



EXTRACTIVE INDUSTRY (SAND) OPERATIONS PLAN

**LOT 103 BOYANUP ROAD WEST,
STRATHAM**

September 2023

Telephone +61 418 950 852

info@accendoaustralia.com.au

PO Box 5178 West Busselton WA 6280

ABN 11 160 028 642

www.accendoaustralia.com.au

Document Control

Version	Date	Author	Reviewer
V1	20/09/2023	PN	KMT
Filename	2311_Lot 103 Boyanup Rd W EIL _v1		

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1 INTRODUCTION

1.1 Background

Leeuwin Civil Pty Ltd (the applicant) is proposing to extract sand from a 7.4 hectare (ha) area within Lot 103 Boyanup Road West, Stratham (herein referred to as the subject site) (refer to **Figure 1** and **Figure 2**).

The applicant's details are as follows:

Leeuwin Civil Pty Ltd
(08) 9754 7944
995 Gale Rd, Koorup WA 6280

This application is made for a five year period however, the exact life of the project is difficult to estimate as it will be dependent on supply and demand trends.

The available volume of sand (*insitu* volume of approximately 400,000 m³) is to be extracted, commencing to the north of the subject site and moving in a southerly direction (refer to **Figure 2**).

This document has been submitted to fulfil the relevant requirements provided within the Shire of Capel's *Local Planning Scheme No. 8* and the Shire of Capel's *Local Planning Policy No. 6.2 Extractive Industries*. It is intended to provide the Shire of Capel, the public and relevant government agencies with an understanding of the proposal and the environmental strategies and commitments proposed to address various environmental and social issues.

2 EXISTING ENVIRONMENT

2.1 Location and Layout Plans

The subject site is located within Lot 103 Boyanup Road West, Stratham. The Lot is wholly owned by Justin Harris (refer to **Appendix A** for Certificate of Title). Authorisation for Leeuwin Civil to act on the landowner's behalf for this proposal has been provided (refer to **Appendix B**).

The subject site is located within the municipality of the Shire of Capel, approximately 10 km north of the Capel town centre and approximately 170 km south of Perth (refer to **Figure 1**).

2.2 Land Use and Zoning

The subject site is zoned "Rural" under the Shire of Capel's *Local Planning Scheme No. 8* (LPS 8). The subject site is located within the "Special Control Area – Basic raw materials" under the LPS 8. The proposed extractive industry is a permitted land use within this zone subject to development approval from the Shire of Capel.

Land use abutting the boundaries of the subject site are zoned 'Rural' to the north, east and south. Properties to the west of the subject site, on the western side of Bussell Highway, are zoned 'Special Rural'.

The subject site is currently used for the grazing of cattle.

2.3 Topography and Soils

The current topography of the subject site can be described as sloping with the elevation ranging from 13 m Australian Height Datum (AHD) in the west to 32 m AHD in the south eastern corner (refer to **Appendix C**).

The subject site is located on the Perth Coastal Zone consisting of coastal sand dunes and calcarenite within the Spearwood system. The Spearwood systems consists of "*Sand dunes and plains with yellow deep sands, pale deep sands and yellow/brown shallow sands*" (Tille 2006).

The subject site is located within the Spearwood S1b phase consisting of 'dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15%' (Natural Resource Information (NRInfo)) (DPIRD 2023).

2.3.1 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the common name given to naturally occurring soil and sediment containing iron sulfides. They have become a potential issue in land development projects on the Swan Coastal Plain when the naturally anaerobic conditions in which they are situated are disturbed and they are exposed to aerobic conditions and subsequently oxidise. When oxidised, ASS produce sulfuric acid, which can result in a range of impacts to the surrounding environment. ASS that has oxidised and resulted in the creation of acidic conditions are termed "Actual ASS" (AASS), and those that have acid generating potential but remain in their naturally anaerobic conditions are termed "Potential ASS" (PASS).

ASS risk mapping (DWER 2021) indicates that there is a nil risk of ASS occurring within the majority of the subject site. However, a limited area in the north west of the subject site is mapped as having a 'high to moderate risk' of ASS occurring (refer to **Figure 3**). This proposal involves the excavation of material above the watertable (at least 1 m separation to maximum groundwater levels will be maintained at all times) and no dewatering will be undertaken during excavation works. Accordingly, the potential impacts

associated with ASS are expected to be low and therefore no further investigations regarding ASS are considered necessary.

2.4 Climate

The climate of the locality is classified as Mediterranean with warm to hot summers and cool wet winters.

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30°C. July has the lowest average temperature of the year of 7.3°C.

Rainfall for the area is approximately 730 mm per annum with approximately 90% of the rain falling during the winter months, April to October inclusive.

During the summer months the dominant wind in the mornings is from the south-east at 10-14 knots, swinging to the south-west at 20-25 knots in the afternoon. During winter, the winds are most commonly 10-14 knots with no dominant prevailing direction. During storms, winds from the west and north-west can reach 40 knots (BoM 2020).

Rainfall intensity has been calculated using the Bureau of Meteorology (BoM) Intensity-Frequency-Duration (IFD) data system which yields the two hour 1 in 10 (10%) annual exceedance probability storm event for the subject site as 40.2 mm/hr.

2.5 Vegetation and Flora

The vegetation within the subject site is in a 'completely degraded' (Keighery 1994) condition due to prolonged land degradation processes including land clearing, and livestock grazing. A fauna survey was undertaken (Harewood 2023) which describes the vegetation within the subject site as totally degraded 'pasture/bare ground with widely scattered trees including marri (*Corymbia calophylla*), jarrah (*Eucalyptus marginata*), peppermint (*Agonis flexuosa*) and dead unidentified species' (refer to **Plate 1**). Very occasional individuals of the WA Christmas Tree (*Nuytsia floribunda*), Bull Banksia (*Banksia grandis*) and Woody Pear (*Xylomelum occidentale*) were observed during the survey. An area of approximately one hectare in size to the north east of the subject site described as a 'peppermint low woodland with very occasional emergent eucalypts' has been excluded from the extraction footprint (Harewood 2023) (refer to **Plate 2**).



Plate 1. Completely degraded pasture with scattered trees (vegetation at the bottom of the hill is excluded from the extraction footprint).



Plate 2. Peppermint low woodland which has been excluded from the extraction footprint.

2.5.1 Threatened Ecological Communities

An ecological community is defined as “a naturally occurring assemblage that occurs in a particular type of habitat” (PWS 2015). A Threatened Ecological Community (TEC) is one that has declined in area or was originally limited in distribution. Uncommon ecological communities that do not strictly meet TEC defined criteria, or are inadequately defined, are listed by the DBCA as a Priority Ecological Community (PEC).

As well as protection under State legislation, selected ecological communities are also afforded statutory protection at a Federal level pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act provides for the protection of TECs, which are listed under section 181 of the Act, and are defined as “Critically Endangered”, “Endangered” or “Vulnerable” under Section 182.

A search of the Department of Biodiversity Conservation and Attraction’s (DBCA’s) and EPBC Act databases found three TECs endorsed under State and Commonwealth legislation and policy recorded within proximity to the subject site. This included the Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region ecological community, the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community and the Clay Pans of the Swan Coastal Plain ecological community.

None of the vegetation within the subject site is representative of these TECs due to the absence of clay soils, the ‘completely degraded’ condition of the vegetation and the absence or limited numbers of key indicator species such as Banksia spp. and *Eucalyptus gomphocephala*.

2.5.2 Environmentally Sensitive Areas

Section 51B of the *Environmental Protection Act 1986* (EP Act) allows the Minister to declare an Environmentally Sensitive Area (ESA). Once declared, the exemptions to clear native vegetation under the regulations do not apply in these areas. TEC’s areas within 50 m of any Declared Rare flora (DRF) and defined wetland areas constitute ESAs. However, a number of other areas of environmental significance are also listed. Current declared ESAs are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Approximately 2 ha in the south west of the subject site is mapped within an ESA associated with a TEC situated approximately 400 m to the south of the subject site. As discussed within **Section 2.5.1**, no TECs are present within the subject site.

2.6 Fauna

A search of the DBCA's Threatened Fauna database (NatureMap) was undertaken to establish whether species declared as 'Rare or likely to become extinct' (Schedule 1), 'Birds protected under an international agreement' (Schedule 3) and 'Other specially protected fauna' (Schedule 4) as listed under the *Biodiversity Conservation Act 2016* have been recorded in proximity to the subject site. The NatureMap Report identified 18 threatened species, one Priority 1 species, one Priority 2 species, four Priority 3 species, five Priority 4 species and one 'Other specially protected fauna' species (refer to **Table 1**), within a 5 km radius of the subject site. A search of the EPBC Act *Matters of National Environmental Significance* database identified one 'Critically Endangered' species, four 'Endangered' species and four 'Vulnerable' fauna species within a 2 km radius.

Table 1: Significant fauna potentially occurring within proximity of the subject site as identified by State and Commonwealth database searches

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	T	Endangered	Unlikely, absence of suitable habitat.
<i>Calyptorhynchus banksii subsp. naso</i> (Forest Red-tailed Black Cockatoo)	T	Vulnerable	Possible, limited habitat in the form of paddock trees.
<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo)	T	Endangered	Possible, limited habitat in the form of paddock trees.
<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo)	T	Endangered	Possible, limited habitat in the form of paddock trees.
<i>Dasyurus geoffroyi</i> (Western Quoll, Chuditch)	T	Vulnerable	Possible, however very limited/degraded habitat and unlikely to rely on the area.
<i>Falco hypoleucos</i> (grey falcon)	T	Vulnerable	Possible but unlikely to rely on the area due to the limited/degraded habitat.
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, ngwayir)	T	Critically Endangered	Possible but unlikely to rely on the area due to the limited/degraded habitat.
<i>Setonix brachyurus</i> (Quokka)	T	Vulnerable	Unlikely, outside of known extent
<i>Sternula nereis nereis</i> (Australian Fairy Tern)	T	Vulnerable	Unlikely, absence of suitable habitat.

While migratory bird species may infrequently visit the subject site, they will not rely on it for their persistence in consideration of its degraded condition. They have therefore been omitted from the list above.

Fauna habitat within the subject site is totally degraded and therefore, with respect to fauna in general the survey area does not appear to represent habitat of significance and is only likely to support a very depauperate fauna assemblage dominated by a small range of mainly common bird species (Harewood 2023).

A targeted fauna assessment was undertaken by Greg Harewood which included a literature review, a daytime reconnaissance survey and a nocturnal spotlighting survey. The field component of the fauna assessment was carried out on the 22 April 2023 (day survey) and the 26th April (night survey) (refer to **Appendix D**).

The black cockatoo habitat tree assessment identified 22 trees within the proposed extraction area with a diameter at breast height (DBH) >50 cm. Half of these appeared not to contain hollows of any size. The remaining 11 trees contained apparent or obvious hollows, all of which were assessed as being unlikely to be suitable for black cockatoos to use for nesting purposes, due to the hollows apparent small size, unsuitable orientation and/ or low height above ground level. While some of the hollows present in these trees have large entrances none of the hollows were considered by Harewood to be suitable for black cockatoos after close examination with a drone. No hollows showed any conclusive evidence of use by any fauna (Harewood 2023).

Given the relatively small numbers of scattered trees defined as quality foraging habitat (marri, jarrah and banksia) it is not possible to define the area of this resource, however the fauna survey estimates there is approximately less than 0.1 ha based on canopy extent (Harewood 2023).

No evidence of western ringtail possums (WRPs) (i.e. scats, dreys or individuals) was observed during the day or night survey. Furthermore, the small peppermint woodland area of what appears to be suitable habitat (Harewood 2023) has been omitted from this application. This indicates that WRPs are unlikely to utilise the subject site for any purpose.

2.7 Hydrology

2.7.1 Groundwater

The subject site is located within the Bunbury West subarea of the proclaimed Bunbury Groundwater Area.

Groundwater monitoring bores are located within the extraction area and approximately 140 m to the north of the extraction area (refer to **Figure 4**). They have been monitored monthly for groundwater levels from January 2021 to December 2022. Data from this monitoring period indicates a maximum groundwater elevation of 10.4 m AHD in the northern bores and 11.0 m AHD in the bore within the extraction area in September 2022 (refer to **Appendix E**). With an approximate distance of 300 m between these bores and their location at approximately the same topographical elevation (14 m AHD), it can be assumed that a groundwater gradient of approximately 1:0.002 is present across the site. Given the distance between the southern bore and the south western corner of the extraction area is also approximately 300 m with similar elevations, the maximum groundwater at the south western corner of the excavation area will be approximately 11.6 m AHD. To ensure a separation to groundwater of at least 1 m, maximum excavation levels of 12.6 m AHD will be maintained across the subject site.

2.7.2 Surface Water

The subject site is located in the Wonnerup subarea of the unproclaimed Capel surface water area, approximately 400 m to the north of the *Rights in Water and Irrigation (RiWI) Act 1914* proclaimed Capel River System surface water area. The subject site is not proclaimed under the *Country Areas Water Supply Act 1947* as a public drinking water source area.

A dam is located to the north of the subject site. A buffer of at least 100 to this dam will be maintained at all times. Whilst not defined as a watercourse, a drainage depression is located to the west of the subject site. It is proposed to provide a buffer of at least 30 m to this depression at all times.

2.7.3 Wetlands

Wetlands within Western Australia are classified on the basis of landform and water permanence pursuant to the Semeniuk (1995) classification system (refer to **Table 2**).

Table 2. Wetland classifications (Semeniuk 1995).

Water Longevity	Landform				
	Basin	Channel	Flat	Slope	Highland
Permanent Inundation	Lake	River	-	-	-
Seasonal Inundation	Sumpland	Creek	Floodplain	-	-
Intermittent Inundation	Playa	Wadi	Barlkarra	-	-
Seasonal Waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

Areas of wetlands in Western Australia have been mapped and this mapping has been converted into a digital dataset that is maintained by the Department of Biodiversity, Conservation and Attractions (DBCA) and is referred to as the ‘*Geomorphic Wetlands of the Swan Coastal Plain*’ dataset. This dataset contains information on geomorphic wetland types and assigns management categories that guide the recommended management approach for each wetland area. The wetland management categories and management objectives are listed in **Table 3**.

Table 3. DBCA wetland management categories (Semeniuk 1995).

