EXTRACTIVE INDUSTRY (SAND) OPERATIONS PLAN

LOT 262 (No. 220) QUEELUP ROAD, NORTH BOYANUP

October 2025

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CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

JW Cross Maintenance Pty Ltd (the applicant) is proposing to extract sand from approximately a 16.36 hectare (ha) area within Lot 262 (No. 220) Queelup Road, North Boyanup (herein referred to as the subject site) (refer to **Figure 1** and **Figure 2**).

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 500,000 m^3) is to be extracted, commencing to the south of the subject site and moving in a northerly 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 262 (No. 220) Queelup Road, North Boyanup. The Lot is wholly owned by Geoffrey and Jill Cross (refer to **Appendix A** for Certificate of Title). Geoffrey is also a director of JW Cross Maintenance Pty Ltd.

The subject site is located within the municipality of the Shire of Capel, approximately 10 km southeast of the Bunbury town centre and approximately 150 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) and the *Greater Bunbury Region Scheme* (GBRS). The subject site is located within the 'Special Control Area – Strategic minerals and 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 to the east and southeast of the subject site is zoned 'Rural' and 'Local Road' under the LPS 8 and 'Rural' under the GBRS. Properties to the north, west and southwest of the subject site are zoned 'Rural' under the LPS 8 and GBRS. Properties that are located to the northeast of the subject site are zoned 'Rural Residential' under the LPS 8 and 'Rural' under the GBRS.

Historically the subject site has been used for livestock grazing, resulting in the disturbance to some of native vegetation onsite. Intact remnant vegetation remains in the southwestern portion, with the remainder of the subject site comprised of mature paddock trees.

2.3 Topography and Soils

The current topography of the subject site can be described as sloping with the elevation ranging from 24 m Australian Height Datum (AHD) in the north and northwest corner to 33 m AHD in the centre before falling again to 26 m AHD in the southeast (refer to **Appendix B**).

The subject site is located within the Bassendean System of the Bassendean Zone consisting of fixed dunes inland from coastal dune zone containing non-calcareous sands, podsolised soils with l ow-lying wet areas. The Bassendean system consists of "*Sand dunes and sandplains with pale deep sand, semi-wet and wet soil*" (Natural Resource Information (NRInfo)).

The subject site is located within the Bassendean B1b soil phase consisting of "*very low relief dunes of undulating sand plain with deep bleached grey sandy A2 horizons and pale yellow B horizons*" (NRInfo).

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 'moderate to low' risk of ASS occurring across the entirety of the subject site. This proposal involves the excavation of material above the water table 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 dry summers and cool wet winters.

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30.1°C. July has the lowest average temperature of the year of 7.4°C.

Rainfall for the area is approximately 737.3 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 17-18 knots, swinging to the south-west at approximately 22 knots in the afternoon. During winter, the winds are most commonly 12-19 knots from 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 39.1 mm/hr.

2.5 Vegetation and Flora

A fauna survey (SW Environmental 2025) was undertaken which described the subject site as cleared pastoral paddock area and remnant native vegetation of varying density ranging from 'Completely Degraded' to 'Good' condition. Based on the survey results, the subject site contains areas of vegetation described as follows:

- Predominately peppermint (*Agonis flexuosa*) woodland and paddock trees – *Agonis flexuosa, Xylomelum occidentale, Banksia* sp., *Nuytsisa floribunda* over *Kunzea glabrescens* shrubs over cycads and grass-trees over *Stirlingia latifolia* over various *Restionaceae* spp. and *Lomandra* sp. Clumps of *Eucalyptus marginata* and *Corymbia calophylla* also occur (4.68 ha) (refer to **Plate 1**).
- *Eucalyptus marginata* and occasional *Corymbia calophylla* isolated or clumps of paddock trees over open clearings with clumps of low shrubs over various weedy herbs and grasses (0.28 ha) (refer to **Plate 2**).
- Additional cleared areas comprised of paddock-cleared open space consisting of various grasses and herbs (10.88 ha) (refer to **Plate 3**).

Plate 1. *Agonis flexuosa* woodland over cycads and grass trees (SW Environmental 2025).

Plate 2. Jarrah Marri paddock trees over open clearings with clumps of low shrubs over various weedy herbs and grasses (SW Environmental 2025).

Plate 3. Cleared paddock areas (SW Environmental 2025).

2.5.1 Flora of Conservation Significance

A search for known rare and Priority flora within 10 km to the subject site was undertaken through review of the following databases:

- Department of Biodiversity, Conservation and Attraction's (DBCA's) Threatened (Declared Rare) Flora database (Djandjoo);
- DBCA's *Declared Rare and Priority Flora List*; and
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *Matters of National Environmental Significance* database.

In accordance with the DBCA's *Declared Rare and Priority Flora List*, 14 Threatened species, nine Priority 1 species, 14 Priority 2 species, 28 Priority 3 species and 13 Priority 4 species have been recorded within 10 km of the subject site. The EPBC Act *Matters of National Environmental Significance* database search identified an additional three 'Critically Endangered', ten 'Endangered' and six 'Vulnerable' flora species. A summary of the species is provided within **Table 1**.

Table 1: Database search results for significant flora known to occur within proximity of the subject site

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Acacia flagelliformis	P4	-	Prefers sandy soils in winter wet areas. Unlikely to occur based on absence of wet areas.
Acacia lasiocarpa var. lasiocarpa	P2	-	Prefers coastal dunes and flats, swamps. Unlikely to occur based on absence of suitable habitat.
Acacia semitrullata	P4	--	Prefers white/grey sand over laterite or clay. Sandplains and swampy areas. Unlikely based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Adelphacme minima	P3		Prefers ridges, swamps, lower slopes, flats. Unlikely to occur based on absence of suitable habitat.
Allocasuarina ramosissima	P3	-	Prefers lateritic soils, gravel. Unlikely to occur based on absence of suitable habitat.
Andersonia ferricola	P1	--	Prefers rocky slopes, outcrops and ledges. Unlikely to occur based on absence of suitable habitat.
Andersonia gracilis	--	Endangered	White grey sand, sandy clay, gravelly loam. Winter wet areas near swamps. Unlikely based on absence of wet areas.
Angianthus drummondii	P3	-	Grey or brown clay soils, ironstone. Seasonally wet flats. Unlikely based on absence of suitable habitat.
Aponogeton hexatepalus	P4		Freshwater: ponds, rivers, claypans. Unlikely to occur based on absence of suitable habitat.
Austrostipa bronweniae	T	Endangered	Plants grow under *Melaleuca rhaphiophylla*, *Eucalyptus rudis* Low Open Forest over Hakea varia Tall Open Shrubland over *Gahnia trifida* and *Baumea juncea* sedges. Unlikely to occur based on absence of suitable habitat.
Austrostipa jacobsiana	T	Critically Endangered	Prefers shrublands on calcareous soils. Unlikely to occur based on absence of shrubland.
Banksia mimica	-	Endangered	Prefers white or grey sand over laterite, sandy loam. Unlikely based on anthropogenic disturbances.
Banksia nivea subsp. uliginosa	-	Endangered	Prefers red, sandy, shallow loams over ironstone in thick scrub, in winter wet southern and Scott River ironstones. Unlikely to occur based on absence of suitable habitat.
Banksia squarrosa subsp. argillacea	-	Vulnerable	Prefers, white/grey sand, gravelly clay or loam. Winter-wet flats, clay flats. Unlikely based on absence of wet areas.
Boronia humifusa	P1	-	Prefers to grow in open forest. Unlikely to occur based on absence of suitable habitat.
Boronia tetragona	P3	--	Prefers brown sandy loam. Winter-wet flats, swamps, open woodland. Unlikely based on absence of wet areas.
Brachyscias verecundus	-	Critically Endangered	Prefers granite outcrop. Unlikely based on absence of suitable habitat.
Caladenia hoffmanii	-	Endangered	Prefers rocky outcrops and hillsides, ridges, swamps and gullies. Unlikely based on absence of suitable habitat.
Caladenia huegelii	T	Endangered	Prefers grey or brown sand, clay loam. Unlikely based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Caladenia procera	T	-	Prefers Jarrah, Marri and Peppermint woodland environments or other dense heath, sedges or low shrubs. Unlikely based on the lack of dense heath and shrubs.
Caladenia speciosa	P4	-	Prefers white, grey or black sand. Unlikely based on anthropogenic disturbances.
Carex tereticaulis	P3	-	Prefers black peaty sand. Unlikely based on absence of suitable habitat.
Caustis sp. Boyanup	P3	-	Prefers white or grey sand on seasonally inundated flats. Unlikely based on absence of wet areas.
Chamaescilla gibsonii	P3	-	Prefers clay to sandy clay. Winter-wet flats, shallow water-filled claypans. Unlikely based on absence of suitable habitat.
Chamelaucium erythrochlorum	P4	-	Prefers gravelly lateritic soils, clay. Unlikely based on absence of suitable habitat.
Chamelaucium sp. S coastal plain		Vulnerable	Prefers open dryandra shrubland. Unlikely based on absence of suitable habitat.
Craspedia sp. Waterloo	P2	-	Prefers granitite outcrops and seasonally wet flats. Unlikely based on absence of suitable habitat.
Cyathochaeta teretifolia	P3	-	Prefers swamps and creeks. Unlikely based on absence of suitable habitat.
Darwinia whicherensis	T	-	Prefers shallow sandy clay in winter-wet flats in *Dryandra squarrosa* shrubland. Unlikely based on absence of suitable habitat.
Dillwynia dillwynioides	P3	-	Prefers sandy soils. Winter-wet depressions. Unlikely based on absence of wet areas.
Dillwynia sp. Capel	P3	-	Prefers littered grey loamy sand, rocky soils. Valleys, rangelands. Unlikely based on absence of suitable habitat.
Diuris brevis	P2	-	Prefers shrublands and seasonally wet flats with sandy clay and clay soils. Unlikely based on absence of suitable habitat.
Diuris drummondii	T	Vulnerable	Prefers low lying depressions. Unlikely based on absence of suitable habitat.
Diuris micrantha	-	Vulnerable	Prefers brown loamy clay. Winter-wet swamps, in shallow water. Unlikely based on absence of suitable habitat.
Diuris purdiei	-	Endangered	Prefers grey-black sand, moist. Winter-wet swamps. Unlikely based on absence of suitable habitat.
Drakaea elastica	T	Vulnerable	Prefers white or grey sand. Low-lying situations adjoining winter-wet swamps. Unlikely based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Drakaea micrantha	T	Vulnerable	Prefers white/grey sand. Possible although considered unlikely based on anthropogenic disturbances.
Drosera bulbigena	P2	-	Prefers sandy and clayey soils. Winter-wet low-lying areas and swamps. Unlikely based on absence of suitable habitat.
Drosera paleacea	P2	--	Prefers white sand, sandy clay. Possible although considered unlikely based on anthropogenic disturbances.
Eleocharis keigheryi	T	Vulnerable	Prefers freshwater creeks and claypans. Unlikely based on absence of suitable habitat.
Eucalyptus rudis subsp. cratyantha	P4	-	Prefers flats and hillsides. Unlikely based on absence of suitable habitat.
Eucalyptus x mundijongensis	P1	-	Prefers loamy soil in paddocks. Unlikely based on absence of suitable habitat.
Franklandia triaristata	P4	-	Prefers white or grey sand. Possible although considered unlikely based on anthropogenic disturbances.
Gastrolobium papilio	-	Endangered	Prefers red sandy-clay soil over ironstone in winter wet flats. Unlikely based on absence of suitable habitat.
Gastrolobium sp. Yoongarillup	P1	-	Prefers rocky peaks and outcrops along rivers. Unlikely based on absence of suitable habitat.
Gastrolobium whicherense	P2	-	Prefers red-grey sandy clay over quartzite. Steep westerly slopes. Unlikely based on absence of suitable habitat.
Grevillea bronweniae	P3	-	Prefers grey sand over laterite and hillslopes. Unlikely based on absence of suitable habitat.
Grevillea rosieri	P2	-	Prefers shrubland habitat. Unlikely based on absence of suitable habitat.
Hemigenia rigida	P1	-	Prefers sandy soils, lateritic gravelly soils. Hillslopes, granite outcrops, flats, ironstone ridges. Unlikely based on absence of suitable habitat.
Isopogon formosus subsp. dasylepis	P3	-	Prefers sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas. Unlikely based on absence of suitable habitat.
Jacksonia gracillima	P3	-	Commonly associated with shrubland. Unlikely based on absence of suitable habitat.
Lambertia echinata subsp. occidentalis		Endangered	Prefers flats to foothills, winter-wet sites. Unlikely based on absence of suitable habitat.
Lasiopetalum membranaceum	P3	-	Prefers sand over limestone. Unlikely based on absence of suitable habitat
Lepidium fasciculatum	P3	-	Prefers heavy clay depressions, gilgai, and the margins of wetlands. Unlikely based on absence of suitable habitat

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Leptomeria furtiva	P2	-	Prefers grey or black peaty sand. Unlikely based on anthropogenic disturbances.
Leucopogon sp. Busselton	P3	-	Prefers areas with sandy or gravelly loam, sandy clay, laterite, and granite. Unlikely based on absence of suitable habitat.
Lomandra whicherensis	P3	-	Prefers areas with sandy and lateritic soils, often in woodlands and shrublands. Unlikely based on absence of suitable soils.
Loricobbia skinneri	P4	-	Prefers well drained sandy or gravelly soils over laterite. Possible although considered unlikely based on anthropogenic disturbances.
Microtis quadrata	P4	-	Prefers seasonally wet depressions and swampy areas near the coast. Unlikely based on absence of suitable habitat.
Montia australasica	P2	-	Prefers swamps, slow-moving watercourses, and other damp areas like ponds and damp depressions. Unlikely based on absence of suitable habitat.
Morelotia australiensis	-	Vulnerable	Prefers winter-wet, swampy depressions, drainage lines or rises surrounding swamps. Unlikely based on absence of suitable habitat.
Orianthera wendyae	P1	-	Prefers ridge tops with brown lateritic sandy clay soils. Unlikely based on absence of suitable habitat.
Ornduffia submersa	P4	-	Occur in the deepest wetlands. Unlikely based on absence of suitable habitat.
Petrophile latericola	-	Endangered	Prefers red lateritic clay. Winter-wet flats. Unlikely based on absence of suitable habitat.
Pithocarpa corymbulosa	P3	-	Prefers gravelly or sandy loam soils, often amongst granite outcrops. Unlikely based on absence of suitable habitat.
Platysace ramosissima	P3	-	Prefers sandy soils. Unlikely based on anthropogenic disturbances
Pterostylis frenchii	P2	-	Prefers, calcareous sand with limestone, laterite. Flatlands and gentle slopes. Unlikely based on absence of suitable habitat.
Puccinellia vassica	P1	-	Prefers, saline soils. On the outer margins of coastal saltmarshes. Unlikely based on absence of suitable habitat.
Rumex drummondii	P4	-	Prefers, winter-wet disturbed areas. Unlikely based on absence of suitable habitat.
Schoenus benthamii	P3	-	Prefers, white, grey sand, sandy clay. Winter-wet flats, swamps. Unlikely based on absence of suitable habitat.
Schoenus capillifolius	P3	-	Prefers claypans. Unlikely based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Schoenus loliaceus	P2	-	Prefers sandy soils. Winter-wet depressions. Unlikely based on absence of wet areas.
Stenanthemum sublineare	P2	-	Prefers woodland dominated by *Banksia attenuata*. Unlikely based on absence of suitable habitat.
Stylidium acuminatum subsp. acuminatum	P2	-	Prefers hillslopes, ridges and valleys. Unlikely based on absence of suitable habitat.
Stylidium longitubum	P4	-	Prefers sandy clay, clay. Seasonal wetlands. Unlikely based on absence of suitable habitat.
Stylidium nitidum	P1	-	Prefers grey sand. Mostly under Casuarina and Baeckea species amongst Casuarina needle litter in low open woodland. Unlikely based on absence of suitable habitat.
Stylidium paludicola	P3	-	Prefers Marri and Melaleuca woodland, Melaleuca shrubland. Unlikely based on absence of suitable habitat.
Synaphea boyaginensis	P2	--	Prefers gravelly clay loam soils. Unlikely based on anthropogenic disturbances.
Synaphea hians	P3	-	Prefers wet areas with grey-brown sandy loams or clay. Unlikely based on absence of suitable habitat.
Synaphea odocoileops	P1	-	Prefers brown-orange loam & sandy clay, granite. Swamps, winter-wet areas. Unlikely based on absence of suitable habitat.
Synaphea petiolaris subsp. simplex	P3	-	Prefers sandy soils, flats and winter wet areas. Unlikely based on absence of wet areas.
Synaphea polypodioides	P3	-	Prefers sandy-loamy-clay soils over laterite. Unlikely based on absence of suitable habitat.
Synaphea sp. Fairbridge Farm	-	Critically Endangered	Prefers grey, clayey sand with lateritic pebbles in low woodland areas. Unlikely based on absence of suitable habitat.
Synaphea polypodioides	P3	-	Prefers sandy-loamy-clay soils over laterite. Unlikely based on absence of suitable habitat.
Synaphea sp. Pinjarra Plain	T	Endangered	Prefers flat terrain on grey-brown sandy loams. Unlikely based on absence of suitable habitat.
Synaphea sp. Serpentine	T	Critically Endangered	Prefers flat terrain on grey-brown sandy loams to clay in seasonally wet areas. Unlikely based on absence of suitable habitat.
Synaphea stenoloba	T	Endangered	Prefers low-lying areas that are occasionally inundated, often within swampy heathland vegetation Unlikely based on absence of suitable habitat and anthropogenic disturbances.
Thelymitra variegata	T	-	Prefers sandy soils within shrublands and woodlands. Unlikely based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Trithuria australis	P4	-	Prefers damp, open, grassy areas, roadsides, lawns, and even wall crevices, as well as in grassy forests. Unlikely based on absence of suitable habitat.
Verticordia attenuata	P3	-	Prefers white or grey sand within winter-wet depressions. Unlikely based on absence of suitable habitat.
Verticordia densiflora var. pedunculata	T	Endangered	Prefers grey/yellow sand, sandy loam. Winter-wet low-lying areas. Unlikely based on absence of wet areas.
Wurmbea sp. Cranbrook	P3	-	Prefers coastal limestone cliffs and seasonally wet areas in woodlands and shrublands. Unlikely based on absence of suitable habitat.

In consideration of the habitat requirements for the identified conservation significant species and the historical and ongoing anthropogenic disturbances (i.e. livestock grazing), it is considered unlikely for any flora species of conservation significance to occur within the subject site.

2.5.2 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 four 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, the Clay Pans of the Swan Coastal Plain ecological community and the Empodisma peatlands of southwestern Australia.

Based on the information provided from the fauna survey (SW Environmental 2025), none of the vegetation within the subject site appears to be representative of these TECs due to the absence of clay soils, and the absence or limited numbers of key indicator species such as Banksia and *Eucalyptus gomphocephala*.

2.5.3 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.

The subject site is not mapped within an ESA. The closest ESA is approximately 1.3 km to the west of the subject site.

2.6 Fauna

A search of the DBCA's Threatened Fauna database (Dandjoo) 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 Dandjoo Report identified 18 Threatened species, two Priority 2 species, four Priority 3 species, six Priority 4 species and one 'Other specially protected fauna' species (refer to **Table 2**), within a 10 km radius of the subject site. A search of the EPBC Act *Matters of National Environmental Significance* database identified one 'Critically Endangered' species, eight 'Endangered' species and nine 'Vulnerable' fauna species within a 10 km radius.

Table 2: 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
Anous tenuirostris melanops (Australian Lesser Noddy)	-	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Bertmainius opimus (Western Pygmy Trapdoor Spider)	P3	-	Possible but unlikely to rely on subject site for its persistence.
Bettongia penicillata ogilbyi (Wyolie)	T	-	Unlikely due to predation risks.
Botaurus dubius (Black-backed bittern)	P4	-	Unlikely to occur based on absence of suitable habitat.
Botaurus flavicollis australis (Black bittern)	P2	-	Unlikely to occur based on absence of suitable habitat.
Botaurus poiciloptilus (Australian Bittern)	-	Endangered	Unlikely to occur based on absence of suitable habitat.
Bothriembryon irvineanus (Land snail)	P2	-	Unlikely to occur based on absence of suitable habitat.
Calyptorhynchus banksii naso (Forest red-tailed black cockatoo)	T	Vulnerable	Likely to occur.
Cherax tenuimanus (Hairy Marron)	T	-	Unlikely to occur based on absence of suitable habitat.
Ctenotus ora (Coastal plains skink)	P3	-	Unlikely to occur based on absence of suitable habitat.
Dasyurus geoffroii (Western quoll)	T	Vulnerable	Unlikely due to predation risks.
Diomedea exulans (Snowy Albatross)	T	-	Unlikely to occur based on absence of suitable habitat.
Falco hypoleucos (Grey Falcon)	-	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Falco peregrinus (Peregrine falcon)	OS	-	Unlikely to occur based on absence of suitable habitat.
Falsistrellus mackenziei (Western false pipistrelle)	P4	-	Unlikely to occur based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Galaxiella nigrostriata (Black stripe minnow)	T	-	Unlikely to occur based on absence of suitable habitat.
Geotria australis (Pouched Lamprey)	P3	-	Unlikely to occur based on absence of suitable habitat.
Halobaena caerulea (Blue Petrel)	T	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Hydromys chrysogaster (Rakali)	P4	-	Unlikely to occur based on absence of suitable habitat.
Idiosoma sigillatum (Swan coastal plain backed trapdoor spider)	P3	-	Unlikely to occur based on absence of suitable habitat, clay soils.
Isoodon fusciventer (Quenda)	P4	-	Potential to occur in intact vegetation which is outside of the subject site.
Limosa lapponica menzbieri (Northern Siberian Bar- tailed)	-	Endangered	Unlikely to occur based on absence of suitable habitat.
Myrmecobius fasciatus (Numbat)	-	Endangered	Unlikely to occur based on absence of suitable habitat
Nannatherina balstoni (Balston's Pygmy Perch)	-	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Notamacropus irma (Western brush wallaby)	P4	-	Potential to occur as vagrant.
Numenius madagascariensis (Far Eastern curlew)	T	-	Unlikely to occur based on absence of suitable habitat
Oxyura australis (Blue- billed duck)	P4	-	Unlikely to occur based on absence of suitable habitat.
Pachyptila turtur subantarctica (Fairy Prion (southern))	-	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Phaethon rubricauda westralis (Red-tailed Tropicbird)	-	Endangered	Unlikely to occur based on absence of suitable habitat.
Phascogale tapoatafa wambenger (South Western brush-tailed phascogale)	T	-	Confirmed during survey.
Pseudocheirus occidentalis (Western Ringtail Possum)	T	Critically Endangered	Confirmed during survey.
Rostratula australis (Australian Painted-snipe)	-	Endangered	Unlikely to occur based on absence of suitable habitat.
Setonix brachyurus (Quokka)	T	Vulnerable	Unlikely to occur, outside of known habitat range.
Sternula nereis nereis (Australian Fairy Tern)	T	Vulnerable	Unlikely to occur based on absence of suitable habitat.
Thalassarche carteri (Indian Yellow-nosed Albatross)	T	-	Unlikely to occur based on absence of suitable habitat.
Thalassarche chrysostoma (Grey-headed albatross)	T	-	Unlikely to occur based on absence of suitable habitat.

Species	DBCA Status	EPBC Act Status	Likelihood of Occurrence
Thalassarche melanophris (Black-brow Albatross)	T	-	Unlikely to occur based on absence of suitable habitat.
Westralunio carteri (Carters Freshwater Mussel)	T	-	Unlikely to occur based on absence of suitable habitat.
Zanda baudinii (Baudins black cockatoo)	T	Endangered	Likely to occur.
Zanda latirostris (Carnaby's black cockatoo)	T	Endangered	Likely to occur.

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.

Of the abovementioned conservation significant species, based on preferred habitat types, five species have the potential to occur within the subject site.

A summary of the findings relating to the five species of conservation significance that have potential to occur in the subject site is provided below.

Pseudocheirus occidentalis (Western Ringtail Possum) (Critically Endangered)

The Western Ringtail Possum (WRP) is endemic to the south- west of Western Australia. It was formerly patchily distributed through the near-coastal southwest from approximately 120 km southeast of Geraldton to the southern edge of the Nullabor Plain and its range has now substantially contracted (How *et al.*, 1978, de Tores *et al*., 2005, Jones 2004). Extant populations now occur mostly on the coastal strip from Yalgorup (100km south of Perth) to Waychinicup National Park (just east of Albany), with isolated inland populations in the lower Collie River valley, Harvey River valley and at Perup (Manjimup) (de Tores *et al.*, 2005, Jones 2004, Jones 2007).

With the exception of the few isolated inland populations in Eucalypt forests, the WRP generally occurs in coastal Peppermint (*Agonis flexuosa*) woodlands, Peppermint/Tuart (*Eucalyptus gomphocephala*) woodlands, and Peppermint/Eucalypt woodlands associations, with the highest density populations occurring within the Busselton to Dunsborough coastal strip *(de Tores et al.*, 2005; Jones *et al.*, 2007).

A targeted fauna assessment was undertaken by SW environmental which included a desktop review, a diurnal survey and a nocturnal spotlighting survey. The field component of the fauna assessment was carried out on the 5th March 2025 (diurnal survey) and the 10th and 19th March 2025 (nocturnal survey) (refer to **Appendix C**).

The nocturnal survey identified a total of nine WRP within the extraction area. The subject site is likely to broadly align with the 'medium' quality habitat for the species as mapped by the DBCA.

Black Cockatoos

The Forest Red-tailed Black Cockatoo occurs in the south-west of Western Australia, approximately southwest of a line between Gingin and the Green Range (near Wellstead, east of Albany). The range of this sub-species is closely associated with the distribution of Marri (*Corymbia calophylla*); its favoured nesting and foraging trees species. This species typically breeds in tree hollows with a depth of 1 – 5 m primarily in Marri (*Corymbia calophylla*) and Jarrah *(Eucalyptus marginata*).

The Forest Red-tailed Black Cockatoo (FRTBC) predominately forages on seeds of marri and jarrah. It has also been recorded foraging on *Eucalyptus caesia, E. erythrocorys*, river red gum (*E. camaldulensis*), flooded gum (*E. grandis*), *Allocasuarina* cones, fruits of snottygobble (*Personia longifolia*) and mountain marri (*Corymbia haematoxylon*) (SEWPaC 2012).

Carnaby's Black Cockatoo occurs in the south-west of Western Australia, approximately south-west of a line between the Murchison River (near Kalbarri) and Cape Arid National Park (east of Esperance).

Carnaby's Black Cockatoo generally nest in hollows in live or dead trees of Salmon Gum (*E. salmonophloia*), Wandoo (*E. Wandoo*), Tuart, Jarrah, Flooded Gum (*E. rudis*), York Gum (*E. loxophleba supsp. loxophleba*), Powderbark (*E. accedens*), Karri (*E. diversicolor*) and Marri (SEWPaC 2012).

Carnaby's Black Cockatoo forages in native shrubland, kwongan heathland and woodlands dominated by proteaceous plant species such as Banksia spp., Hakea spp. and Grevillea spp. (SEWPaC 2012).

Baudin's Black Cockatoo occurs in the south-west of Western Australia, approximately south-west of a line between Morangup (near Bullsbrook, north of Perth) and Waychinicup National Park (east of Albany). This species generally breeds in the Karri, Marri and Wandoo forests in the southern parts of the species' range and move north to the Darling Range and Swan Coastal Plain during autumn and winter.

During the breeding season, Baudin's Black Cockatoo primarily forage in Eucalypt woodlands, particularly Marri. Outside the breeding season, the species may feed in fruit orchards (mostly pear and apple, but also persimmon) and tips of Pinus spp. (SEWPaC 2012).

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

- Marri - *Corymbia calophylla*;
- Peppermint - *Agonis flexuosa*; and
- Planted non-endemic eucalypts (various unidentified species).

The black cockatoo habitat assessment recorded 35 trees with suitable Diameter at Breast Height (DBH) within the extraction area. Of these, six contained hollows which were confirmed to be unsuitable for black cockatoo breeding (SW Environmental 2025).

The DBCA (2025) dataset of compiled breeding site locations for Baudin's black cockatoo show that one confirmed natural breeding hollow exists 2.6 km northwest of the subject site. No active breeding trees or evidence of night roosts were recorded within the subject site (SW Environmental 2025). Additionally, jarrah and marri trees are common within and surrounding the subject site providing potential black cockatoo foraging resources. FRTBC foraging evidence was observed widely across the subject site including chewing on marri, jarrah and wood pear residue (SW Environmental 2025). Whilst it is likely that the black cockatoos may forage within the subject site it is unlikely that the species will utilise the subject site for breeding or roosting (SW Environmental 2025).

Phascogale tapoatafa wambenger (South Western brush-tailed phascogale)

In Western Australia the Brush-tailed Phascogale is now known to occur in the south west between Perth and Albany. It occurs at low densities in the northern Jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DEC 2012). One brush tailed phascogales was observed within the subject site.

Notamacropus irma (Western brush wallaby)

The western brush wallaby's optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also recorded in some areas of mallee and heathland, and is uncommon in karri forest (DBCA, 2025). While the proposed development may result in the loss or modification of some habitat within the site, the species' mobility and the availability of suitable habitat in the surrounding landscape mean that individuals are likely to relocate to adjacent undisturbed areas. Consequently, the overall impact on the local population is not expected to be significant.

Isoodon fusciventer (Quenda)

Quenda inhabit dense scrubby, often swampy, vegetation with dense cover. The proposed extraction area is largely devoid of understorey and therefore does not provide preferential habitat for the species. Therefore, negligible impact is anticipated

2.7 Hydrology

2.7.1 Groundwater

The subject site is located within the Bunbury East and the Bunbury -Yarragadee subarea of the proclaimed Bunbury Groundwater Area.

Three groundwater monitoring bores and one windmill located in proximity to the extraction area (refer to **Figure 3**) have been monitored monthly for groundwater levels from August 2024 to June 2025 (refer to **Appendix D**). Data from this monitoring period indicates maximum groundwater levels were recorded at 3.7 m below ground level (BGL), 3.9 m BGL and 7.4 m BGL at the windmill, Bore No. 1 and Bore No. 2 respectively, in September 2024. Bore #3 which is 8 m BGL was found to be dry over the entire monitoring period.

DWER groundwater monitoring bore Bunbury Shallow (BY8A) is located approximately 1.3 km from the southwest corner of the subject site (see **Figure 3**). While no data is available in the peak period of 2024, over a ten year monitoring period groundwater data indicates the highest recorded peak groundwater level was 5.42 m AHD, observed in October 2016 and September 2017. The lowest peak level occurred in September 2023 at 4.18 m AHD, resulting in a range of 1.24 m between the maximum and minimum peak levels. Based on this historical variability, it is possible that groundwater levels during a year with a higher seasonal peak could be up to approximately 1.24 m higher than current observations. A review of annual rainfall statistics shows that the annual total rainfall was the lowest in 2023 and the highest in 2021 with 562 mm and 1019 mm, respectively. The annual rainfall for 2024 was between these two years with a total annual rainfall of 799 mm. To account for possible variation in groundwater levels, a safety factor of 1.24 m has been applied to all peak groundwater levels recorded when determining peak groundwater contours (refer to **Figure 4**).

2.7.2 Surface Water

The subject site is located in the Middle Preston subarea of the unproclaimed Preston surface water area, approximately 5 km to the south west of the *Rights in Water and Irrigation* (RiWI) *Act 1914* proclaimed Collie River Irrigation district. The subject site is not proclaimed under the *Country Areas Water Supply Act 1947* as a public drinking water source area. The closest public drinking water source area is the Bunbury Water Reserve located approximately 2 km to the west of the subject site.

No surface water features are present within the subject site.

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 3**).

Table 3. 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 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 4**.

Table 4. 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: • 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 are no wetlands mapped within the subject site. A Multiple Use (MU) wetland (UFI 949) surrounds the northern boundary of the subject site (refer to **Figure 3**). Six Resource Enhancement (RE) wetlands (UFI: 1337, 1338, 1093, 1247, 1442, 1265) are located within 1 km of the subject site. The closest RE wetland (UFI 1337) is located approximately 240 m to the south of the subject site, over Ducane Road. A buffer of at least 50 m will be maintained to all wetlands at all times.

2.8 Dieback

Given that native vegetation has largely been altered within the majority of 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. The closest DBCA land of interest (Register No. R1167) is located approximately 1.2 km to the southeast of the subject site. 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 2025). 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 Preston River (ID 19795) located approximately 1 km to the northwest of the excavation area.

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 in **Table 5** and shown in **Figure 5.**

Table 5: Residential dwellings within 1,000 m of the subject site.

Resident No.	Distance to subject site (m)
1	65 m
2	93 m
3	168 m
4	188 m
5	271 m
6	448 m
7	592 m
8	595 m
9	612 m
10	675 m
11	752 m
12	900 m
13	992 m

The closest residential dwelling to the subject site is located 65 m from the eastern boundary. Additionally, a residential estate comprising of 17 houses is located approximately 448 m to 877 m from the northeastern boundary of the subject site. An acoustic assessment has been undertaken and indicated that operations can achieve compliance with the *Environmental Protection (Noise) Regulations 1997*.

