROAD, YOUNGS SIDING, ALBANY WA

CLEARING PERMIT APPLICATION AREA

Figure 2a

Job: FRE2018-003



Corymbia calophylla, *Eucalyptus marginata*
over *Agonis flexuosa* weedy understorey with
Desmodcladus flexuosus
Condition: Type II Modified

Eucalyptus diversicolor, *Eucalyptus marginata*,
Corymbia calophylla over *Agonis flexuosa*, *Bossiaea*
linophylla understorey
Condition: Type III Modified

Eucalyptus diversicolor with *Corymbia calophylla*,
Eucalyptus marginata and *Agonis flexuosa* over
bracken. Southern portion of road reserve largely
already cleared
Condition: Type III Transformed

- Habitat Trees**
- *Corymbia calophylla* (Marri)
 - *Eucalyptus marginata* (Jarrah)
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 - ▲ Western Ringtail Possum Location
 - ✚ Long-Necked Turtle Location

N

0 10 20 30 40 50m

SCALE 1 : 1 750 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Topographic Contour
- Clearing Extent
- Vegetation Type Boundary

PINPOINT CARTOGRAPHICS (08) 9562 7136

CONTOUR SOURCE: Dept. of Agriculture, 2000.
CADASTRAL SOURCE: Landgate, October 2018.
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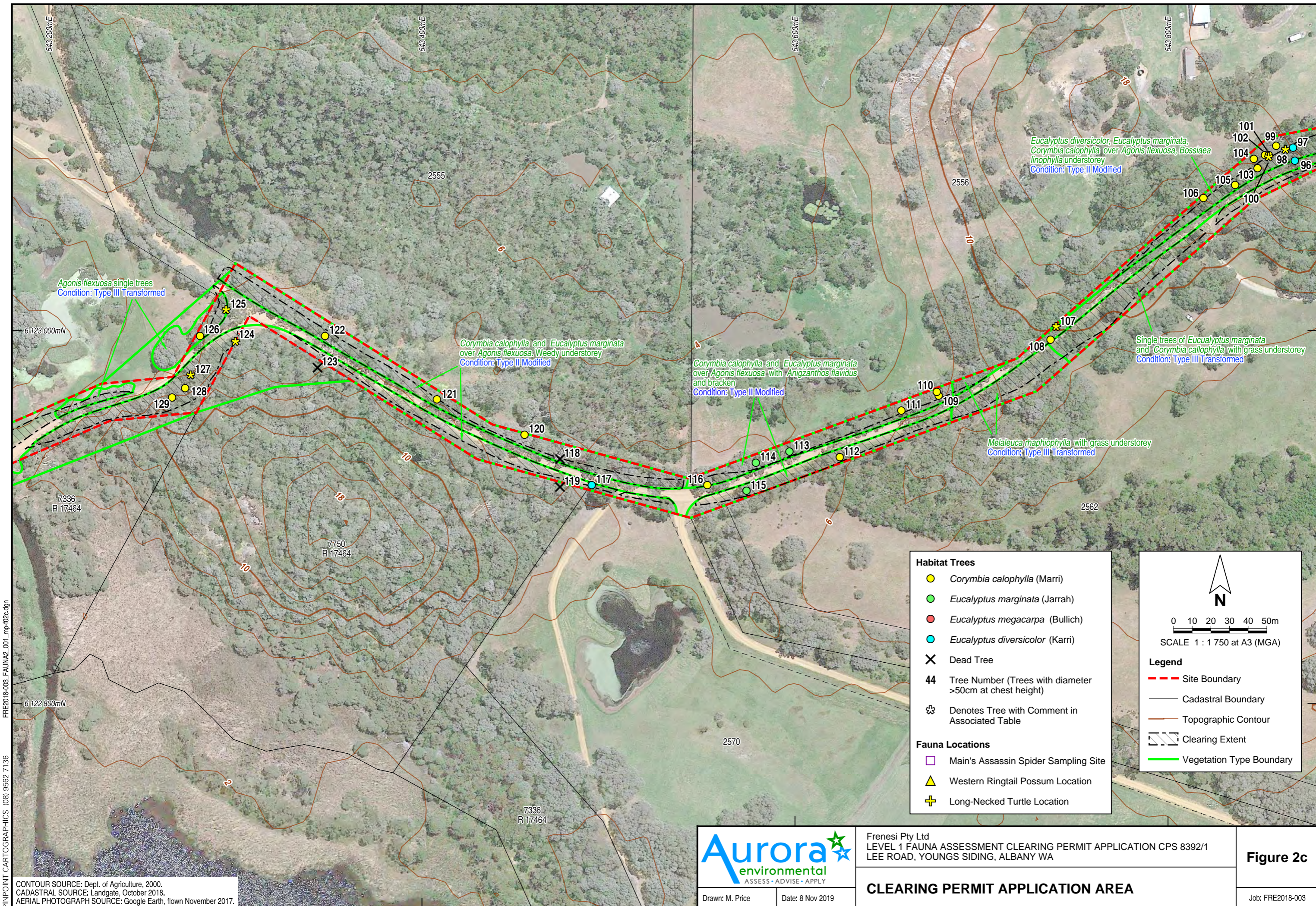
Drawn: M. Price Date: 8 Nov 2019