Category	Description	Management Objectives
Conservation	Wetlands support a high level of ecological attributes and functions.	Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including: <ul style="list-style-type: none"> • Reservation in national parks, crown reserves and State owned land, • Protection under Environmental Protection Policies, and • Wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.
Resource Enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity.
Multiple Use	Wetlands with few remaining attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

There is one Multiple Use (MU) wetland (UFI 13329) mapped to the west of the extraction site (refer to **Figure 4**).

MU wetlands are assessed as possessing few remaining ecological attributes and functions, which is characteristic of these mapped areas within the property. While such wetlands can still contribute to regional or landscape ecosystem management, including hydrological function, they are considered to

have low intrinsic ecological value. Typically, they have minimal or no native vegetation remaining (less than 10%). Accordingly, there is no legislative requirement to protect or retain them and as such MU wetlands do not preclude development.

The management objective for MU wetlands is to preserve the hydrological functions in the context of the proposed development (EPA 2008). The current water cycle within the subject site consists of inputs from rainwater being infiltrated on site or flowing through the drainage lines into the wider drainage system. The development is not proposing to alter this process, with all water being retained within the excavated areas to enable infiltration through stormwater pits to ensure water quality is maintained.

2.8 Dieback

Given that native vegetation has largely been altered within the subject site to enable the establishment of pasture, dieback indicator species are largely absent and therefore it is not possible to detect whether dieback is present or absent. On this basis, it is reasonable to classify the subject site as 'uninterpretable', denoting that a precautionary management approach should be adopted in relation to dieback.

2.9 Crown Land and Reserves

The subject site is not located within Crown land. A DBCA land of interest (Register No. 2684/750) is located approximately 350 m to the south of the subject site on the opposite side of Boyanup Road West. The proposed operations are not likely to impact this site.

2.10 Aboriginal Heritage

All Aboriginal sites in Western Australia are provided protection under the *Aboriginal Heritage Act 1972* in which it is an offence for anyone to excavate, damage, destroy, conceal or in any way alter an Aboriginal site without the Minister's permission.

An online search for relevant Aboriginal heritage information was undertaken using the Department for Planning, Lands and Heritage (DPLH) *Aboriginal Cultural Heritage Inquiry System* that incorporates both the heritage site register and the heritage survey database (DPLH 2023). The Aboriginal Cultural Heritage Directory provides locations and information about Aboriginal cultural heritage in Western Australia. The system contains past survey reports, places, cultural landscapes, protected areas, local Aboriginal cultural heritage services and Native Title Parties.

Results of the database search revealed that there have been three heritage surveys undertaken covering the subject site as follows:

- Heritage Survey Area 104079: Bunbury-Wellington Regional Planning Study: Working Papers no. 6, Aboriginal Heritage and Planning Survey;
- Heritage Survey Area 20283: An addendum to a desktop preliminary Aboriginal heritage Survey for Water Corporations proposed development of the Yarragadee Aquifer extending to the Blackwood Groundwater area; and
- Heritage Survey Area 104608: Bunbury-Wellington Regional Planning Study: Aboriginal Heritage and planning survey: working paper no. 6.

While these surveys did not constitute a comprehensive 'site identification', 'site avoidance' or 'work area/programme clearance' survey, no Aboriginal heritage sites are identified as being present within the subject site. The closest Aboriginal heritage site is the Capel Bussell Highway (ID 5813) located approximately 2 km to the southwest of the excavation area (refer to **Figure 5**).

2.11 Surrounding Residents

The subject site has been designed to maximise setbacks to the closest sensitive receptors, where possible. This has involved extensive analysis of the local landform, environmental characteristics, land uses and location of sensitive receptors.

The key amenity issues for sensitive premises associated with the proposal are:

- Visual amenity;
- Dust; and
- Noise.

The Environmental Protection Authority's (EPA) *Guidance for the Assessment of Environmental Factors* (June 2005) provides generic separation distances to assist in the determination of suitable buffers where industry may have the potential to affect the amenity of a sensitive land use. In particular, for extractive industries, a buffer distance of 300 m to 500 m is recommended from sensitive land uses.

The closest residential dwellings to the subject site are provided below and shown in **Figure 6**.

Table 4. Residential dwellings within 1,000 m of the subject site.

Resident No.	Distance to subject site (m)
1	140 m
2	648 m
3	779 m
4	786 m
5	880 m
6	936 m
7	987 m

The closest residential dwelling to the subject site is located 140 m from the southern boundary. This dwelling is periodically uninhabited and therefore it is proposed to undertake excavation activities within the south during these periods. The applicant has undertaken extensive consultation with Resident No. 1 to ensure that all concerns and potential impacts are adequately addressed. Ongoing consultation will be undertaken for the life of the quarry.

Management measures associated with noise and dust are discussed in further detail in **Sections 5.5** and **5.6**, respectively.

3 PLANNING FRAMEWORK

3.1 State Planning Strategy 2050

The *State Planning Strategy 2050* comprises a range of strategies, actions, policies and plans to guide the planning and development of regional and local areas in Western Australia.

In relation to Basic Raw Materials (BRM), the key outcome for the Strategy is '*accessible and affordable supplies of BRM are available close to demand*'.

The proposal is consistent with this outcome as a nearby and relatively environmentally unconstrained resource will be provided to the South West region.

3.2 Statement of Planning Policy No. 2 Environmental and Natural Resources Policy

In relation to basic raw material resources, this policy recommends that planning strategies, schemes and decision making should:

- Identify and protect important and economic mineral resources; and
- Identify and protect important basic raw material resources and provide for their extraction.

The extraction proposal is consistent with the intent of this policy as it will enable the extraction of a basic raw material from the site while ensuring the protection of the nearby environmental values associated with wetlands and groundwater.

3.3 Planning Policies

3.3.1 Existing and Surrounding Land Uses

Land use abutting the boundaries of the subject site is rural based to the north, east and south. Properties to the west of the subject site on the other side of Bussell Highway are zoned 'Special Rural'.

3.3.2 Shire of Capel Local Planning Scheme No. 8

The subject site is zoned "Rural" under the Shire of Capel's *Local Planning Scheme No. 8*. The proposed extractive industry is a permitted land use within this zone subject to development approval from the Shire of Capel.

The subject site is located within the "Special Control Area – Basic raw materials" under the *Local Planning Scheme No. 8*. The purpose of this Special control Area is outlined within the draft scheme as 'To identify areas where basic raw materials and strategic mineral resources need to be protected from incompatible land uses in line with the GBRS Strategic Minerals and Basic Raw Materials Resource Policy 2018'. The draft scheme contains the following objectives in relation to the Special Control Area:

- a) To identify land within the Scheme area which contains mineral resources and basic raw materials of State or regional significance.
- b) To prevent mineral resources and basic raw materials of State or regional significance being sterilised by incompatible development and land uses.
- c) To encourage the mining of mineral resources and extraction of basic raw materials in accordance with acceptable environmental standards.

- d) To promote the rehabilitation and restoration of mining and extraction sites, after works have been completed, in a way that is consistent with the long-term use of the land.

3.3.3 Shire of Capel's Local Planning Policy No. 6.2 Extractive Industries

The Shire of Capel's *Local Planning Policy No 6.2 Extractive Industries* contains the following objectives:

1. Ensure extractive industries do not adversely affect the environment or the amenity of the locality during or after extraction.
2. Ensure extractive industries are in the most appropriate locations.
3. Ensure volumes of extraction occurs where the available haulage routes and road hierarchy are satisfactory or can be upgraded to support an extractive industry without affecting the safety of road users and the sustainability of the transport network.
4. Achieve a high level of stage rehabilitation to native vegetation where required or where clearing of remnant vegetation is proposed and approved.
5. Achieve a high level of groundwater resource protection.
6. Clearly outline matters required to be addressed by proponents.
7. To provide clarity of the development assessment process for proponents and the broader community.
8. Inform the community and stakeholders of the importance of a rigorous assessment process and the reasoning for the Shire's policy stance.

Furthermore, the policy outlines the assessment criteria and policy provisions by which applications for planning consent for an extractive industry will be assessed against which includes the following:

1) Amenity

- PC1.1.1 Development does not result in a landform that prejudices the productive use or potential use of agricultural land on site or in the surrounding locality.
- PC1.1.2 Development and the volume of truck movements does not unduly disrupt surrounding residents by way of vehicular traffic, noise, dust, blasting and vibration.
- PC1.1.3 Consultation has occurred with the local community and relevant government agencies.
- PC1.1.4 The site can be rehabilitated in a way that is compatible with the long-term planning and environmental protection for the site and surrounding area.

2) Environmental

- PC1.2.1 Development is located to minimise the impact upon native flora and fauna; groundwater quality, quantity and use; surface drainage and surface water quality including discharge of sediment and sites of cultural and/or historic significance on or near the land.
- PC1.2.2 Development is located and managed to minimise the spread of Phytophthora (Dieback).
- PC1.2.3 Development is located and managed to achieve a high level of surface and groundwater resources protection to provide soil depth for rehabilitation to native vegetation, future landuse and a buffer against groundwater contamination and exposing groundwater.
- PC1.2.4 Final excavation batters to achieve rehabilitated slopes compatible with future landuse, existing soil structure, topography, and positive environmental outcomes.
- PC1.2.5 Development is located and managed to achieve a high level of staged rehabilitation.

3) Buffers

- PC1.3 Development is sited in accordance with the principles of the State Planning Policy 4.1 State Industrial Buffer Policy and Guidance Note 3 – Separation Distances Between Industrial and Sensitive Land Uses (EPA -2005)

4) Visual Impacts

PC1.4 Development is unobtrusive and does not prejudicially affect the natural landscape.

5) Transport

PC1.5 Development satisfactorily addresses the following issues:

PC1.5.1 Proximity and interaction with school bus routes.

PC1.5.2 Transport route is to be suitable for the proposed development and truck volumes.

PC1.5.3 Proposed route shall have appropriate Restricted Access Vehicle allocation to match proposed vehicle configurations.

PC1.5.4 Development does not create hazards to other road users, impact on sustainability of the transport network, nor negatively impact on the amenity of the residences along the route, in terms of:

- Access points to the operation site.
- Existence of any other extractive industry or heavy haulage in the vicinity and cumulative effects on the transport network.
- Comment of Main Roads WA.

PC1.5.5 Dust can be managed to ensure traffic safety and protection of rural and residential amenity.

Extractive industries within Rural zoned areas are expected to be approved, where such operations can meet the requirements of these provisions and the Scheme, provided they do not have an adverse impact on Prime Agricultural land. A Development Approval after a minimum 21 day advertising period is required.

4 EXTRACTION ACTIVITIES

The sand quarry will cover an area of approximately 7.4 ha, with a current maximum elevation ranging from 13 m AHD to 30 m AHD. It will be excavated to a maximum depth of approximately 12.6 m AHD commencing in the north east and moving initially in a southerly direction in stages less than 2 ha in size (refer to **Figure 2**). The proposal does not include any crushing or screening of material.

A 10 m buffer to the drip line of all trees outside of the extraction area will be maintained.

It is estimated that the total maximum volume of sand to be removed will be approximately 400,000 m³ with up to 200,000 m³ excavated each year, depending on supply and demand.

The planned end use of the quarry is to restore a natural soil profile and return the area to pasture, ensuring that there is no net loss of agricultural land.

4.1 Operational Works

Using a loader, the topsoil (where available) will be stripped and placed in stockpiles. Overburden, if present, will be removed using a dump truck and stockpiled to the perimeter of the proposed pit area.

4.1.1 Truck Movements

Access from the property will be via Boyanup Road West (a RAV -4 classified road), travelling west to Bussell Highway (refer to **Figure 7**). The road intersection will be asphalt, with sealing up to the length of a vehicle followed by a gravel access track. Signage will be erected on both the West and East extents of the road access advising of trucks entering.

It is proposed to extract a maximum of approximately 200,000 m³ or bank cubic metres (BCM) per year. The average daily extraction rate:

$$\begin{aligned} &= 200,000 \text{ BCM} / 52 \text{ weeks} / 5 \text{ working days per week} \\ &= 769 \text{ BCM per day.} \end{aligned}$$

It is estimated that approximately 70% of the haulage is proposed to be undertaken from October to May (8 months). Therefore, the average daily extraction rate (main season):

$$\begin{aligned} &= 200,000 \text{ BCM} \times 70\% / 32 \text{ weeks} / 5 \text{ working days} \\ &= 875 \text{ BCM per day.} \end{aligned}$$

The average daily extraction rate (LCM):

$$\begin{aligned} &= 875 \text{ BCM} \times 1.15 \\ &= 1006 \text{ LCM} \end{aligned}$$

It is proposed to utilise 22 tonne semi-trailers with a capacity of approximately 39.6 LCM of gravel. Accordingly, the average daily truck movements during the main season are as follows:

$$\begin{aligned} &= 1006 \text{ LCM} / 39.6 \text{ LCM truck capacity} \\ &= 25 \text{ truck movements per day} \times 2 \text{ (to and from)} \\ &= 50 \text{ trips per day} \times 2 \text{ (peak fluctuations)} \\ &= 100 \text{ trips per day maximum.} \end{aligned}$$

Given the highly variable nature of the campaigns, these calculations are estimates only, there may be periods in which these daily truck numbers are exceeded.

4.1.2 Sand Extraction

The sand will be excavated by a bulldozer to a stockpile or loaded directly to waiting trucks for transport. A summary of the proposed sand extraction activities is provided below:

- Prior to excavation commencing the site will be ground surveyed, the excavation footprint marked out and a 1 m contour plan developed.
- The topsoil/overburden will be stripped and stockpiled using a loader.
- An excavator or front-end loader will be used to dig the sand and transport it to a stockpile.
- The sand will then be picked up by a loader and loaded to trucks for transport.
- All static and other equipment, will be located on the floor of the quarry to provide visual and acoustic screening.
- Excavation will commence in the north of the quarry and then move in a southerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of quarry, the section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours.
- At the end of excavation, the floor of the quarry will be deep ripped, covered by overburden and topsoil, and rehabilitated to a constructed soil.

4.1.3 Final Contours

The slope of the final contours of the quarry will be an undulating surface at approximately 12.6 m AHD which is consistent with the adjoining land (refer to **Figure 8**).

Slopes of the batters at the end of excavation will be retained at 1:4 vertical to horizontal which will enable the landform to be integrated with the surrounding landscape. This batter can be readily traversed by livestock, vehicles and machinery and is considered appropriate for the site's topographical relief. This is consistent with other sand extraction operations approved by the Shire of Capel (Lot 2 Calinup Road) and other organisations such as Main Roads WA who undertakes rehabilitation of slopes steeper than 1:6.