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 to the east and south east of the subject site are zoned 'Rural' under the LPS 8 and 'Rural' under the GBRS. Properties to the north, west and south west of the subject site are zoned 'Rural'. Properties that are located to the north east of the subject site over Queelup Road are zoned 'Rural Residential' under the LPS 8 and 'Rural' under the GBRS.

3.3.2 Shire of Capel Local Planning Scheme No. 8

The subject site is zoned 'Rural' under the Shire of Capel's LPS8. 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 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 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 is to demonstrate a negligible impact on the amenity of residential areas by way of vehicular traffic, noise, dust, blasting and vibration.
   - PC1.1.2 Development does not result in land degradation, or a landform that prejudices the productive end use of the site in accordance with the objectives of the zone..
2) Environmental
   - PC1.2.1 With advice from relevant state government departments, 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 Through Development of an adopted Rehabilitation Plan, the final landform shall not have a significant detrimental impact on visual amenity of the landscape when viewed from surrounding sites.

5) Transport

PC1.5 Development satisfactorily addresses the following issues:

PC1.5.1 P The proposed haulage route is not to have a detrimental impact on safety and amenity of residents, and local road users.

PC1.5.2 The application is accompanied by a Traffic Management Plan to demonstrate that haulage periods that conflict with school pick and drop off times are acceptable in their impact to the safety of the road network.

PC1.5.3 The applicant is to demonstrate that the haulage traffic will not have adverse impacts on the locality by virtue of noise, dust pollution, and safety, and that suitable arrangements be made by the developer to ensure the road is maintained to an appropriate standard.

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.

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 pit will cover an area of approximately 16.35 ha, with a current maximum elevation ranging from 24 m AHD to 33 m AHD. It will be excavated to a maximum depth ranging from 1.96 m to 6.26 m BGL commencing in the south and moving initially in a northerly direction in eight stages, each stage 2 ha in size (refer to **Figure 2**). The proposal does not include any crushing of material.

A 10 m buffer to the drip line of all trees outside of the extraction area and a 20 m buffer to the property boundary will be maintained, excluding the western boundary. Excavation will occur to the western property boundary to ensure topographic continuity with the adjoining property on which sand extraction has previously occurred.

It is estimated that the total maximum volume of sand to be removed will be approximately 500,000 m^3 with up to 50,000 m^3 excavated each year, depending on supply and demand.

The planned end use of the pit 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

4.1.1 Truck Movements

Access from the property will be via Ducane Rd and Queelup Rd, travelling north to Lillydale Road (refer to **Figure 6**). These roads are all local roads with no RAV network classification. The road intersection will be asphalt, with sealing up to the length of a vehicle. Signage will be erected 100 m either side of the road access advising of trucks entering.

It is proposed to extract a maximum of approximately 100,000 m^3 or bank cubic metres (BCM) per year. The average daily extraction rate:

= 50,000 BCM / 52 weeks / 5 working days per week
= 192 BCM per day.

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):

= 50,000 BCM x 70% / 32 weeks / 5 working days
= 220 BCM per day.

The average daily extraction rate (LCM):

= 220 BCM x 1.15
= 253 LCM

It is proposed to utilise 19.0 m semi-tippers which in accordance with the *City of Busselton Local Planning Policy No. 2.3 – Extractive Industries* has a capacity of approximately 18.9 LCM of sand. Accordingly, the average daily truck movements during the main season are as follows:

= 253 LCM/ 18.9 LCM truck capacity
= 13 truck movements per day x 2 (to and from)
= 26 trips per day x 2 (peak fluctuations)
= 52 trips per day maximum.

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 an excavator and loader 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 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 pit to provide visual and acoustic screening.
- Excavation will commence in the south of the pit and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of the pit, 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 pit will be deep ripped, covered with topsoil, and rehabilitated to a constructed soil.

4.1.3 Final Contours

The slope of the final contours of the pit will slope from approximately 22.3 m AHD in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 m AHD in the north (refer to **Figure 7**).

Slopes of the batters at the end of excavation will be retained at 1:5 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 1:5.

4.1.4 Rehabilitation

Progressive rehabilitation will be undertaken as far as practicable. Works will commence in the south of the subject site moving in a northerly direction. 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 7 am to 5 pm Monday to Friday. No work will be undertaken on Saturdays, Sundays or public holidays. The subject site will be worked by 2 - 3 persons, depending on market demand.

The proposed transport route is a designated bus route. To ensure that trucks are not operating on designated school bus routes at the same time as the bus, trucks will not operate on the route during

designated periods 15 minutes before and after the expected school bus times. Given that school bus times are regularly subject to change (due to school holidays and schedule changes based on pick up/drop off points), the applicant will be responsible for liaising with the school bus company prior to the commencement of school holidays and every school term. The pit operators will be careful to ensure compliance with these requirements.

4.3 Equipment

All operational equipment will work on the pit 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 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 **Table 6** below.

Table 6. 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.
Finlay Screen	Used for the screening of sand.
Front end wheel loader	Loaders will be used for the movement of sand and loading road trucks.
Radial Stacker	Used for removing sand material
Excavator	An excavator may be used for the removal of sand material.
Fuel storage	No fuel will be stored onsite.
Light vehicles	Access to and around the site.
Road truck	Removal of sand from site.

4.3.1 Water Usage

Water is only required for dust suppression within the pit and the access road. Water will be sourced offsite from a potable water standpipe, 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 Queelup Road and Ducane Road are obscured by roadside vegetation comprised of mature tree species. Trees will be planted along the eastern boundary of Queelup Road and along the corner of Ducane Road and Queelup Road to further obscure the subject site. Furthermore, all native vegetation on the eastern boundary of the extraction footprint will be retained to further assist in visual screening from the abovementioned road.

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 northly 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 or the surrounding lot. 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 E**. 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 pit and therefore, no impacts to groundwater levels are proposed.

Maximum excavation levels will range from approximately 1.96 m BGL in the north to 6.26 m BGL in the south at cell 1. As discussed within **Section 2.7.1** no interaction with groundwater is expected during

excavation works. Furthermore, a separation of at least 0.7 m, 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 cleared pastural paddocks and remnant native vegetation of varying density. Remnant native vegetation consists of predominantly jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) paddock trees over peppermint (*Agonis flexuosa*), Woody Pear (*Xylomelum occidentale*) and *Nuytsia floribunda* woodland over open shrubland (SW Environmental 2025).

The black cockatoo habitat assessment recorded 35 trees with suitable DBH within the extraction area. Of these, six contained hollows which were confirmed to be unsuitable for black cockatoos (SW Environmental 2025).

Additionally, jarrah and marri trees are common within and surrounding the subject site providing potential black cockatoo foraging resources. FRTBC foraging evidence was observed widely across the subject site including chewing on marri, jarrah and wood pear residue (SW Environmental 2025). Whilst it is likely that the black cockatoos may forage within the subject site it is unlikely that the species will utilise the subject site for breeding or roosting (SW Environmental 2025).

The nocturnal survey identified a total of nine WRP within the extraction area. Additionally, one brush tailed phascogale was observed within the subject site. The subject site is likely to broadly align with the 'medium' quality habitat for the species as mapped by the DBCA.

Based on the above, the proposal will require a referral under the Commonwealth EPBC Act and will be submitted to the DWER for a vegetation clearing permit. 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.

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 7.**

Table 7. 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.
	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 8. 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 7**.	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 indicating the operations can achieve compliance with the applicable regulatory criteria, between 7.00 a.m. and 7.00 p.m. Monday to Saturday at all noise sensitive receivers (Lloyd George 2025).

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 F**. 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 G**. 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 E**).

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.

Table 9. 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.

6.3 Landform Reconstruction and Contouring

Landform reconstruction and contouring will involve the following:

- The final landform will be formed to be approximately between 22.3 m AHD and 24.6 m AHD. This will ensure a separation of at least 0.7 m, between the final contours and the maximum groundwater elevation will be maintained.
- Batters will be retained at 1:5 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 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**.

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** Table 10. **10**. The timing for weed control is specified within **Table 11**.

Table 10. Weed control treatment.

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

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 11. 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

	Stockpile all surface materials in the general vicinity of its origin.	Surface material removal
Hygiene Measures	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 pit 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 objections are achieved.	

6.6 Rehabilitation

As previously discussed, it is proposed to return the extraction area to pasture.

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).

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.
    - 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;
- The area will have the slopes and soils constructed to allow for the future proposed land use.

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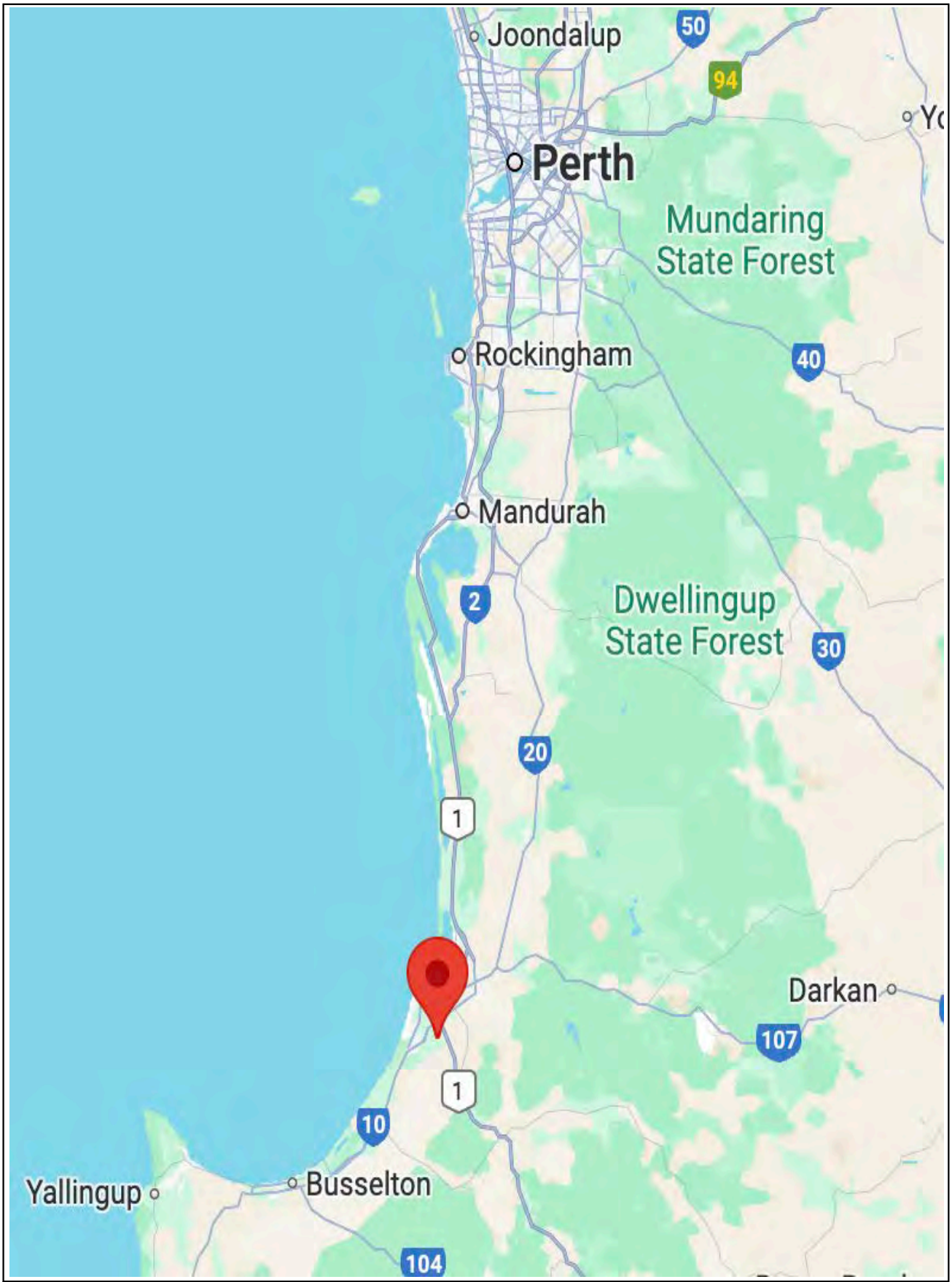
FIGURES



PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 1	A
DRAWING TITLE	Figure 1 – Site Locality	Designed NC	Checked	
		Drawn PN	Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	05/06/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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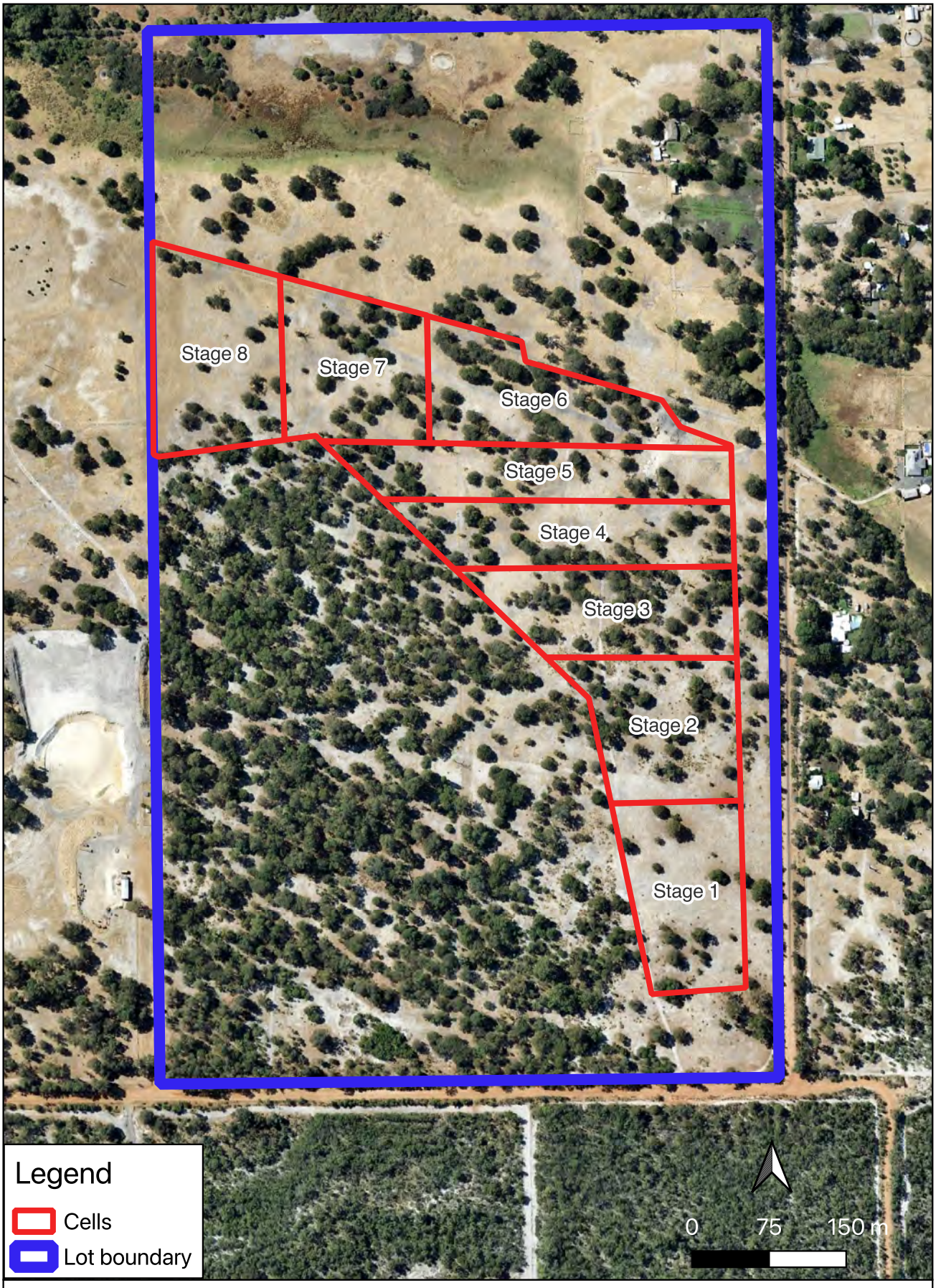

PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 2	B
DRAWING TITLE	Figure 2- Site Extent	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	23/09/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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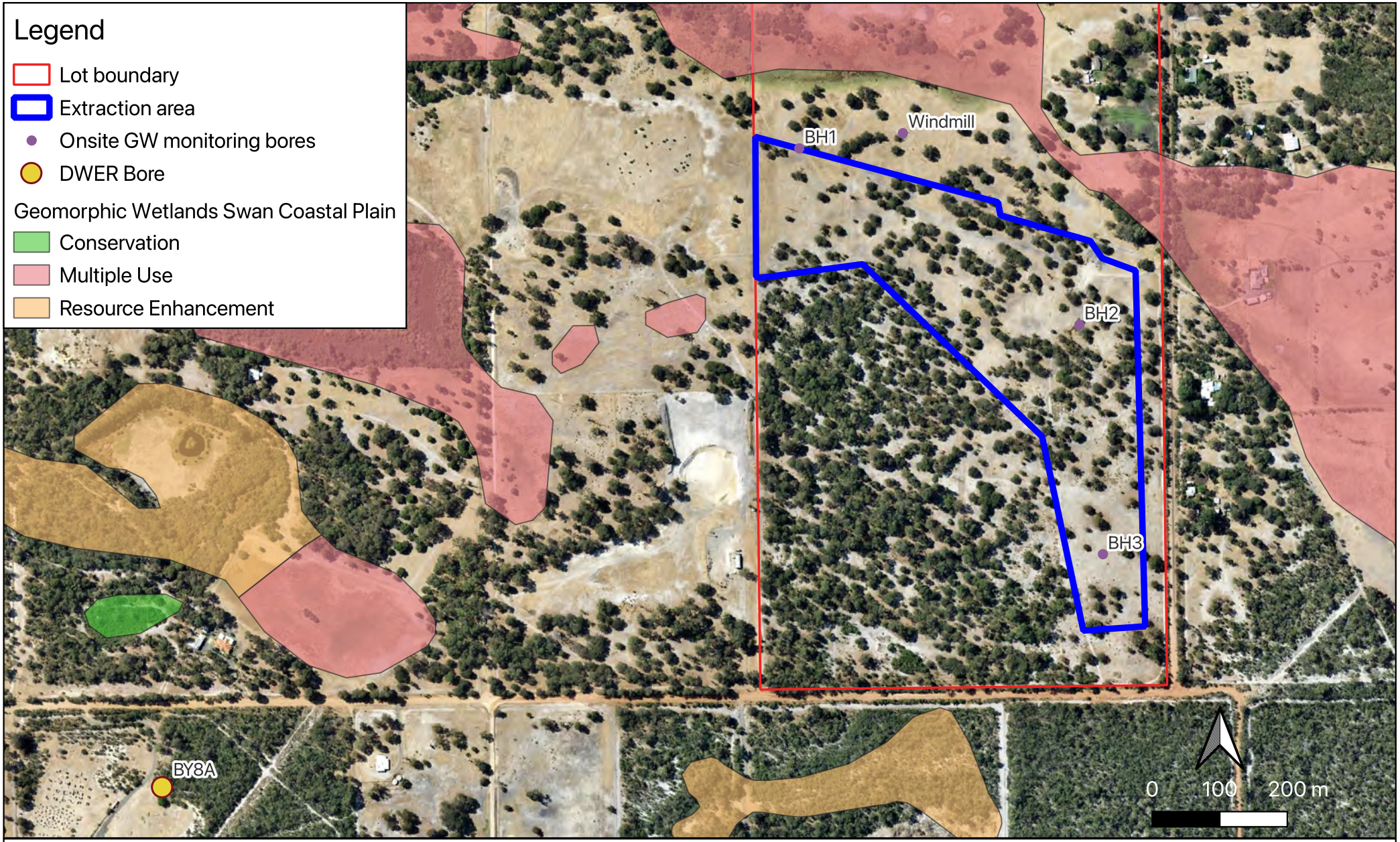

PROJECT	Lot 262 (220) Queelup Rd,North Boyanup
DRAWING TITLE	Figure 3 - Water Features
CLIENT	JW Cross Maintenance Pty Ltd

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Project Number	2538	Designed	PN
Drawing Number	Figure 3	Drawn	PN
Revision	A	Checked	
Date	23/09/2025	Approved	
Sheet 1 of 1		Local Authority	Shire of Capel

PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 4	A
DRAWING TITLE	Figure 4- Groundwater Contours	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	30/09/2025	
		Local Authority	Shire of Capel	
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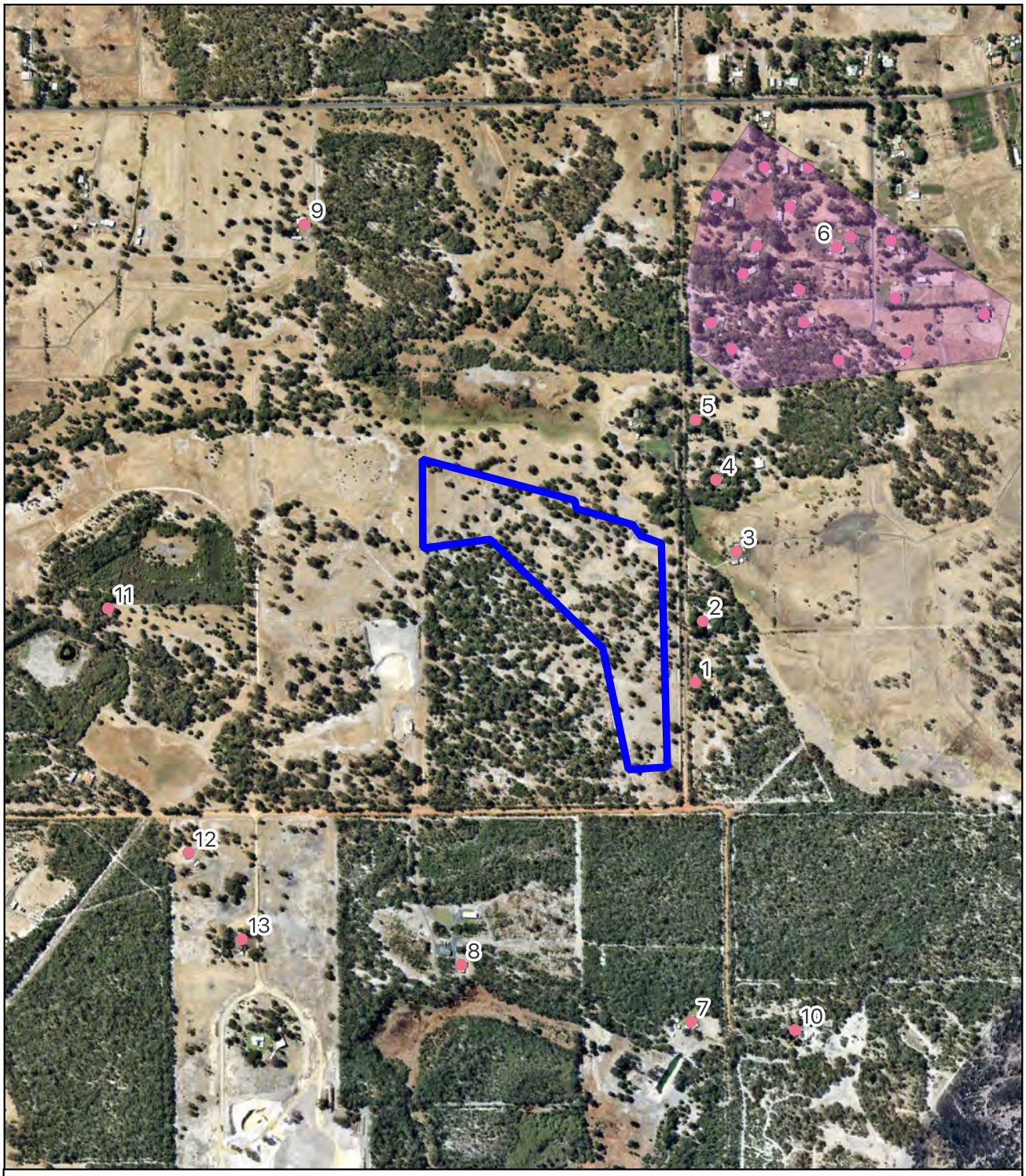

Legend

- Sensitive receptor housing estate
- Sensitive receptors
- Extraction area

0 250 500 m

PROJECT	Lot 262 (220) Queelup Rd,Boyanup
DRAWING TITLE	Figure 5 - Sensitive receptors
CLIENT	JW Cross Maintenance Pty Ltd

Project Number	Drawing Number	Revision
2538	Figure 5	A

Designed NC
Drawn PN
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Date 21/06/2025
Local Authority Shire of Capel
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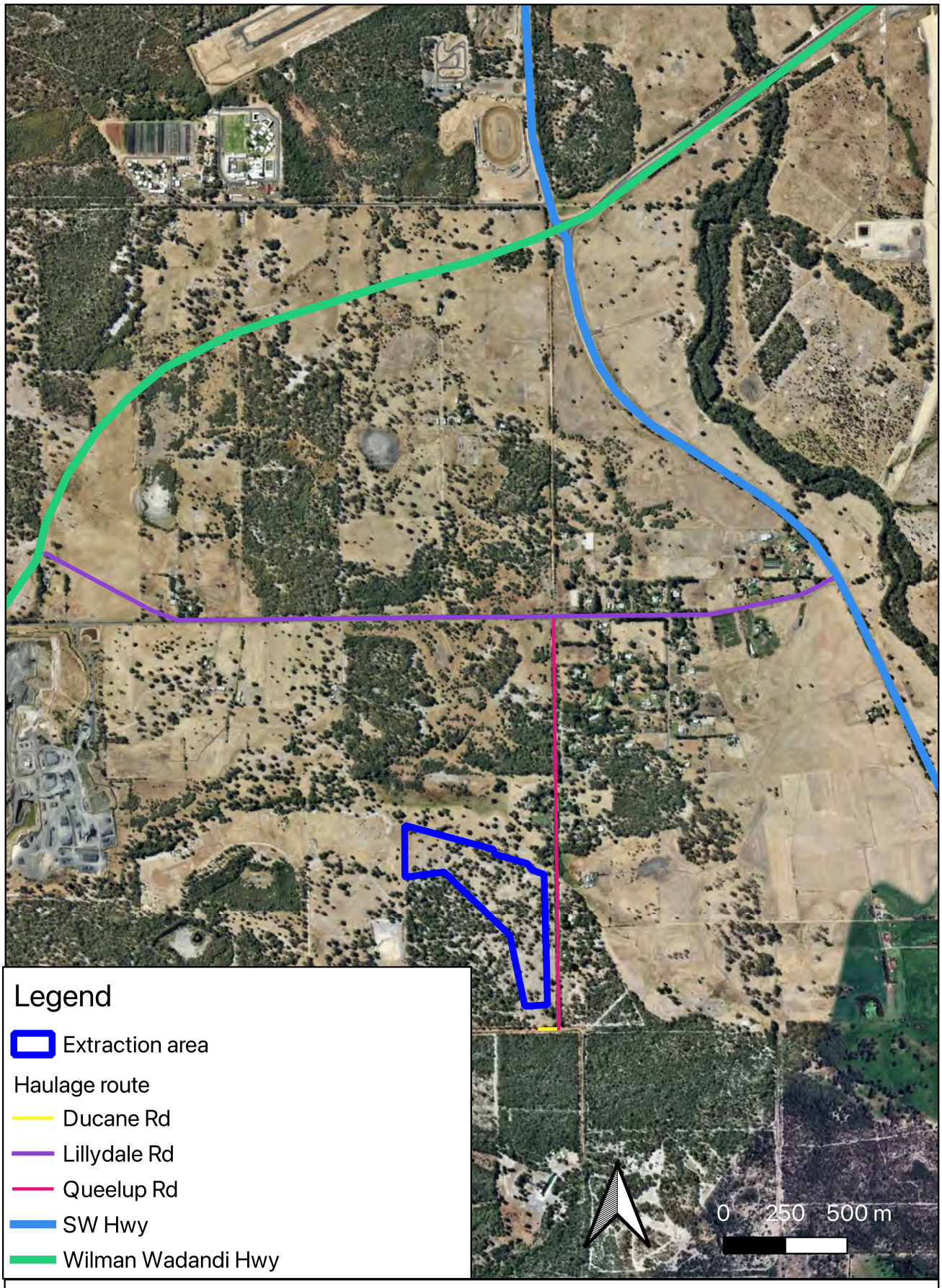

PROJECT	Lot 262 (220) Queelup Rd,Boyanup	Project Number	Drawing Number	Revision
DRAWING TITLE	Figure 6 - Haulage Route	2538	Figure 6	A
CLIENT	JW Cross Maintenance Pty Ltd	Designed NC Drawn PN	Checked Approved	
		Date Local Authority Sheet 1 of 1	30/09/2025 Shire of Capel	

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PROJECT	Lot 262 (220) Queelup Rd,Boyanup		Project Number	Drawing Number	Revision
DRAWING TITLE	Figure 7 - Final contours		2538	Figure 7	A
CLIENT	JW Cross Maintenance Pty Ltd		Designed NC Drawn PN	Checked Approved	
			Date Local Authority Sheet 1 of 1	30/09/2025 Shire of Capel	

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APPENDIX A – CERTIFICATE OF TITLE

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FURTHER TO THE SETTLEMENT OF YOUR PROPERTY
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CT 1456 0358 F

VOL. 1456 FOL. 358

Application B287909 WESTERN AUSTRALIA

Volume 203 Folio 14A

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

Page 1 (of 2 pages) VOL. 1456 FOL. 358

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

DATED 8th February, 1977

REGISTRAR OF TITLES

OFFICE OF TITLES WESTERN AUSTRALIA

ESTATE AND LAND REFERRED TO

Estate in fee simple in portion of Boyanup Agricultural Area Lot 262, delineated and coloured green on the map in the Third Schedule hereto, limited however to the natural surface and therefrom to a depth of 60.96 metres.