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LEVEL 1 FAUNA ASSESSMENT CLEARING PERMIT APPLICATION CPS 8392/1
LEE ROAD, YOUNGS SIDING, ALBANY WA

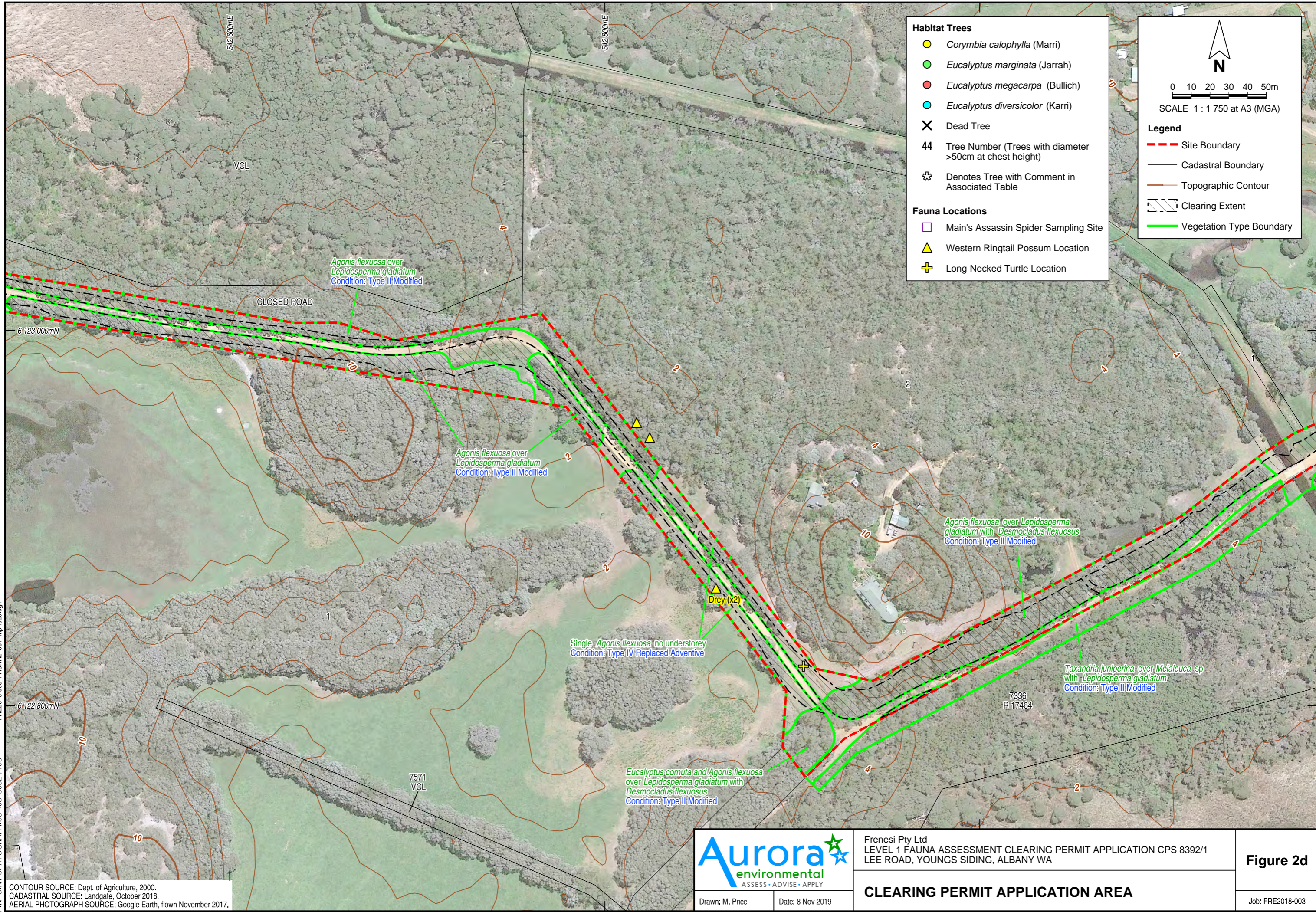
CLEARING PERMIT APPLICATION AREA

Figure 2b

Job: FRE2018-003



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FRE2018-003_FAUNA2_001_mp+02d.dgn
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CONTOUR SOURCE: Dept. of Agriculture, 2000.
 CADASTRAL SOURCE: Landgate, October 2018.
 AERIAL PHOTOGRAPH SOURCE: Google Earth, flown November 2017.

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 environmental
 ASSESS • ADVISE • APPLY
 Drawn: M. Price Date: 8 Nov 2019

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 LEVEL 1 FAUNA ASSESSMENT CLEARING PERMIT APPLICATION CPS 8392/1
 LEE ROAD, YOUNGS SIDING, ALBANY WA
CLEARING PERMIT APPLICATION AREA

Figure 2d
 Job: FRE2018-003