The proposed batters of 1:4 will only occur along the edges of the pit, adjacent to remnant vegetation, whereas the remainder of the site will be flat. This will not limit the current or potential future rural landuse of the property.

4.1.4 Rehabilitation

Progressive rehabilitation will be undertaken as far as practicable. Works will commence in the north east of the subject site with the excavation at higher elevations being undertaken first. This will then be rehabilitated while the works at lower elevation to the west are being completed. Rehabilitation will be undertaken upon the completion of each stage.

Upon completion of quarrying, the following broad completion criteria will be achieved:

- A self-sustaining cover of pasture;
- Weed levels that are not likely to impact on the viability of the reconstructed soils; and
- A safe and stable landform suitable for the proposed future land use which will be productive, grazing pasturelands.

Rehabilitation is discussed in further detail in **Section 6**.

4.2 Proposed Operating Times

Typical operating hours for quarries will be adopted for the subject site which involves 7am to 6pm each Monday to Friday and Saturdays 7am to 1pm (for rehabilitation works only), excluding public holidays. The subject site will be worked by 2 - 3 persons, depending on market demand.

Boyanup Road West is a designated bus route. Correspondence with the bus company indicates there are school buses in the area which traverse Boyanup Road West at 7:50 to 8:15 in the morning and 3:35 to 4:10 (two services) in the afternoon. To ensure that trucks are not operating on designated school bus routes at the same time as the bus, trucks will not operate on Boyanup Road West between 7:40am – 8:25am and 3:25 pm – 4:20pm, Monday to Friday, during school periods. The pit operators will be careful to ensure compliance with these requirements.

4.3 Equipment

All operational equipment will work on the quarry floor to provide maximum sound and visual screening. All equipment and infrastructure will be fully portable to facilitate movement throughout the site required for staged quarrying operations. The subject site will be secured by locked gates when it is not being actively worked. The boundary fencing will be maintained to prevent inadvertent and unauthorised entry.

Equipment and facilities that may be used onsite are provided in the Table below.

Table 5. Equipment.

Equipment	Description
Site office and/or containers	May be required for the management and security of small items.
Toilet	A portable toilet may be required on site.
Water tanker	Used for dust suppression on the access roads and working floors when required.
Loader (938/330)	Loaders will be used for the movement of sand and loading road trucks.
Excavator (325/330)	An excavator may be used for the removal of sand material.
Anaconda Radial Stockpiler	Used for stockpiling sand.
Fuel storage	No fuel will be stored onsite.
Light vehicles	Access to and around the site.
Tip truck	Removal of sand from site.

4.3.1 Water Usage

Water is only required for dust suppression within the quarry and the access road. Water will be sourced from an offsite source and tankered to the site for dust suppression purposes, as required.

5 ENVIRONMENTAL IMPACTS AND MANAGEMENT

The following factors are considered to represent the potential environmental and amenity impacts associated with the proposal:

- Hydrology;
- Dust;
- Noise;
- Dieback and weeds; and
- Uncontrolled discharge of contaminants to land.

These environmental factors are discussed in more detail below, together with the proposed management actions.

5.1 Visual Impact

Visual impact can occur in a number of circumstances, by the operation being set too high in the landscape, by being too close to neighbours and by insufficient visual protection.

Views of the subject site from the Boyanup Road West and Bussell Highway are obscured by roadside vegetation comprised of mature tree species. Furthermore, all native vegetation on the western boundary of the extraction footprint will be retained to further assist in visual screening from the abovementioned roads.

The locality has been extensively developed for agricultural land uses and therefore is not located in a visually sensitive landscape. Rehabilitation will be undertaken progressively upon the completion of each stage, and the subject site will be returned to pasture, ensuring that any potential visual impacts are short-term. Accordingly, no further management measures are proposed for potential visual impacts.

5.2 Hydrology

5.2.1 Surface Water

The current water cycle within the subject site consists of inputs from rainwater flowing downhill in a westerly direction into the wider drainage system. The development is not proposing to alter this process, as there are no drainage lines within the proposed extraction area.

No surface water features have been identified within the extraction site with a dam located to the north west of the subject site with a 100 m buffer. Therefore, the development is unlikely to impact on surface flows.

A Water Management Plan has been prepared for the subject site and is provided in **Appendix F**. This Plan documents the proposed surface water management measures associated with the extractive industry operation.

5.2.2 Groundwater

Groundwater will not be extracted or dewatered during the operation of the quarry and therefore, no impacts to groundwater levels are proposed.

Maximum excavation levels will be approximately 12.6 m AHD. As discussed within **Section 2.5.1** no interaction with groundwater is expected during excavation works. Furthermore, a separation of at least 1m, between the final contours and the maximum groundwater elevation will be maintained.

Accordingly, no impacts to groundwater are expected as a result of this proposal.

5.3 Vegetation and Fauna

As described in **Section 2.5**, the subject site has undergone historic disturbance and is currently comprised of a variety of pasture grasses with widely scattered trees, predominately marri (*Corymbia calophylla*), jarrah (*Eucalyptus marginata*) and peppermint (*Agonis flexuosa*). An area approximately one hectare in size in the north east of the subject site described as a ‘peppermint low woodland with very occasional emergent eucalypts’ has been omitted from the extraction footprint (Harewood 2023). Based on the current vegetation condition (completely degraded), it is considered very unlikely that the subject site contains any vegetation or flora of conservation significance.

A fauna survey undertaken within the subject site found a total of 22 possible black cockatoo habitat trees, in which 11 were observed to contain hollows. None of these hollows were considered suitable for black cockatoos after close examination with a drone (Harewood 2023). Furthermore, no conclusive evidence of use by any fauna of these hollows was observed during the survey.

No evidence of WRPs was observed during the day or night survey.

Based on the above, the proposal will require a referral under the Commonwealth EPBC Act and a clearing permit application to be submitted to the DWER for the vegetation clearing. Any impacts to native flora, vegetation or fauna, and appropriate management measures will be addressed through this process. Furthermore, as a component of the environmental approval process, it is proposed to protect and improve areas of onsite native vegetation (refer to **Figure 9**).

5.4 Dieback (*Phytophthora cinnamomi*)

Given that native vegetation has largely been altered within the subject site to enable the establishment of pasture, dieback indicator species are largely absent and therefore it is not possible to detect whether dieback is present or absent. On this basis, it is reasonable to classify the subject site as ‘uninterpretable’, denoting that a precautionary management approach should be adopted.

The primary objective of dieback management during operations is to minimise the risk of entry of dieback to the subject site. This can be achieved by preventing the importation of soil or plant material to and from the subject site. The risk of transportation via vehicles and equipment is low given that sealed roads will be utilised prior to entering the subject site.

The management measures proposed for dieback control are developed in accordance with the *Dieback Working Group (DWG) – Best Practice Guidelines* (DWG, 2005) for an uninterpretable site and are provided within **Table 6**

Table 6. Dieback management measures.

Timing	Management Measures
Topsoil removal, excavation and rehabilitation activities	Training will be provided to all personnel during an initial safety and environment induction course. This will include an explanation of the specific requirements with regard to Phytophthora dieback management.
	Fencing and lockable gates will be maintained and used to control unauthorised access to the excavation area.
	As far as reasonable and practicable haulage vehicles are to be cleaned of all loose external soil and plant material prior to entry and exit from the extraction area.

Timing	Management Measures
	Access to the subject site during operation will be restricted to the proposed roads. No other access points should be established. The access location and vehicle inspection point should be clearly sign posted.
	The extraction area will be managed to avoid ponding of surface water where vehicle access is required.
	Trucks will be loaded and covered to ensure there is no spillage of material during transport.

A risk assessment to determine the residual risk associated with dieback is provided below. The risk assessment indicates that with the application of suitable management measures the potential risk associated with dieback introduction and spread is 'Low'.

Table 7. Risk assessment associated with dieback.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Introduction/spread of dieback	Importation of soil/plant material. Onsite movement of soil.	Impacts to the condition of remnant vegetation. Spread to offsite locations.	Refer to Management Measures provided in Table 6 .	1	2	Low

5.5 Noise

Noise can originate from various operations and may impact on onsite workers, or travel offsite and impact nearby sensitive premises. Both potential noise impacts are addressed by reducing the noise generated from the quarrying and processing operations.

An Environmental Noise Assessment has been undertaken for the subject site by Lloyd George and Associates in which the installation of a 4 m bund to the south of the subject site was recommended to ensure compliance with the *Environmental Protection (Noise) Regulations 1997*.

The proponent will ensure that all noise emissions comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. A Noise Management Plan has been prepared for the subject site and is provided in **Appendix G**. This Plan documents the proposed noise management measures associated with the extractive industry operation.

5.6 Dust

The proposed extractive industry activities will involve the disturbance of large quantities of soil and earthen material. Specifically, this may include the following activities:

- Earthworks during extraction activities;
- Topsoil stripping;
- Loading and transportation of material;
- Vehicle movement within the site; and

- Wind erosion of exposed surfaces.

These activities have the potential to generate dust that, if not adequately controlled, can cause nuisance and safety risks. In-pit operations tend to generate less dust than surrounding activities due to the reduced airflow within the pit. The removal and replacement of topsoil material has the highest risk associated with dust generation due to the large volumes of material involved and generally lower levels of soil moisture.

A Dust Management Plan has been prepared for the subject site and is provided in **Appendix H**. This Plan documents the proposed dust management measures associated with the extraction industry operation.

5.7 Heritage Sites

A search of the DPLH *Aboriginal Cultural Heritage Inquiry System* shows no specific sites of Aboriginal significance occurring within or in proximity to the subject site. If during the course of mining an Aboriginal cultural heritage site is discovered, the proponent will immediately advise the DPLH and abide by the *Aboriginal Heritage Act 1972*.

5.8 Domestic and Industrial Waste Products

No domestic or industrial waste will be stored onsite. Any waste material generated during the operational activities will be taken offsite for disposal at an approved landfill facility on a daily basis. Hydrocarbon wastes such as accidental oil spills will be mopped up with absorbent material and segregated for removal and disposal offsite by a licensed contractor.

An approved portable toilet system may be temporarily placed onsite during construction activities. Waste from the toilet system will be disposed of offsite at an approved treatment facility.

5.9 Hydrocarbons and Dangerous Goods Management

Hydrocarbons are the only dangerous goods that will be utilised within the proposed extraction area. However, storage of hydrocarbons on the site will not occur.

Servicing of machinery and equipment will not occur onsite further reducing the possibility of contamination.

There is the minor possibility for soil and water contamination as a result of an incidental hydrocarbon leakages or spills during the operation of machinery. Accordingly, management measures for hydrocarbon spills are provided in the Water Management Plan (refer to **Appendix F**).

6 REHABILITATION MANAGEMENT PLAN

6.1 Objectives

The objective is to return the land to a condition capable of supporting agricultural activities, with pasture production rates equivalent to or better than pre-mining production rates. This will include dryland pasture with a variety of species. Rehabilitation of pasture is more successful at steeper batters (i.e. 1:4) as opposed to revegetation with native species.

Table 8. Rehabilitation Objectives

Land Use	Closure Objectives	Completion Criteria	Performance Criteria	Measurement Tool
Agriculture	A self sustaining cover of pasture	Crops cover the extraction area after completion of the rehabilitation works.	Less than 5% bare ground	Annual monitoring as provided in Section 6.8
	Weed levels that are not likely to impact on the viability of the reconstructed soils	No declared weed species are present. Weed species are not competing with cover crop across the site.	Declared weed species absent from the rehabilitation area.	Annual monitoring as provided in Section 6.8
	A safe and stable landform suitable for the proposed future land use	No areas of erosion or soil collapse are observed.	Rehabilitation surface remains flat and stable, with no evidence of surface erosion.	Annual monitoring as provided in Section 6.8

6.2 Topsoil and Overburden Removal

Topsoil is an integral part of rehabilitation as it contains organic matter and a seed bank which assists in establishing vegetation when respread on disturbed areas.

Topsoil where available will be stripped and stockpiled separately, prior to commencing quarrying.

The soils will be stripped in a dry state to preserve soil structure and stripping will be undertaken in relatively still weather conditions. Management of the topsoil will involve the following:

- Stockpiles will be located sufficiently distant from quarrying operations so that they will not be disturbed prior to being used in rehabilitation.
- Soil stripping should be avoided during wet conditions.
- The dimensions of the topsoil stockpiles will not exceed 2 m in height. This is to prevent topsoil becoming anaerobic and deteriorating in soil structure, organic matter, nutrients, seed resource and populations of beneficial soil micro-organisms.

6.3 Landform Reconstruction and Contouring

Landform reconstruction and contouring will involve the following:

- The final landform will be formed to approximately 12.6 m AHD.
- Batters will be retained at 1:4 vertical to horizontal.

- The excavated floor will be deep ripped in two directions. The width between rip lines will be 1 m intervals.
- The topsoil and overburden will be spread over the surface where available to provide a substrate for agricultural soils.

6.4 Site Preparation

To ensure the success of the revegetation works, site preparation should occur well before planting is undertaken. This includes landform reconstruction and contouring measures as outlined in **Section 6.3** the implementation of a weed control programme as outlined in **Section 6.5**.

In the event that compacted areas are identified within the revegetation area, contour ripping may be required. Ripping loosens soil aggregates and provides a softer soil surface for the establishment of plant roots. Ripping also promotes aeration of soil, assisting in the breakdown of organic matter and water infiltration.

6.5 Weed Management

6.5.1 Weed Control

Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species. Given the current land use, it is not anticipated that weed control will be other than normal agriculture practice. If required, weed control will only be conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate.

Herbicides will be selected for the target species, taking into account the surrounding environment and the constraints this may present.

Based on the location and species of weeds present, the recommended weed treatments are detailed in **Table 9**. The timing for weed control is specified within **Table 10**.

Table 9. Weed control treatment.

Treatment	Suggested Constituents	Target Species
Glyphosate spray	2% Glyphosate including Pulse®, wetting agent and Chlorsulfuron	Broadleaf species e.g. <i>Pelargonium capitatum</i> Woody weeds e.g. <i>Zantedeschia aethiopica</i>
Selective grass spray	Fusilade and approved adjuvant (e.g. Pulse®)	Grass species e.g. <i>Ehrharta longifolia</i>

6.5.2 Weed Hygiene

The following weed hygiene practices will be employed:

- Machinery will be checked prior to entering rehabilitation areas to ensure that weed seeds and propagules are not transported to this area.