FIRST SCHEDULE (continued overleaf)

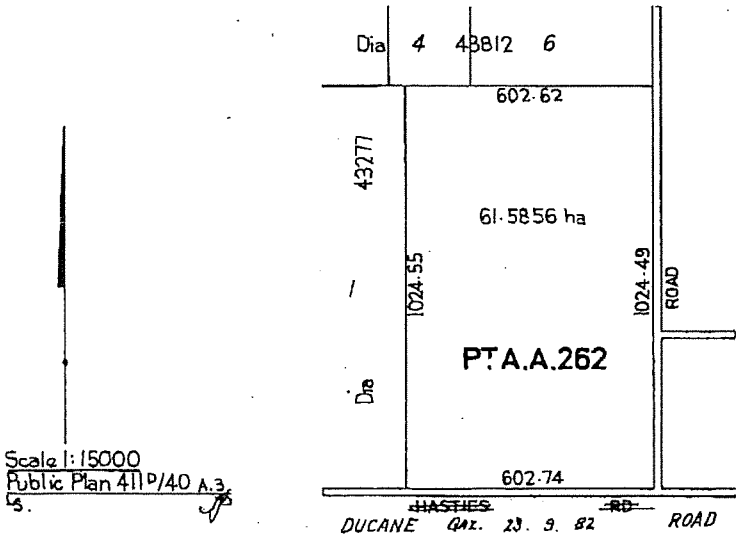
~~Frederick Ernest Roberts, Agent and Dorothy Zoe Roberts, Married Woman, both of 14 Spencer Street, Bunbury, as tenants in common in equal shares~~

SECOND SCHEDULE (continued overleaf)

NIL

REGISTRAR OF TITLES

THIRD SCHEDULE



PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT. ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

53063/12/75–20M–S/2860

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FIRST SCHEDULE (continued)

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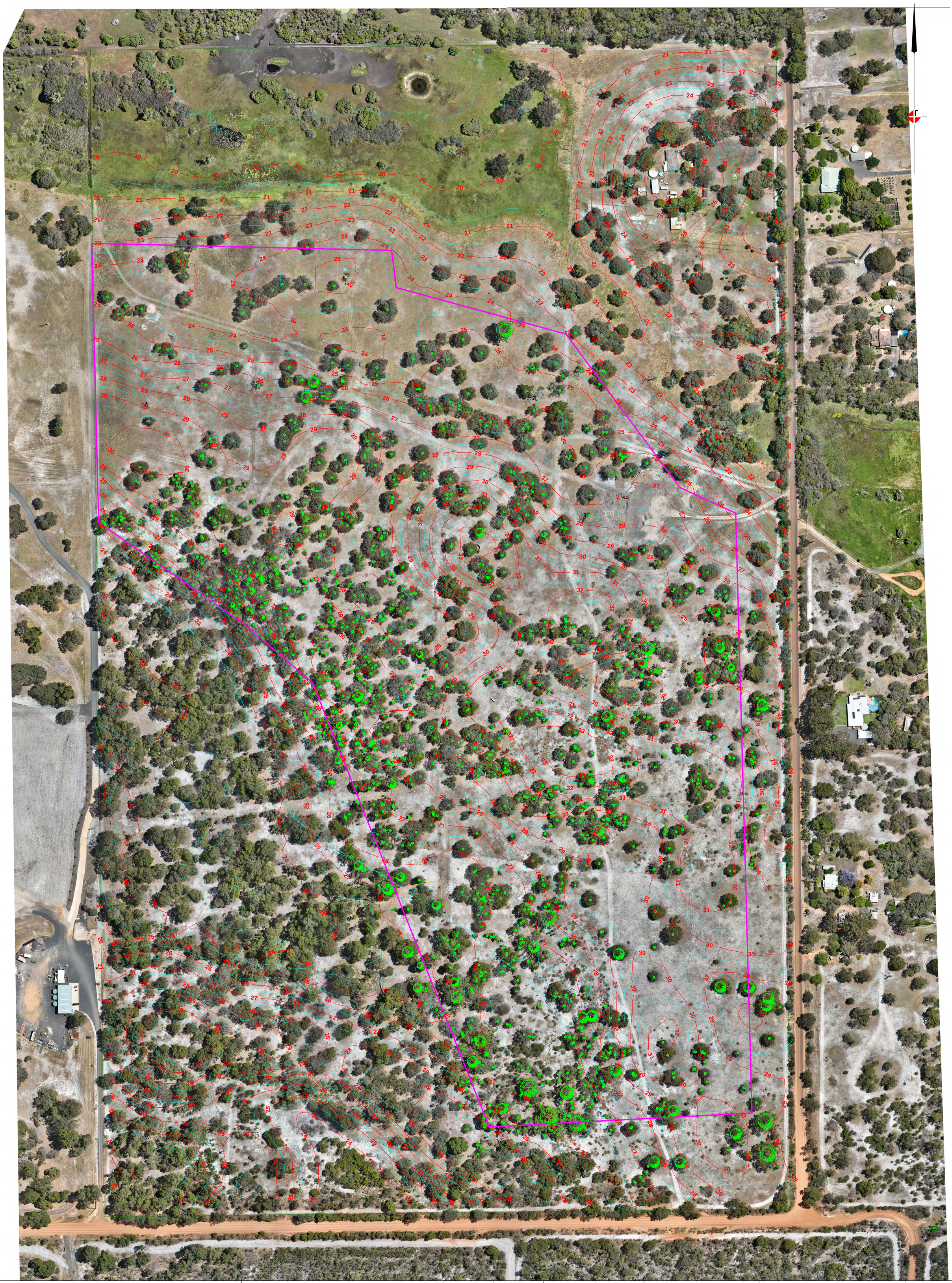
REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	TIME	SEAL	INITIALS
Sendel Pty. Ltd of 17 Haig Crescent, Bunbury.	Transfer	B818472	16.11.79	11.37		
Geoffrey Thomas Cross and Jill Elizabeth Cross both of Location 2663 Crooked Brook Road, Dardanup, as joint tenants.	Transfer	H933023	20.11.01	16.03		

SECOND SCHEDULE (continued)

NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT. ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	TIME	SEAL	INITIALS	CANCELLATION	NUMBER	REGISTERED OR LODGED	SEAL	INITIALS
Mortgage	H933024	to Sendel Pty. Ltd.	20.11.01	16.03							

APPENDIX B – SITE SURVEY



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CLIENT:	J.W CROSS	Date: 09/12/2024	Drawn: PS	Surveyor: RRe	CHKd: PS
PROJECT:	LOT 262 (#220) QUEELUP ROAD NORTH BOYANUP	File: 23017 MGA94 DATA - Drawing001			
		Scale (@A1)	1:1500		
TITLE:	FEATURE SURVEY				
DATUM	HOR: M.G.A. 94 Z50	VERT: A.H.D.			
A.H.D. HEIGHTS DERIVED FROM :	SSM HASTIES 21				

ISO 9001 : ISO14001 : ISO 45001 Global-Mark.com.au®

REVISION SCHEDULE — Sheet 1 of 1

No.	Date	Description

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APPENDIX C – FAUNA SURVEY

Targeted Fauna Survey: Black Cockatoo and Western Ringtail Possum

Lot 220 Queelup Road, North Boyanup

APRIL 2025

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CONTENTS

Figures

Tables

Abbreviations and acronyms

Common terms	
CBP	Common brushtail possum (*Trichosurus vulpecula*)
CE	Critically Endangered species
DBCA	WA Department of Biodiversity, Conservation and Attractions
DCCEEW	Federal Department of Climate Change, Energy, the Environment and Water
DWER	WA Department of Water and Environmental Regulation
EN	Endangered species
FRTBC	Forest Red-tailed Black Cockatoo (*Calyptorynchus banksi* subsp. *naso*)
Survey Area	28.45 ha area at Lot 220 Queelup Road, North Boyanup
Desktop Survey Area	10 km buffer around Survey Area (general searches), 12 km buffer around Survey Area (black cockatoo records)
Suitable DBH tree	Tree of a suitable species and size Diameter at Breast Height (DBH) to develop large hollows: ≥30 cm for most Wheatbelt species (e.g. Wandoo, Salmon Gum) ≥50 cm most trees in the Southwest (e.g. Jarrah, Marri, Tuart) ≥75 cm for fast growing species (e.g. Karri or Eastern States Eucalypts)
VU	Vulnerable species
WA	Western Australia
WRP	Western ringtail possum (*Pseudocheirus occidentalis*)
Legislation	
BC Act	WA *Biodiversity Conservation Act 2016*
EP Act	WA *Environmental Protection Act 1986*
EPBC Act	Federal *Environment Protection and Biodiversity Conservation Act 1999*
Measurements	
DBH	Diameter at Breast Height in centimetres
cm	Centimetre
ha	Hectare
km	Kilometre
m	Metre

Executive Summary

Accendo Australia have been engaged by JW Cross Maintenance Pty Ltd to assist in in the environmental approvals process regarding a 28.45 ha area (the Survey Area) at Lot 220 Queelup Road, North Boyanup (Shire of Capel). Targeted Black Cockatoo and Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*) surveys were required to identify black cockatoo and WRP habitat values within the Survey Area.

Field work consisted of one diurnal survey on the 3rd of March 2025 and two non-consecutive nocturnal surveys undertaken on the 10th and 19th of March 2025. Surveys were undertaken to validate the desktop review and ground truth fauna habitat.

All three black cockatoo[1] species occur locally. One confirmed white-tailed black cockatoo (WTBC) natural breeding hollow occurs approximately 2.6 km northwest of the Survey Area, along with one potential natural breeding hollow located ~4.6 km southwest of the Survey Area (DBCA, 2025). One WTBC black cockatoo roost has been recorded within 1 km of the Survey Area, CAPNORR001, last surveyed in 2016 (DBCA, 2025). Recent forest red-tailed black cockatoo black cockatoo (*Calyptorhynchus banksii subsp. naso*) (FRTBC) feeding residue was observed widely across the Survey Area.

Two key fauna habitat types were identified within the Survey Area, consisting of predominantly high-quality foraging habitat for all three black cockatoo species:

- Predominately Peppermint (*Agonis flexuosa*) woodland and paddock trees (7.81 ha) – *Agonis flexuosa*, *Xylomelum occidentale*, *Banksia* spp., *Nuytsisa floribunda* over *Kunzea glabrescens* shrubs over *Macrozamia* sp. cycads and *Xanthorrhoea* sp. grass-trees over *Stirlingia latifolia* over various Restionaceae spp. and *Lomandra* sp. Clumps of *Euclayptus marginata*, and *Corymbia calophylla* also occur, (<50 cm DBH) dispersed throughout the habitat type.
- Jarrah Marri paddock trees (1.03 ha) – *Eucalyptus marginata* and occasional *Corymbia calophylla* isolated or clumps of paddock trees (>50 cm DBH) over open clearings with clumps of low shrubs over various weedy herbs and grasses.

Ninety suitable DBH trees both with and without hollows, were identified within the Survey Area (66 Jarrah, 11 Marri and 13 in dead trees). Ten hollow-bearing trees were observed, including four *Trees with suitable DBH with unsuitable hollows*, and two *Trees with potentially suitable size hollows with no signs of use*. Black cockatoos are unlikely to breed within the Survey Area due to the absence of suitable breeding hollows. No evidence of night roosts were observed.

The Survey Area contained 8.84 ha of High-quality foraging habitat for Carnaby's cockatoo and 1.03 ha of High-quality habitat for FRTBC. Additionally, the site contained 8.84 ha of Moderate quality foraging

[1] Black cockatoos collectively refer to

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii subsp. naso*) (Vulnerable)
- Baudin's White-tailed Black Cockatoo (*Zanda baudinii*) (Endangered)
- Carnaby's White-tailed Black Cockatoo (*Zanda latirostris*) (Endangered)

habitat for Baudin's cockatoo, and 7.81 of Moderate quality habitat for FRTBC. Recent FRTBC feeding residue was found widely across the Survey Area.

The Survey Area is within the WRP Swan Coastal Plain Management Zone in the Recovery Plan (DPaW, 2017). WRP are common locally. The Survey Area broadly aligns with Critical habitat as outlined in the Western Ringtail Possum Recovery Plan (DPaW, 2017). Nocturnal surveys identified a total of 12 WRP, with six individuals observed during each night of survey. Additionally, four Brush-tailed Phascogale (*Phascogale tapoatafa*) (Specially Protected) and 16 Common Brushtail Possum (CBP) observations were recorded. Three dreys were identified within the Survey Area.

The following recommendations are made

- Clearing should be minimised, where possible.
- Clearing schedules should be planned to avoid spring breeding peaks, if possible.
- An authorised fauna spotter should be present during clearing.
- Weed management and infill planting could be considered in degraded areas in adjacent vegetation that may be retained.
- Once the final footprint is known then impacts should be assessed against the relevant DCCEEW Significant Impact Guidelines as the following aspects may trigger the need for the project to be referred to the Department under the EPBC Act.

1 Introduction

1.1 Project Background

Accendo Australia have been engaged by JW Cross Maintenance Pty Ltd to assist in the environmental approvals process regarding a 28.45 ha area at Lot 220 Queelup Road, North Boyanup (herein referred to as the 'Survey Area'). The Survey Area (Figure 1) falls within the Local Government Authority (LGA) of the Shire of Capel, located approximately 1.82 km southeast of the intersection between Lilydale Road and the Wilman Wadandi Highway. Targeted black cockatoo and Western ringtail possum (WRP) (*Pseudocheirus occidentalis*) surveys were required to identify black cockatoo and WRP habitat values within the Survey Area.

1.2 Scope

SW Environmental was engaged to undertake a targeted black cockatoo and WRP survey within the circa 28.45 ha Survey Area (Figure 2). The surveys were to include desktop review and fieldwork components in line with relevant guidelines.

1.3 Regulatory Context

Key environmental legislation relevant to the survey is outlined in Table 1-1.

Table 1-1 Environmental legislation that may be relevant to the Project

Legislation	Responsible Government Department	Aspect
Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Matters of National Environmental Significance including threatened fauna and environmental offsets.
Biodiversity Conservation Act 2016 (BC Act)	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Threatened species habitats, threatening processes, environmental pests and weeds.
Environmental Protection Act 1986 (EP Act)	Environmental Protection Authority or Department of Water and Environmental Regulation (DWER)	Environmental impact assessment and management and offsets.

Fauna in WA may be afforded protection under the WA BC Act and or federal EPBC Act. All three black cockatoo species and WRP targeted in this survey are listed under the BC and EPBC Acts as:

- CE: Critically Endangered species (WRP)
- EN: Endangered species (Baudin's cockatoo and Carnaby's cockatoo)

- VU: Vulnerable species (FRTBC)

1.3.1 Guidelines

Black cockatoo habitat is typically assessed by considering breeding, roosting and foraging habitat. The black cockatoo and WRP survey methodologies were developed with consideration of:

- Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, Department of the Environment, Water, Heritage and the Arts (2009).
- Commonwealth *Referral guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-cockatoo (Calyptorhynchus banksii naso)* Department of Agriculture, Water and the Environment (2022).
- Commonwealth *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), Zanda latirostris, Baudin's cockatoo (vulnerable), Zanda baudinii, and Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso* (SEWPaC, 2012)
- Department of Parks and Wildlife (2013). Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia.
- Department of Environment and Conservation (2008) Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan
- Department of Parks and Wildlife (2017). Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA.
- Environmental Protection Authority (2002). Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3.
- Environmental Protection Authority (2020). Technical Guidance – Terrestrial Guidance for Fauna Surveys for Environmental Impact Assessment. Perth, Western Australia.

1.3.2 EPBC Act considerations

The Commonwealth of Australia (DAWE, 2022) guideline applies to the three black cockatoo species listed as threatened species under the EPBC Act. The guideline provides guidance on what actions are likely or unlikely to require referral to the Minister for the Environment regarding significant impact on black cockatoos (SEWPaC, 2012):

- Currently, the overall population trend for all three black cockatoo species is declining and is expected to continue to decline.
- The loss of breeding habitat is likely to require a referral.
- The loss of one or more known or suitable nesting trees is likely to require a referral.

- The loss of a known night roosting site is likely to require a referral.
- The loss of equal to or greater than one ha of high-quality foraging habitat is likely to require a referral (as determined using the foraging quality scoring tool in (Table 2-2, Section 2.2.3).
- The loss of one or more hectares of predominantly exotic habitat (e.g. pines) known to be utilised by black cockatoos is likely to require a referral.
- The loss of under 10 ha of low-quality foraging habitat is unlikely to require a referral (as determined using the foraging quality scoring tool in Section 2.2.3).
- Light pruning or trimming of a night roosting site is unlikely to require a referral.

Once the final impact area (proposed action) is known, the proposal should be assessed against the DAWE (2022) Foraging quality scoring tool (template presented in Appendix B of this report). The scoring tool includes consideration of the three components used in the EPBC Act Offsets Assessment Guide (SEWPaC, 2012) in the calculation of habitat quality (site condition, site context and species stocking rate) by considering contextual factors relating to habitat quality to give a final habitat quality score.

Proposed impacts to WRP and their habitat should be assessed against the Commonwealth Matters of National Environmental Significance – *Significant impact guidelines 1.1* (DEWHA, 2009).

2 Methods

2.1 Desktop Review

A desktop review of breeding, foraging habitat and roosting requirements for all three black cockatoo species within 12 km of the Survey Area was completed prior to field work. It included a review of:

- relevant literature such as recovery plans, journal articles, survey guidelines,
- general consultation with a black cockatoo expert (Tony Kirkby),
- interrogating spatial datasets, such as:
    - Atlas of Living Australia (ALA, 2025),
    - Birdata (BirdLife Australia, 2025),
    - Dandjoo (DBCA, 2024a)
    - Protected Matters Database (DCCEEW, 2024), and
    - Department of Biodiversity, Conservation and Attraction's Threatened, Specially Protected and Priority Fauna Database and black cockatoo breeding and roosting records (DBCA, 2024b).

2.2 Field Survey

2.2.1 Survey Area

The 28.45 ha Survey Area is located at Lot 220 Queelup Road, North Boyanup, approximately 1.82 km southeast of the intersection between Lilydale Road and the Wilman Wadandi Highway. The Survey Area consists of cleared pastural paddock area and remnant native vegetation of varying density. Remnant native vegetation includes predominantly Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) paddock trees over Peppermint (*Agonis flexuosa*), Woody Pear (*Xylomelum occidentale*) and *Nuytsia floribunda* woodland over open shrubland. The Desktop Study Area (DSA) utilised for desktop database searches consisted of a 10-12 km buffer around the Survey Area boundary (Figure 1, Appendix A).

2.2.2 Site Reconnaissance

Field work consisted of a diurnal survey on the 5th of March, and nocturnal spotlighting surveys conducted on the 10th and 19th of March 2025. Field personnel engaged in undertaking surveys included Shane Priddle (Principal Ecologist), Georgia Johnsen (Ecologist), Angela Filardi (Ecologist) and Kelly Paterson (Ecologist). Surveys were undertaken to validate the desktop review and ground truth fauna habitat. Evidence of target fauna, e.g. feed residue, scat, breeding evidence, and sightings were noted. Survey methods for black cockatoos and WRP are described below.

2.2.3 Black Cockatoo Survey Methodology

Black cockatoo surveys (habitat assessment and tree surveys) were conducted during the diurnal survey. The field survey methodology was based on the Commonwealth referral guidelines for black cockatoos (DAWE, 2022; SEWPaC, 2012) and black cockatoo species profiles presented in the Desktop Review (Section 3). The profiles are based on literature review and previous work and consultation with Tony Kirby, a recognised black cockatoo expert. Black cockatoo habitat surveys included an assessment of suitable DBH trees, tree hollow assessment, foraging habitat assessment, and roosting habitat.

Twelve km is referenced as a nominal distance for site context and local vegetation and habitat values and is considered the maximum range that black cockatoos travel from a nesting site to forage (DAWE, 2022).

Suitable DBH Tree and Hollow Survey

Black cockatoos' nest in hollows formed in large, native eucalypt trees, assessed as potential habitat or "Suitable DBH trees". Suitable DBH tree refers to a suitable Diameter at Breast Height measurement. In the Southwest, black cockatoos normally breed in *Corymbia calophylla* (Marri), *Eucalyptus gomphocephala* (Tuart) or Karri (*Eucalyptus diversicolor*). Sometimes *Eucalyptus marginata* (Jarrah), *Eucalyptus rudis* (Flooded gum) or other native trees are used.

Notes on tree records: Trees with a suitable DBH include those with a measurement ≥ 50 cm for most trees in the Southwest, ≥ 30 cm DBH for most Wheatbelt species e.g. *Eucalyptus wandoo* (Wandoo) and *Eucalyptus salmonophloia* (Salmon gum), and ≥75 cm for fast growing trees, such as eastern states eucalypts or Karri (*Eucalyptus diversicolor*).

Mallee form or multi-stemmed trees typically have the largest stem measured. If they are multi-stemmed around head height with under sized DBH on the main trunk, they are not recorded. Planted eastern states eucalypts such as blue gums, e.g. *Eucalyptus saligna* or *Eucalyptus globulus,* are unlikely to develop hollows unless they are at an advanced age (S. Priddle pers obs.). As such, they are not recorded unless they were visibly senescing or large hollows are observed. Trees laying over or considered to have no potential to develop hollows (burnt or close to falling) are not recorded.

Trees were mapped by GPS (~3 m accuracy), with notes made on tree species and DBH size class. A ground-based assessment of each tree was made using binoculars. The black cockatoo breeding suitability of a hollow was assessed based on an assessment of attributes such as hollow angle, access, entry (aperture) size, estimate of chamber size, and use by other animals. European honeybee (*Apis mellifera*) hives may render a hollow unsuitable for the short term, so bees were noted. Hollows that were potentially suitable or likely to provide breeding habitat were further assessed by drone or pole camera. Records *confirmed* or *not confirmed* indicate whether pole cam or drone inspection was conducted. Pole camera and/or use of drones was conducted in line with animal ethics and license requirements.

The number of hollows (limited to the most suitable hollows), aperture size, angle, height, breeding suitability, evidence of use was recorded. Assessment criteria are provided in Table 2-1.

Table 2-1 Suitable DBH tree and hollow classes and descriptions

Class	Description
Tree with suitable DBH without hollows	Suitable DBH tree (described above) that do not have hollows or hollows are too small for black cockatoo entry (<10 cm aperture).
Tree with suitable DBH with unsuitable hollow	Suitable DBH tree with a hollow with multiple attributes that would make the hollow unlikely to be suitable for breeding such as unsuitable entry aperture, internal dimensions, height or angle. Unlikely to be used by black cockatoos in current form.
Tree with potentially suitable size hollow with no signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as the marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has no evidence of use (chew marks, scarring, eggs, woodchips, etc). Possible but unlikely to be used by black cockatoos in current form.
Tree with suitable size hollow with no signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has no evidence of use (chew marks, scarring, eggs, woodchips) and whilst not currently used could be used in future.
Tree with potentially suitable size hollow with signs of use	Suitable DBH tree that may have a suitable hollow but with a single attribute that might reduce the suitability of the hollow for breeding, such as marginal entry aperture size, coned out internal dimensions, low height or oblique angle. The hollow has evidence of use (chew marks, scarring, eggs, woodchips). The evidence may be caused by other species, but black cockatoo use could not be ruled out without further survey.
Tree with suitable size hollow with signs of use	Suitable DBH tree with a hollow with suitable attributes for breeding (suitable entry size, internal dimensions, height and angle). The hollow has evidence of use (chew marks, scarring, eggs, woodchips) consistent with black cockatoo use, previous or current. The evidence may be caused by other species, but use of the hollow by black cockatoo is considered likely.
Known nesting tree	Suitable DBH tree with a known nesting hollow (cockatoos observed using the hollow and assumed to be breeding) or previously recorded as a breeding tree.

Foraging Habitat Assessment

The quality of potential black cockatoo foraging habitat was described based on structural vegetation mapping, with presence or absence of key feed species. Key feed species are defined in the species' profiles in Section 3 and from the plant list classified as primary or secondary foraging plants as assessed in Appendix C. Foraging habitat scores should be used as a high-level guide and in consideration of site context, timing and other factors. For example,

- lower quality foraging habitat may be important during breeding periods if it is located near breeding habitat (the closer the foraging resource the more important it may be),
- certain feed species may may be used in some regions but not in others due to a preference for other plants that may be available – the same feed species in the Jarrah Forest may not be used as heavily on the Swan Coastal Plain,
- as primary feed plants may flower or fruit at certain times, secondary plants may become as important as the primary plants when the primary plants resources are not available.

A high resolution orthophoto (3 cm pixels) and vegetation mapping was ground-truthed and used as a basis for the black cockatoo foraging habitat quality. Feed residue was noted if observed. Foraging categories were assigned to the fauna habitats in line with Table 2-2 for each black cockatoo species.

Table 2-2 Foraging habitat category and description

Category	Description
No foraging habitat	Cleared areas, dead trees, or plant species that are not known to be frequently fed on.
Low quality foraging habitat	Low quality foraging habitat may include one or more of the following • primary feed species that are isolated or disease affected, • some secondary foraging habitat such as trees that are not frequently fed on or are not considered a sustaining resource, • no evidence of foraging, • vegetation in a Completely Degraded or Degraded condition or relatively small areas relative to other higher quality surrounding habitat. Examples include dieback (e.g. *Phytophthora* spp.) affected Jarrah or *Banksia* or severe canker (*Quambalaria coyrecup*) affected Marri or very sparse primary or secondary feed species.
Moderate quality foraging habitat	Moderate quality foraging habitat may include one or more of the following • primary feed species (e.g., *Hakea*, Jarrah, Marri or pine trees) present but patchy or as paddock trees, • habitat dominated by a number of secondary feed species - vegetation communities with very few primary feed species present, • no evidence of recent foraging or some evidence in small amounts, • not near (within 6 km) breeding hollows (known or likely), • native vegetation where few primary or secondary feed species are present in Degraded or Good condition (EPA, 2016a).
High quality foraging habitat	High quality foraging habitat may include one or more of the following depending on the site context and surrounding habitat • primary feed species (e.g. *Hakea*, Jarrah, Marri or pine trees) dominant as paddock trees, patches, or components of a larger patch, • within 6 km breeding hollows (known or likely), • evidence of recent foraging, • native vegetation in Good or better condition (EPA, 2016a).

Roosting Habitat Survey

Roosting cockatoos would have been observed during the diurnal (secondary evidence) and nocturnal surveys (direct observations). Direct and indirect evidence of black cockatoo roosting within trees on site was noted if observed. Secondary evidence was also noted, such as the presence of moulted or preened feathers or down, clipped branches and whitewash.

2.2.4 Western Ringtail Possum Survey Methodology

WRP targeted surveys included diurnal and nocturnal surveys. The diurnal survey on 5th of March 2025 included general habitat assessment and WRP scat searches broadly across the survey area at the base of trees, on fallen timber and bare ground. The presence or absence of dreys and hollows was noted. Photos were taken within all habitat types.

Nocturnal spotlight surveys, conducted on the 10th and 19th of March 2025, aimed to survey the distribution and abundance of WRP within the Survey Area (survey effort shown in (Figure 6, Appendix A). Animals just outside of the Survey Area were also recorded. Surveys were conducted by two experienced surveyors by foot using 1000 lumen LED head torches, over the entire Survey. Transects were established following Eastings as a heading, utilising transect spacing of ~30 m. Weather

conditions were conducive for spotlighting. Common brushtail possum (CBP) (*Trichosurus vulpecula*) and South-western brush-tailed phascogale (*Phascogale tapoatafa)* (Specially Protected) were also recorded.

2.2.5 Animal Ethics

The survey conformed to Section 4 of the *Australian code of practice for the care and use of animals for scientific purposes* (National Health and Medical Research Council 2004). No animals were captured or collected during the survey. Surveys were carried out under Scientific Use License *Animal Welfare Act 2002* Licence to use animals for scientific purposes No: U285/ 2022-2024 and Wildlife Animal Ethics Committee Permit: WAEC 22-08-88. No nesting black cockatoos were disturbed during the survey.

2.3 Limitations

In accordance with *Technical Guidance* (EPA, 2020) potential survey limitations are identified below.

Table 2-3 Limitations of survey adequacy and accuracy

Aspect	Constraint	Comment
Competency / experience	No	Shane Priddle (Ba Science; Certified Environmental Practitioner No.310) led and/or oversaw the surveys. Shane has nearly 25 years' experience surveying black cockatoo and WRP throughout NSW and WA. Other field personnel hold relevant qualifications and experience to conduct fauna surveys
Scope	No	The targeted fauna survey scope is adequate to inform planning and assessment in relation to black cockatoos and WRP site values.
Adequacy of the survey intensity and proportion of survey achieved	No	The survey effort applied was adequate to identify black cockatoo and WRP habitat values. A precautionary approach has been adopted.
The proportion of the task achieved and further work	No	The surveys were completed adequately, to a sufficient level with respect to the scope.
Timing/weather/season	No	The surveys were completed in suitable weather conditions.
Disturbances	No	There were no disturbances that affected the survey.
Intensity	No	The survey effort was adequate to meet the project scope.
Completeness	Negligible	The entire Survey Area was assessed.
Resources	No	The surveys were completed adequately.
Access problems	No	The site was within the public land and accessible.
Identification of hollows	Low	Known limitations inherent in the survey of hollows include bias with surveyors, times, differing familiarity with tree types, levels of expertise, survey conditions such as weather and time of day, and survey technique (Gorrod & Keith, 2008; Rayner et al., 2011). Ground counts of hollows are subjective. Some hollows may be missed, obscured, particularly hollows in branches and vertical hollows. As well as providing inaccurate counts of hollow abundance, ground surveys provide incomplete or inaccurate information on hollow dimensions and use of hollows by fauna (Koch, 2008). Generally, ground-based surveys lead to overestimation of hollows (Rayner et al., 2011, S. Priddle, pers obs.) This

Aspect	Constraint	Comment
		limitation was reduced by checking hollows with a pole camera or drone for suitability where required. Hollow characteristics may change over time. There is some risk, although low, that black cockatoos may breed in a hollow where evidence of use is not visible or hollow characteristics are atypical. Not all active cockatoo hollows show signs of heavy chewing, and active or past breeding hollows may be missed. Also, other animals such as Little corella (*Cacatua sanguinea*) or Galah (*Eolophus roseicapilla*) may use black cockatoo hollows at other times of the year or between years. The author has extensive experience in the identification and assessment of hollows and is considered competent in relation to this skill. The results are provided based on experience and professional judgement though certainty of use cannot be guaranteed without hollow watching during the breeding season.

3 Desktop Review

3.1 Site Context

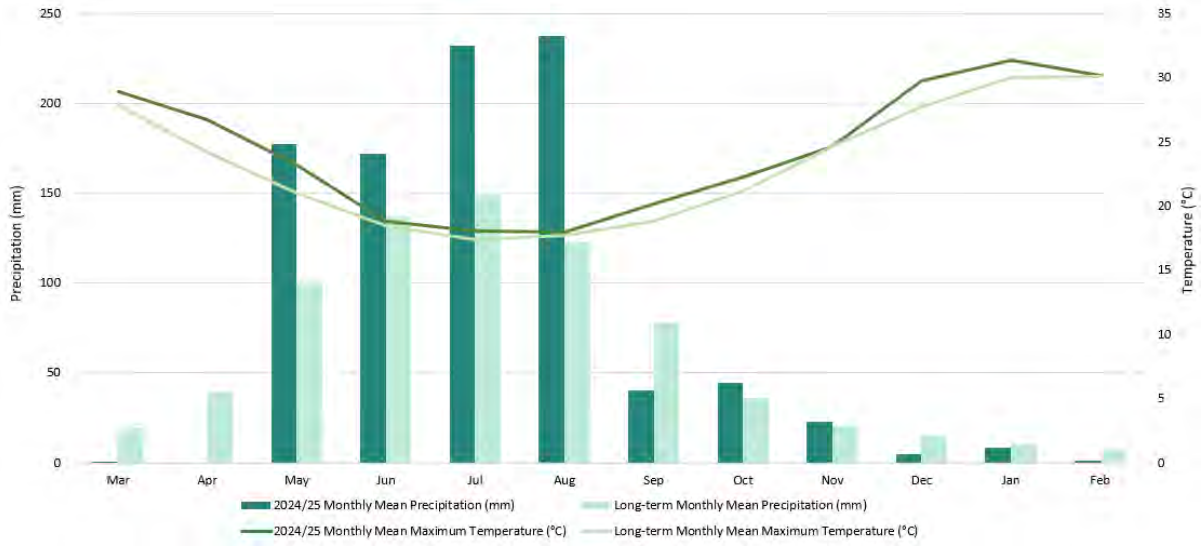
3.1.1 IBRA Region and Climate

The Survey Area is located within the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) bioregion, specifically within the Perth (SWA02) IBRA subregion (DCCEEW, 2022, 2023). The SWA02 IBRA subregion is of a warm, Mediterranean climate, typically experiencing an annual average rainfall of 600 to 1,000 millimeters (mm) (Mitchell et al., 2002a).

Graph 4-1 presents climatic information from the Bunbury WA weather station (station number 9965), the most relevant meteorological station for the Survey Area, situated 9.1 km from North Boyanup (BoM, 2025). The Bunbury weather station contained the most comprehensive weather data, in comparison to other stations within close proximity to the Survey Area. Long-term mean maximum temperatures range from 30.1°C in the hottest month of February, to 17.4°C in the coolest month of July. The long-term average annual rainfall is 737.3 mm.

Precipitation recorded between March 2024 and February 2025 was above average, at 942 mm., exceeding the long-term mean by over 200 mm. Whilst rainfall exceeded long-term averages substantially between the months May to August, it fell below the mean across the months March to April, September, and December (2024), and January to February (2025) (Graph 4-1). The greatest fluctuation in rainfall where records fell below the long-term average was experienced in April 2024, with a difference of 39.7 mm. Winter average rainfall (Jun – August) exceeded long-term averages by ~230 mm.

Weather records from the 12 months preceding the survey period demonstrate temperatures that have exceeded the long-term average over all months, with the exception of November 2024 during which the record matched the long-term average (Graph 4-1).



Graph 4-1 Temperature and rainfall data from the Bunbury weather station (station number 9519) (BoM, 2025)

3.1.2 Local Habitat Remaining

In a local context, the Swan Coastal Plain has historically been heavily over-cleared. Within 5 and 12 km of the Survey Area (similar to the extent typically travelled by breeding black cockatoos), no DBCA-managed areas occur. The area of native vegetation remaining within 10 km of the Survey Area is poorly represented less than 30 % of the total area. The area remaining within 10 km is only slightly higher, at 30 %, as presented in Table 3-1.

Table 3-1 Areas of DBCA reserves and native vegetation remaining within the foraging distances (6-12 km) from the survey area (Landgate, 2024)

Foraging range	Total area (ha)	Reserved (DBCA) %, Area (ha)	Native vegetation (including regrowth) remaining % of total area, Area (ha)
5 km	9,023.50	0 % (0 ha)	30 % (2,712.18 ha)
10 km	33,710.81	0 % (0 ha)	21 % (7,156.69 ha)

3.1.3 Habitat Connectivity

The South West Regional Ecological Linkages (SWREL) project (Molloy et al., 2009) identifies regional scale ecological linkages and aims to respond to the issues of fragmentation and climate change through land use planning policy and procedures. It also seeks to retain native vegetation and fauna habitat and reduce the loss of biodiversity and ecological function in the southwest.

The SWREL axis lines can be summarised as a series of vegetation patches which, due to their proximity, act as habitat stepping stones, thereby facilitating ecological processes and movement of organisms within and across the landscape (i.e. at the landscape scale).

The capacity for fauna to move is generally related to size; the larger the animal generally the greater the ability for the animal to cover a greater area (Molloy et al., 2009). Studies referred to in the SWREL Technical Report generally indicate (simplified) that

- Small mammals may cross widths of up to 100 m while dispersing,
- Small insectivorous passerines may cross gaps up to 20 m but not over 80 m,
- Arthropods and small lizards are generally sedentary in nature and unlikely to move between patches,
- Small invertebrates (as pollinators) will generally not disperse over 100 m,
- Frogs will generally disperse over 150m.

The above indicates that while vegetation gaps will, to some degree, compromise the capacity of fauna to persist, gaps of <100 m will not bring about a significant barrier to the dispersal of many fauna species. A gap of 1000 m between patches of remnant vegetation is recognised as a major barrier to the movement of many fauna species and represents a threshold, of which once crossed, presents a major decline in biotic interaction. The southeast of the Survey Area, particularly across habitat type 1 is represented as having good connectivity, declining towards the north end of the Survey Area and in a pocket of the southeast corner. This section of remnant vegetation is mapped to be in category 1c (with an edge touching or <100 m from a natural area selected in 1b).The southern extent of the Survey Area occurs approximately 1.4 km north of the nearest axis line.