6.5.3 Weed Management Plan

The following weed and disease controls will be implemented within the subject site to assist in the control of invasive species and enhance the outcomes of the proposed rehabilitation works.

Table 10. Management actions for weed control.

Parameter	Action	Timing
Surface Material	Assess weed potential within topsoil material prior to removal and separate weed affected topsoil for treatment or disposal.	Prior to and during topsoil removal
	Store significantly weedy surface material separately to clean surface material.	Surface material removal
	Stockpile all surface materials in the general vicinity of its origin.	Surface material removal
Hygiene Measures	Avoid moving surface material or fill material from weed infected areas to non-infested areas.	At all times
	All earthmoving and ground engaging equipment will be cleaned of vegetation, mud and soil prior to entry and exit of the subject site.	At all times
	No soil and vegetation should be brought to the site apart from that to be used in rehabilitation and plants used in rehabilitation should be free of weeds.	At all times
Access	Control access within the quarry area to reduce the spread of weeds, especially off-road vehicle access, to prevent disturbance to vegetation and weed invasion.	At all times
	Restrict access to areas outside the subject site to reduce the spread of weeds into or out of the site.	At all times
Weed Control	Chemical spraying is to be undertaken as per Section 6.5.1 .	Refer to Section 6.8
Monitoring and Reporting	Monitoring and reporting work are required to ensure that the revegetation objectives are achieved.	

6.6 Rehabilitation

As previously discussed, it is proposed to return the extraction area to pasture. Ripping will be undertaken within the quarry to reduce the potential for surface erosion and promote a seed bed for establishing pasture. During this process, a number of measures will be utilised to ensure maximum efficiency with minimal disturbance. Any ripping that occurs along slopes will have regular contour banks built across the tracks to prevent erosion from water runoff.

As far as possible, topsoil will be placed along the contour to help reduce erosion. Placing the topsoil in such a manner will reduce the down slope flow of water and increase water storage. The final landform will resemble the pre-mining landform where practicable (minus the excavated material). The overburden storage area will take into consideration the surrounding landform and as far as practicable match the surrounding features.

While no specific soil preparation is anticipated, the requirement for the application of lime and/or fertiliser can be determined by soil testing once the landform has been rehabilitated.

For pasture revegetation it is essential that the species are matched to the soil types and rainfall. The location falls into the “High Rainfall Coastal” planting regime with sandy to gravelly soils. Suitable perennial legumes include birdsfoot trefoil, lucerne, strawberry clover and sulla. Perennial pasture includes perennial ryegrass, phalaris, cocksfoot and Rhodes grass. Annual pasture species include ryegrass, serradella and subterranean clover.

The actual species used will be determined by the individual season, nature of the rainfall in the preceding months and stocking/hay production proposed by the landholder which may change from time to time.

Seeding rates are 2 – 5 kg/ha depending on the species used; for example, ryegrass is seeded at 3 kg/ha whereas Rhodes grass is seeded at 4 kg/ha. Seed will be broadcast uniformly within the marked areas in overlapping passes using mechanical equipment to allow for complete and even seed coverage of the pre-prepared area.

6.7 Maintenance

Maintenance will be undertaken following planting/seeding with all activities to be conducted in response to the maintenance inspections and monitoring (as discussed below). The key elements associated with maintenance works will include suppression of smothering weeds and infill planting. The requirement to implement revegetation maintenance and infill planting measures will be determined following each monitoring event.

6.8 Monitoring and Reporting

A program of monitoring of the rehabilitation works is required to ensure that the objectives are achieved.

Maintenance inspections will be undertaken annually in spring by the proponent to determine the requirement for maintenance measures.

During these inspections, the area will be assessed to determine pasture and weed coverage within areas that have been rehabilitated.

6.8.1 Completion Criteria

To achieve the rehabilitation objectives and ensure that future management is minimised, the measurable goals for rehabilitated areas are as follows:

- Self-sustaining crop cover with less than 5% bare ground;
- Reduce weed cover to less than 10% (noting that the pasture is not considered a 'weed'); and
- Rehabilitation surface remains flat and stable, with no evidence of surface erosion.

Maintenance will continue to be undertaken as required until this criterion has been achieved or as otherwise agreed with the Shire of Capel. Following the successful completion of the revegetation program, the Shire will, upon application from the owner, refund the bond lodged against the implementation of the rehabilitation.

6.9 Scheduling

The rehabilitation will be undertaken on the completion of excavation of each stage. Accordingly, a definitive timeline for rehabilitation is not prescribed, but rather a commitment to establish pasture by the first August, following completion of the extraction works for each stage.

Rehabilitation works will be undertaken at the following specified times of year:

1. Spring/summer:
 - Excavated area to be graded to levels and contours conforming to the adjacent unaffected areas minus the thickness of the excavated material.
 - Deep ripping along the contour at 1 m intervals.
 - Embankment batters will be cut as specified in **Section 6.3**.
 - Stockpiled topsoil will be spread over the shaped surface.
2. Autumn:
 - Pre-seeding weed control.

3. Autumn/winter:
 - Seeding with appropriate agricultural seed mix.
 - If sufficient vegetation does not germinate following initial seeding, the area will be re-seeded.
4. Spring:
 - Maintenance inspections to determine extent of maintenance requirements.
 - Formal monitoring will be undertaken in areas that have been rehabilitated.

6.10 Decommissioning

Following completion of the extraction activities, the applicant will undertake the following actions to decommission the site:

- All buildings and infrastructure will be removed;
- Any hard stand surfaces will be removed and used to backfill the pit;
- Overburden will be used as backfill;
- The area will have the slopes and soils constructed to allow for the future proposed land use.

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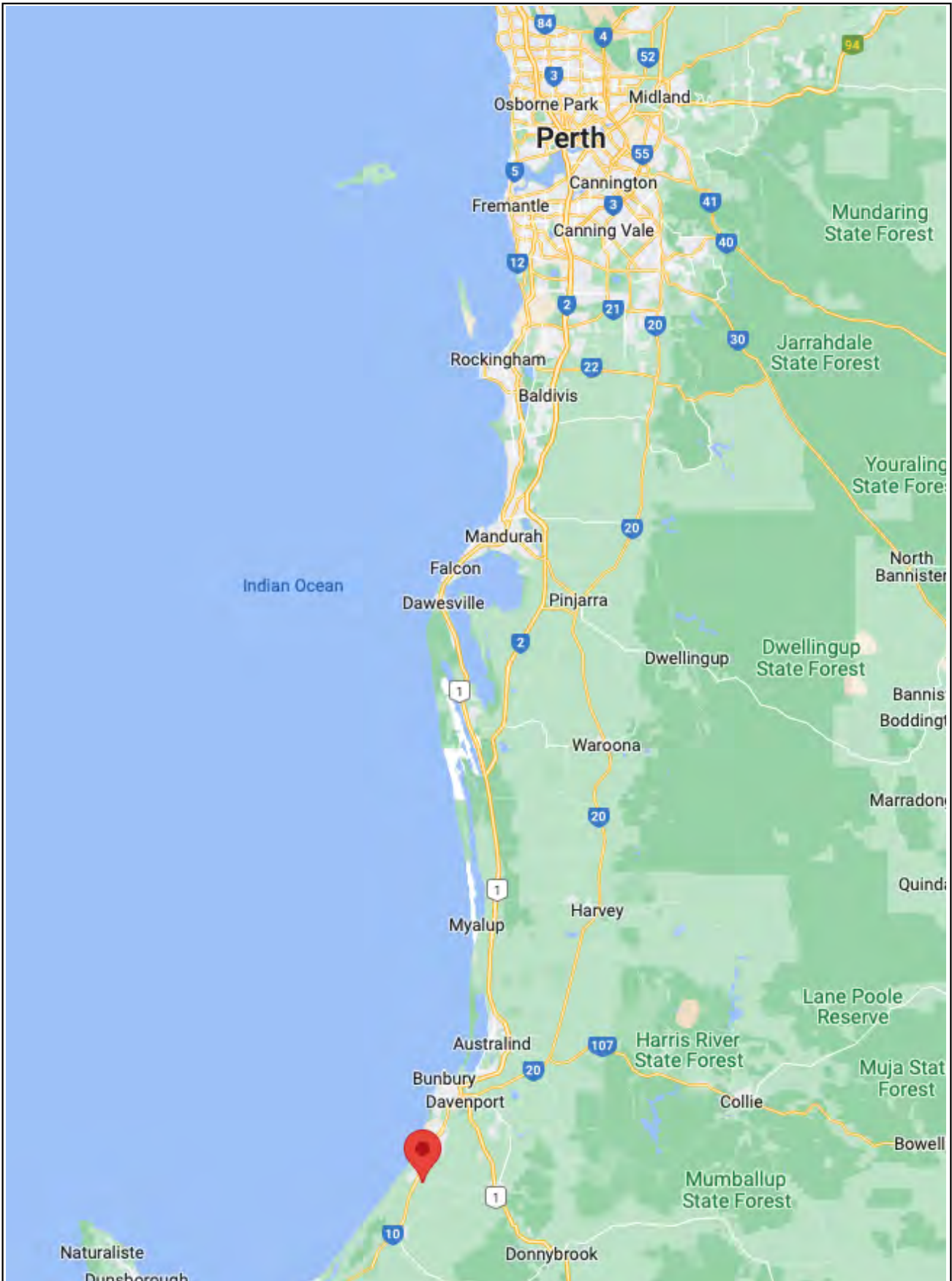
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FIGURES



PROJECT Lot 103 Boyanup Rd W, Stratham

DRAWING TITLE Figure 1 – Site Locality

CLIENT Leeuwin Civil Pty Ltd



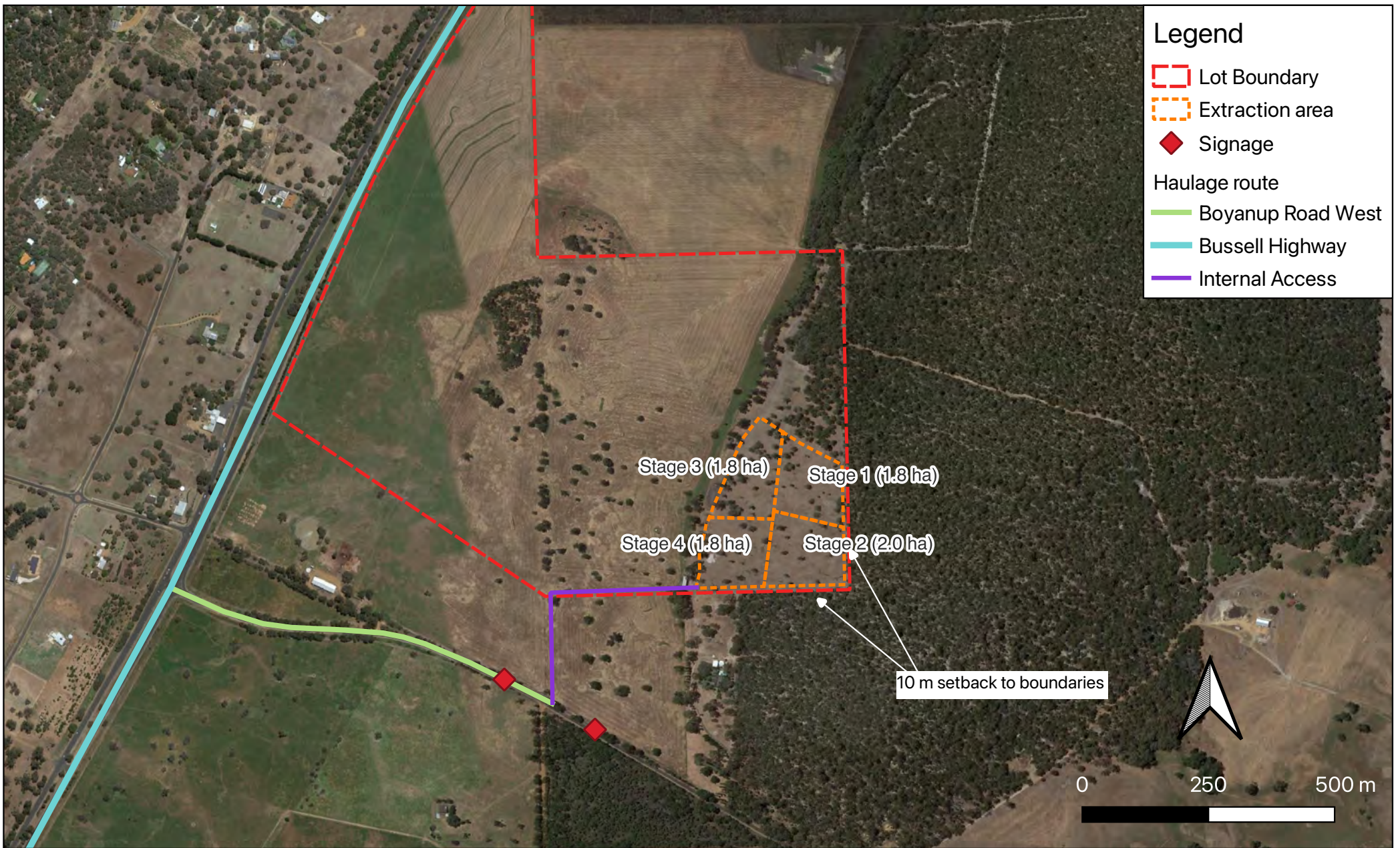
Project Number 2311 Drawing Number Figure 1 Revision A

Designed PN Checked Approved
 Drawn PN

Date 26/09/2023
 Local Authority Shire of Capel
 Sheet 1 of 1

PO Box 5178
 West Busselton
 Western Australia 6280
 Mobile 0418 950 852

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Legend

- Lot Boundary
- Extraction area
- ◆ Signage
- Haulage route
- Boyanup Road West
- Bussell Highway
- Internal Access