3.2 Black Cockatoos

3.2.1 Species Profiles

The Survey Area falls within Region 1 Swan Coastal Plain (DAWE, 2022), characterised by the dominant presence of *Banksia* spp. and Tuart woodlands, as well as Marri, with Jarrah in the east. Black cockatoos utilise Region 1 primarily for foraging resources, with some small patches of breeding habitat existing (DAWE, 2022). There are scattered records for all three black cockatoo species locally (ALA, 2025; BirdLife Australia, 2025; DBCA, 2024b). Species profiles are provided below for further context.

Baudin's Black Cockatoo (*Zanda baudinii*)
EN (EPBC Act), EN (BC Act)

Baudin's cockatoo is a large forest cockatoo endemic to the southwest of WA. Depending on the region of origin, Baudin's cockatoo is a resident, a post nuptial nomad or migrant, with the bulk of the population vacating the coldest parts of their range (the Karri Forest) in the autumn and migrating northwards during the non-breeding season. Small numbers also appear resident in a few places including Leeuwin – Naturaliste Ridge and Manjimup (Johnstone & Kirkby, 2008). Flock sizes vary from small family groups to large aggregations at roosting sites.

Breeding mainly takes place in forested areas from August to November (egg laying dates) (Tony Kirkby, pers comm.) (DAWE, 2022). Baudin's cockatoo breeds in remnant woodland or forest, but may also breed in partially cleared areas, including isolated trees. Nests are in hollows in live or dead trees particularly Karri, Marri, Jarrah, Wandoo, Bullich and Tuart (DAWE, 2022).

In the non-breeding season, Baudin's cockatoo is mainly an inhabitant of Jarrah Marri Forest but also farmland and orchards. Its main food is Marri from which it takes seeds, flowers, grubs, and nectar. Its long bill is adapted to removing seeds from Marri nuts. It feeds on a variety of other foods, including nectar and seeds from *Hakea* and *Banksia* spp., rarely Jarrah, the pith of Kangaroo Paw (*Anigozanthos flavidus*), tips of *Pinus* spp.; *Macadamia* spp., almonds and pecans, seeds and fruit of apples and pears (DAWE, 2022). Refer to Appendix E.

Roost sites are usually in or near riparian environments or other permanent water sources in tall trees; any tree may provide roosting habitat, but particularly Jarrah, Flooded Gum, Blackbutt, Tuart and introduced *Eucalyptus* spp. (Blue Gum, Lemon Scented Gum) (DAWE, 2022; Johnstone & Kirkby, 2008).

Carnaby's Black Cockatoo (*Zanda latirostris*)
EN (EPBC Act), EN (BC Act)

Carnaby's cockatoo mainly occurs in or near eucalypt woodlands, especially those dominated by Wandoo or Salmon Gum, and sometimes in forests of Marri, Jarrah, Karri and Tuart. It is a postnuptial nomad, moving west after breeding. Nesting occurs mainly in the Wheatbelt but is increasingly occurring on the west and south coast. This species is currently expanding its breeding range westward and south into the Jarrah Marri Forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain along with the Capes Region (S. Priddle pers obs.). This may be due to climate change (Cale, 2003; SPRAT, n.d.; WA Museum, 2010).

Breeding occurs mainly from early July to mid-December normally in remnant woodland or forest, but also in partially cleared areas, including isolated trees. Nests are in hollows in live or dead trees, particularly Salmon Gum, Wandoo, Tuart, Jarrah, Flooded Gum, York Gum, Powderbark, Karri and Marri (DAWE, 2022). Breeding success is largely dependent on suitable feeding habitat near the nest site to provide food necessary for the survival of the chick (Johnstone et al., n.d.).

The species forages in native shrubland, kwongan heathland and woodland dominated by proteaceous plant species, on seeds, flowers and nectar of *Banksia* spp., *Hakea* spp. and *Grevillea* spp., as well as *Callistemon* spp. and Marri, and in eucalypt woodland and forest that contains foraging species, individual trees and small stands of these species. It also feeds on seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds, macadamia and pecans; insects and insect larvae; occasionally apples and persimmons; and liquidambar (DAWE, 2022). Refer to Appendix E.

Carnaby's cockatoos roost near riparian environments or other natural or artificial permanent water sources. Any tall trees may provide roosting habitat, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced *Eucalyptus* spp. and introduced *Pinus* spp. (DAWE, 2022).

Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*)
VU (EPBC Act), VU (BC Act)

The FRTBC is a large forest cockatoo, endemic to the Southwest. FRTBC occurs throughout the Jarrah Marri Karri forested areas and more recently on the Swan Coastal Plain. Group sizes vary from small family groups and pairs to larger gatherings at roost sites.

FRTBC generally breed in remnant woodland or forest but may also breed in partially cleared areas, including isolated trees. They nest in hollows in live or dead trees particularly Marri, Karri, Wandoo, Bullich, Blackbutt, Tuart and Jarrah (DAWE, 2022; Johnstone et al., 2013). FRTBC have been recorded breeding in all months, but with peaks in Spring and Autumn following Marri (or Jarrah) fruit flushes. There are also years when very little breeding takes place (Johnstone and Kirkby, unpublished data).

FRTBC diet is mostly (90%) seeds of Jarrah and Marri in woodlands and forest, and in the edges of Karri forests, with the remainder made up of Blackbutt, *E. staeri* (Albany Blackbutt), Bullich, *Hakea* spp, Tuart, Western Sheoak *(Allocasuarina fraseriana)*, Snottygobble (*Persoonia longifolia*) and the non-indigenous Australian native *Melia azederach* (Cape Lilac) (Johnstone & Kirkby, 1999). The species forage on cones, the fruits of Snottygobble and Mountain Marri. On the Swan Coastal Plain, the species often feed on introduced *Corymbia maculata* (Spotted Gum), Cape Lilac, *Eucalyptus caesia*, *E. erythrocorys*, Lemon-scented Gum and Kaffir Plum (DAWE, 2022). Refer to Appendix E.

FRTBC are known to roost within any tall trees that may provide roosting habitat, particularly tall Jarrah, Marri, Blackbutt, Tuart and introduced *Eucalyptus* spp. trees or large trees on the edges of forests (DAWE, 2022)

3.2.2 Breeding Requirements

All three black cockatoos rely on large hollows for breeding which take many years to form. The onset of hollow formation is dependent on damage to the tree, from animals (normally termites) or snapped / dropped branches, then further rotting. Fire does not appear to be a hollow-forming process; it may reduce the quality and number of hollows over time (S. Priddle pers obs.). Young and healthy trees can quickly heal after damage and trees less than 100 years old are unlikely to contain large hollows. For nesting, black cockatoos show a preference for:

- Large senescing trees,
- Hollows not angled more than 45 degrees from vertical,
- Entrances of at least 12 cm but usually much larger (20-40 cm),
- Deep or well-sheltered hollows in main trunks, or large branches which can provide a floor space of at least 30 cm diameter or more.

All three species of black cockatoo are of similar size and utilise similar hollows when breeding. The actual species of tree is likely unimportant. For example, Carnaby's cockatoo nest in Marri trees in the Marri Forest and Wandoo in the Wheatbelt. All three species may use the same individual hollows when not occupied in the breeding season by other black cockatoo species (Kirkby pers comm, 2019). Suitable hollows may also be used interchangeably with other medium sized birds such as corellas, Galah, ducks and owls. Marri and Jarrah trees are considered by Commonwealth of Australia (DAWE, 2022; SEWPaC, 2012) to be large enough to develop hollows once they are >50 cm DBH. Wheatbelt species such as Wandoo and Salmon Gum may develop hollows at 30 cm DBH (DAWE, 2022). Planted eastern states *Eucalyptus* spp. such as blue gums are generally unlikely to develop hollows unless they are at an advanced age (at least 75cm DBH but usually much larger).

Hollows suitable for use by black cockatoos are usually in trees that are at least 100 years old but usually much older. Supporting literature identifies suitable breeding hollows as occurring in

- Trees over 150 years old (Koch, 2008),
- Marri trees aged ~200 years and Jarrah (~300 years), with an average tree being inhabited at ~400 years for Marri and ~500 years for Jarrah (Inions et al., 1989),
- Marri trees aged between 140 and 410 years of age (Johnstone et al., 2015),
- Jarrah trees aged between 120 and 150 years (Whitford, 2002),
- Marri trees aged at ~450 years, utilised by the medium sized Long-billed Corella (smaller than black cockatoos) (Mawson & Long, 1994), and
- Jarrah trees aged at over 1000 years (as stags) (Wayne, 2005).

While breeding, black cockatoos will generally forage within a 6–12 km radius of their nesting site. Following breeding, birds assemble into flocks and move through the landscape searching for food, usually within six kms of a night roost (SEWPaC, 2012). Black cockatoos rely on access to watering points in selecting night roost sites, with roost sites usually within two kms of a watering point where they often drink in the afternoon following daytime feeding (DAWE, 2022).

3.2.3 Roosting Behaviour

Most roosts are in a large stand of tall trees, with a dense canopy and close to permanent water. Roosting trees need to be a suitable height, have a leafy canopy to shield the birds and help retain body heat. Smaller roost sites up to eight km away from the main roosts are sometimes used, when foraging distances from the main roost become too great (e.g. Carnaby's cockatoo and FRTBC when Jarrah fruit has been exhausted locally) (S. Priddle pers obs., Johnstone et al., 2010).

Baudin's and Carnaby's cockatoos often roost as individuals (about 30 cm or more apart) in the outermost thin branches of the canopy, often among a clump of dense leaves, and generally in positions that are wind affected. FRTBC however roost side-by-side in family groups and on thick, protected perches under the canopy of tall trees (Johnstone et al., n.d.).

3.2.4 Local Context and Records

There are no Important Bird Areas (IBAs) defined as conservation priorities by Birdlife International near (within 12 km of) the survey area (BirdLife International, 2025).

DBCA (2025) database records included the following within 12 km of the survey area:

- A total of 130 black cockatoo records (20 Baudin's cockatoos, 88 Carnaby's cockatoos and 22 FRTBC).
- Two natural breeding hollows recorded (one confirmed, one potential, taxa unconfirmed), located 2.6 km northwest and ~4.6 km southwest of the Survey Area, respectively.
- Twelve roosts over 65 surveys, mostly Baudin's or Carnaby's cockatoos. One roost record occurs less than 1 km northeast of the Survey Area, CAPNORR001. This roost was last surveyed in 2016, with a maximum count of 26.

Table 3-2 DBCA roosts within 12 km (DBCA, 2025)

Site code	WTBC BC	WTBC max count	FRTBC count	FRTBC max count	No. of surveys
CAPBOYR001	0	0	47	17	5
CAPCROR001	0	0	0	0	2
CAPGELR002	129	89	47	17	6
CAPGELR003	0	0	0	0	1
CAPNORR001	30	26	0	0	7
CAPGELR001	48	38	0	0	8
BUNCOLR002	3	3	0	0	5
BUNCOLR001	49	22	0	0	8
BUNGLER002	156	79	0	0	6
BUNGLER001	96	62	0	0	7
DAREATR001	59	20	0	0	8
DAREATR003	0	0	0	0	2

3.3 Western Ringtail Possum

3.3.1 Species Profile

Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*)

CE (EPBC Act), CE (BC Act)

WRP mostly inhabit Peppermint and Peppermint-Tuart associations from Bunbury to Albany but also occur in Jarrah Marri forest in lower densities. The highest densities of WRP occur in the Swan Coastal Plain and South Coast (Biota, 2020; Shedley & Williams, 2014). Peppermint leaves form the basis of the WRP diet in coastal areas, but when unavailable, the dominant myrtaceous species are preferred. In the inland forest, Jarrah and Marri are the main food source. Garden plant varieties are also exploited in urban areas. WRP also feed on new shoots, flowers, leaves and/or fruiting bodies from a range of flora including *Nuytsia floribunda, Acacia saligna, Hardenbergia comptoniana, Allocasuarina fraseriana, E. gomphocephala, E. rudis, Melaleuca viminea, M. cuticularis, M. rhaphiophylla, Kunzea glabrescens* and *Xylomelum occidentale* (Shedley & Williams, 2014).

WRP use a range of nest and shelter sites to avoid predators and exposure to the weather. Dreys are constructed in the canopy if hollows are not available. Adequate nest and shelter sites are necessary components of good quality habitat (Jones et al., 1994; Shedley & Williams, 2014).

Fox predation is one of the main threats and causes of mortality to WRP (Wayne, 2005) along with the loss and fragmentation of native vegetation. This is due to their high dependence on midstorey and overstorey vegetation for food, shelter and protection from predators. In the Jarrah Marri forests, for example around Margaret River, the highest relative abundance occurs in areas with limited anthropogenic disturbance (unlogged or lightly logged, and a low intensity and low frequency fire history), that are intensively fox-baited and have low indices of fragmentation(DSEWPaC, 2010).

Critical habitat for the species as outlined in the Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan (DPaW, 2017) is as follows:

> Habitat critical to survival for WRP is not well understood, and is therefore based on the habitat variables observed where WRP possums are most commonly recorded. These appear to vary between key management zones. The common themes however are high nutrient foliage availability for food, suitable structures for protection/nesting, and canopy continuity to avoid/escape predation and other threats. Long-term survival of the species requires linkages between suitable habitat patches and as such habitat critical to survival incorporates this. Vegetation communities critical to the species include long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity and high foliage nutrients (high in nitrogen and low toxin levels); Jarrah (*Eucalyptus marginata*)/Marri (*Corymbia calophylla*) forests and woodlands with limited anthropogenic disturbance (unlogged or lightly logged, and a low intensity and low frequency fire history), that are intensively fox-baited and have low indices of fragmentation; coastal heath, Jarrah/Marri woodland and forest, peppermint woodlands, myrtaceous heaths and shrublands, Bullich (*Eucalyptus megacarpa*) dominated riparian zones and karri forest. Any habitat where WRP occur naturally are considered critical and worthy of protection.

The Survey Area is within the Swan Coastal Plain Management Zone in the Recovery Plan (DPaW, 2017).

3.3.2 Local Context and Records

Biota (2020) undertook a regional survey of WRP which estimated a combined number of over 20,000 WRP within the areas surveyed, from the three regional populations. Population estimates within the survey areas included the Swan Coastal Plain management zone at 9,270 individuals, the Southern Forest management zone at 7,500 individuals and the South Coast management zone at 3,340 WRP. The survey area falls within the Swan Coastal Plain management zone, specifically within the SWA02 IBRA subregion subpopulation in Biota (2020). These results were based on density sampling and provide an estimate of population size for subpopulations within the Swan Coastal Plain management zone.

Total WRP habitat in the Swan Coastal Plain IBRA bioregion (south of Myalup), surveyed by Shedley & Williams (2014), combined with the surveyed area of Yalgorup National Park, yielded a total area of 366km^2, of which 12.8 % was surveyed by Biota. 'Manea Park' was the closest Biota (2020) study area to this project's Survey Area, located approximately 3.6 km northwest of the Survey Area. The average encounter rate at Manea Park was 3.63 individuals per kilometre, and a total number of 103 individuals were observed over 28 transects (Biota, 2020). DBCA (2025) database records suggest that WRP are locally abundant, with 3309 records returned within 12 km of the Survey Area.

4 Results and Discussion

4.1 General Habitat Characteristics

The Survey Area, occurring within the Perth (SWA02) subregion of the Swan Coastal Plain IBRA bioregion (DCCEEW, 2022, 2023), is comprised of Heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah-*Banksia* woodlands on marine dunes, and Marri on colluvial and alluvial deposits (Mitchell et al., 2002b). The site contains the same vegetation type and general fauna habitat type throughout, with denser remnant vegetation through the southwestern corner of the site. The northern and eastern areas typically contain paddock trees only. Large (>50 cm DBH) Jarrah and Marri trees have been excised from the remaining habitat due to their higher value to black cockatoos. As such, two key fauna habitat types were identified within the Survey Area, Figure 4 (Appendix A):

1. **Predominately Peppermint (*Agonis flexuosa*) woodland and paddock trees (7.81 ha) –** *Agonis flexuosa, Xylomelum occidentale, Banksia* sp., *Nuytsisa floribunda over Kunzea glabrescens* shrubs *over Macrozamia* sp. cycads and *Xanthorrhoea sp.* grass-trees over *Stirlingia latifolia* over various *Restionaceae* spp. and *Lomandra* sp.. Clumps of *Euclayptus marginata,* and *Corymbia calophylla* also occur. (<50 cm DBH) dispersed throughout the habitat type.

Photo 1 Fauna habitat type 1

2. **Jarrah Marri paddock trees (1.03 ha) –** *Eucalyptus marginata* and occasional *Corymbia calophylla* isolated or clumps of paddock trees (>50 cm DBH) over open clearings with clumps of low shrubs over various weedy herbs and grasses.

Photo 2 Fauna habitat type 2

- **Additional Cleared Areas (19.61 ha) –** Paddock-cleared open space consisting of various grasses and herbs.

Photo 3 Additional cleared paddock area

Vegetation condition ranged from Completely Degraded to Good condition (EPA, 2016a), displaying multiple signs of disturbances, but retaining basic vegetation structure in more densely vegetated areas. Within habitat type 1, the canopy of remnant vegetation displays a better level of connectivity. Isolated paddock trees, have been identified and generally mapped separately where they are >50 cm DBH due to their value for black cockatoo foraging and breeding (described above).

4.2 Habitat Trees

The survey identified 90 suitable DBH trees, inclusive of 66 Jarrah, 11 Marri and 13 unidentified, dead trees. Of the DBH trees, 13 hollows were recorded across 10 trees. A comprehensive list of DBH trees existing within the Survey Area is provided in Appendix D.

4.3 Black Cockatoo Foraging

FRTBC foraging residue was observed widely across the Survey Area (Photos 4, 5, 6). No Baudin's or Carnaby's cockatoo foraging residue was observed. Several plant species within the Survey Area were known as primary or secondary black cockatoo feed species (Table 4-1). The overall Survey Area contained:

- One primary and at least three secondary foraging plant taxa for Baudin's cockatoo,
- At least four primary and two secondary foraging plant taxa for Carnaby's cockatoo, and
- two primary and one secondary foraging plant taxa for FRTBC.

Photo 4 Marri FRTB chewing

Photo 5 Woody Pear FRTB chewing (as confirmed by T. Kirkby, pers comms)

Photo 6 Jarrah FRTBC chewing

Fauna habitat type 1 contains key structural species Jarrah and Marri (small, mostly sparse regrowth < 50cm DBH) and larger Peppermints and Woody pear. Larger Jarrah and Marri trees have been mapped as habitat type 2. Peppermints exist as secondary foraging species for Carnaby's cockatoo (mostly feeding on borers). Other species comprising fauna habitat type 1 include *Banksia* spp., being primary foraging species for Carnaby's cockatoo, and secondary foraging for Baudin's cockatoo (Table 4-1). Foraging habitat value for habitat type 1 would be considered Moderate due to the presence of Woody pear and sparse regrowth of Jarrah and Marri (Primary feed species).

Within habitat type 2, the proportion of Jarrah trees far exceeded the number of Marris. Jarrah and Marri are considered High quality foraging, breeding and roosting habitat for black cockatoos, generally. This habitat type was therefore considered as Moderate quality for Baudin's cockatoo within the context of the site, as the taxa only utilises Jarrah trees as secondary foraging species. Carnaby's cockatoo and FRTBC utilise both Jarrah and Marri as primary foraging species; this habitat type was therefore considered to be of High quality for these species (Table 4-1).

Additional cleared areas provided no habitat value to any black cockatoo species. The habitat quality for this type of area was therefore Nil (Table 4-1).

Table 4-1 Black cockatoo foraging species across habitat types

Species	Primary Foraging Species	Secondary Foraging Species	Habitat Quality
Habitat Type 1 – Peppermint woodland and paddock trees over open shrubland (7.81 ha, Degraded to Good vegetation condition)			
Baudin's cockatoo	*Corymbia calophylla*	*Banksia ilicifolia* *Banksia* spp. *Eucalyptus marginata*	**Moderate**
Carnaby's cockatoo	*Banksia ilicifolia* *Banksia* spp. *Corymbia calophylla* *Eucalyptus marginata*	*Agonis flexuosa* *Xylomelum occidentale*	**High**
FRTBC	*Corymbia calophylla* *Eucalyptus marginata*	*Xylomelum occidentale*	**Moderate**
Habitat Type 2 – Jarrah Marri paddock trees (1.03 ha, Completely Degraded to Degraded vegetation condition)			
Baudin's cockatoo	*Corymbia calophylla*	*Eucalyptus marginata*	**Moderate**
Carnaby's cockatoo	*Corymbia calophylla* *Eucalyptus marginata*	–	**High**
FRTBC	*Corymbia calophylla* *Eucalyptus marginata*	–	**High**
Additional Cleared Areas – Paddock-cleared open space (19.61 ha, Completely Degraded vegetation condition)			
Baudin's cockatoo	–	–	**Nil**
Carnaby's cockatoo	–	–	**Nil**
FRTBC	–	–	**Nil**

4.4 Black Cockatoo Breeding

Habitat Types 1 and 2 contained potential breeding habitat for black cockatoos (consisted of at least one suitable DBH tree). Black cockatoo foraging habitat quality across the Survey Area is presented in Table 4-1, with habitat types mapped in Figure 4 (Appendix A).

A total of 10 hollow-bearing trees were observed within the Survey Area (as outlined in Appendix D). Ninety trees with DBH measuring over 50 cm were recorded. Four of these were *Trees with suitable DBH with unsuitable hollows*, and two were *Trees with potentially suitable size hollows with no signs of use* (10 – 15 cm aperture, Jarrah – ID 576, 120 cm DBH) (10 – 15 cm aperture, Dead tree – ID 1388, 55 cm DBH). Suitable DBH trees (inclusive of *Trees with suitable DBH without hollows*) are presented in Figure 5 (Appendix A). Upon closer investigation of potentially suitable sized hollows (ID 576, ID 1388), they were deemed unlikely to support black cockatoo breeding due to their narrow entry aperture, along with not appearing to contain a suitably large internal chamber (as detailed in Appendix E).

DBCA (2025) dataset of compiled breeding site locations for WTBC show that one confirmed natural breeding hollow exists 2.6 km northwest of the Survey Area (as mentioned in Section 3.2.4). No active breeding trees were recorded within the Survey Area.

Trees recorded with hollows that were deemed as unsuitable for black cockatoos may still be utilised by other target fauna (WRB) or non-target taxa. Tree ID 576 contained a hollow that was inhabited by CBP. All other hollows were vacant during the time of survey.

4.5 Roosts

There was no evidence of black cockatoos roosting within or immediately adjacent to the Survey Area.

4.6 WRP Results

A total of 12 WRP observations were recorded across the nocturnal survey period, occurring on the 10th and 19th of March 2025 (Figure 6, Appendix A). Six WRP were recorded each night. Additionally, four brush-tailed phascogale (*Phascogale tapoatafa*) (Specially Protected) and 16 CPB observations occurred. Three brush-tailed phascogales were recorded on the 10th, and one on the 19th of March 2025.

Three dreys were located during the diurnal survey on the 5th of March 2025. The Survey Area is likely to broadly align with Critical habitat for the species as outlined in the Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan (DPaW, 2017).

5 Conclusions and Recommendations

The black cockatoo values of the Survey Area are provided below:

- The Survey Area is located within the Region 1 Swan Coastal Plain, and is characterised by the dominant presence of Jarrah, Marri, *Banksia* spp. and Peppermints. All three black cockatoo species occur locally, with one confirmed natural breeding hollow occurring approximately 2.6 km northwest of the Survey Area, and one potential breeding hollow ~4.6 km southwest of the Survey Area (DBCA, 2025). One roost has been recorded within 1 km of the Survey Area, CAPNORR001, last surveyed in 2016 (DBCA, 2025).
- Two key fauna habitat types were identified within the Survey Area:
    - Predominately Peppermint (*Agonis flexuosa*) woodland and paddock trees (7.81 ha) – *Agonis flexuosa*, *Xylomelum occidentale*, *Banksia* spp., *Nuytsisa floribunda* over *Kunzea glabrescens* shrubs over *Macrozamia* sp. cycads and *Xanthorrhoea* sp. grass-trees over *Stirlingia latifolia* over various Restionaceae spp. and *Lomandra* sp.. Clumps of *Euclayptus marginata*, and *Corymbia calophylla* also occur, (<50 cm DBH) dispersed throughout the habitat type.
    - Jarrah Marri paddock trees (1.03 ha) – *Eucalyptus marginata* and occasional *Corymbia calophylla* isolated or clumps of paddock trees (>50 cm DBH) over open clearings with clumps of low shrubs over various weedy herbs and grasses.
- Jarrah and Marri trees are common within and surrounding the Survey Area, providing potential black cockatoo foraging resources.
- Recent FRTBC feeding residue was found to be dispersed widely across the Survey Area. The Survey Area contained 8.84 ha of High-quality foraging habitat for Carnaby's cockatoo and 1.03 ha of High-quality habitat for FRTBC. Additionally, the site contained 8.84 ha of Moderate quality foraging habitat for Baudin's cockatoo, and 7.81 of Moderate quality habitat for FRTBC.
- predominantly High across fauna habitat types 1 – 2 (8.84 ha combined area).
- No feeding residue from WTBC was observed, however plant taxa within the Survey Area is inclusive of multiple primary and secondary foraging species.
- 90 suitable DBH trees, both with and without hollows, were identified within the Survey Area (66 Jarrah, 11 Marri and 13 unidentified, dead trees). Ten hollow-bearing trees were observed, including four *Trees with suitable DBH with unsuitable hollows*, and two *Trees with potentially suitable size hollows with no signs of use*.
- Black cockatoos are unlikely to breed with the Survey Area.
- No evidence of night roosts were observed.

The WRP values of the survey area are as follows:

- The Survey Area is within the Swan Coastal Plain Management Zone in the Recovery Plan (DPaW, 2017). WRP are common locally.
- The Survey Area broadly aligns with Critical habitat as outlined in the Western Ringtail Possum Recovery Plan (DPaW, 2017).

- The nocturnal surveys identified a total of 12 WRP, with six observed during each night of survey. Four brush-tailed phascogales and 16 CPB were additionally observed. Three dreys were recorded during the diurnal survey.

The following recommendations are made

- Clearing should be minimised, where possible.
- Clearing schedules should be planned to avoid spring breeding peaks, if possible.
- An authorised fauna spotter should be present during clearing.
- Weed management and infill planting could be considered in adjacent degraded areas.
- Once the final footprint is known then impacts should be assessed against the relevant DCCEEW Significant Impact Guidelines.

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Appendix A Figures

FIGURE 1 LOCATION MAP AND DESKTOP STUDY AREA

LOT 220 QUEELUP ROAD, NORTH BOYANUP

- Desktop Study Area (10 km)
- Study Area
- Major watercourse
- Minor drainage line

A3 @ 1:100000

0 0.5 1 2 km

GRID: GDA2020 zone 50

N

Ref: SW580
Date: 27/03/2025 Author: SP

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FIGURE 2 STUDY AREA

Study Area (Lot 220 Queelup Road, North Boyanup)

Road

LOT 220 QUEELUP ROAD, NORTH BOYANUP

A3 @ 1:3500

0 25 50 100 m

N

GRID: GDA2020 zone 50

Ref: SW580
Date: 27/03/2025 Author: SP

Source: Base map © Esri and its data suppliers. SLIP Landgate (2024)

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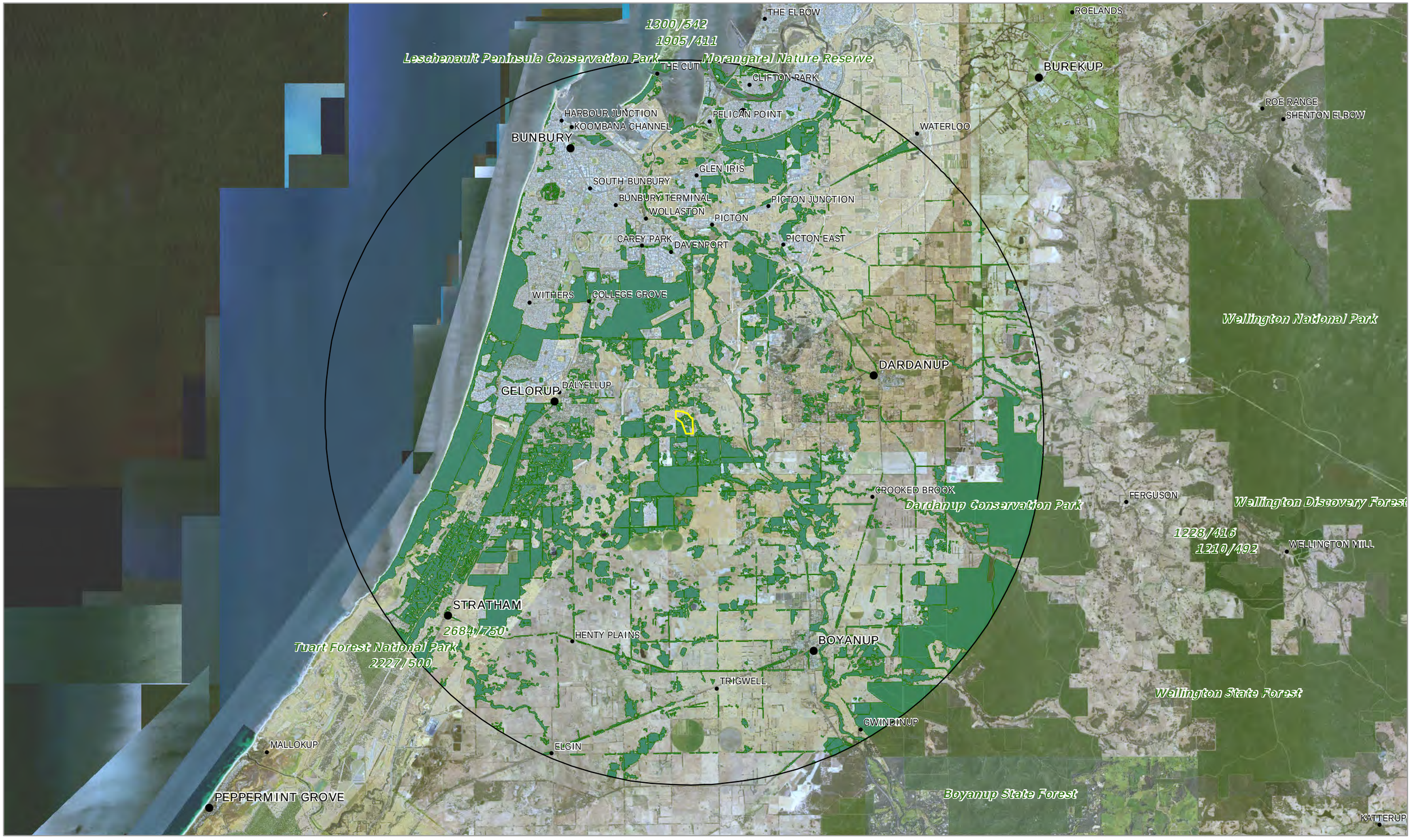

FIGURE 3 VEGETATION REMAINING WITHIN 12 KM OF THE SURVEY AREA

LOT 220 QUEELUP ROAD, NORTH BOYANUP

- Study Area (Lot 220 Queelup Road, North Boyanup)
- 12km
- DBCA managed land
- Native vegetation remaining (DPIRD, 2024)

A3 @ 1:120000

0 0.5 1 2 km

GRID: GDA2020 zone 50

N

Ref: SW580
Date: 27/03/2025 Author: SP

Source: Base map © Esri and its data suppliers. SLIP Landgate (2024)

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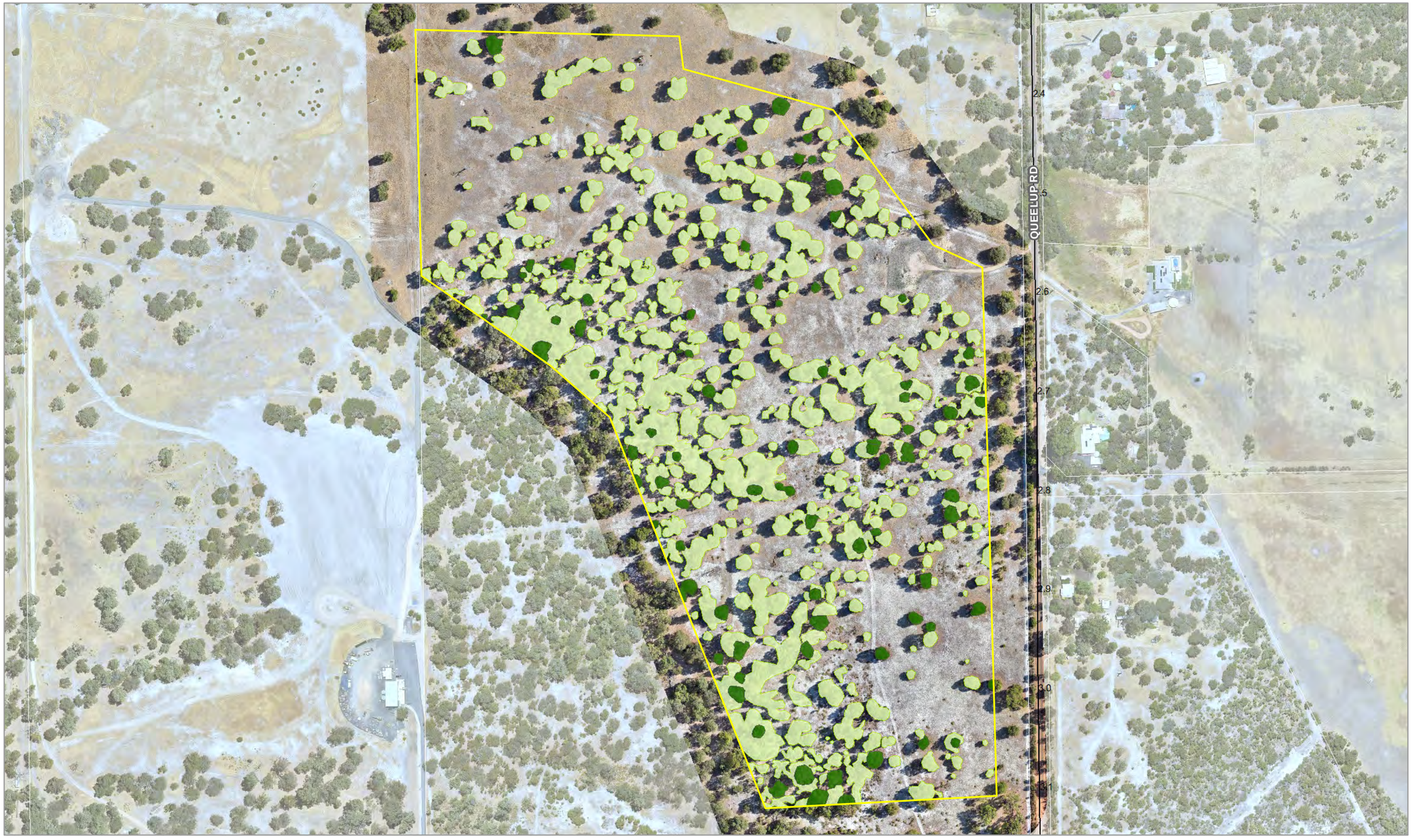

FIGURE 4 FAUNA HABITAT

LOT 220 QUEELUP ROAD, NORTH BOYANUP

Study Area (Lot 220 Queelup Road, North Boyanup)

Fauna habitat

- Jarrah or Marri paddock trees (1.03 ha)
- Predominately Peppermint woodland and paddock trees (7.81 ha)
- Road

A3 @ 1:3500

N

0 25 50 100 m

GRID: GDA2020 zone 50

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Ref: SW580
Date: 27/03/2025 Author: SP

FIGURE 5 POTENTIAL BLACK COCKATOO BREEDING TREES

LOT 220 QUEELUP ROAD, NORTH BOYANUP

Ref: SW580
Date: 27/03/2025 Author: SP

Study Area (Lot 220 Queelup Road, North Boyanup)

Road

Potential black cockatoo breeding trees

- Potentially suitable size hollow no signs of use (confirmed)
- Unsuitable hollow (confirmed)
- Suitable DBH no hollows
- Other tree

A3 @ 1:3500

0 25 50 100 m

GRID: GDA2020 zone 50

N

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Source: Base map © Esri and its data suppliers. SLIP Landgate (2024)

FIGURE 6 WRP NOCTURNAL EFFORT AND RESULTS

LOT 220 QUEELUP ROAD, NORTH BOYANUP

Ref: SW580_SP
Date: 28/03/2025 Author: SP

Study Area (Lot 220 Queelup Road, North Boyanup)

Taxon, Abundance

- South-western brush-tailed phascogale , 1
- Western ringtail possum, 1
- Western ringtail possum, 2
- Common brushtail possum, 1
- Common brushtail possum, 2

Nocturnal survey effort

- 10/03/2025
- 19/03/2025

A3 @ 1:3500

0 25 50 100 m

GRID: GDA2020 zone 50

N

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Appendix B Commonwealth Black Cockatoo Foraging Quality Scoring Tool Template (SEWPAC 2012)

Table A1 Foraging quality scoring tool template

Starting score		Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-Cockatoo
10		**Start at a score of 10** if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. **This tool only applies to sites equal to or larger than 1 hectare in size.**
Attribute	Sub-tractions	Context adjustor (attributes reducing functionality of foraging habitat)		
Foraging potential	**-2**	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.
Connectivity	**-2**	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	**-2**	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.