PROJECT 103 Boyanup Road West, Stratham

DRAWING TITLE Figure 2 - Site Extent

CLIENT Leeuwin Civil Pty Ltd

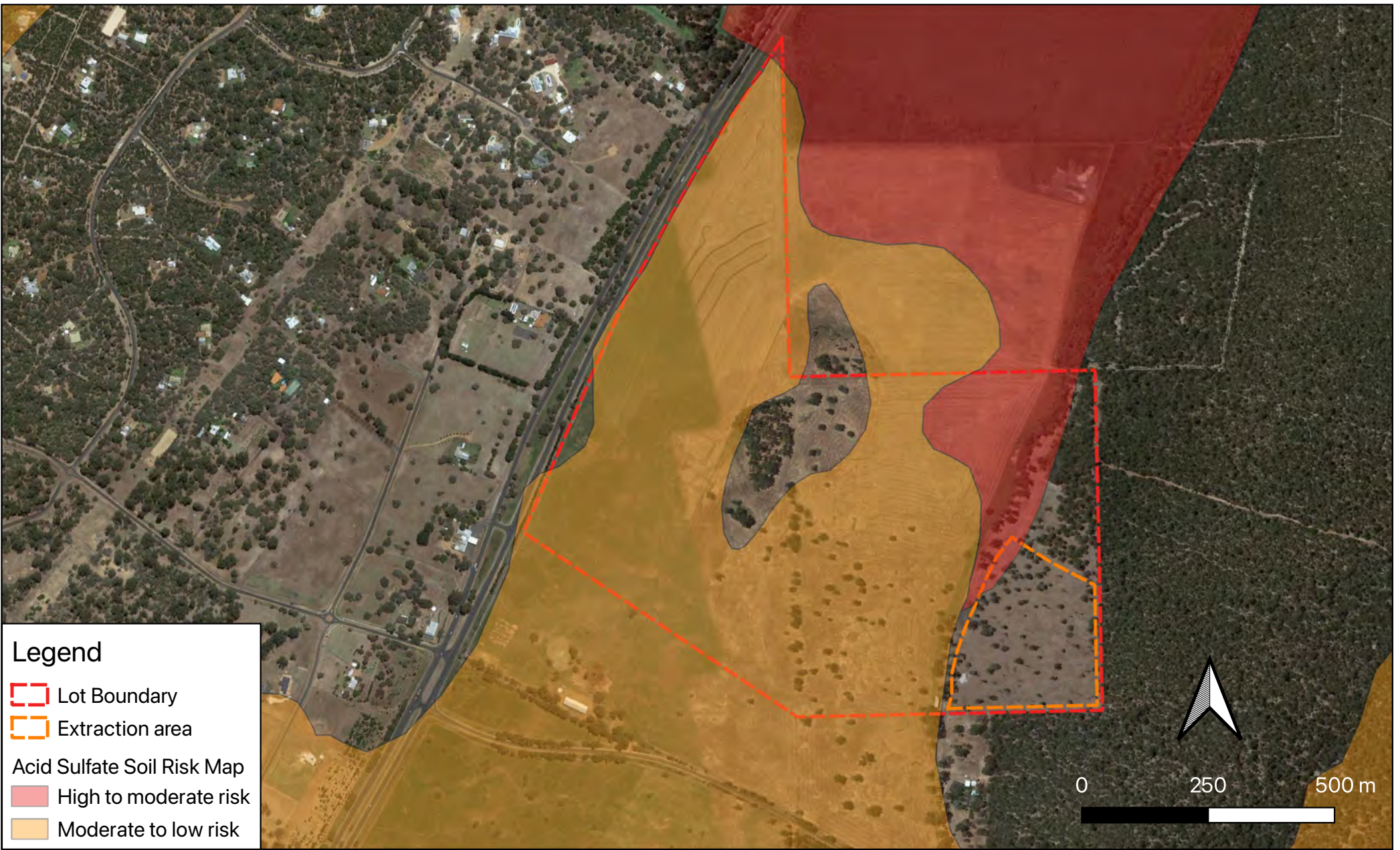
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AUSTRALIA

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Western Australia 6280
Mobile 0418 950 852



Project Number 2311
 Drawing Number Figure 2
 Revision A
 Date 20/09/2023
 Sheet 1 of 1

Designed PN
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 Approved
 Local Authority Shire of Capel



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Legend

-  Lot Boundary
-  Extraction area

Acid Sulfate Soil Risk Map

-  High to moderate risk
-  Moderate to low risk

PROJECT 103 Boyanup Road West, Stratham

DRAWING TITLE Figure 3 - Acid Sulfate Soil Mapping

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Drawing Number Figure 3
Revision A
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Designed PN
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Approved PN
Local Authority Shire of Capel

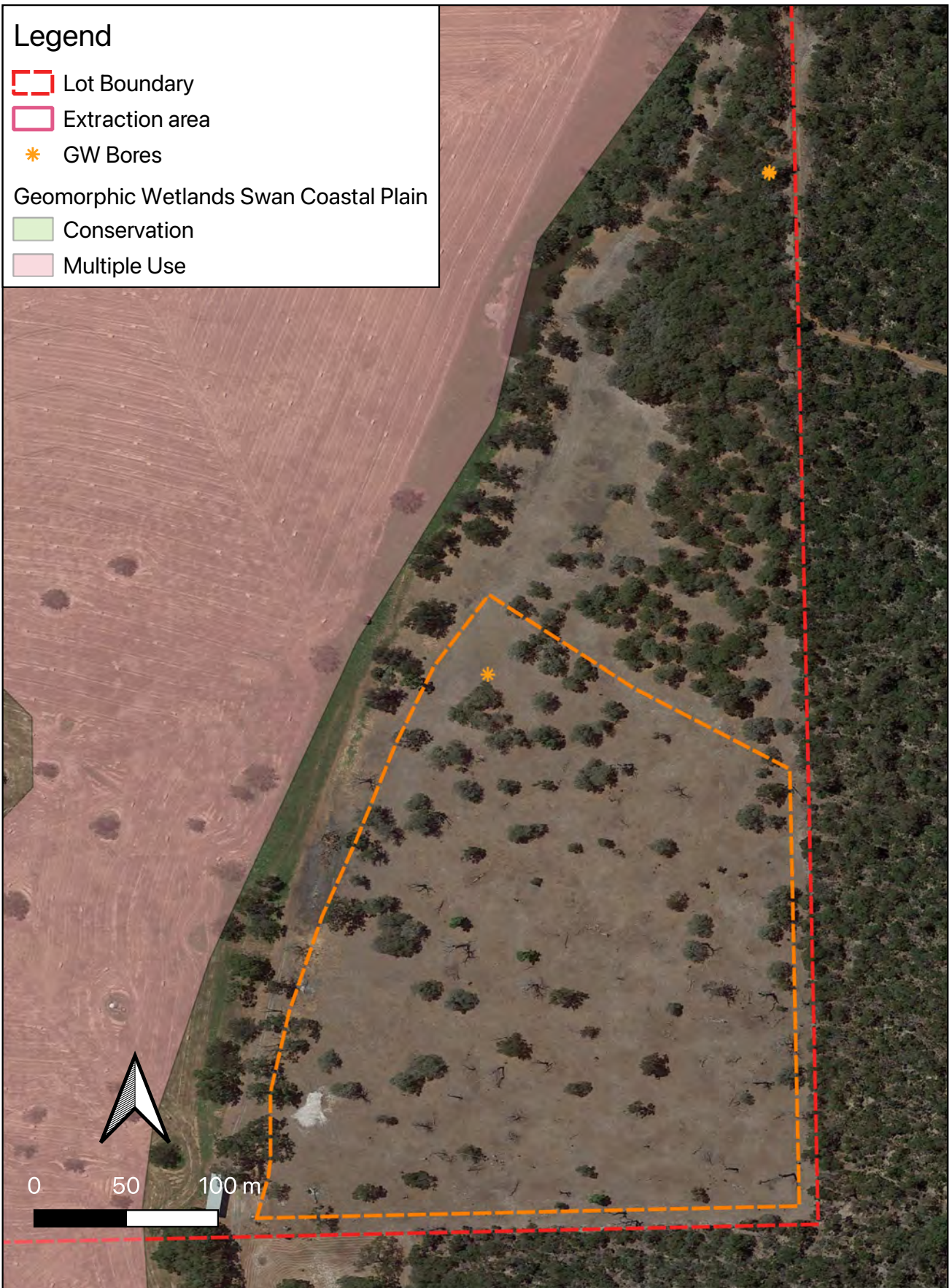
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Legend

- Lot Boundary
- Extraction area
- * GW Bores

Geomorphic Wetlands Swan Coastal Plain

- Conservation
- Multiple Use



PROJECT Lot 103 (Harris Pit), Stratham

Project Number 2311

Drawing Number Figure 4

Revision A

DRAWING TITLE Figure 4 - Water Features

Designed PN
Drawn PN

Checked Approved

CLIENT Leeuwin Civil Pty Ltd



Date
Local Authority
Sheet 1 of 1

21/09/2023
Shire of Capel

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Legend

- Extraction area
- Lot Boundary
- Aboriginal Heritage Registered Site



PROJECT Lot 103 (Harris Pit), Stratham

DRAWING TITLE Figure 5 – Aboriginal Heritage Sites

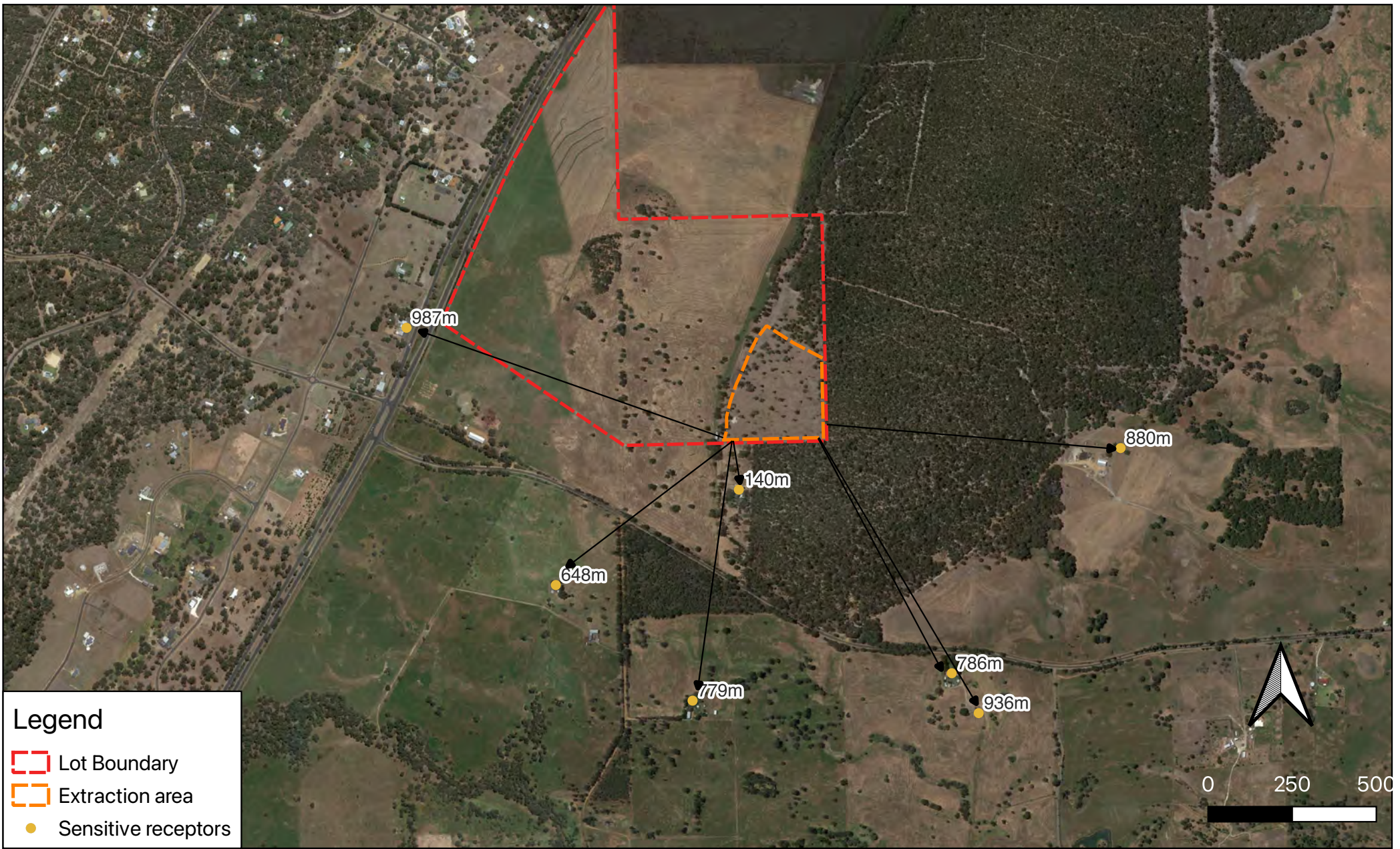
CLIENT Leeuwin Civil Pty Ltd



Project Number	2311	Drawing Number	Figure 5	Revision	A
Designed	PN	Checked	PN		
Drawn	PN	Approved			
Date	21/09/2023				
Local Authority	Shire of Capel				
Sheet 1 of 1					

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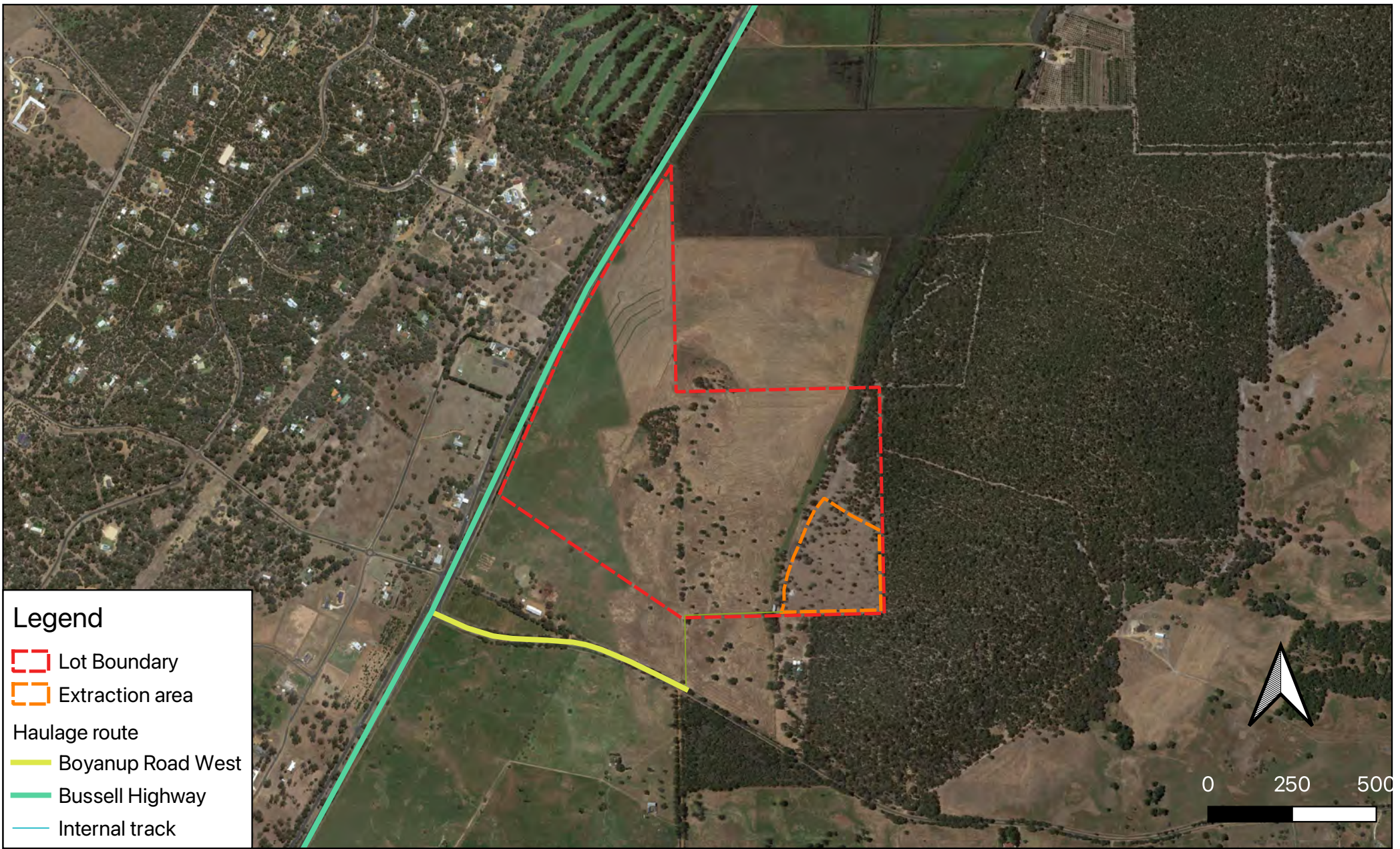


Legend

- Lot Boundary
- Extraction area
- Sensitive receptors

PROJECT	103 Boyanup Road West, Stratham	 PO Box 5178 West Busselton Western Australia 6280 Mobile 0418 950 852	Project Number	2311	Designed	PN
DRAWING TITLE	Figure 6 - Sensitive Receptors		Drawing Number	Figure 6	Drawn	PN
CLIENT	Leeuwin Civil Pty Ltd	Revision	A	Checked		
		Date	21/09/2023	Approved		
		Sheet 1 of 1		Local Authority	Shire of Capel	

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Legend

- Lot Boundary
- Extraction area
- Haulage route
- Boyanup Road West
- Bussell Highway
- Internal track

PROJECT 103 Boyanup Road West, Stratham

DRAWING TITLE Figure 7 - Haulage Route

CLIENT Leeuwin Civil Pty Ltd



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Project Number
 Drawing Number
 Revision
 Date
 Sheet 1 of 1

2311
 Figure 7
 A
 21/09/2023

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Local Authority	Shire of Capel

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Legend

-  Extraction area 140923
-  Lot Boundary
-  Final contours



PROJECT Lot 103 (Harris Pit), Stratham
 DRAWING TITLE Figure 8 – Final Contours
 CLIENT Leeuwin Civil Pty Ltd



Project Number 2311
 Drawing Number Figure 8
 Revision A
 Designed PN
 Drawn PN
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 Date 21/09/2023
 Local Authority Shire of Capel
 Sheet 1 of 1

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Legend

- Lot Boundary
- Extraction area
- Vegetation to be retained

PROJECT	Lot 103 (Harris Pit), Stratham	Project Number	2311	Drawing Number	Figure 9	Revision	A
DRAWING TITLE	Figure 9 - Vegetation retention	Designed	PN	Checked			
CLIENT	Leeuwin Civil Pty Ltd	Drawn	PN	Approved			
		Date	21/09/2023				
		Local Authority	Shire of Capel				
		Sheet 1 of 1					



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APPENDIX A – CERTIFICATE OF TITLE

WESTERN



AUSTRALIA

TITLE NUMBER

Volume Folio

1451 168

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 103 ON DIAGRAM 51141

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

SEATREK HOLDINGS PTY LTD OF 7 PARKFIELD STREET BUNBURY WA 6230

(T O505429) REGISTERED 23/9/2020

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. TITLE EXCLUDES THE LAND SHOWN ON PLAN 18080.
2. O505430 MORTGAGE TO WESTPAC BANKING CORPORATION REGISTERED 23/9/2020.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1451-168 (103/D51141)
PREVIOUS TITLE: 35-36A, 1411-719
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY: SHIRE OF CAPEL

NOTE 1: A000001A PENDING SURVEY - PLAN 18080.

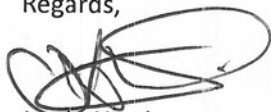
APPENDIX B – AUTHORISATION FROM LANDOWNER

5/9/2023

To Whom it May Concern,

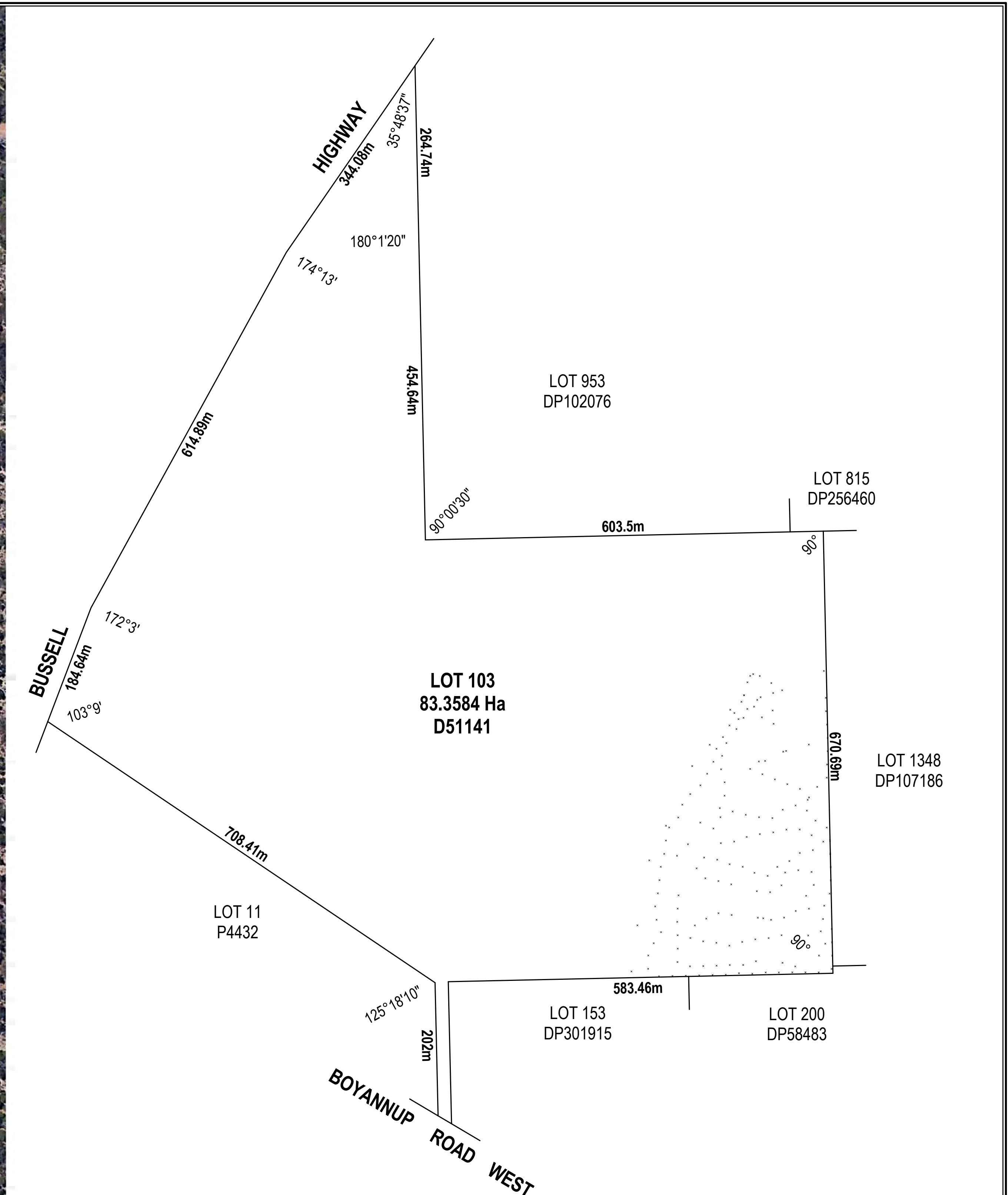
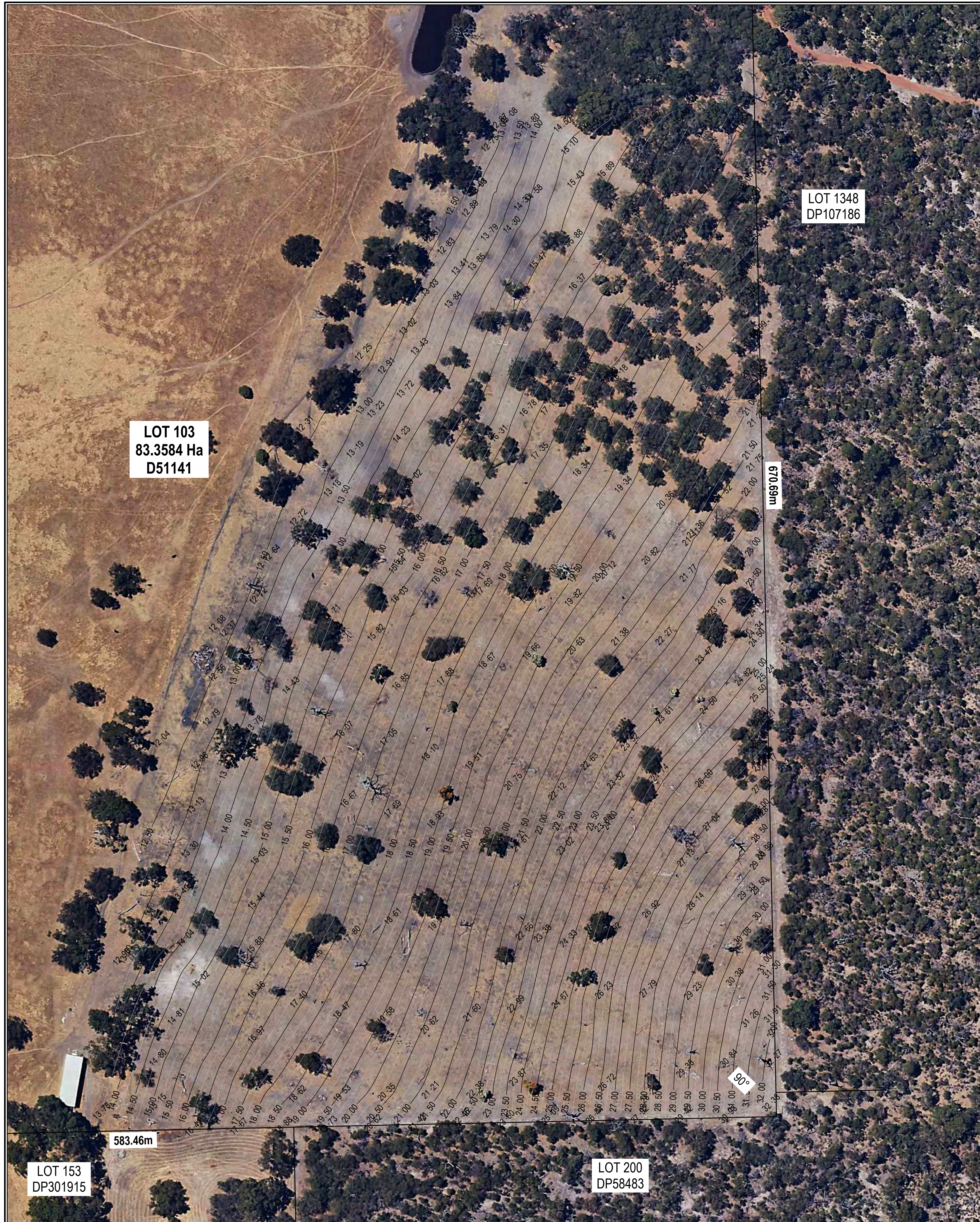
I give Leeuwin Civil authority to act on my behalf in the application for the proposed sand extraction on Lot 103 Boyanup Road West, Stratham.

Regards,

A handwritten signature in black ink, appearing to be 'Justin Harris', written over a circular scribble.

Justin Harris

APPENDIX C – SITE CONTOUR SURVEY



LOCALITY DIAGRAM (NOT TO SCALE)

LEGEND
 27.13 EXISTING SURFACE HEIGHT
 BOUNDARY

NOTES:
 1. Limited boundary marks found. Boundary resurvey recommended if building on or close to boundary.
 2. Datum is AHD established from VRS / GPS.
 3. Above ground services located by survey. Underground services plotted from plans supplied by the relevant authorities.
 No liability is accepted for errors in underground service locations. All services to be located on site prior to any work being done.
 4. No boundary marks found unless otherwise noted.
 5. Contour interval is 0.25m.
 6. PDF to be used in conjunction with DWG file supplied.
 Some point heights may have been omitted for clarity; see DWG file.

Scale: 1:1000		A1		ALL DISTANCES IN METRES	
0 10 20 30 40 50		ORIG		Surveyor: MR	
				Survey date: 18/7/2023	
				Precal/Cad: N/A	

The contents of this plan are dated within the revision panel. All consultants and persons wishing to utilise this data should satisfy themselves of the plan's currency by contacting Survecon.