Proximity to roosting	**-1**	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	**-1**	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total score		*8*	*10*	*10*
Appraisal		To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.		

Appendix C Black Cockatoo Foraging Plants (recorded during survey)

Table C.1 Flora taxa within the Survey Area with potential for quality black cockatoo foraging value

Species	Common name	Habit	Baudin's cockatoo	Carnaby's cockatoo	FRTBC	Reference
Agonis flexuosa	Peppermint Tree	Tree		Secondary		(Groom, 2011; Valentine & Stock, 2008)
Banksia ilicifolia			Secondary	Primary		(DoEE, 2017; Groom, 2011; Johnstone et al., 2010a, 2010b; Johnstone & Storr, 1998; Valentine & Stock, 2008)
Banksia spp.			Secondary	Primary		(DoEE, 2017; Saunders, 1979; SEWPaC, 2012)
Corymbia calophylla	Marri	Tree	Primary	Primary	Primary	(DoEE, 2017; Johnstone et al., n.d., 2010a, 2010b, 2010c, 2017; Johnstone & Kirkby, 1999, 2008; Johnstone & Storr, 1998; Saunders, 1979; SEWPaC, 2012; Valentine & Stock, 2008)
Eucalyptus marginata	Jarrah	Tree	Secondary	Primary	Primary	(Birds Australia, n.d.; DoEE, 2017; Groom, 2011; Johnstone et al., n.d., 2010a, 2010b, 2010c, 2017; Johnstone & Kirkby, 1999; Johnstone & Storr, 1998; Saunders, 1979; SEWPaC, 2012; Valentine & Stock, 2008)
Xylomelum occidentale	Woody Pear	Tree or tall shrub		Secondary	Secondary	(Groom 2011, S. Priddle pers obs.)

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Appendix D Tree Survey Results

Table 6-1 Tree assessment results (DBH trees only) and black cockatoo breeding suitability (only best hollows recorded)

ID	Species	DBH	Comments	Hollows	Size	Type	Height	Note	Easting (GDA94)	Northing
18	Jarrah	50	Suitable DBH no hollows						377261.344	6302393.713
21	Jarrah	50	Suitable DBH no hollows						377266.261	6302398.716
22	Jarrah	50	Suitable DBH no hollows						377268.187	6302405.581
29	Jarrah	80	Suitable DBH no hollows						377307.154	6302402.028
54	Jarrah	65	Suitable DBH no hollows						377323.282	6302367.657
62	Dead	60	Suitable DBH no hollows						377292.62	6302348.769
92	Jarrah	65	Suitable DBH no hollows						377278.399	6302318.148
96	Marri	50	Suitable DBH no hollows						377280.171	6302310.385
111	Jarrah	60	Suitable DBH no hollows						377315.921	6302340.2
112	Jarrah	50	Suitable DBH no hollows						377316.944	6302336.689
168	Jarrah	50	Suitable DBH no hollows						377330.377	6302293.626
276	Jarrah	60	Suitable DBH no hollows						377441.774	6302276.183
280	Jarrah	60	Suitable DBH no hollows						377424.924	6302314.042
305	Dead	75	Unsuitable hollow (confirmed)	1	10 – 15 cm	Knot	10 – 15 m	Knot angle suitable	377440.997	6302404.981
320	Jarrah	50	Suitable DBH no hollows						377481.863	6302419.288
322	Jarrah	65	Unsuitable hollow (confirmed)	1	15 – 20 cm	Spout	to 10 m	No evidence of use	377481.92	6302406.792
325	Jarrah	70	Suitable DBH no hollows						377494.72	6302383.402
338	Jarrah	50	Suitable DBH no hollows						377514.407	6302363.197
355	Jarrah	60	Suitable DBH no hollows						377550.945	6302381.147
365	Dead	65	Suitable DBH no hollows						377590.264	6302398.093
371	Dead	100	Suitable DBH no hollows						377638.807	6302368.001
390	Jarrah	50	Suitable DBH no hollows						377570.656	6302449.585
475	Jarrah	60	Suitable DBH no hollows						377227.938	6302395.315
478	Jarrah	60	Suitable DBH no hollows						377221.509	6302351.286
507	Dead	50	Suitable DBH no hollows						377182.954	6302582.319
517	Dead	85	Unsuitable hollow (confirmed)	1	to 10 cm	Spout	to 10 m	Spout angle not suitable, aperture too small	377300.367	6302512.744
525	Dead	60	Unsuitable hollow (confirmed)	1	20 cm +	Vertical	to 10 m	Hollow too shallow or exposed	377373.608	6302515.802

ID	Species	DBH	Comments	Hollows	Size	Type	Height	Note	Easting (GDA94)	Northing
540	Marri	65	Suitable DBH no hollows						377230.646	6302621.414
560	Marri	125	Suitable DBH no hollows						377517.284	6302560.766
562	Jarrah	65	Suitable DBH no hollows						377540.969	6302528.189
565	Dead	50	Suitable DBH no hollows						377583.677	6302524.993
575	Marri	125	Unsuitable hollow (confirmed)	1	20 cm +	Knot	to 10 m	Hollow too shallow or exposed	377570.153	6302480.51
576	Jarrah	120	Potentially suitable size hollow no signs of use (confirmed)	2	10 – 15 cm, 15 – 20 cm	Spout	10 – 15 m	Suitable spout angle (first hollow), Common Brushtail Possum inhabiting second hollow, entry not large enough, unlikely to have suitable chamber	377546.088	6302506.131
577	Jarrah	70	Suitable DBH no hollows						377541.901	6302490.324
578	Jarrah	50	Suitable DBH no hollows						377535.55	6302507.617
582	Jarrah	50	Suitable DBH no hollows						377529.653	6302220.183
611	Jarrah	65	Suitable DBH no hollows						377641.844	6302272.256
612	Dead	130	Unsuitable hollow (confirmed)	1	10 – 15 cm	Knot	10 – 15 m	Chamber too small	377642.102	6302281.091
635	Jarrah	65	Suitable DBH no hollows						377687.299	6302254.133
640	Jarrah	90	Suitable DBH no hollows						377708.242	6302286.124
645	Jarrah	70	Suitable DBH no hollows						377715.409	6302264.796
658	Jarrah	80	Suitable DBH no hollows						377701.877	6302313.285
703	Jarrah	50	Suitable DBH no hollows						377558.654	6302296.915
751	Dead	95	Suitable DBH no hollows						377495.434	6302177.786
763	Jarrah	50	Suitable DBH no hollows						377413.495	6302212.359
770	Jarrah	60	Suitable DBH no hollows						377388.553	6302232.001
821	Jarrah	60	Suitable DBH no hollows						377396.278	6302184.752
831	Jarrah	70	Suitable DBH no hollows						377369.463	6302214.777
837	Jarrah	60	Suitable DBH no hollows						377373.829	6302191.704
846	Jarrah	60	Suitable DBH no hollows						377417.085	6302162.336
859	Jarrah	55	Suitable DBH no hollows						377391.304	6302145.565
863	Marri	60	Suitable DBH no hollows						377476.215	6301991.824
868	Marri	50	Suitable DBH no hollows						377475.935	6302020.688
869	Marri	55	Suitable DBH no hollows						377475.03	6302019.743
875	Marri	55	Suitable DBH no hollows						377454.204	6302010.004

ID	Species	DBH	Comments	Hollows	Size	Type	Height	Note	Easting (GDA94)	Northing
876	Jarrah	60	Suitable DBH no hollows						377456.516	6302055.861
878	Jarrah	55	Suitable DBH no hollows						377425.045	6302080.743
924	Jarrah	50	Suitable DBH no hollows						377495.274	6301936.499
945	Jarrah	100	Suitable DBH no hollows						377537.6	6301895.25
949	Jarrah	70	Suitable DBH no hollows						377513.93	6301877.133
955	Jarrah	95	Suitable DBH no hollows						377555.179	6301869.854
963	Jarrah	60	Suitable DBH no hollows						377571.213	6301891.181
1030	Dead	55	Suitable DBH no hollows						377415.752	6302121.713
1044	Jarrah	55	Suitable DBH no hollows						377549.714	6302077.823
1063	Jarrah	50	Suitable DBH no hollows						377547.54	6302146.539
1079	Jarrah	50	Suitable DBH no hollows						377516.903	6302180.752
1081	Jarrah	50	Suitable DBH no hollows						377525.214	6302177.304
1168	Jarrah	50	Suitable DBH no hollows						377613.287	6302134.67
1173	Jarrah	80	Suitable DBH no hollows						377598.712	6302121.409
1196	Jarrah	90	Unsuitable hollow (confirmed)	1	to 10 cm	Knot	10 – 15 m	Knot angle suitable, aperture too small	377608.994	6302219.945
1202	Jarrah	60	Suitable DBH no hollows						377643.645	6302220.758
1213	Jarrah	60	Suitable DBH no hollows						377686.535	6302171.37
1217	Jarrah	60	Suitable DBH no hollows						377686.524	6302153.779
1244	Jarrah	50	Suitable DBH no hollows						377708.82	6302055.517
1247	Jarrah	70	Suitable DBH no hollows						377660.585	6302089.955
1251	Jarrah	130	Unsuitable hollow (confirmed)	3	10 – 15 cm, 10 – 15 cm	Spout	10 – 15 m	Spout angles suitable, hollow too shallow and exposed	377555.022	6302044.674
1257	Jarrah	50	Suitable DBH no hollows						377691.838	6301925.799
1262	Jarrah	50	Suitable DBH no hollows						377659.262	6301924.428
1281	Jarrah	110	Suitable DBH no hollows						377614.405	6301910.409
1344	Jarrah	75	Suitable DBH no hollows						377542.268	6302019.185
1352	Jarrah	60	Suitable DBH no hollows						377616.672	6302013.119
1355	Jarrah	90	Suitable DBH no hollows						377648.978	6302050.259
1377	Jarrah	50	Suitable DBH no hollows						377727.613	6301984.235
1381	Jarrah	70	Suitable DBH no hollows						377584.1665	6301865.728
1383	Dead	55	Suitable DBH no hollows						377479.426	6302023.368

ID	Species	DBH	Comments	Hollows	Size	Type	Height	Note	Easting (GDA94)	Northing
1384	Marri	120	Suitable DBH no hollows						377258.7645	6302358.029
1385	Marri	80	Suitable DBH no hollows						377453.132	6302102.104
1386	Marri	55	Suitable DBH no hollows						377417.6635	6302075.483
1387	Jarrah	70	Suitable DBH no hollows						377208.8181	6302497.458
1388	Dead	55	Potentially suitable size hollow no signs of use (confirmed)	1	10 – 15 cm	Knot	10 – 15 m	Marginal sized entry and unlikely to have chamber	377476.746	6301977.977

Appendix E Hollow Assessment

Note: Only best hollows shown.

Tree ID	Comments	H1 note	Photo
576	Potentially suitable size hollow no signs of use (confirmed)	10 – 15 cm aperture, CBP inhabiting hollow, entry aperture not large enough. Unlikely to have a suitable chamber inside.	  

1388	Potentially suitable size hollow no signs of use (confirmed)	10 – 15 cm aperture, marginal sized entry and unlikely to have a suitable chamber inside.	  

APPENDIX D – GROUNDWATER MONITORING DATA

QUEELUP BLOCK GROUND WATER RECORD

NOTE: Levels based on depth from natural ground to water table.

DATE	BORE # 1	BORE # 2	BORE # 3	WINDMILL	COMMENTS
19.08.2024	4.4 (metres)	7.6	DRY	4.0	
25.08.2024	4.2	7.5	DRY	4.0	
04.09.2024	4.0	7.4	DRY	3.9	
11.09.2024	4.0	7.5	DRY	3.8	
17.09.2024	3.9	7.7	DRY	3.7	
09.10.2024	3.9	7.8	DRY	3.8	
16.10.2024	3.9	7.9	DRY	3.8	
30.10.2024	4.0	DRY	DRY	3.9	
06.11.2024	4.0	DRY	DRY	3.9	
14.11.2024	4.0	DRY	DRY	3.9	
21.11.2024	4.0	DRY	DRY	3.9	
28.11.2024	4.1	DRY	DRY	3.9	
04.12.2024	4.1	DRY	DRY	3.9	
11.12.2024	4.1	DRY	DRY	3.9	
19.12.2024	4.2	DRY	DRY	4.0	
06.01.2025	4.2	DRY	DRY	4.0	
05.02.2025	4.4	DRY	DRY	4.1	
24.02.2025	4.6	DRY	DRY	4.1	
10.03.2025	4.7	DRY	DRY	4.1	
19.03.2025	4.8	DRY	DRY	4.1	
01.04.2025	4.9	DRY	DRY	4.1	
20.04.2025	4.8	DRY	DRY	4.0	
07.05.2025	4.8	DRY	DRY	3.9	
15.05.2025	4.8	DRY	DRY	3.9	
22.05.2025	4.8	DRY	DRY	3.9	
29.05.2025	4.7	DRY	DRY	3.8	
09.06.2025	4.6	DRY	DRY	3.8	
13.06.2025	4.6	DRY	DRY	3.8	

APPENDIX E - WATER MANAGEMENT PLAN

WATER MANAGEMENT PLAN

LOT 262 (No. 220) QUEELUP ROAD, NORTH BOYANUP

October 2025

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Document Control

Version	Date	Author	Reviewer
V1	22/9/2025	PN	KMT
V2	28/10/2025	PN	KMT
Filename	2538_Lot 262 Queelup Rd WMP_V2		

Limitations

This report has been prepared by Accendo Australia Pty Ltd in accordance with the scope limitations provided in this report, or as otherwise agreed, between the Client and Accendo.

This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

This report has been prepared based upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report, which Accendo has not independently verified or checked beyond the agreed scope of work. Accendo does not accept liability in connection with such unverified information.

The conclusions and recommendations in this report are based on assumptions made by Accendo described in this report where and as they are required. Accendo disclaims liability arising from any of the assumptions being incorrect.

The report is based on site specific conditions encountered and information received at the time of preparation of this report or the time that site investigations were undertaken. Accendo disclaims responsibility for any changes that may have occurred after this time.

The preparation of this report has been undertaken and performed in a professional manner, in consideration of the scope of services and in accordance with environmental consulting practices. No other warranty is made.

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

JW Cross Maintenance Pty Ltd (the applicant) is proposing to extract sand from approximately 16.36 hectare (ha) area within Lot 262 (No. 220) Queelup Road, North Boyanup (herein referred to as the subject site) (refer to **Figure 1** and **Figure 2**).

The available volume of sand (*insitu* volume of approximately 500,000 m^3) is to be extracted, commencing to the south of the subject site and moving in a northerly direction.

The slope of the final contours of the pit will slope from approximately 22.3 m Australian Height Datum (AHD) in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north.

Slopes of the batters at the end of excavation will be retained at 1:6 vertical to horizontal.

1.2 Purpose and Scope

The purpose of this Water Management Plan (WMP) is to review the risks and control measures to appropriately manage minimise the environmental impacts of the extractive industry on both groundwater and surface water in proximity to the subject site.

The scope of the WMP is to cover the following:

- Legislative and regulatory compliance;
- Existing environment;
- Risk assessment water quality impacts;
- Mitigation and measurement measures; and
- Roles and responsibilities in relation to water management.

2 EXISTING ENVIRONMENT

2.1 Location

The subject site is located within Lot 262 Queelup Road, North Boyanup. The subject site is located within the municipality of the Shire of Capel, approximately 10 km southeast of the Bunbury town centre and approximately 150 km south of Perth (refer to **Figure 1** and **Figure 2**).

2.2 Land Use

The subject site is zoned 'Rural' under the Shire of Capel's *Local Planning Scheme No. 8* (LPS 8) and the *Greater Bunbury Region Scheme* (GBRS). The subject site is located within the 'Special Control Area – Strategic minerals and 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 to the east and southeast of the subject site is zoned 'Rural' and 'Local Road' under the LPS 8 and 'Rural' under the GBRS. Properties to the north, west and southwest of the subject site are zoned 'Rural' under the LPS 8 and GBRS. Properties that are located to the northeast of the subject site over Queelup Road are zoned 'Rural Residential' under the LPS 8 and 'Rural' under the GBRS.

Historically the subject site has been used for livestock grazing, resulting in the disturbance of the majority of native vegetation onsite. Intact remnant vegetation remains in the southwestern portion, with the remainder of the subject site comprised of mature paddock trees.

2.3 Topography and Soils

The current topography of the subject site can be described as sloping with the elevation ranging from 24 m AHD in the north and northwest corner to 33 m AHD in the centre before falling again to 26 m AHD in the southeast (refer to **Appendix A**).

The subject site is located within the Bassendean System of the Bassendean Zone consisting of fixed dunes inland from coastal dune zone containing non-calcareous sands, podsolised soils with l ow-lying wet areas. The Bassendean system consists of "*Sand dunes and sandplains with pale deep sand, semi-wet and wet soil*" (Natural Resource Information (NRInfo)).

The subject site is located within the Bassendean B1b soil phase consisting of "*very low relief dunes of undulating sand plain with deep bleached grey sandy A2 horizons and pale yellow B horizons*" (NRInfo).

2.4 Climate

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

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30.1°C. July has the lowest average temperature of the year of 7.4°C.

Rainfall for the area is approximately 737.3 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 17-18 knots, swinging to the south-west at approximately 22 knots in the afternoon. During winter, the winds are most commonly 12-19 knots from 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 39.1 mm/hr.

2.5 Hydrology

2.5.1 Groundwater

The subject site is located within the Bunbury East and the Bunbury -Yarragadee subarea of the proclaimed Bunbury Groundwater Area.

Three Groundwater monitoring bores and one windmill located in proximity to the extraction area (refer to **Figure 3**) have been monitored monthly for groundwater levels from August 2024 to June 2025 (refer to **Appendix B**). Data from this monitoring period indicates maximum groundwater levels were recorded at 3.7 m below ground level (BGL), 3.9 m BGL and 7.4 m BGL at the windmill, Bore No. 1 and Bore No. 2 respectively, in September 2024. Bore No. 3 which is 8 m BGL was found to be dry over the entire monitoring period. DWER groundwater monitoring bore Bunbury Shallow (BY8A) is located approximately 1.3 km from the southwest corner of the subject site (see **Figure 3**). While no data is available in the peak period of 2024, over a ten year monitoring period groundwater data indicates the highest recorded peak groundwater level was 5.42 m AHD, observed in October 2016 and September 2017. The lowest peak level occurred in September 2023 at 4.18 m AHD, resulting in a range of 1.24 m between the maximum and minimum peak levels. Based on this historical variability, it is possible that groundwater levels during a year with a higher seasonal peak could be up to approximately 1.24 m higher than current observations. A review of annual rainfall statistics shows that the annual total rainfall was the lowest in 2023 and the highest in 2021 with 562 mm and 1019 mm, respectively. The annual rainfall for 2024 was between these two years with a total annual rainfall of 799 mm. To account for possible variation in groundwater levels a safety factor of 1.24 m has been applied to all peak groundwater levels recorded when determining peak groundwater contours (refer to **Figure 4**).

2.5.2 Surface Water

The subject site is located in the Middle Preston subarea of the unproclaimed Preston surface water area, approximately 5km to the south west of the *Rights in Water and Irrigation* (RiWI) *Act 1914* proclaimed Collie River Irrigation district. The subject site is not proclaimed under the *Country Areas Water Supply Act 1947* as a public drinking water source area. The closest public drinking water source area is the Bunbury Water Reserve located approximately 2 km to the west of the subject site.

No surface water features are present within the subject site.

2.5.3 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 1**).

Table 1. 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 2**.

Table 2. 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: • 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 are no wetlands mapped within the subject site. A Multiple Use (MU) wetland (UFI 949) surrounds the northern boundary of the subject site (refer to **Figure 3**). Six Resource Enhancement (RE) wetlands (UFI: 1337, 1338, 1093, 1247, 1442, 1265) are located within 1 km of the subject site. The closest RE wetland (UFI 1337) is located approximately 240 m to the south of the subject site, over Ducane Road. A buffer of at least 50 m will be maintained to all wetlands at all times.

3 EXTRACTION ACTIVITIES

The sand pit will cover an area of approximately 16.35 ha, with a current maximum elevation ranging from 24 m AHD to 33 m AHD. It will be excavated to a maximum depth ranging from 1.96 m BGL to 6.26 m BGL commencing in the south and moving initially in a northerly direction in stages less than 2 ha in size (refer to **Figure 2**). The proposal does not include any crushing of material.

It is estimated that the total maximum volume of sand to be removed will be approximately 500,000 m^3 with a maximum of approximately 50,000 m^3 excavated each year, depending on supply and demand.

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

3.1 Operational Works

Typical operating hours for quarries will be adopted for the subject site which involves 7 am to 5 pm each Monday to Friday; and at no time on Saturdays, Sundays or public holidays. The site will be worked by 2 - 3 persons, depending on market demand.

3.1.1 Sand Extraction

The sand will be excavated by an excavator and loader 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 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 pit to provide visual and acoustic screening.
- Excavation will commence in the south of the pit and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of pit, 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 pit will be deep ripped, covered by topsoil, and rehabilitated to a constructed soil.

3.1.2 Final Contours

The slope of the final contours of the pit will slope from approximately 22.3 m AHD in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north (refer to **Figure 5**).

Slopes of the batters at the end of excavation will be retained at 1:5 vertical to horizontal.

3.1.3 Equipment

All operational equipment will work on the pit 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 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 3. 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.
Finlay Screen	Used for the screening of sand.
Front end wheel loader	Loaders will be used for the movement of sand and loading road trucks.
Radial Stacker	Used for removing sand material
Excavator	An excavator may be used for the removal of sand material.
Fuel storage	No fuel will be stored onsite.
Light vehicles	Access to and around the site.
Road truck	Removal of sand from site.

3.1.4 Water Usage

Water is only required for dust suppression within the pit and the access road. Water will be sourced offsite from a potable water standpipe, as required.

4 POTENTIAL IMPACTS AND MANAGEMENT

This Section provides and overview of the potential impacts to water resources associated with the proposed land use, and the proposed management measures to address the identified impacts.

4.1 Surface Water

The current water cycle within the subject site consists of inputs from rainwater flowing downhill into the wider drainage system. The development will maintain this process, with all surface water being retained within the excavated areas to enable infiltration through the base of the pit to ensure water quality to the drains is maintained.

An MU wetland is located to the north of the subject site (refer to **Figure 3**). A buffer of at least 50 m from the excavation area to the mapped boundary of all wetlands will be maintained.

MU wetlands are assessed as possessing few remaining ecological attributes and functions, which is characteristic of these mapped areas adjacent to the subject site. While such wetlands can still contribute to regional or landscape ecosystem management, including hydrological function, they are considered to have low intrinsic ecological value. The mapped wetland adjacent to the subject site is not a moving water body and is located within an existing paddock fertilised and containing cow manure. 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 proposed activities are not proposing to alter the natural surface flow process, with all water being retained within the excavated areas to enable infiltration through stormwater pits to ensure water quality is maintained.

The mobilisation and positioning of equipment is not associated with any impacts to surface water, including stormwater runoff.

4.2 Drainage

Potential impacts associated with sedimentation and erosion from stormwater runoff during the operation of the pit will be minimised by the construction of diversion drains around the excavation areas to divert clean water away from the pit and contain any potentially sediment laden surface water within the pit.

The DWER recommendation is that surface water runoff produced within the excavation area from the two hour, 1 in 10 (10%) annual exceedance probability event should be contained within the pit (DoW 2019). Rainfall intensity has been calculated using the Bureau of Meteorology (BoM) Intensity-Frequency-Duration (IFD) data system (BoM 2021), which yields the two hour 1 in 10% (10%) annual exceedance probability event for the site at 39.1 mm. For every 1 ha area open for excavation at any time a holding volume of 391 m^3 is required. The required holding volume can be readily achieved within the excavated pit. Given the minimum width of the stages range from 88 m to 340 m when 9 m has been extracted to a depth of 1 m the holding volume of the stage will be greater than 792 m^3 to 3,060m^3.

During excavation activities, the surface will be internally drained, with the gradients in the cells being constructed to ensure that no surface water runoff occurs.

A risk assessment relating to surface water and stormwater runoff in consideration of the proposed management measures is provided below. The residual risk associated with sedimentation and erosion from stormwater runoff during the operation of the extractive industry is considered low.

Table 4. Risk assessment associated with surface water and stormwater.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Erosion and sedimentation	Uncontrolled and contaminated stormwater runoff	Erosion and sedimentation resulting in poor surface water quality in surrounding waterways.	Construction of diversion drains around the excavation areas to divert clean water away from the pit and contain any potentially sediment laden surface water within the pit. Excavation undertaken with a gradient to ensure that stormwater is contained within the excavation footprint.	1	2	Low

4.3 Groundwater

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

Maximum excavation levels have been determined to ensure at least 0.5 m separation from the maximum groundwater level will be maintained at all times. The final contours of the pit will provide an undulating surface at approximately 22.3 m AHD to 24.6 m AHD. This will provide a separation of at least 0.7 m between the final contours and the maximum groundwater elevation. As previously discussed, a safety factor has been applied to these calculations taking into account historic groundwater levels to ensure annual variability does not preclude this separation. This separation to groundwater is consistent with advice provided by the DWER and subsequently many previously approved extractive industry operations in the southwest.

The specific 2 m separation distance was originally recommended for operations in highly sensitive environments such as Public Drinking Water Areas (PDWA) (refer to *Water Quality Protection Note 15*). Furthermore, it is noted that the *Government Sewage Policy 2019* recommends a 0.6 m to 1.5 m separation distance from the discharge point of an onsite sewage system to groundwater. As opposed to sewage systems, extractive industries are not associated with any environmental discharges (excluding accidental spills which can occur in any land use). The extraction and processing of sand is a chemically free operation with the liquids used being lubricants for machinery and fuel. There will be no storage of chemicals or fuel on the subject site. In addition, the subject site is not adjacent to any environmental sensitive areas (i.e. conservation category or Ramsar wetlands). Therefore, a 0.5 m separation to groundwater is deemed to be suitable in consideration of the low risk nature of the operation.

Table 5. Risk assessment associated with groundwater.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Contamination of groundwater	Machinery	Contamination of groundwater	Maintenance of at least 0.5 m separation from groundwater at all times.	1	2	Low

4.4 Hydrocarbons and Dangerous Goods Management

Hydrocarbons are the only dangerous goods that will be utilised within the proposed subject site for the operation of machinery. However, storage of hydrocarbons on the subject 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 incidental hydrocarbon leakages or spills during the operation of machinery. In such instances the management measures specified below will be implemented.

Table 6. Hydrocarbon and dangerous goods management measures.

Timing	Management Measure
During pit operations	Mobile refuelling of equipment and vehicles will be undertaken on site by a mobile fuelling truck on a hard stand area outside of the pit area.
	Spill kits containing appropriate equipment for control, containment and cleanup of hydrocarbon and chemical spills will be available in appropriate locations onsite and maintained.
	No vehicles or machinery are to be serviced or cleaned within the subject site.

A risk assessment to determine the residual risk associated with the uncontrolled discharge of contaminants is provided below. The risk assessment indicates that with the application of suitable management measures the potential risk associated with uncontrolled discharges is 'Low'.

Table 7. Risk assessment associated with the uncontrolled discharge of contaminants.

Hazard	Source of Hazard	Potential Impacts	Mitigation	Likelihood	Consequence	Residual Risk
Uncontrolled discharge of contaminants to land	Machinery	Contamination of soils and/or water	Refer to Management Measures provided in **Table 6**.	1	2	Low

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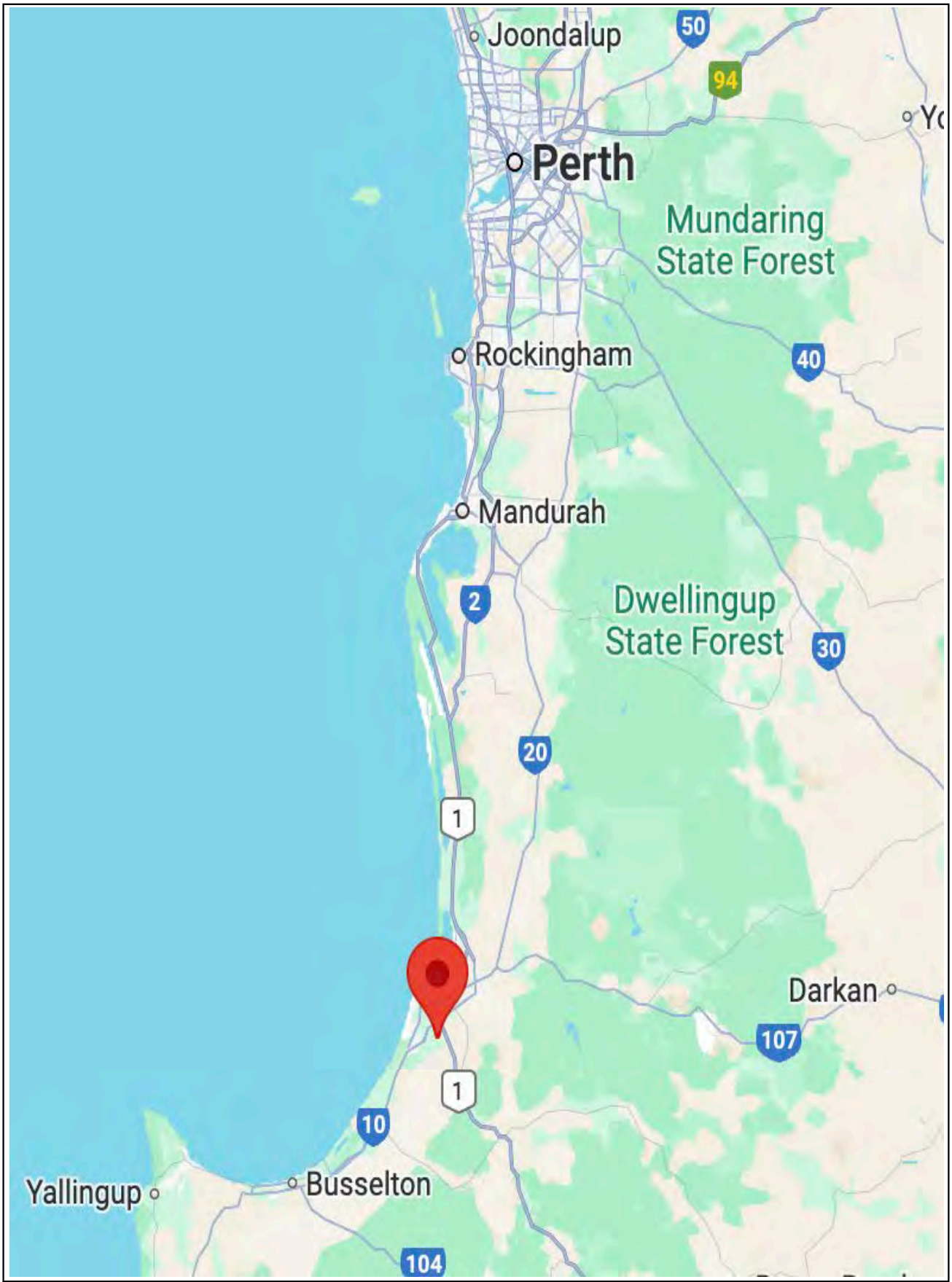
FIGURES



PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 1	A
DRAWING TITLE	Figure 1 – Site Locality	Designed NC	Checked	
		Drawn PN	Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	05/06/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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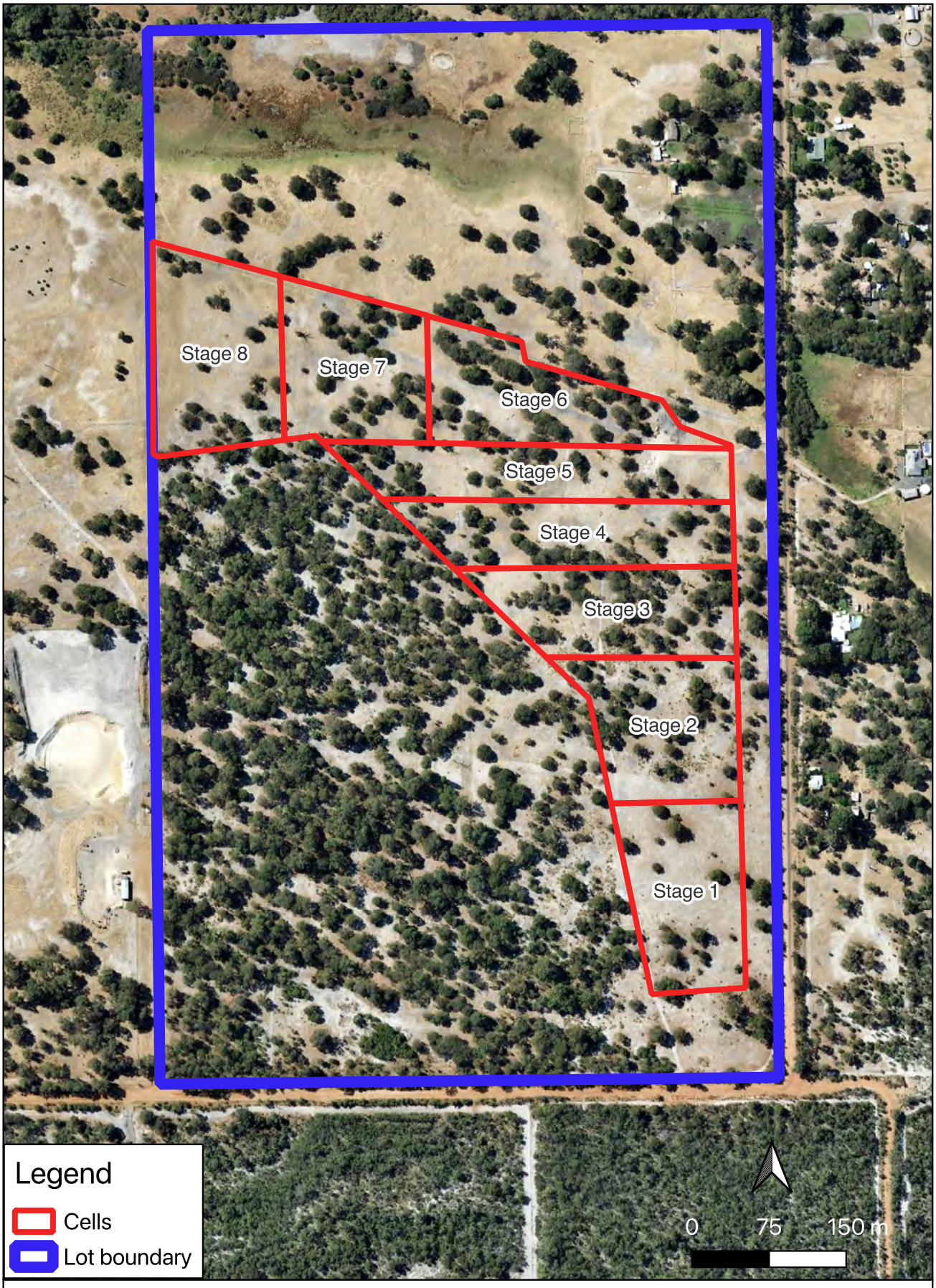

PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 2	B
DRAWING TITLE	Figure 2- Site Extent	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	23/09/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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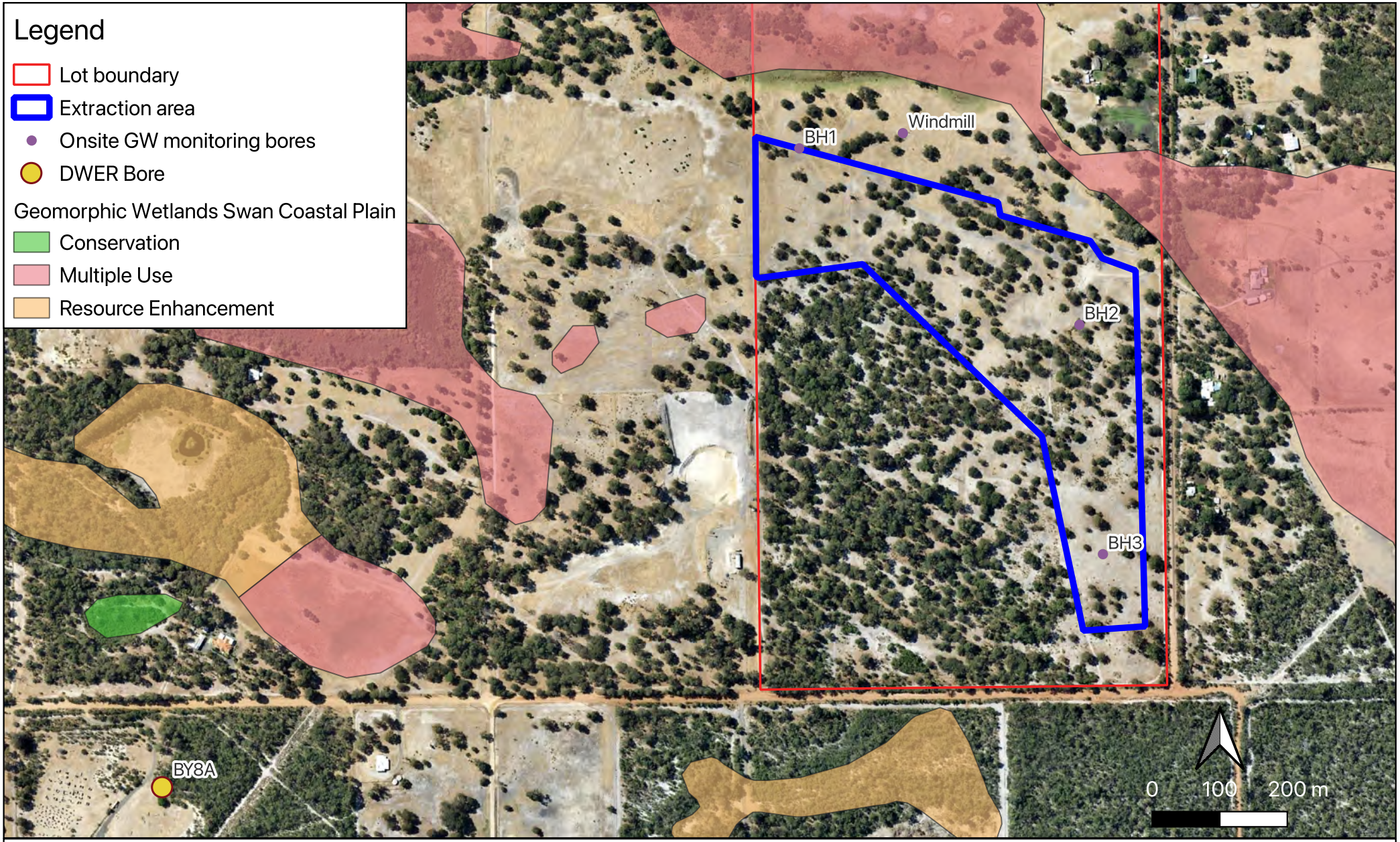

PROJECT	Lot 262 (220) Queelup Rd,North Boyanup
DRAWING TITLE	Figure 3 - Water Features
CLIENT	JW Cross Maintenance Pty Ltd

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Project Number	2538	Designed	PN
Drawing Number	Figure 3	Drawn	PN
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Date	23/09/2025	Approved	
Sheet 1 of 1		Local Authority	Shire of Capel

PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 4	A
DRAWING TITLE	Figure 4- Groundwater Contours	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	30/09/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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Legend

- Final contours
- Extraction area
- Lot boundary

PROJECT	Lot 262 (220) Queelup Rd,Boyanup
DRAWING TITLE	Figure 5 - Final contours
CLIENT	JW Cross Maintenance Pty Ltd

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Project Number	Drawing Number	Revision
2538	Figure 5	A

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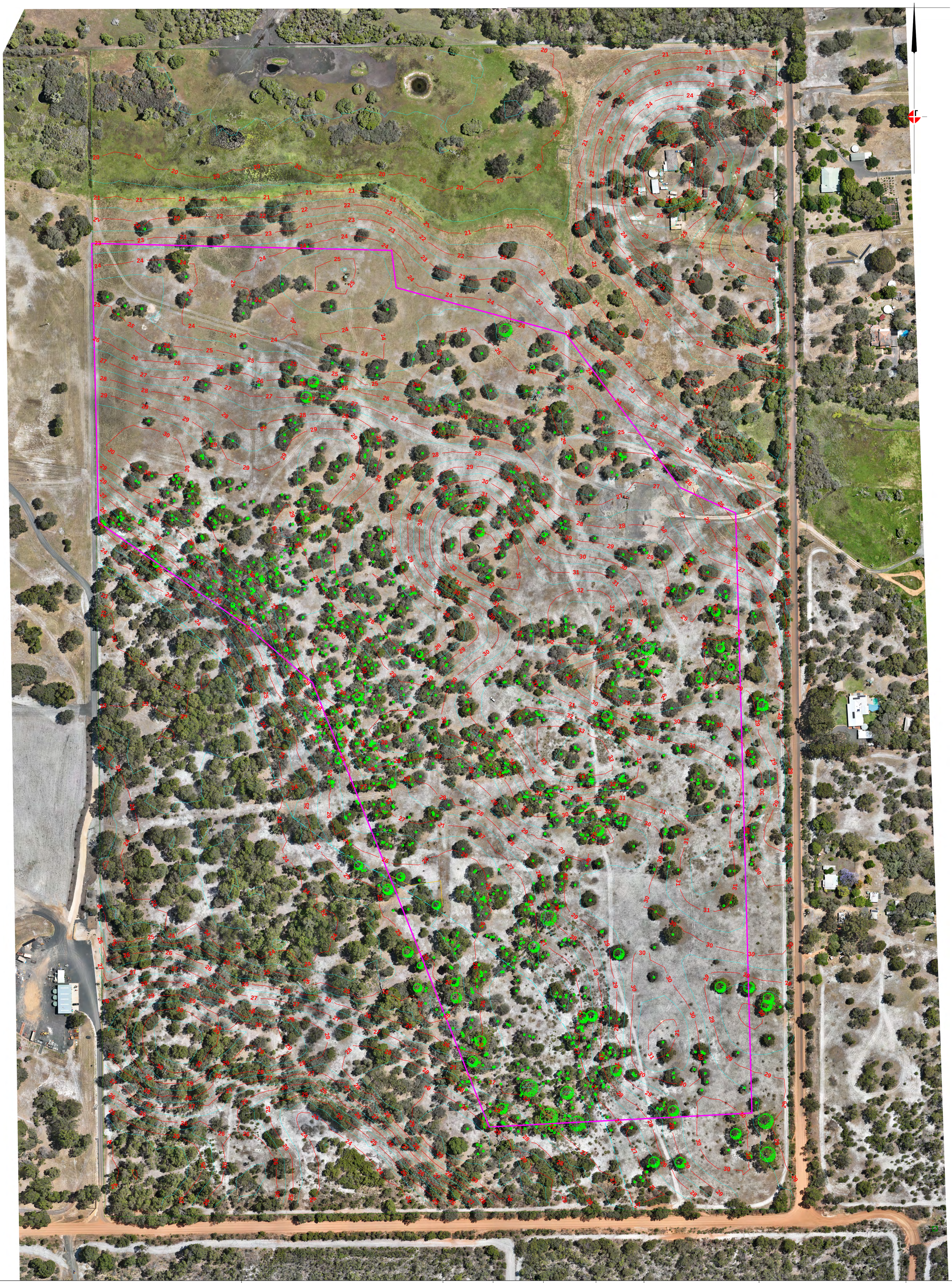
Date 30/09/2025
Local Authority Shire of Capel
Sheet 1 of 1

APPENDIX A – SITE CONTOUR SURVEY



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CLIENT:	J.W CROSS	Date: 09/12/2024	Drawn: PS	Surveyor: RRe	CHKd: PS
PROJECT:	LOT 262 (#220) QUEELUP ROAD NORTH BOYANUP	File: 23017 MGA94 DATA - Drawing001			
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TITLE:	FEATURE SURVEY				
DATUM	HOR: M.G.A. 94 Z50	VERT: A.H.D.			
A.H.D. HEIGHTS DERIVED FROM :	SSM HASTIES 21				

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REVISION SCHEDULE — Sheet 1 of 1

No.	Date	Description

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APPENDIX B - GROUNDWATER MONITORING DATA

QUEELUP BLOCK GROUND WATER RECORD

NOTE: Levels based on depth from natural ground to water table.

DATE	BORE # 1	BORE # 2	BORE # 3	WINDMILL	COMMENTS
19.08.2024	4.4 (metres)	7.6	DRY	4.0	
25.08.2024	4.2	7.5	DRY	4.0	
04.09.2024	4.0	7.4	DRY	3.9	
11.09.2024	4.0	7.5	DRY	3.8	
17.09.2024	3.9	7.7	DRY	3.7	
09.10.2024	3.9	7.8	DRY	3.8	
16.10.2024	3.9	7.9	DRY	3.8	
30.10.2024	4.0	DRY	DRY	3.9	
06.11.2024	4.0	DRY	DRY	3.9	
14.11.2024	4.0	DRY	DRY	3.9	
21.11.2024	4.0	DRY	DRY	3.9	
28.11.2024	4.1	DRY	DRY	3.9	
04.12.2024	4.1	DRY	DRY	3.9	
11.12.2024	4.1	DRY	DRY	3.9	
19.12.2024	4.2	DRY	DRY	4.0	
06.01.2025	4.2	DRY	DRY	4.0	
05.02.2025	4.4	DRY	DRY	4.1	
24.02.2025	4.6	DRY	DRY	4.1	
10.03.2025	4.7	DRY	DRY	4.1	
19.03.2025	4.8	DRY	DRY	4.1	
01.04.2025	4.9	DRY	DRY	4.1	
20.04.2025	4.8	DRY	DRY	4.0	
07.05.2025	4.8	DRY	DRY	3.9	
15.05.2025	4.8	DRY	DRY	3.9	
22.05.2025	4.8	DRY	DRY	3.9	
29.05.2025	4.7	DRY	DRY	3.8	
09.06.2025	4.6	DRY	DRY	3.8	
13.06.2025	4.6	DRY	DRY	3.8	

APPENDIX F – NOISE MANAGEMENT PLAN

NOISE MANAGEMENT PLAN

LOT 262 (No. 220) QUEELUP ROAD, NORTH BOYANUP

October 2025

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Document Control

Version	Date	Author	Reviewer
V1	22/9/2025	PN	KMT
V2	28/10/2025	PN	KMT
Filename	2538_Lot 262 Queelup Rd NMP_v2		

Limitations

This report has been prepared by Accendo Australia Pty Ltd in accordance with the scope limitations provided in this report, or as otherwise agreed, between the Client and Accendo.

This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

This report has been prepared based upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report, which Accendo has not independently verified or checked beyond the agreed scope of work. Accendo does not accept liability in connection with such unverified information.

The conclusions and recommendations in this report are based on assumptions made by Accendo described in this report where and as they are required. Accendo disclaims liability arising from any of the assumptions being incorrect.

The report is based on site specific conditions encountered and information received at the time of preparation of this report or the time that site investigations were undertaken. Accendo disclaims responsibility for any changes that may have occurred after this time.

The preparation of this report has been undertaken and performed in a professional manner, in consideration of the scope of services and in accordance with environmental consulting practices. No other warranty is made.

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

JW Cross Maintenance Pty Ltd (the applicant) is proposing to extract sand from approximately 16.36 hectare (ha) area within Lot 262 (No. 220) Queelup Road, North Boyanup (herein referred to as the subject site) (refer to **Figure 1** and **Figure 2**).

The available volume of sand (*insitu* volume of approximately 500,000 m^3) is to be extracted, commencing to the south of the subject site and moving in a northerly direction.

The slope of the final contours of the pit will slope from approximately 22.3 m Australian Height Datum (AHD) in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north.

Slopes of the batters at the end of excavation will be retained at 1:5 vertical to horizontal.

1.2 Purpose and Scope

This Noise Management Plan (NMP) has been prepared 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 noise emissions associated with the proposed land use. This document has been prepared to support and should be read in conjunction with, the *Extractive Industry Operations Plan* prepared by Accendo Australia (2025) for sand extraction within the subject site.

The Plan will describe the proposed management measures necessary to ensure noise impacts on surrounding receptors will be managed in accordance with best practice and the *Environmental Protection (Noise) Regulations 1997*.

2 EXISTING ENVIRONMENT

2.1 Land Use

The subject site is zoned 'Rural' under the Shire of Capel's *Local Planning Scheme No. 8* (LPS 8) and the *Greater Bunbury Region Scheme* (GBRS). The subject site is located within the 'Special Control Area – Strategic minerals and 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 to the east and southeast of the subject site is zoned 'Rural' and 'Local Road' under the LPS 8 and 'Rural' under the GBRS. Properties to the north, west and southwest of the subject site are zoned 'Rural' under the LPS 8 and GBRS. Properties that are located to the northeast of the subject site over Queelup Road are zoned 'Rural Residential' under the LPS 8 and 'Rural' under the GBRS.

Historically the subject site has been used for livestock grazing, resulting in the disturbance of the majority of native vegetation onsite. Intact remnant vegetation remains in the southwestern portion, with the remainder of the subject site comprised of mature paddock trees.

2.2 Topography and Soils

The current topography of the subject site can be described as sloping with the elevation ranging from 24 m AHD in the north and northwest corner to 33 m AHD in the centre before falling again to 26 m AHD in the southeast (refer to **Appendix A**).

The subject site is located within the Bassendean System of the Bassendean Zone consisting of fixed dunes inland from coastal dune zone containing non-calcareous sands, podsolised soils with l ow-lying wet areas. The Bassendean system consists of "*Sand dunes and sandplains with pale deep sand, semi-wet and wet soil*" (Natural Resource Information (NRInfo)).

The subject site is located within the Bassendean B1b soil phase consisting of "*very low relief dunes of undulating sand plain with deep bleached grey sandy A2 horizons and pale yellow B horizons*" (NRInfo).

2.3 Climate

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

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30.1°C. July has the lowest average temperature of the year of 7.4°C.

Rainfall for the area is approximately 737.3 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 17-18 knots, swinging to the south-west at approximately 22 knots in the afternoon. During winter, the winds are most commonly 12-19 knots from 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 39.1 mm/hr.

3 EXTRACTION ACTIVITIES

The sand pit will cover an area of approximately 16.35 ha, with a current maximum elevation ranging from 24 m AHD to 33 m AHD. It will be excavated to a maximum depth ranging from 1.96 m to 6.26 m below ground level (BGL) commencing in the south and moving initially in a northerly direction in stages 2 ha in size (refer to **Figure 2**). The proposal does not include any crushing of material.

A 10 m buffer to the drip line of all trees outside of the extraction area and a 20 m buffer to the property boundary will be maintained, excluding the western boundary. Excavation will occur to the western property boundary to ensure topographic continuity with the adjoining property on which sand extraction has previously occurred.

It is estimated that the total maximum volume of sand to be removed will be approximately 500,000 m^3 with up to 50,000 m^3 excavated each year, depending on supply and demand.

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

3.1 Operational Works

3.1.1 Truck Movements

Access from the property will be via Ducane Rd and Queelup Rd, travelling north to Lillydale Road (refer to **Figure 3**). The road intersection will be asphalt, with sealing up to the length of a vehicle. Signage will be erected 100 m either side of the road access advising of trucks entering.

It is proposed to extract a maximum of approximately 100,000 m^3 or bank cubic metres (BCM) per year. The average daily extraction rate:

= 50,000 BCM / 52 weeks / 5 working days per week
= 192 BCM per day.

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):

= 50,000 BCM x 70% / 32 weeks / 5 working days
= 220 BCM per day.

The average daily extraction rate (LCM):

= 220 BCM x 1.15
= 253 LCM

It is proposed to utilise 19.0 m semi-tippers which in accordance with the *City of Busselton Local Planning Policy No. 2.3 – Extractive Industries* has a capacity of approximately 18.9 LCM of sand. Accordingly, the average daily truck movements during the main season are as follows:

= 253 LCM/ 18.9 LCM truck capacity
= 13 truck movements per day x 2 (to and from)
= 26 trips per day x 2 (peak fluctuations)
= 52 trips per day maximum.

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.

3.1.2 Sand Extraction

The sand will be excavated by an excavator and loader 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 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 pit to provide visual and acoustic screening.
- Excavation will commence in the south of the pit and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of pit, 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 pit will be deep ripped, covered by topsoil, and rehabilitated to a constructed soil.

3.1.3 Final Contours

The slope of the final contours of the pit will slope from approximately 22.3 m AHD in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north.

Slopes of the batters at the end of excavation will be retained at 1:5 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.

3.1.4 Rehabilitation

Progressive rehabilitation within the extraction footprint will be undertaken as far as practicable. Works will commence in the south of the site and move in a northerly direction. Rehabilitation will be completed upon the completion of the pit.

Upon completion, 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.

3.2 Proposed Operating Times

Typical operating hours for quarries will be adopted for the subject site which involves 7 am to 5 pm each Monday to Friday. The subject site will be worked by 2 - 3 persons, depending on market demand.

The proposed transport route is a designated bus route. To ensure that trucks are not operating on designated school bus routes at the same time as the bus, trucks will not operate on the route during designated periods 15 minutes before and after the expected school bus times. Given that school bus times are regularly subject to change (due to school holidays and schedule changes based on pick up/drop off points), the applicant will be responsible for liaising with the school bus company prior to the commencement of school holidays and every school term. The pit operators will be careful to ensure compliance with these requirements.

3.3 Equipment

All operational equipment will work on the pit 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 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 1. 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.
Finlay Screen	Used for the screening of sand.
Front end wheel loader	Loaders will be used for the movement of sand and loading road trucks.
Radial Stacker	Used for removing sand material
Excavator	An excavator may be used for the removal of sand material.
Fuel storage	No fuel will be stored onsite.
Light vehicles	Access to and around the site.
Road truck	Removal of sand from site.

4 NOISE IMPACTS AND MANAGEMENT

4.1 Sensitive Receptors

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 where no crushing will take place, 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 4.**

Table 2. Residential dwellings within 1,000 m of the subject site.

Resident No.	Distance to subject site (m)
1	65 m
2	93 m
3	168 m
4	188 m
5	271 m
6	448 m
7	592 m
8	595 m
9	612 m
10	675 m
11	752 m
12	900 m
13	992 m

The closest residential dwelling to the subject site is located 65 m from the eastern boundary. Additionally, a residential estate comprising of 17 houses is located approximately 448 m to 877 m from the northeastern boundary of the subject site.

4.2 Noise Generating Activities

The project works will involve the use of machinery and equipment that will generate noise during operation. Sources of noise from the subject site will included:

- Machinery noise from equipment use.
- Noise from safety equipment (beepers on machinery).
- Noise from trucks departing the site.

Reversing alarms can represent significant nuisance noise to sensitive receptors. There are a number of alternatives to alarms that maintain a safe work environment and also comply with occupational health and safety legislation. Reversing alarms alert pedestrians when a vehicle is moving, however, given that no pedestrians will be onsite (private property), the applicant has committed to using flashing lights or a broadband alarm system as an alternative. The sound of a broadband alarm is much less intrusive by nature than the sound of a tonal alarm and tends to be masked by the background noise at a lesser distance. This will eliminate/reduce noise emissions associated with reversing alarms.

Extraction activities will only be undertaken during standard hours of operation (in accordance with the conditions of the Extractive Industry Licence). A summary of potential noise generating activities is presented in **Table 3**.

Table 3. Noise generating activities.

Activity	Duration	Equipment to be used	Sound pressure Level (dB(A))	Comments
Topsoil stripping	3 weeks per year	CAT 966 Front end Wheel Loader (FEL) or similar	109	Initial impact to closest resident which will reduce as stockpiles increase.
Excavation and stockpiling of sand	80% of works undertaken within 6 months of the year	CAT 330F Excavator	104	Noise will be muffled by stockpiles present at edge of excavation areas.
Loading of trucks from stockpiles	A maximum of 5 years with up to 80 loads per day, dependent on demand.	Single Semi-loader, semi – tipper or road train	103	Noise will be muffled by stockpiles, vehicles are new and well maintained.

Noise levels have been obtained from a combination of manufacturers' specifications and from measurement of the plant undertaken at Nuttman Road, Walsall (Lloyd George Acoustics 2022).

A Noise Assessment was undertaken by Lloyd George Acoustics (Lloyd George 2025) (refer to **Appendix B**) which demonstrated that noise levels resulting from the extraction and screening works, are predicted to exceed the assigned level of 45dB $L_{A10.}$ To address the noise exceedance, it is recommended to construct noise bunds around the future location of the proposed screening fixed plant. The height of these boundary bunds should be as high as is reasonably practicable to a minimum of 5.0 m above the base of pit ground height as detailed within **Figure 6-1** of **Appendix B**.

The predicted noise levels with these bunds in place are below the assigned level of 45dB L_{A10} at all residents.

4.3 Noise Management Measures

The proponent will ensure that noise emissions comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. In addition, the management measures prescribed within **Table 4** will be implemented to reduce noise emissions as far as practicable.

Table 4. Management actions for noise.

Item	Action	Trigger/Timing	Responsibility
Inductions			
1	As part of site inductions, employees, contractors and visitors to the site are reminded of their responsibility to undertake work activities in an environmentally sensitive manner, including minimising noise while on site, or entering and leaving the site.	Ongoing	Site Manager
Planning Controls			
2	Daily Planning • The use of significant noise generating equipment or activities simultaneously is avoided. • The noisiest activities are scheduled to the least sensitive times of the day.	Where possible	Site Manager
3	Regular review of meteorological data, specifically wind speed and direction, to guide decisions on quarrying activities.	As required, with consideration to the intensity of activities onsite and the prevailing weather conditions	Site Manager
Operational Controls			
4	Equipment and Machinery • Use machinery and equipment with minimal noise output levels. • Ensure all machinery is regularly serviced as per the equipment's maintenance schedule to minimise noise generation. • Where appropriate, all machinery and equipment will be shut off when not in use. • Use flashing lights/broadband alarms instead of tonal reversing alarms on excavators/loaders. • Apply speed restrictions (15 km/hr within site) and a ban on exhaust braking.	Continuous	All employees & contractors
5	Earth bunds • Topsoil will be used to form perimeter bunds to assist with noise screening. • Earth bunding around the fixed plant, as specified in Figure 6-1 of **Appendix B** will be constructed to reduce noise impacts surrounding Residents.	Prior to quarrying	Site Manager

Item	Action	Trigger/Timing	Responsibility
Inductions			
Complaints Management			
6	Erect on-site signage directing public to make complaints to the relevant person.	Prior to quarrying	Site Manager
7	Maintain a complaints register (refer to **Appendix C**). A Complaints Register will be established for the site to record the following information: • Date, time, location and nature of the exceedance. • Identify the cause (or likely cause) of the exceedance and responsible parties. • Identify the activities that were occurring at the time of the non-compliance. • Determine the activities that were most likely contributing to the non-compliance. • Describe what action has been taken to date. • Describe the proposed measures to address the exceedance. If the complaint is verified as being due to a site source, remedial action will be undertaken within 2 hours. The Shire of Capel will be advised of all complaints as soon as they are received. If a compliant cannot be resolved within the 2 hour response period, it may be necessary to cease operations.	Upon receiving complaint	Site Manager

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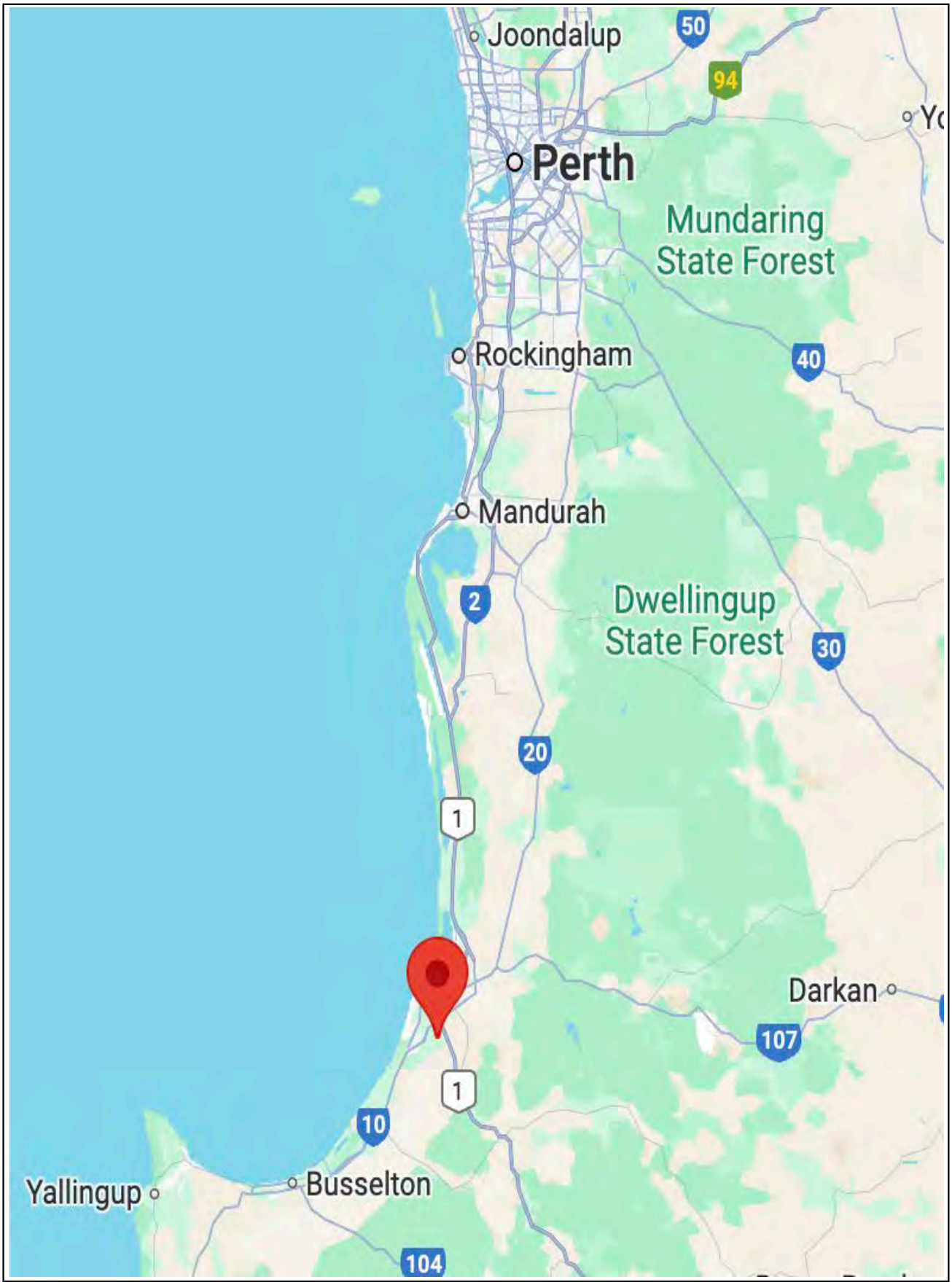
FIGURES