The boundaries depicted on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Re-establishment of the cadastral boundaries is recommended for any proposed works on or near existing boundaries.

Rev.	DESCRIPTION	Drawn	Date	Checked
A	INITIAL ISSUE	TJ	30/8/23	MR

Client: LEEUWIN CIVIL

FEATURE AND CONTOUR SURVEY
LOT 103 ON DIAGRAM 51141,
BOYANUP ROAD, STRATHAM

PROJ: Michael Pridmore
 SURVCON SURVEYING SERVICES
 PO Box 365
 Duneborough
 WA 6281
 Australia
 Tel: (08) 9754 1188
 Fax: (08) 9756 8000
 mail@survcon.com.au
 www.survcon.com.au

9238 SS A

APPENDIX D – FAUNA SURVEY

Fauna Assessment



Lot 103 Boyanup Road West Stratham

May 2023

V2

On behalf of:

Accendo Australia
PO Box 5178
WEST BUSSELTON WA 6280
M: 0418 950 852
E: kirsten@accendoaustralia.com.au

Prepared by:

Greg Harewood
Zoologist
PO Box 755
BUNBURY WA 6231
M: 0402 141 197
E: gharewood@inet.net.au

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- APPENDIX A: Habitat Tree Details

SUMMARY

This report details the results of a targeted fauna assessment over a section of Lot 103 Boyanup Road West, Stratham (the survey area)(Figure 1). The survey area has a total extent of about 9.1 hectares (ha).

Leeuwin Civil Pty Ltd (in collaboration with the landowners) are investigating the viability of developing a sand pit with the survey area and the removal/modification of areas of vegetation potentially in use by native fauna will possibly be required.

The fauna assessment was primarily undertaken to document black cockatoo habitat and to determine the possible presence of western ringtail possums and other conservation significant fauna species and/or their habitat.

The assessment has included a literature review, a daytime reconnaissance survey and a nocturnal spotlighting survey. The field component of the fauna assessment was carried out on the 22 April 2023 (day survey) and the 26 April 2023 (night survey). All survey work and reporting has been carried out by Greg Harewood (Zoologist).

Key Findings

Most of the survey area has been cleared for livestock grazing and consists of pasture/bare ground with widely scattered trees including marri (*Corymbia calophylla*) jarrah (*Eucalyptus marginata*), peppermint (*Agonis flexuosa*) and dead identified species (Figure 1).

An approximate one hectare area of peppermint low woodland with very occasional emergent eucalypts is present in the north east section of the survey area. A small number of scattered flooded gum (*Eucalyptus rudis*) and paperbarks (*Melaleuca raphiophylla*) border the survey area along its lower lying western boundary. The only other variation to vegetation cover is a small grove of marri dominated open woodland location in the south west section of the survey area.

Other tree species present in small numbers include the WA Christmas tree (*Nuytsia floribunda*), Bull Banksia (*Banksia grandis*) and Woody Pear (*Xylomelum occidentale*).

The broad scale fauna habitats present are all totally degraded and therefore, with respect to fauna in general the survey area does not appear to represent habitat of significance and is only likely to support a very depauperate fauna assemblage dominated by a small range of mainly common bird species.

The black cockatoo habitat tree assessment identified 30 trees within the survey area with a DBH of ≥ 50 cm. Half of these trees (15) appeared not to contain hollows of any size. The remaining (15) trees contained apparent or obvious hollows, all of which were assessed as being unlikely to be suitable for black cockatoos to use for nesting purposes, due to the hollows apparent small size, unsuitable orientation and/or low height above ground level. While some of the hollows present in these trees have large entrances none of the hollows were considered by the Author to be suitable for black cockatoos after close examination with a drone. No hollows showed any conclusive evidence of use by any fauna.

Quality foraging habitat within the survey area can mainly be defined as the areas containing marri, jarrah and banksia. It is not possible to define the area of this resource as the relatively small number of trees are generally scattered in cleared paddocks, but the total area is likely to be very small (i.e. less than 0.1 ha based on canopy extent).

No evidence of western ringtail possums was observed during the day or night survey despite the presence of a small area of what appears to be suitable habitat.

1. INTRODUCTION

This report details the results of a targeted fauna assessment over a section of Lot 103 Boyanup Road West, Stratham (the survey area)(Figure 1). The survey area has a total extent of about 9.1 hectares (ha).

Leeuwin Civil Pty Ltd (in collaboration with the landowners) are investigating the viability of developing a sand pit with the survey area and the removal/modification of areas of vegetation potentially in use by native fauna will possibly be required.

Information obtained as part of this fauna assessment report will be used in conjunction with other environmental investigations to guide project planning which will aim to minimise potential environmental impacts. The outcome of the survey and information supplied in the fauna survey report will also be used to inform the environmental assessment and approvals process.

2. SCOPE OF WORKS

The scope of works was to conduct a targeted survey for black cockatoo habitat and western ringtail possums. The assessment has therefore involved:

1. Targeted searches for black cockatoo habitat/site use (habitat trees, existing and potential nest hollows, foraging and roosting habitat);
2. Targeted western ringtail possum (WRP) survey; and
3. Report for summarising methods and results.

Note: For the purposes of this proposal the term black cockatoo is in reference to Baudin's cockatoo *Zanda baudinii*, Carnaby's cockatoo *Zanda latirostris* and the forest red-tailed black cockatoo *Calyptorhynchus banksii naso*.

3. METHODS

The field component of the fauna assessment was carried out on the 22 April 2023 (day survey) and the 26 April 2023 (night survey).

3.1 FAUNA HABITAT ASSESSMENT

Vegetation units, landforms and soils observed during the site reconnaissance survey have been used to define broad fauna habitat types across the survey area.

The main objective of the assessment was to determine if it were likely that species of conservation significance would utilise the habitats identified as occurring within the survey area based on their documented habitat preference and current known distribution.

3.2 BLACK COCKATOO HABITAT ASSESSMENT

The following methods were employed to comply with the defined scope of works and are based on Commonwealth of Australia (2012 and 2022) guidelines which state that surveys for Carnaby's, Baudin's and forest red-tailed black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;
- maximise the chance of detecting the species' habitat and/or signs of use;
- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 10 km);
- account for uncertainty and error (false presence and absences); and
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

The Commonwealth of Australia (2012) places habitats used by black cockatoos into the following three categories:

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

3.2.1 Breeding Habitat Assessment

The black cockatoo breeding habitat assessment identified all suitable breeding tree species within the survey area that have a diameter at breast height (DBH) equal to or greater than 50cm. The DBH of each tree was estimated using a pre-made "caliper".

Target tree species included marri, jarrah, tuart and flooded gum and any other *Corymbia/Eucalyptus* species of a suitable size that was present. Peppermints, *Banksia*, sheoak and *Melaleuca* tree species (for example) were not assessed as they typically do not develop hollows used by black cockatoos.

The location of each tree identified as being over the threshold DBH will be recorded with a GPS and details on tree species, number and size of hollows (if any) noted. Trees observed to contain hollows (of any size/type) will be marked with "H" using spray paint.

Hollow/potential hollows were placed into one of four categories, based on the size of the apparent hollow entrance, these being:

- Small = ~<5cm diameter (i.e. entrance too small for a black cockatoo);
- Medium = ~5cm-10cm diameter (i.e. entrance too small for a black cockatoo);

- Large = $\sim > 10$ cm diameter (entrance large enough for a black cockatoo but hollow appears unsuitable for nesting i.e. wrong orientation, appears too small, too low or too shallow); or
- Large (cockatoo) = $\sim > 10$ cm diameter (entrance and apparent hollow appears big enough and suitably sized/orientated for a black cockatoo to use for nesting).

Based on this assessment, trees present within the survey area were placed into one of four categories:

- Tree < 50 cm DBH or an unsuitable species (these were not assessed/recorded);
- Tree ≥ 50 cm DBH, no hollows seen;
- Tree ≥ 50 cm DBH, one or more hollows seen, none of which were considered suitable for black cockatoos to use for nesting; or
- Tree ≥ 50 cm DBH, one or more hollows seen, with at least one considered suitable for black cockatoos to use for nesting.

For the purposes of this assessment, a tree containing a potential black cockatoo nest hollow was defined as:

Generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) or possible hollows potentially suitable for occupation by black cockatoo for the purpose of nesting/breeding. Hollows or possible hollows that had an entrance greater than about 10cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, were recorded as a “potential nest hollow”.

Identified hollows were 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). Details recorded included hollow size, height, type, orientation, comments on suitability and any evidence of use.

Trees with possible nest hollows were also scratched and raked with a large stick in attempt to flush any sitting birds from hollows and calls of chicks were listened for. Where the assessment was inconclusive, and if possible, trees identified as having potential nest hollows were subsequently examined and photographed using a drone (DJI Mavic Air).

3.2.2 Foraging Habitat Assessment

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence. Foraging habitat is represented by plant species that are known to provide a food source for black cockatoos. This can be in the form of seeds, flowers and also boring grubs that are extracted from some plant species.

3.2.3 Night Roosting Habitat Assessment

Direct and indirect evidence of black cockatoos roosting within trees on site was noted where observed (e.g. branch clippings, droppings or moulted feathers).

3.3 WESTERN RINGTAIL POSSUM ASSESSMENT

3.3.1 Daytime Survey

A daytime survey to locate and record dreys, obvious tree hollows, scats and individual WRPs was carried out during the daytime field reconnaissance surveys and involved a series of traverses on foot across the survey area.

3.3.2 Night Time Survey

A single night-time survey to locate and record individual WRPs was carried out. The survey involved a series of transects across the survey area, on foot using a LED head torch.

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 FAUNA OBSERVATIONS

Evidence of the presence or likely presence of fauna species of conservation significance (or suitable habitat) was searched for and recorded concurrent with other site surveys. Opportunistic observations of all fauna species were made during all field survey work and recorded where positive species identifications were made.

This aspect of the assessment included but was not limited to:

- Undertaking a series of transects across the survey area.
- Searching for evidence (i.e. individuals, tracks, scats, calls) of potential conservation significant species under logs, rocks and leaf litter.
- Observing bird species with binoculars.

4. SURVEY LIMITATIONS

No seasonal sampling was carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. It should be recognised that site conditions can change with time.

Lack of observational data on some species should also not necessarily be taken as an indication that a species is absent from the site or does not utilise it for some purpose at times.

During the survey, habitat trees with hollows were searched for. It should be noted that identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

5. RESULTS

5.1 FAUNA HABITAT ASSESSMENT

Most of the survey area has been cleared for livestock grazing and consists of pasture/bare ground with widely scattered trees including marri (*Corymbia calophylla*) jarrah (*Eucalyptus marginata*), peppermint (*Agonis flexuosa*) and dead identified species (Figure 1).




An approximate one hectare area of peppermint low woodland with very occasional emergent eucalypts is present in the north east section of the survey area. A small number of scattered flooded gum (*Eucalyptus rudis*) and paperbarks (*Melaleuca raphiophylla*) border the survey area along its lower lying western boundary. The only other variation to vegetation cover is a small grove of marri dominated open woodland location in the south west section of the survey area.

Other tree species present in small numbers include the WA Christmas tree (*Nuytsia floribunda*), Bull Banksia (*Banksia grandis*) and Woody Pear (*Xylomelum occidentale*).

The broad scale fauna habitats present are all totally degraded and therefore, with respect to fauna in general the survey area does not appear to represent habitat of significance and is only likely to support a very depauperate fauna assemblage dominated by a small range of mainly common bird species.

Example images of the various fauna habitats present are provided in Table 1.

Table 1: Example images of the fauna habitats within the survey area

Fauna Habitat Description	Example Image
<p>Cleared pasture with widely scattered trees (jarrah, marri and dead unidentified species).</p> <p>Makes up most of the survey area.</p>	
<p>Peppermint low woodland with very occasional emergent eucalyptus (jarrah/marri/dead) over grassland/bare ground.</p> <p>Confined to the northeast corner of the survey area</p>	
<p>Scattered flooded gum and paperbarks.</p> <p>Confined to the western boundary of the survey area.</p>	

Fauna Habitat Description	Example Image
<p>Small grove of marri.</p> <p>Located in the southwest corner of the survey area.</p>	

5.2 BLACK COCKATOO HABITAT ASSESSMENT

5.3 Breeding Habitat Assessment

Trees considered potentially suitable for black cockatoos to use as nesting habitat (subject to a suitable hollow being present and other factors) found within the survey area comprised the following species:

- Jarrah - *Eucalyptus marginata*
- Marri – *Corymbia calophylla*;
- Flooded Gum - *Eucalyptus rudis*; and
- Dead Unidentified Eucalypts – *Eucalyptus* spp.

A summary of the habitat trees observed is provided in Table 2. The locations of habitat trees are shown in Figure 4.

Table 2: Summary of potential habitat trees (DBH \geq 50cm) within the survey area

Total Number of Habitat Trees (DBH > 50cm)	Number of Habitat Trees with <u>No Hollows Observed</u>	Number of Habitat Trees with <u>Possible Hollows</u> considered <u>Unsuitable</u> for Black Cockatoos	Number of Habitat Trees with <u>Possible Hollows</u> considered <u>Potentially suitable</u> for Black Cockatoos	Tree Species			
				Jarrah	Marri	Flooded Gum	Dead Unidentified Eucalypt
30	15	15	0	11	6	5	8

The assessment identified 30 trees within the survey area with a DBH of ≥ 50 cm. Half of these trees (15) appeared not to contain hollows of any size. The remaining (15) trees contained apparent or obvious hollows, all of which were assessed as being unlikely to be suitable for black cockatoos to use for nesting purposes, due to the hollows apparent small size, unsuitable orientation and/or low height above ground level.

While some of the hollows present in these trees have large entrances none of the hollows were considered by the Author to be suitable for black cockatoos after close examination with a drone. No hollows showed any conclusive evidence of use by any fauna.

Additional details on each habitat tree observed can be found in Appendix A.

5.3.1 Foraging Habitat Assessment

The following flora species, known to be or potentially used as a direct food source (e.g. seeds, flowers, nectar, bark or grubs) by one or more species of black cockatoo were recorded within the survey area:

- Jarrah - *Eucalyptus marginata*
- Marri – *Corymbia calophylla*;
- Flooded Gum - *Eucalyptus rudis*;
- Bull Banksia – *Banksia grandis*; and
- Peppermint – *Agonis flexuosa*.