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		Sheet 1 of 1		

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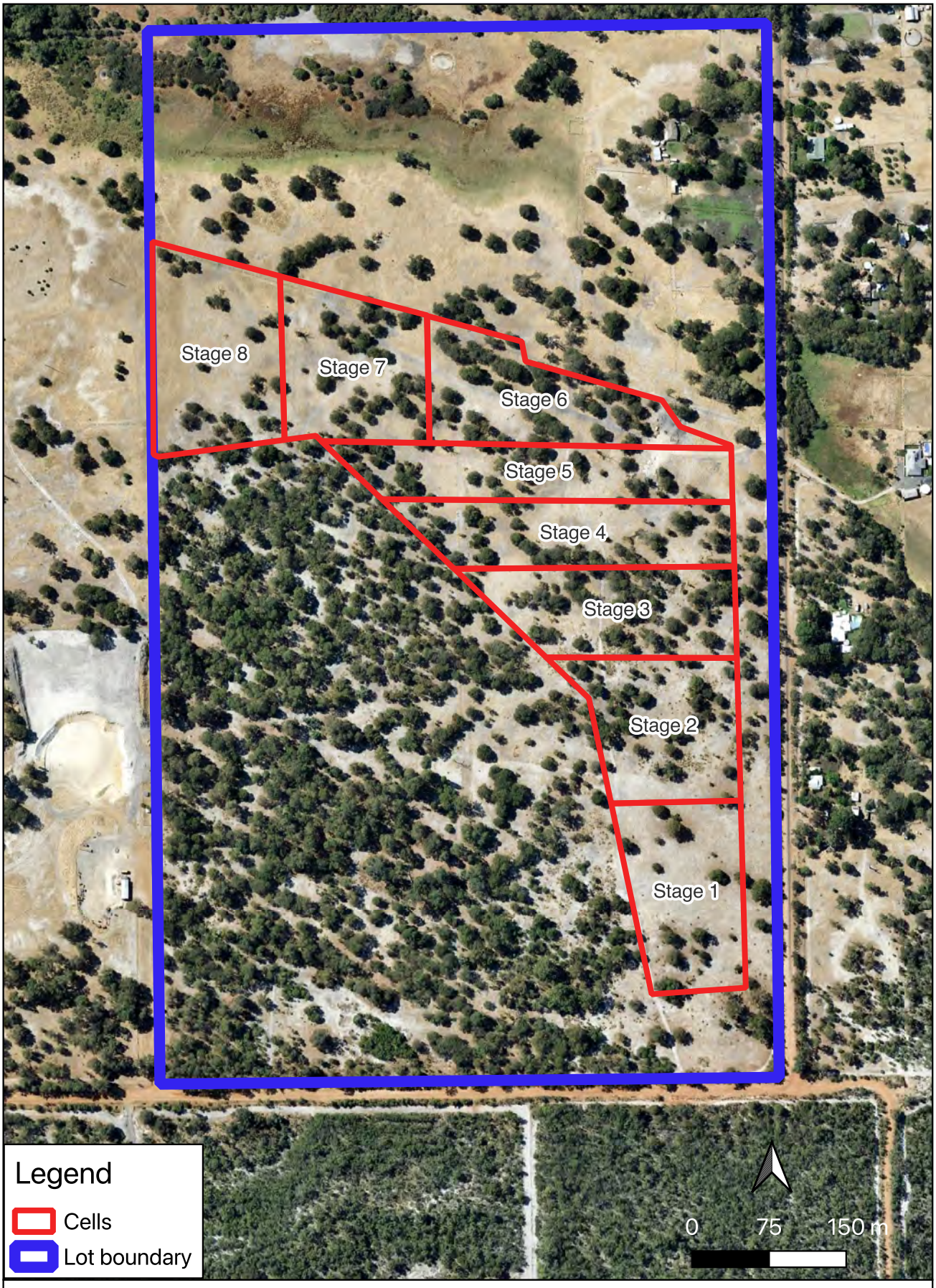

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		2538	Figure 2	B
DRAWING TITLE	Figure 2- Site Extent	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	23/09/2025	
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		Sheet 1 of 1		

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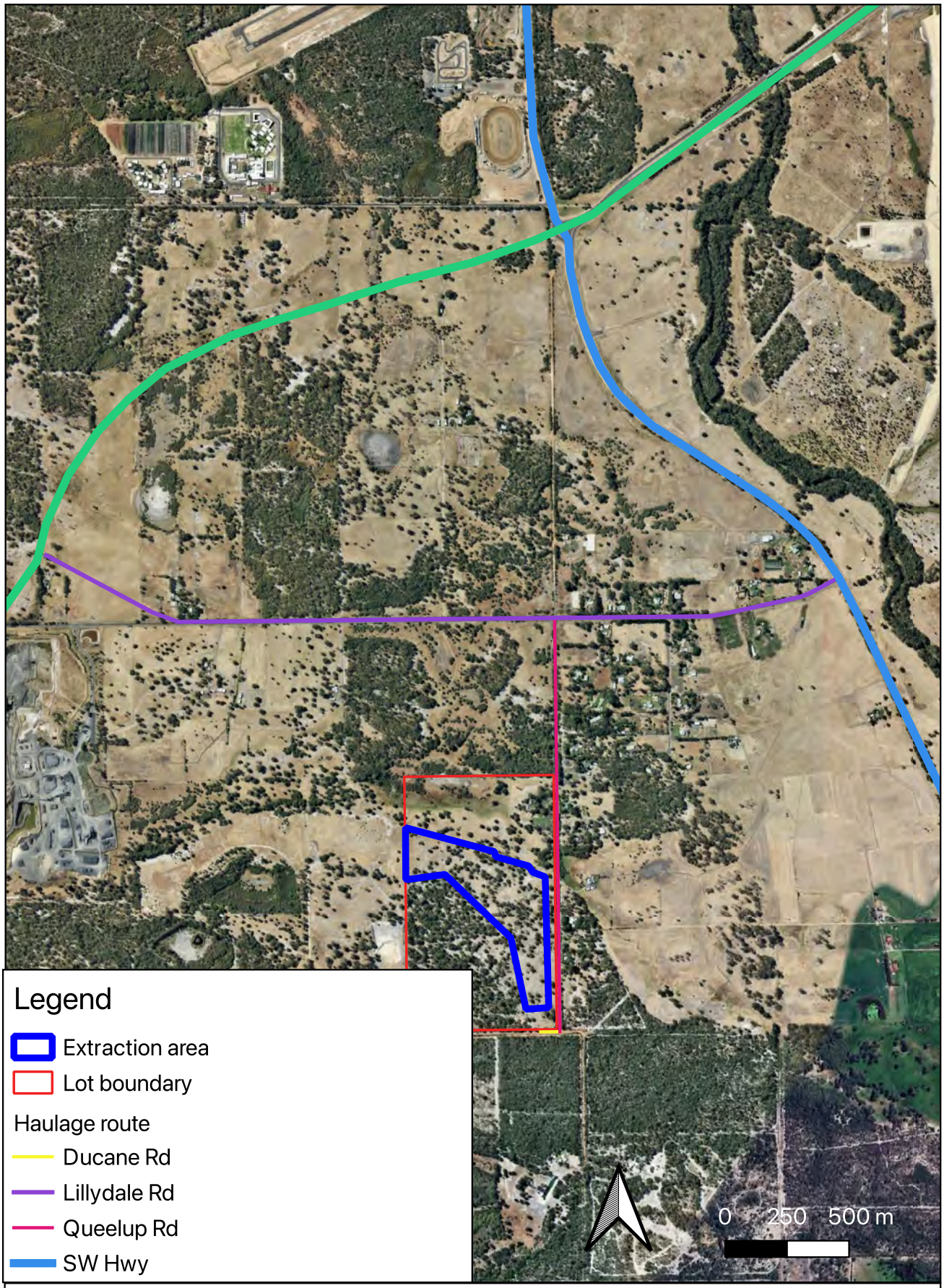

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DRAWING TITLE	Figure 3 - Haulage Route	2538	Figure 3	A
CLIENT	JW Cross Maintenance Pty Ltd	Designed NC Drawn PN	Checked Approved	
		Date Local Authority Sheet 1 of 1	30/09/2025 Shire of Capel	

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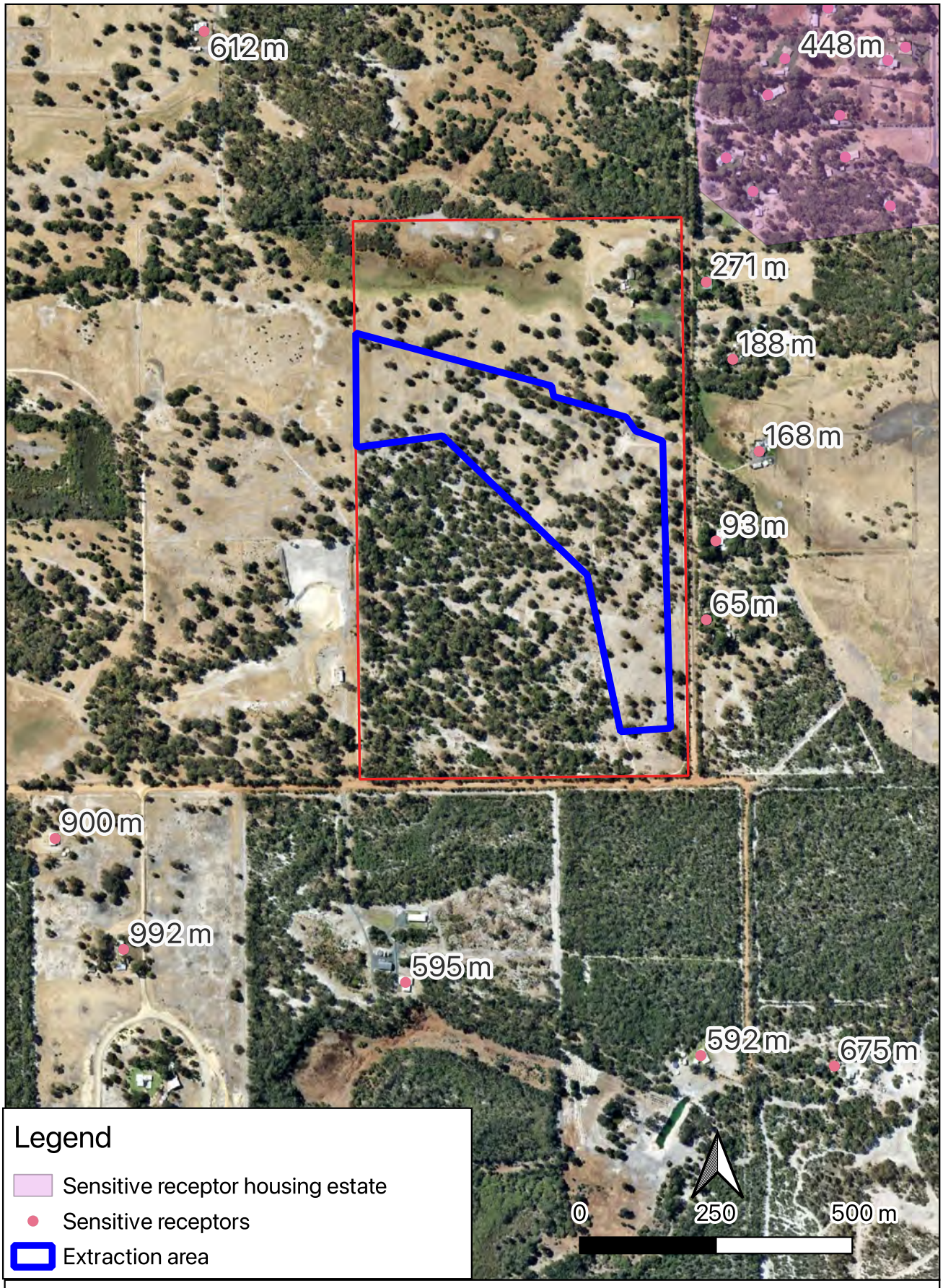

PROJECT	Lot 262 (220) Queelup Rd,Boyanup	Project Number	Drawing Number	Revision
DRAWING TITLE	Figure 4 - Sensitive receptors	2538	Figure 4	A
CLIENT	JW Cross Maintenance Pty Ltd	Designed NC Drawn PN	Checked Approved	
		Date Local Authority Sheet 1 of 1	23/09/2025 Shire of Capel	

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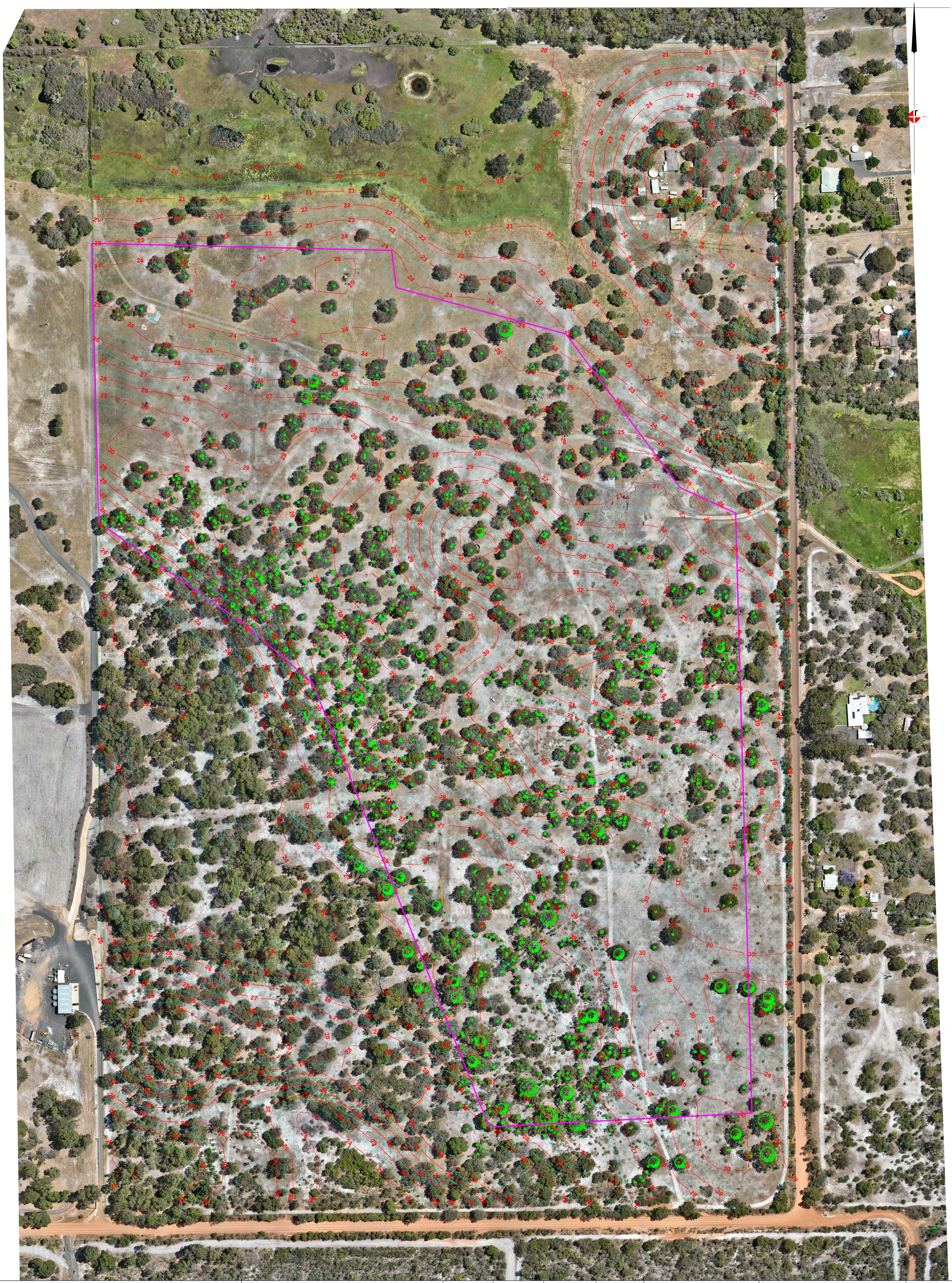
Mobile 0418 950 852

APPENDIX A – SITE CONTOUR SURVEY



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CLIENT:	J.W CROSS	Date: 09/12/2024	Drawn: PS	Surveyor: RRe	CHKd: PS
PROJECT:	LOT 262 (#220) QUEELUP ROAD NORTH BOYANUP	File: 23017 MGA94 DATA - Drawing001			
		Scale (@A1)	1:1500		
TITLE:	FEATURE SURVEY				
DATUM	HOR: M.G.A. 94 Z50	VERT: A.H.D.			
A.H.D. HEIGHTS DERIVED FROM :	SSM HASTIES 21				

ISO 9001 : ISO14001 : ISO 45001 Global-Mark.com.au®

REVISION SCHEDULE — Sheet 1 of 1

No.	Date	Description

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APPENDIX B - NOISE ASSESSMENT

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Environmental Noise Assessment - Extractive Materials Pit

Lot 262 (#220) Queelup Rd, North Boyanup

Reference: 250710497-01b

Prepared for:
JW Cross c/o Accendo Australia

Reference: 250710497-01

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Date	Rev	Description	Author	Verified
25-Jul-25	0	Issued to Client	Rob Connolly	Terry George
29-Jul-25	A	Heading change	Rob Connolly	-
21-Aug-25	B	Revised Plant	Rob Connolly	Terry George

CONTENTS

List of Tables

List of Figures

Appendices

EXECUTIVE SUMMARY

The noise emissions resulting from a proposed extraction and screening operations at Lot 262 (#220) Queelup Rd, North Boyanup, Western Australia, have been assessed by means of predictive noise modelling and the results compared against the assigned levels within the *Environmental Protection (Noise) Regulations 1997*.

The proposed hours of operation are 7.00 am to 5.00 pm Monday to Friday. The site will be closed on Public Holidays.

The proposed plant required for the construction, extraction and crushing works includes:

- Finlay Screen;
- Radial Stacker;
- CAT 982 Front End Loader;
- CAT 336 Excavator;
- CAT Dozer for Construction Activates Only;
- Water cart moving at low speed;
- Haulage trucks moving at low speed.

Given that there is moving plant and the close proximity to the noise sensitive receivers to boundaries of the extractive area, compliance may not be practicable at all times. However based on the assumptions made, the noise predictions show that the operations can achieve compliance with the applicable regulatory criteria, between 7.00 a.m. and 7.00 p.m. Monday to Saturday at all noise sensitive receivers, providing the earth bunds are constructed around the screening plant as recommended in this assessment.

1. INTRODUCTION

Lloyd George Acoustics was engaged by JW Cross c/o Accendo Australia to undertake an environmental noise assessment for a proposed extractive pit to be located at Lot 262 (#220) Queelup Rd, North Boyanup - refer *Figure 1-1*.

Figure 1-1: Subject Site Location (Source: DPLH PlanWA)

With regard to noise emissions, consideration is given to noise from extraction, screening and loading operations when received at neighbouring properties, against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997*.

The product will be extracted from the area shown in *Figure 1-2.* The plant is assumed to be operating at base of pit level. It is understood that the Client will utilise the waste topsoil and overburden to construct noise bunds during the construction phase.

The sand pit will operate within the day period of 7.00 a.m. to 5.00 p.m. Monday to Friday. It will not be operated on Public Holidays. Trucks will arrive on site and will be loaded with sand. It is anticipated that 250 – 300 tonnes per day will be extracted/loaded. This equates to 10 - 12 trucks (20 - 24 movements) accessing the pit during a typical day. Access points will be to the south of the lot – refer *Figure 1-3*.

Screening plant will only run in campaigns, sometimes only expected to run 30% of the time. The excavator will also cover rehab which are anticipated to be biannually or possibly even annually.

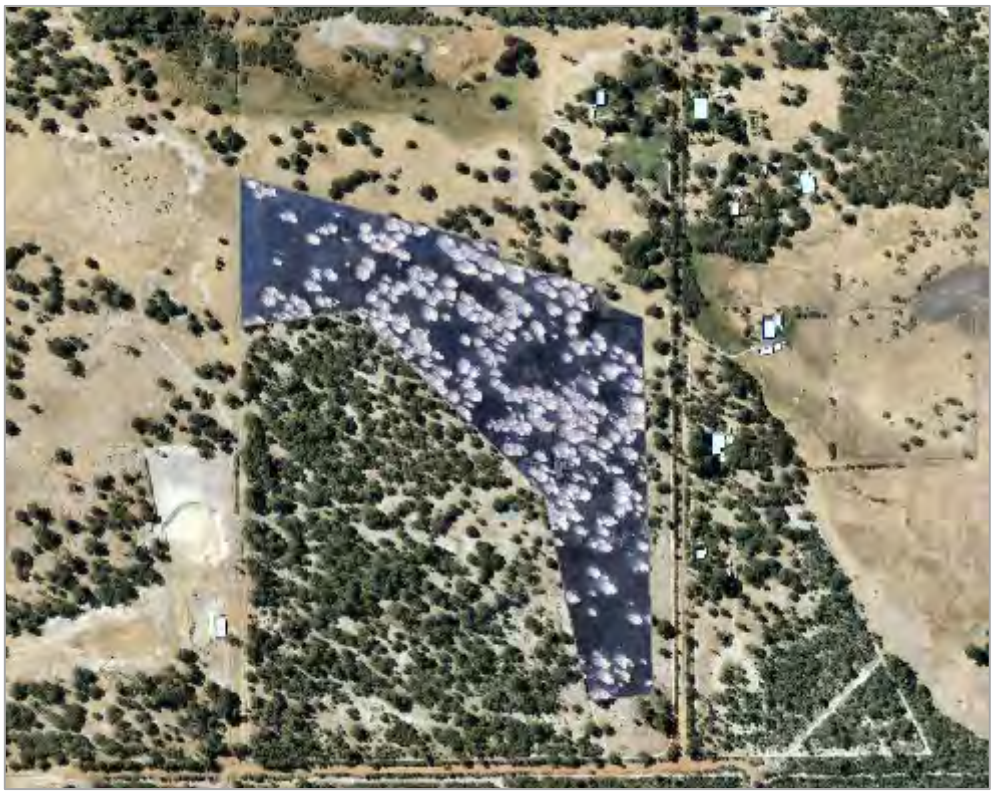


Figure 1-2: Area of Extraction Highlighted

Figure 1-3: Road Haulage Route

Appendix A contains a description of some of the terminology used throughout this report.

2. CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

2.1. Regulation 13

Regulation 13 provides the noise requirements that are to be satisfied whilst the construction activities are occurring and are detailed below:

Regulation 13(2)

"Regulation 7 does not apply to noise emitted from a construction site as a result of construction work carried out between 0700 hours and 1900 hours on any day which is not a Sunday or public holiday if the occupier of the premises or public place, shows that –

- *(a) the construction work was carried out in accordance with control of environmental noise practices set out in section 4 of AS 2436-2010 Guide to noise and vibration control on construction, maintenance and demolition sites; and*
- *(b) the equipment used on the premises was the quietest reasonably available; and*
- *(c) if the occupier was required to prepare a noise management plan … in respect of the construction site –*
  - *(i) the noise management plan was prepared and given in accordance with the requirement, and approved by the CEO or authorised delegate; and*
  - *(ii) the construction work was carried out in accordance with the noise management plan, excluding any ancillary measure;"*

Regulation 13(3)

"Regulation 7 does not apply to noise emitted from a construction site as a result of construction work carried out other than between the hours specified in subregulation (2) if the occupier of the construction site shows that -

- *(a) the construction work was carried out in accordance with control of environmental noise practices set out in section 4 of AS 2436-2010 Guide to noise and vibration control on construction, maintenance and demolition sites; and*
- *(b) the equipment used on the premises was the quietest reasonably available; and*
- *(c) the construction work was carried out in accordance with a noise management plan, excluding any ancillary measure, in respect of the construction site –*
  - *(i) prepared and given to the CEO or authorised delegate not later than 7 days before the construction work commenced; and*
  - *(ii) approved by the CEO or authorised delegate; and*
- *(d) at least 24 hours before the construction work commenced, the occupier of the construction site gave written notice of the proposed construction work to the occupiers of all premises at which noise emissions received were likely to fail to comply with the standard prescribed under regulation 7; and*
- *(e) it was reasonably necessary for the construction work to be carried out at that time."*

Regulation 13(6)

"A noise management plan prepared under subregulation (3)(c), (4) or (5A) is to include, but is not limited to -

(a) details of, and reasons for, construction work on the construction site; and
(b) details of, and the duration of, activities on the construction site likely to result in noise emissions that fail to comply with the standard prescribed under regulation 7; and
(c) predictions of noise emissions on the construction site; and
(d) details of measures to be implemented to control noise (including vibration) emissions; and
(e) procedures to be adopted for monitoring noise (including vibration) emissions; and
(f) complaint response procedures to be adopted."

Although it is stated that Regulation 7 does not apply, it is still referred to in terms of providing written notice.

2.2. Regulations 7, 8 & 9

This group of regulations provide the prescribed standard for noise as follows:

"7. Prescribed standard for noise emissions

(1) Noise emitted from any premises or public place when received at other premises –
(a) must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and
(b) must be free of –
(i) tonality; and
(ii) impulsiveness; and
(iii) modulation,
when assessed under regulation 9.

(2) For the purposes of subregulation (1)(a), a noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level at the point of reception."

Tonality, impulsiveness and modulation are defined in regulation 9 (refer *Appendix A*). Under regulation 9(3), *"Noise is taken to be free of the characteristics of tonality, impulsiveness and modulation if -*

(a) the characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and
(b) the noise emission complies with the standard prescribed under regulation 7(1)(a) after the adjustments in the table [Table 2-1] … are made to the noise emission as measured at the point of reception."

Table 2-1: Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music*			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

* These adjustments are cumulative to a maximum of 15 dB.

The assigned levels (prescribed standards) for all premises are specified in regulation 8(3) and are shown in *Table 2-2*. The L_{A10} assigned level is applicable to noises present for more than 10% of a representative assessment period, generally applicable to "steady-state" noise sources. The L_{A1} is for short-term noise sources present for less than 10% and more than 1% of the time. The L_{Amax} assigned level is applicable for incidental noise sources, present for less than 1% of the time.

Table 2-2: Baseline Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

As properties surround the proposed pit are in a rural area, away from any major or secondary roads and there are no commercial or industrial land usages, the influencing factor (IF), in relation to noise received at noise sensitive premises, has been calculated as 0 dB. It is noted that the dwelling identified as R0 is located on the same lot (Lot 262 #220 Queelup Rd) as the proposed extractive areas and as such an agreement will be entered into with the homeowner and the assigned noise levels will not be applicable at this dwelling. *Table 2-3* shows the assigned levels (ANL's) including the influencing factor during the operating hours of the pit at the receiving locations, being that of the baseline ANL's.

Table 2-3: Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
+0 dB IF Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45	55	65
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

It must be noted the assigned levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces.

The assigned levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as "*a period of time of not less than 15 minutes, and not exceeding 4 hours*, *determined by* an *inspector* or *authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission*". An inspector or authorised person is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Water Environmental Regulation. Acoustic consultants or other environmental consultants are not appointed as an inspector or authorised person. Therefore, whilst this assessment is based on a 4-hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

2.3. Regulation 3

"3. Regulations do not apply to certain noise emissions

(1) Nothing in these regulations applies to the following noise emissions –

(a) Noise emissions from the propulsion and braking systems of motor vehicles operating on a road;"

(b) a reversing alarm fitted to a motor vehicle, mobile plant, or mining or earthmoving equipment;

In regards to regulation 3(1)(a), while trucks associated with the loading of sand are on public roads, they are exempt from the Regulations, however, the noise must be assessed once they enter private land. In regards to regulation 3(1)(b), it is considered by DWER that any reversing alarms fitted to the mobile plant and transport trucks are not necessarily exempt under the Regulations, since they are not specifically required under another written law. The commonly used fixed noise output tonal reversing alarms also known as 'reversing beeper' emit, by their very nature, tonal and modulating noise at high levels. As such, this type of reversing alarm generally cannot comply with the Regulations even at distant receivers. Alternative alarms such as broadband alarms are commonly used to minimise the impact.

3. METHODOLOGY

3.1. Site Measurements

As this is a rural area, it can be expected that ambient noise levels will be low and that any noise resulting from operations at the sand pit will be audible at the nearest noise sensitive premises. Therefore, background noise monitoring was not considered to be required for this assessment.

3.2. Noise Modelling

Computer modelling has been used to predict the noise emissions from the development to all nearby receivers. The software used was *SoundPLAN 9.0* with the CONCAWE algorithms (ISO 17534-3 improved method) selected, as they include the influence of meteorological conditions. Input data required in the model are listed below and discussed in *Section 3.2.1* to *Section 3.2.4*:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.2.1. Meteorological Conditions

Meteorological information utilised is provided in *Figure 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1: Modelling Meteorological Conditions

Parameter	Day (7.00am to 7.00pm)[2]
Temperature (°C)	20
Humidity (%)	50
Wind Speed (m/s)	4
Wind Direction[1]	All
Pasquil Stability Factor	E

Notes:

1. The modelling package allows for all wind directions to be modelled simultaneously.
2. The conditions above are as defined in *Guideline: Assessment of Environmental Noise Emissions*; May 2021

* The modelling package allows for all wind directions to be modelled simultaneously.

Alternatives to the above default conditions can be used where one year of weather data is available and the analysis considers the worst 2% of the day and night for the month of the year in which the worst-case weather conditions prevail (source: *Draft Guideline on Environmental Noise for Prescribed Premises*, May 2016). In most cases, the default conditions occur for more than 2% of the time and therefore must be satisfied.

3.2.2. Topographical Data

Topographical data was adapted from publicly available information (e.g. *Google*) in the form of spot heights.

Surrounding existing buildings were also incorporated in the noise model, as these can provide noise shielding as well as reflection paths. All buildings are assumed to be single storey buildings and modelled with a height of 3.5 metres with receivers 1.4 metres above ground.

Figure 3-1 shows a 2D overview of the noise model with the location of all relevant receivers identified.

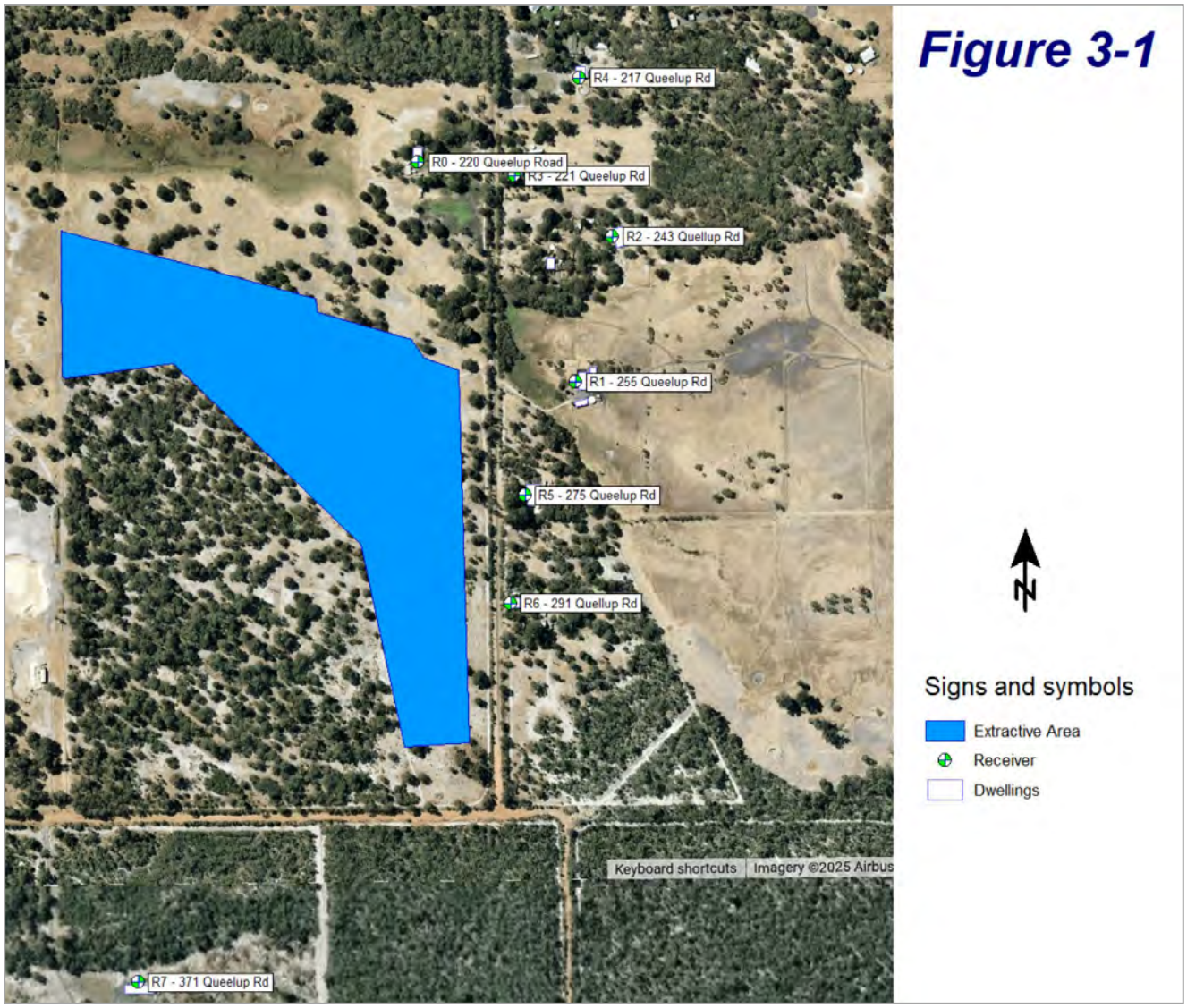


Figure 3-1: Overview of Noise Model

3.2.3. Ground Absorption

The ground absorption has been assumed to be 0.8 (80%) for the survey area, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

3.2.4. Source Sound Levels

The source sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2: Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Excavator	112	110	104	99	98	95	90	0	**104**
Finlay Screen	108	120	105	103	100	99	100	88	**109**
Trucks	107	108	101	100	97	96	87	81	**103**
Dozer, For Construction Phase Only	104	113	110	107	107	105	100	100	**112**
FEL	102	112	104	105	104	102	98	93	**109**
Radial Stacker	95	93	94	88	93	90	78	75	**96**
Water Cart	93	101	97	93	94	92	86	78	**99**

The following is noted in relation to *Table 3-2*:

- Sound power levels are a mixture of both manufacturer's and on-file data;
- All plant is assumed to be 2.0 metres above ground level (AGL);
- Sound source represents L_{10} level;
- Truck and water cart moving sound power is converted from shown sound power in Sound*PLAN* software based on travelling speed at a maximum of 30 km/hr whilst onsite;
- All sources are modelled as operating concurrently;
- Scenario 2 noise model includes the 5 metre high noise bunds (meaning a minimum of 3 metres above the screening plant height) created around the fixed plant during the construction phase;
- Fixed plant source group contains the Finlay Screen and Radial Stacker;
- Moving plant source group includes haulage trucks and water carts;
- Mobile plant source group contains all other plant.