It should be noted that some of the plant species listed above are not favoured by black cockatoos as a foraging resource (i.e. flooded gum and peppermint) and would only make up a very small proportion of any one birds food intake. In addition, some species are represented by only a small number of specimens (e.g. Bull Banksia).

No foraging debris attributed to black cockatoos was located within the survey area during the survey period.

Quality foraging habitat within the survey area can mainly be defined as the areas containing marri, jarrah and banksia. It is not possible to define the area of this resource as the relatively small number of trees are generally scattered in cleared paddocks, but the total area is likely to be very small (i.e. less than 0.1 ha based on canopy extent).

5.3.2 Night Roosting Habitat Assessment

No evidence of black cockatoos roosting within trees located within the survey area was observed during the survey period. It is difficult to determine if trees or groves of trees within the survey area represent potential roosting habitat as a range of factors, not all of which can be observed, determine suitability. Some of the larger trees (including non-endemics) may be suitable for roosting but as indicated no actual evidence of use was seen.

5.4 WESTERN RINGTAIL POSSUM ASSESSMENT

5.4.1 Daytime Survey

No evidence of western ringtail possums was observed during the day survey (i.e. no dreys, scats or individuals).

5.4.2 Night Time Survey

A single common brushtail possum was observed within the survey area during the single nocturnal survey carried out in April 2023 (Figure 3).

5.4.3 Habitat Assessment

Superficially the one hectare area of low woodland situated in the north east section of the survey area appears to represent potential WRP habitat given the presence of a semi continuous midstorey layer dominated by peppermint (*Agonis flexuosa*). The scattered peppermint and jarrah trees present in paddock areas also represent potential habitat of much lesser value.

While no WRPs were detected within the survey area they are known to occur in the general area and therefore may frequent the survey area at times, though the survey results suggest it is not being specifically favoured by the species.

5.5 FAUNA OBSERVATIONS

A relatively small number of fauna species were observed or heard during the survey period, most being common bird species often found in farmland environments.

One fauna species of conservation significance was recorded, this being Carnaby's cockatoo (Endangered), a small flock of which was observed flying overhead. Based on degraded nature of the vegetation present it is considered unlikely that the survey area represents habitat of significance to any species of fauna known to frequent the general area.

6. CONCLUSION

The fauna assessment within the survey area was primarily undertaken to document black cockatoo habitat and to determine the possible presence of western ringtail possums and other conservation significant fauna species and/or their habitat.

The broad scale fauna habitats present are all totally degraded and therefore, with respect to fauna in general the survey area does not appear to represent habitat of significance and is only likely to support a very depauperate fauna assemblage dominated by a small range of mainly common bird species.

Black cockatoo habitat with the survey area is represented by a relatively small number of “habitat trees” (DBH >50cm). No large hollows possibly suitable for black cockatoo to use for nesting were identified.

Quality black cockatoo foraging habitat within the survey area is limited to a small number of generally scattered marri, jarrah and banksia trees, which when combined have a very limited extent . No evidence of this vegetation (or any other plant species) being used as a foraging resource was observed. No evidence black cockatoos roosting within the survey area was noted.

No evidence of western ringtail possums was observed during the day or night survey despite the presence of a small area of what appears to be suitable habitat.

7. REFERENCES


Commonwealth of Australia (2012). *EPBC Act Referral guidelines for three threatened Black Cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo (vulnerable) *Calyptorhynchus banksii naso*.*

Commonwealth of Australia (2022). *Referral guideline for 3 threatened WA threatened black cockatoo species: Carnaby's cockatoo (*Zanda latirostris*), Baudin's cockatoo (*Zanda baudinii*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). Department of Agriculture, Water and the Environment, Canberra.*

FIGURES



Legend

 Survey Area



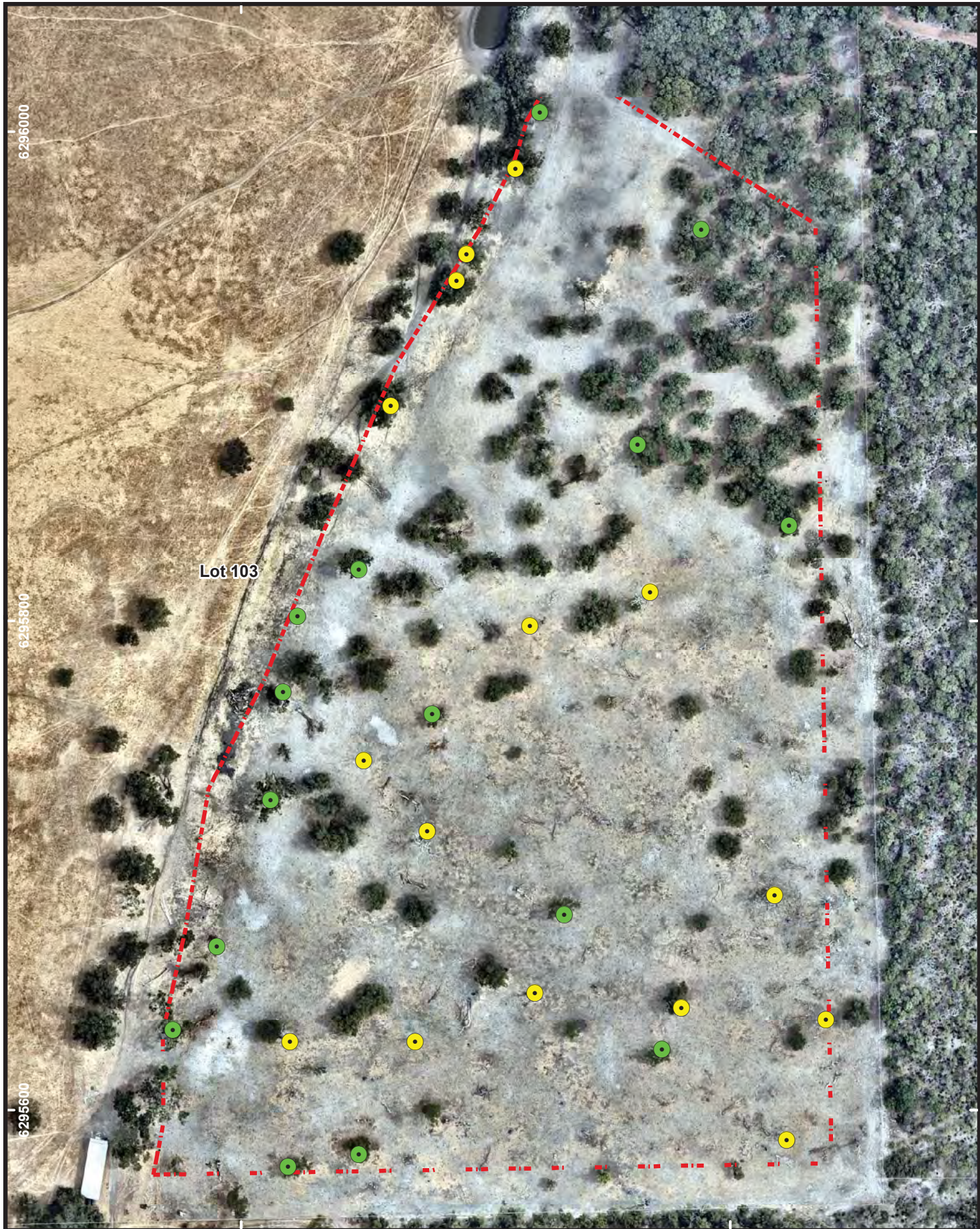
0 50 100
 Metres






Drawn: G Harewood
 Date: 01-May-23
 Scale: 1:2,000

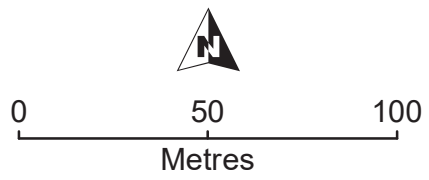
Lot 103 Boyanup Road West
 Stratham

**Survey Area
 Aerial Photograph**



Legend

-  Survey Area
-  Habitat Tree - No hollows seen
-  Habitat Tree - One or more hollows, None considered suitable for black cockatoos




Fauna Survey
 Drawn: G Harewood
 Date: 01-May-23
 Scale: 1:2,000



Lot 103 Boyanup Road West
 Stratham

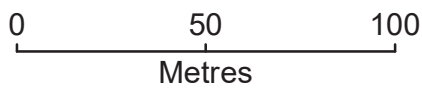
**Survey Area
 Habitat Trees
 (DBH >50cm)**

Projection/Coordinate System: UTM/MGA Zone 50 Figure: 2



Legend

-  Survey Area
-  Common Brushtail Possum



Drawn: G Harewood
 Date: 01-May-23
 Scale: 1:2,000

Lot 103 Boyanup Road West
 Stratham

**Survey Area
 Possum
 Observations**

APPENDIX A

HABITAT TREE DETAILS

Habitat Trees (DBH >50cm)

Datum GDA 94

Estimated Hollow Entrance Size: Small+ <5cm, Medium = 5 to<10cm, Large = 10cm+

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	DBH (cm)	Number of Hollows	Estimated Hollow Entrance Size	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt002	50H	370419	6295577	Jarrah	10-15	>50	0					
wpt003	50H	370448	6295582	Jarrah	10-15	>50	0					
wpt005	50H	370623	6295588	Dead Unknown	15-20	>50	2+	Small, Medium & Large			No	Examined with drone
wpt007	50H	370639	6295637	Dead Unknown	20+	>50	2+	Large			No	Examined with drone
wpt009	50H	370618	6295688	Jarrah	15-20	>50	2+	Small & Medium			No	
wpt011	50H	370624	6295839	Marri	15-20	>50	0					
wpt013	50H	370588	6295960	Dead Jarrah	10-15	>50	0					
wpt014	50H	370562	6295872	Jarrah	10-15	>50	0					
wpt015	50H	370522	6296008	Flooded Gum	15-20	>50	0					
wpt019	50H	370512	6295985	Flooded Gum	15-20	>50	2+	Small			No	
wpt023	50H	370492	6295950	Flooded Gum	15-20	>50	2+	Small			No	
wpt024	50H	370488	6295939	Flooded Gum	15-20	>50	2+	Small			No	
wpt026	50H	370461	6295888	Flooded Gum	20+	>50	2+	Small			No	
wpt028	50H	370448	6295821	Marri	15-20	>50	0					
wpt029	50H	370423	6295802	Dead Unknown	15-20	>50	0					
wpt030	50H	370417	6295771	Dead Marri	15-20	>50	0					
wpt031	50H	370412	6295727	Marri	20+	>50	0					
wpt032	50H	370390	6295667	Marri	15-20	>50	0					
wpt035	50H	370372	6295633	Marri	20+	>50	0					
wpt042	50H	370420	6295628	Dead Jarrah	15-20	>50	2+	Small & Medium			No	
wpt043	50H	370471	6295628	Dead Unknown	15-20	>50	2+	Small			No	
wpt044	50H	370520	6295648	Dead Unknown	15-20	>50	2+	Medium & Large			No	Examined with drone
wpt045	50H	370532	6295680	Jarrah	15-20	>50	0					
wpt046	50H	370572	6295625	Jarrah	10-15	>50	0					
wpt047	50H	370580	6295642	Jarrah	15-20	>50	2+	Small, Medium & Large			No	Examined with drone
wpt048	50H	370567	6295812	Dead Unknown	15-20	>50	2+	Small & Medium			No	
wpt049	50H	370518	6295798	Dead Jarrah	5-10	>50	2+	Small & Medium			No	
wpt050	50H	370478	6295762	Jarrah	10-15	>50	0					
wpt051	50H	370450	6295743	Dead Unknown	15-20	>50	2+	Small & Medium			No	
wpt052	50H	370476	6295714	Dead Unknown	15-20	>50	2+	Medium & Large			No	Examined with drone

DISCLAIMER

This fauna assessment report (“the report”) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood (“the Author”). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report (“the data”). Except as otherwise stated in the report, the Author has not verified the accuracy of completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (“conclusions”) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

APPENDIX E – GROUNDWATER MONITORING DATA

SMB002A_G		13.98	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Date			14/1/2021	12/2/2021	26/3/2021	21/4/2021	13/5/2021	15/6/2021	12/7/2021	6/8/2021	21/9/2021	25/10/2021	15/11/2021	16/12/2021	25/1/2022	17/2/2022	31/3/2022	14/4/2022	24/5/2022	30/6/2022	28/7/2022	31/8/2022	28/9/2022	1/11/2022	23/11/2022	4/1/2023
Casing Height above topo	m		0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Depth of bor	m		21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88	21.88
SWL (m)	m (from top of casing)		4.32	4.34	4.45	4.37	4.34	4.27	4.22	4.13	4.09	4.1	4.1	4.1	4.27	4.34	4.44	4.42	4.46	4.27	4.2	4.15	4.1	4.12	4.24	4.52
m AHD	survey of top steel		10.20	10.18	10.07	10.15	10.18	10.25	10.30	10.39	10.43	10.42	10.42	10.42	10.25	10.18	10.08	10.10	10.06	10.25	10.32	10.37	10.42	10.40	10.28	10.00
SMB008_GL		13.97	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Date			14/01/2021	12/02/2021	26/03/2021	20/04/2021	13/05/2021	15/06/2021	12/07/2021	6/08/2021	21/9/2021	25/10/2021	15/11/2021	16/12/2021	25/1/2022	17/2/2022	22/3/2022	14/4/2022	24/05/2022	30/6/2022	28/7/2022	31/8/2022	28/9/2022	1/11/2022	23/11/2022	4/01/2023
Casing Height above topo	m		0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Depth of bor	m		14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56	14.56
SWL (m)	m (from top of casing)		3.86	3.89	4.05	3.93	3.95	3.78	3.58	3.46	3.52	3.57	3.61	3.66	3.75	3.82	3.9	3.92	3.96	3.89	3.67	3.56	3.44	3.65	3.82	3.96
m AHD	survey of top steel		10.60	10.57	10.41	10.53	10.51	10.68	10.88	11.00	10.94	10.89	10.85	10.80	10.71	10.64	10.56	10.54	10.50	10.57	10.79	10.90	11.02	10.81	10.64	10.50

APPENDIX F - WATER MANAGEMENT PLAN

APPENDIX G – NOISE MANAGEMENT PLAN

APPENDIX H – DUST MANAGEMENT PLAN