4. RESULTS

4.1. Noise Measurements

As this is a rural area, it can be expected that ambient noise levels will be low and that any noise resulting from operations at the sand pit will be audible at the nearest noise sensitive premises. Therefore, ambient noise monitoring was not considered to be required for this assessment.

4.2. Noise Modelling

The noise levels were predicted for various scenarios:

- Scenario 1: Construction Phase – Removing topsoil/overburden and constructing 5 metre high bunds around the future screening plant area. Ground works will include the use of up to 1x Excavator, 1x water cart, 1x dozer, 1x front end wheeled loader (FEL) and haulage trucks. Ground level will be lowered with the removal of overburden/topsoil during this phase. All plant operating concurrently.
- Scenario 2: Normal Operations – Removing the sand material involving the use of 1x FEL, 1x water cart, 1x excavator, 1x screen, 1x radial stacker and haulage trucks entering and existing the site after being loaded by the FEL. Noise model includes the 5 metre high noise bunds created around the fixed plant during the construction phase. All plant operating concurrently.

4.2.1. Scenario 1 – Construction Phase

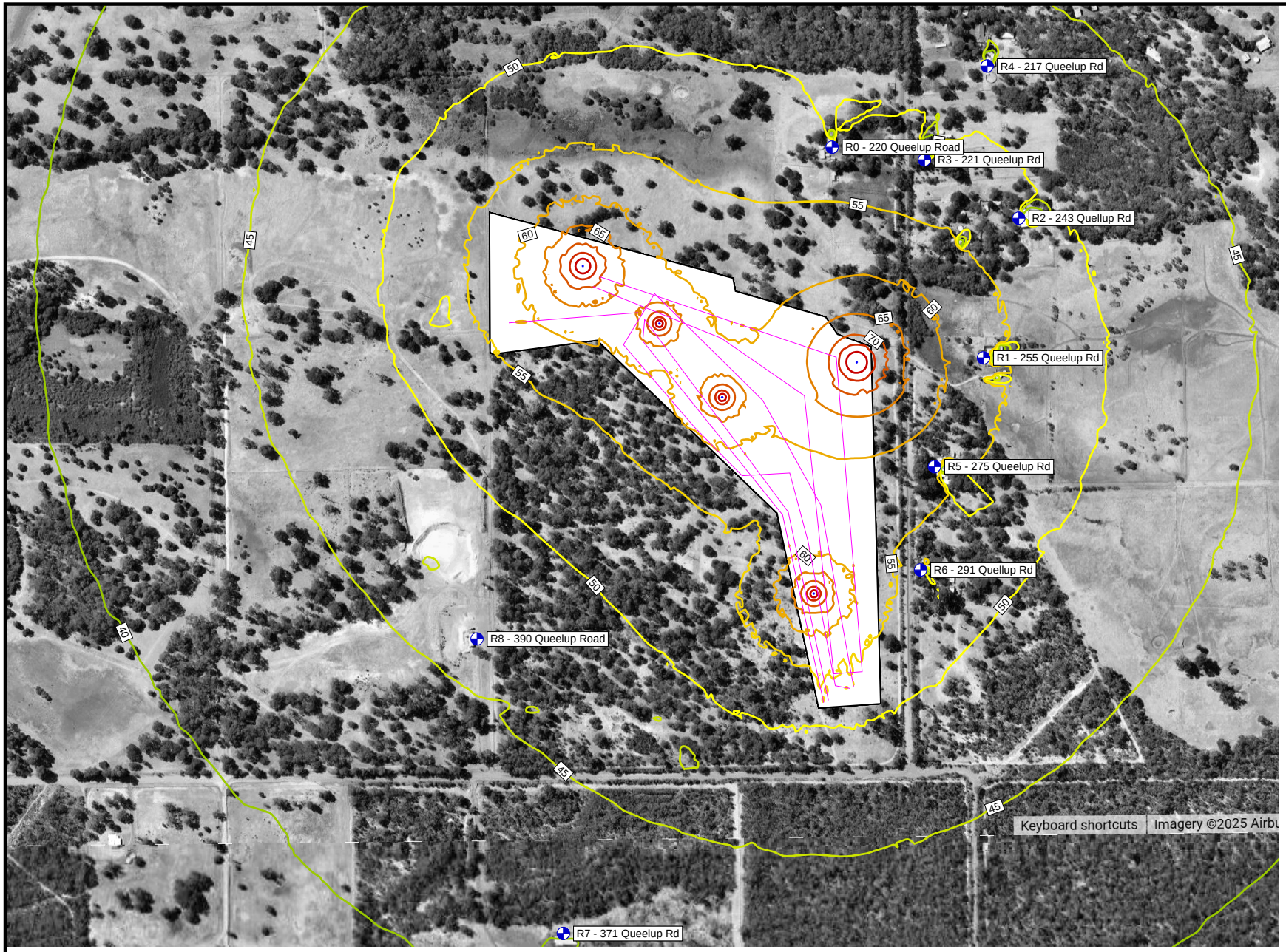
The predicted noise levels during the construction phase of stripping the topsoil, moving the topsoil and overburden and construction of 5 metre high noise bunds around the location of future fixed crusher/screening plant are provided in *Table 4-1*. A noise contour plot is also provided in *Figure 4-1* showing noise levels at ground floor.

Table 4-1: Scenario 1 - Predicted Levels during Construction Phase, L_{10} dB(A)

Receiver	Predicted Nosie Level	Adjusted Nosie Level[1]
R0 - 220 Queelup Rd	53	58
R1 - 255 Queelup Rd	57	62
R2 - 243 Quellup Rd	52	57
R3 - 221 Queelup Rd	52	57
R4 - 217 Queelup Rd	48	53
R5 - 275 Queelup Rd	57	62
R6 - 291 Quellup Rd	54	59
R7 - 371 Queelup Rd	42	47
R8 - 390 Queelup Rd	47	52

* Adjusted by + 5 dB for tonality

Figure 4-1



Predicted Noise l
L_{A10} dB

- = 40
- = 45
- = 50
- = 55
- = 60
- = 65
- = 70
- = 75
- = 80

N

Signs and symbols

- Extractive Area
- Point source
- Line source
- Receiver

Scale 1:8250

0 40 80 160 240 320 m

Scenario 1 - Construction Phase - Lot 262 (#200) Queelup Road, North Boyanup - Predicted Noise Levels

L_{A10} Noise Level Contours - Mobile Plant Only - No Tonality Penalty Included - Ground Floor

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4.2.2. Scenario 2 – Normal Operations

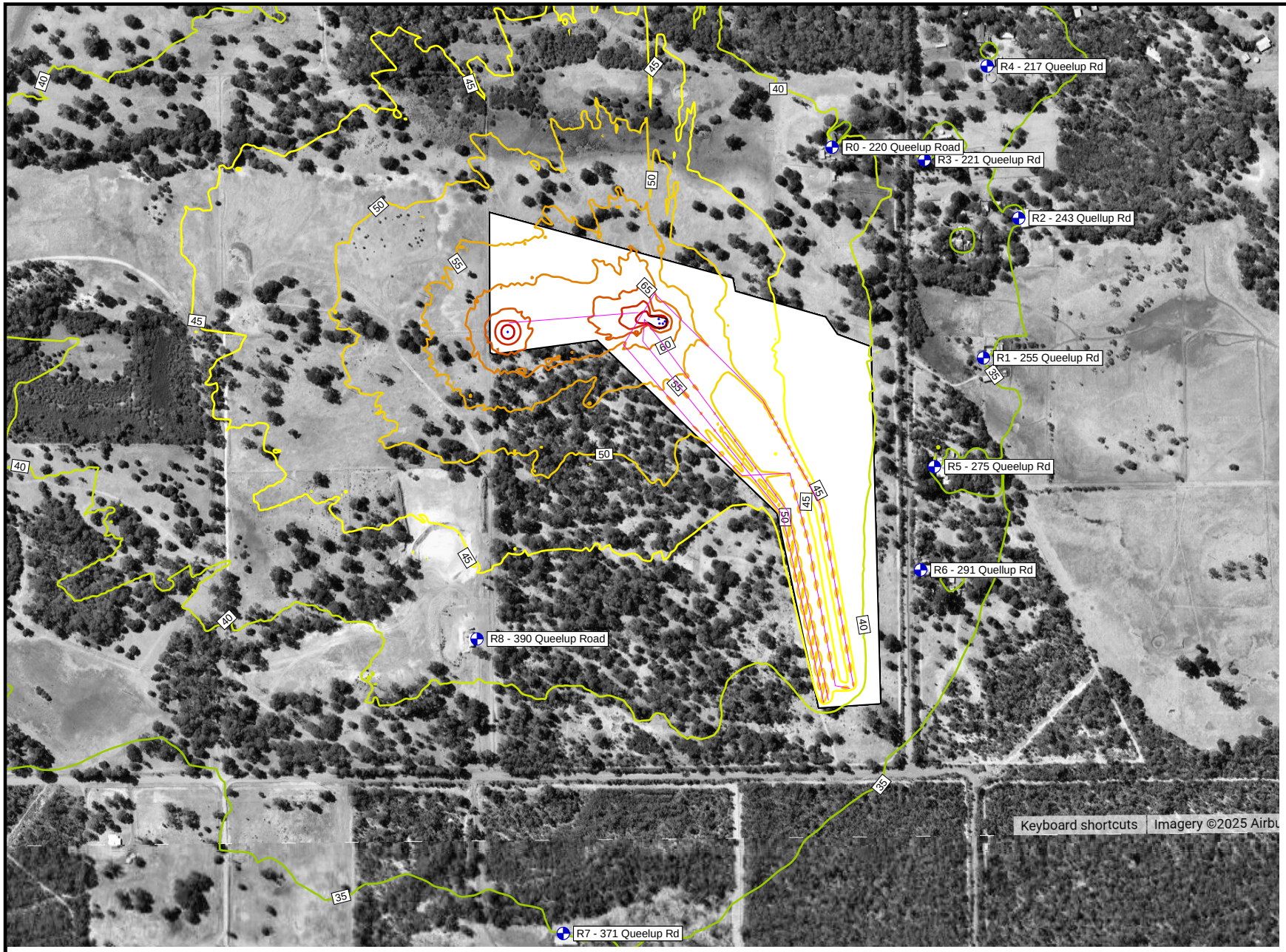
The results for the Normal Operations Scenario 2 are provided in *Table 4-2*. A noise contour plot is also provided in *Figure 4-2* showing noise levels at ground floor.

Table 4-2: Scenario 2 – Normal Operations Predicted Levels, L_{10} dB(A)

Receiver	Fixed Plant	Moving Haulage Trucks & Water Cart	Stationary Trucks Being Loaded	All Other Mobile Plant	Overall
R0 - 220 Queelup Rd	38	24	32	40	**42**
R1 - 255 Queelup Rd	29	25	22	35	**36**
R2 - 243 Quellup Rd	27	22	25	33	**35**
R3 - 221 Queelup Rd	30	22	27	37	**38**
R4 - 217 Queelup Rd	35	19	26	35	**36**
R5 - 275 Queelup Rd	36	29	25	37	**38**
R6 - 291 Quellup Rd	35	31	21	35	**37**
R7 - 371 Queelup Rd	32	19	22	32	**35**

The dominant source at all identified receivers is the fixed crusher/screening plant.

Figure 4-2



Predicted Noise l
L_{A10} dB

- = 35
- = 40
- = 45
- = 50
- = 55
- = 60
- = 65
- = 70
- = 75

N

Signs and symbols

- Extractive Area
- Point source
- Line source
- Receiver
- Noise Bund

Scale 1:8250

0 40 80 160 240 320 m

Scenario 2 - Normal Operations - Lot 262 (#200) Queelup Road, North Boyanup - Predicted Noise Levels

L_{A10} Noise Level Contours - Mobile & Fixed Plant Only - No Tonality Penalty Included - Ground Floor

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5. ASSESSMENT

5.1. Scenario 1

Table 5-1 provides the noise levels for Scenario 1 – Construction Phase. Intrusive characteristics are expected, so noise levels are adjusted by +5 dB for possible tonal characteristics.

Table 5-1: Adjusted Levels during Construction Phase, L_{10} dB(A)

Receiver	Predicted Nosie Level	Adjusted Nosie Level[1]
R0 - 220 Queelup Rd	53	58
R1 - 255 Queelup Rd	57	62
R2 - 243 Quellup Rd	52	57
R3 - 221 Queelup Rd	52	57
R4 - 217 Queelup Rd	48	53
R5 - 275 Queelup Rd	57	62
R6 - 291 Quellup Rd	51	56
R7 - 371 Queelup Rd	41	46
R8 - 390 Queelup Rd	46	51

* Adjusted by + 5 dB for tonality

Noise from the construction activity is not required to meet the assigned levels. However, under regulation 13, it must be demonstrated that the noise is being managed such that the emissions are as low as reasonably practicable. In this instance, this would be achieved by:

- using well-maintained equipment at all times;
- where practicable, orientating equipment such that the noise side faces away from the residences;
- where practicable and safe, any reversing alarms fitted to the mobile plant should be of the broadband noise type rather than tonal, beeping type. It was noted on the site visit that this was predominately the case already for the existing mobile plant.

5.2. Scenario 2

Table 5-2 assesses the noise levels for Scenario 2, Normal Operations. Intrusive characteristics are expected, so noise levels are adjusted by +5 dB for possible tonal characteristics and compared against the daytime assigned levels.

Table 5-2: Adjusted Scenario 2 Assessment, dB(A)

Receiver	Adjusted Level[1]	Assigned Level	Assessment
R0 - 220 Queelup Rd	47	N/A	*Complies*
R1 - 255 Queelup Rd	41	45	*Complies*
R2 - 243 Quellup Rd	40	45	*Complies*
R3 - 221 Queelup Rd	43	45	*Complies*
R4 - 217 Queelup Rd	41	45	*Complies*
R5 - 275 Queelup Rd	43	45	*Complies*
R6 - 291 Quellup Rd	42	45	*Complies*
R7 - 371 Queelup Rd	40	45	*Complies*

* Adjusted by + 5 dB for tonality

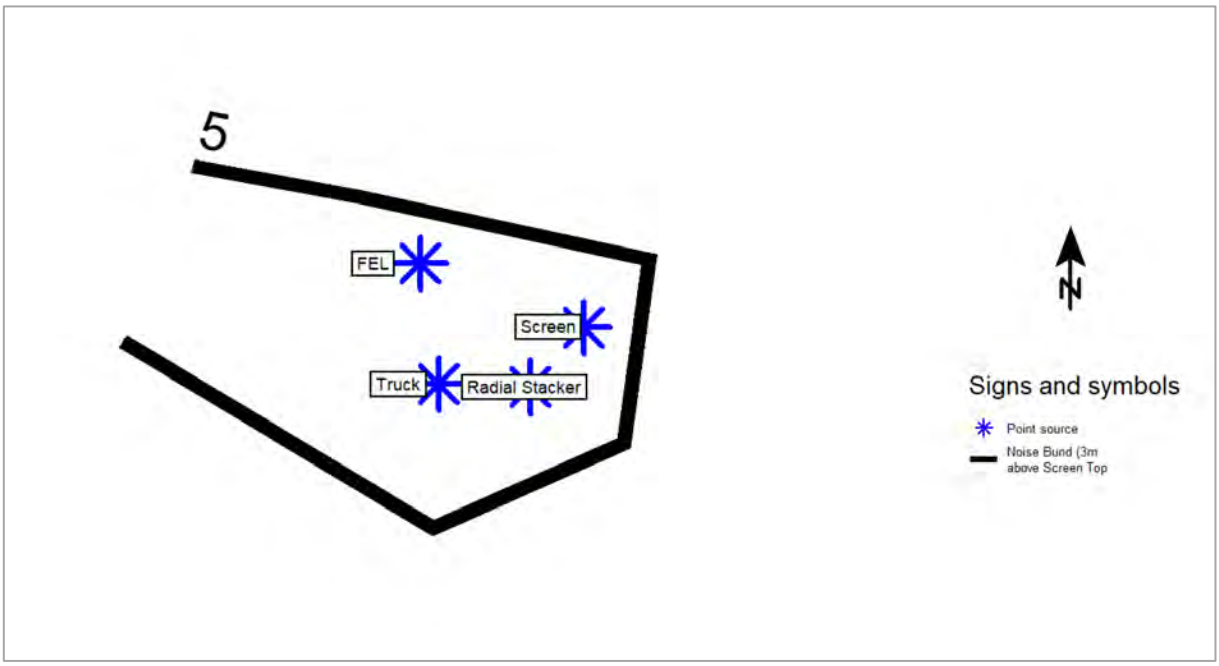
From the above, it can be seen that compliance is achieved at all identified receivers for normal operations.

6. RECOMMENDATIONS

Given that there is moving plant and the close proximity to the noise sensitive receivers to boundaries of the extractive area, compliance may not be practicable at all times. However based on the assumptions made, the noise predictions show that the operations can achieve compliance with the applicable regulatory criteria, between 7.00 a.m. and 7.00 p.m. Monday to Saturday providing earth bunds are constructed around the screening plant as part of the construction phase of works. The noise bunds should be constructed of topsoil and overburden as follows:

- Noise bunds to be constructed around the future location of the proposed screening fixed plant. Height of boundary bunds should be as high as is reasonably practicable to a minimum of 5.0 metres above the base of pit ground height (meaning a minimum of 3 metres above the screening plant height) at that location- refer *Figure 6-1*. These are to be considered to be carried out in the initial construction phase.

Figure 6-1: Noise Bund Detail Around Screening Plant



The noise should also be managed as follows:

- Make use of radio communication between wheeled loader and road truck operators to allow for positioning and loading of trucks without the use of horn signals as far as practicable;
- Mobile plant tonal reversing alarm alternatives should be considered where deemed safe (i.e. broadband);
- Selection of the quietest plant possible;
- Ensure that trucks aren't exiting and entering the site at the same time where practicable, so as to minimise noise impact at nearby receivers;
- There is to be only three haulage trucks operational on site at any one time where practicable;
- Purchasing staff need clear policy guidelines for procurement of new plant to ensure that noise levels do not increase over time;
- Maintenance staff may need to implement a maintenance programme to prevent noise levels increasing over time.

Appendix A – Terminology

The following is an explanation of the terminology used throughout this report:

- **Decibel (dB)**

The decibel is the unit that describes the sound pressure levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

- **A-Weighting**

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A, dB.

- **Sound Power Level (L_w)**

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure level at known distances. Noise modelling incorporates source sound power levels as part of the input data.

- **Sound Pressure Level (L_p)**

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc. and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

- **L_{ASlow}**

This is the noise level in decibels, obtained using the A-frequency weighting and the S (slow) time weighting. Unless assessing modulation, all measurements use the slow time weighting characteristic.

- **L_{AFast}**

This is the noise level in decibels, obtained using the A-frequency weighting and the F (fast) time weighting. This is used when assessing the presence of modulation.

- **L_{APeak}**

This is the greatest absolute instantaneous sound pressure level in decibels using the A-frequency weighting.

- **L_{Amax}**

An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

- **L_{A1}**

The L_{A1} level is the A-weighted noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L_{A10}**

The L_{A10} level is the A-weighted noise level exceeded for 10 percent of the measurement period and is considered to represent the "intrusive" noise level.

- **L_{A90}**

The L_{A90} level is the A-weighted noise level exceeded for 90 percent of the measurement period and is considered to represent the "background" noise level.

- **L_{Aeq}**

The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

- **One-Third-Octave Band**

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20000 Hz inclusive.

- **Representative Assessment Period**

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

- **L_{Amax} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded at any time.

- **L_{A1} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded for more than 1 percent of the representative assessment period.

- **L_{A10} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded for more than 10 percent of the representative assessment period.

- **Tonal Noise**

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

– the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

- **Modulating Noise**

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

– a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band; and

(b) is present for at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible.

- **Impulsive Noise**

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness means:

– a variation in the emission of a noise where the difference between L_{Apeak} and L_{Amax} is more than 15 dB when determined for a single representative event.

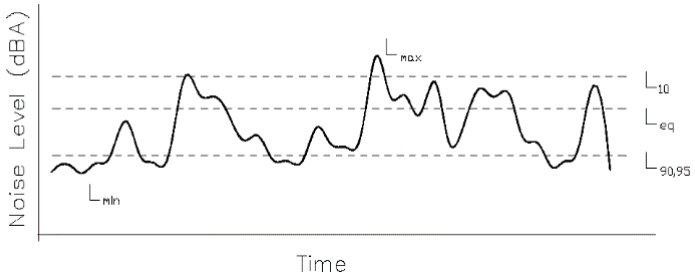
- **Major Road**

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

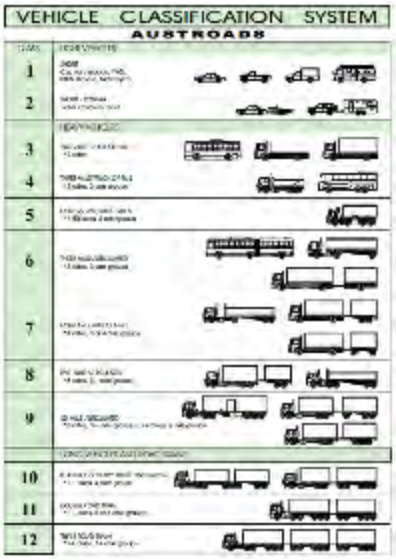
- **Secondary / Minor Road**

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

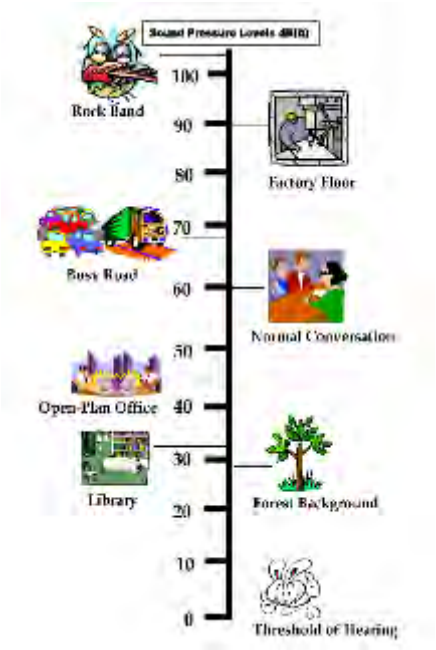
- **Chart of Noise Level Descriptors**



- **Austroads Vehicle Class**



- **Typical Noise Levels**



APPENDIX C - COMPLAINTS REGISTER

Complaints Register

Ref. No.	Date	Name & Address of Complainant	Time/Date of Complaint	Detail of Complaint	Summary of Actions Taken	Shire Notified	Person Responsible

APPENDIX G – DUST MANAGMENT PLAN

DUST MANAGEMENT PLAN

LOT 262 (No. 220) QUEELUP ROAD, NORTH BOYANUP

October 2025

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Filename	2538_Lot 262 Queelup Rd W DMP_V2		

Limitations

This report has been prepared by Accendo Australia Pty Ltd in accordance with the scope limitations provided in this report, or as otherwise agreed, between the Client and Accendo.

This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

This report has been prepared based upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report, which Accendo has not independently verified or checked beyond the agreed scope of work. Accendo does not accept liability in connection with such unverified information.

The conclusions and recommendations in this report are based on assumptions made by Accendo described in this report where and as they are required. Accendo disclaims liability arising from any of the assumptions being incorrect.

The report is based on site specific conditions encountered and information received at the time of preparation of this report or the time that site investigations were undertaken. Accendo disclaims responsibility for any changes that may have occurred after this time.

The preparation of this report has been undertaken and performed in a professional manner, in consideration of the scope of services and in accordance with environmental consulting practices. No other warranty is made.

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

JW Cross Maintenance Pty Ltd (the applicant) is proposing to extract sand from a 16.36 ha area within Lot 262 (No. 220) Queelup Road, North Boyanup (herein referred to as the subject site) (refer to **Figure 1** and **Figure 2**).

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 500,000 m^3) is to be extracted, commencing to the south of the subject site and moving in a northerly direction (refer to **Figure 2**).

The slope of the final contours of the pit will slope from approximately 22.3 m Australian Height Datum (AHD) in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north.

Slopes of the batters at the end of excavation will be retained at 1:5 vertical to horizontal.

1.2 Purpose and Scope

This Dust Management Plan (DMP) has been prepared to fulfil the relevant requirements provided within the Shire of Capel's *Local Planning Scheme No. 8* and *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 dust emissions associated with the proposed land use. This document has been prepared to support and should be read in conjunction with, the *Extractive Industry Operations Plan* prepared by Accendo Australia (2025) for sand extraction within the subject site.

Recognised industry standard practices for dust control are well-established within Western Australia. The utilisation of these standard practices is proposed at the subject site to suppress dust and reduce potential impacts associated with dust emissions.

Management of these activities are an effective means to prevent adverse effects of dust. The purpose of this DMP is to review the risks and control measures to appropriately manage dust and mitigate its impact.

The scope of the DMP is to cover the following:

- Legislative and regulatory compliance;
- Existing environment;
- Risk assessment of potential dust sources and air quality impacts;
- Mitigation and measurement measures; and
- Roles and responsibilities in relation to dust management.

2 EXISTING ENVIRONMENT

2.1 Land Use

The subject site is zoned 'Rural' under the Shire of Capel's *Local Planning Scheme No. 8* (LPS 8) and the *Greater Bunbury Region Scheme* (GBRS). The subject site is located within the 'Special Control Area – Strategic minerals and 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 to the east and southeast of the subject site is zoned 'Rural' and 'Local Road' under the LPS 8 and 'Rural' under the GBRS. Properties to the north, west and southwest of the subject site are zoned 'Rural' under the LPS 8 and GBRS. Properties that are located to the northeast of the subject site over Queelup Road are zoned 'Rural Residential' under the LPS 8 and 'Rural' under the GBRS.

Historically the subject site has been used for livestock grazing, resulting in the disturbance of the majority of native vegetation onsite. Intact remnant vegetation remains in the southwestern portion, with the remainder of the subject site comprised of mature paddock trees.

2.2 Sensitive Receptors

The Environmental Protection Authority (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 where no crushing will occur, 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 3.**

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

Resident No.	Distance to subject site (m)
1	65 m
2	93 m
3	168 m
4	188 m
5	271 m
6	448 m
7	592 m
8	595 m
9	612 m
10	675 m
11	752 m
12	900 m
13	992 m

The closest residential dwelling to the subject site is located 65 m from the eastern boundary. Additionally, a residential estate comprising of 17 houses is located approximately 448 m to 877 m from the northeastern boundary of the subject site.

2.3 Topography and Soils

The current topography of the subject site can be described as sloping with the elevation ranging from 24 m AHD in the north and northwest corner to 33 m AHD in the centre before falling again to 26 m AHD in the southeast (refer to **Appendix A**).

The subject site is located within the Bassendean System of the Bassendean Zone consisting of fixed dunes inland from coastal dune zone containing non-calcareous sands, podsolised soils with l ow-lying wet areas. The Bassendean system consists of "*Sand dunes and sandplains with pale deep sand, semi-wet and wet soil*" (Natural Resource Information (NRInfo)).

The subject site is located within the Bassendean B1b soil phase consisting of "*very low relief dunes of undulating sand plain with deep bleached grey sandy A2 horizons and pale yellow B horizons*" (NRInfo).

2.4 Climate

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

The closest weather recording station is Bunbury (Station 9965). Temperatures are highest on average in February, at approximately 30.1°C. July has the lowest average temperature of the year of 7.4°C.

Rainfall for the area is approximately 737.3 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 17-18 knots, swinging to the south-west at approximately 22 knots in the afternoon. During winter, the winds are most commonly 12-19 knots from 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 39.1 mm/hr.

3 EXTRACTION ACTIVITIES

The sand pit will cover an area of approximately 16.35 ha, with a current maximum elevation ranging from 24 m AHD to 33 m AHD. It will be excavated to a maximum depth ranging from 1.96 m to 6.26 m below ground level (BGL) commencing in the south and moving initially in a northerly direction in stages 2 ha in size (refer to **Figure 2**). The proposal does not include any crushing of material.

A 10 m buffer to the drip line of all trees outside of the extraction area and a 20 m buffer to the property boundary will be maintained, excluding the western boundary. Excavation will occur to the western property boundary to ensure topographic continuity with the adjoining property on which sand extraction has previously occurred.

It is estimated that the total maximum volume of sand to be removed will be approximately 500,000 m^3 with up to 50,000 m^3 excavated each year, depending on supply and demand.

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

3.1 Operational Works

Using a excavator or 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.

Typical operating hours for quarries will be adopted for the subject site which involves 0700 to 1700 each Monday to Friday. No work will be undertaken on Saturdays, Sundays or public holidays. The site will be worked by 2 - 3 persons, depending on market demand.

3.1.1 Truck Movements

Access from the property will be via Ducane Rd and Queelup Rd, travelling north to Lillydale Road (refer to **Figure 5**). The road intersection will be asphalt, with sealing up to the length of a vehicle. Signage will be erected 100 m either side of the road access advising of trucks entering.

It is proposed to extract a maximum of approximately 100,000 m^3 or bank cubic metres (BCM) per year. The average daily extraction rate:

= 50,000 BCM / 52 weeks / 5 working days per week
= 192 BCM per day.

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):

= 50,000 BCM x 70% / 32 weeks / 5 working days
= 220 BCM per day.

The average daily extraction rate (LCM):

= 220 BCM x 1.15
= 253 LCM

It is proposed to utilise 19.0 m semi-tippers which in accordance with the *City of Busselton Local Planning Policy No. 2.3 – Extractive Industries* has a capacity of approximately 18.9 LCM of sand. Accordingly, the average daily truck movements during the main season are as follows:

= 253 LCM/ 18.9 LCM truck capacity
= 13 truck movements per day x 2 (to and from)
= 26 trips per day x 2 (peak fluctuations)
= 52 trips per day maximum.

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.

3.1.2 Sand Extraction

The sand will be excavated by an excavator and loader 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 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 pit to provide visual and acoustic screening.
- Excavation will commence in the south of the pit and then move in a northerly direction. The face and walls of the pit will act as noise barriers.
- Upon completion of each section of pit, 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 pit will be deep ripped, covered by overburden and topsoil, and rehabilitated to a constructed soil.

3.1.3 Final Contours

The slope of the final contours of the pit will slope from approximately 22.3 m AHD in the south to 24.6 m AHD in the centre of the extraction area back to 23.7 in the north.

Slopes of the batters at the end of excavation will be retained at 1:5 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.

3.1.4 Equipment

All operational equipment will work on the pit 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 operations. The 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 2. 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.

Equipment	Description
Water tanker	Used for dust suppression on the access roads and working floors when required.
Finlay Screen	Used for the screening of sand.
Front end wheel loader	Loaders will be used for the movement of sand and loading road trucks.
Radial Stacker	Used for removing sand material
Excavator	An excavator may be used for the removal of sand material.
Fuel storage	No fuel will be stored onsite.
Light vehicles	Access to and around the site.
Road truck	Removal of sand from site.

3.1.5 Water Usage

Water is only required for dust suppression within the pit and the access road. Water will be sourced offsite from a potable water standpipe, as required.

4 POTENTIAL IMPACTS

4.1 Dust Sources

The proposed extraction 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.

4.2 Risk Assessment

In accordance with the DWER's "*A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*", a risk assessment for dust emissions has been prepared (DWER 2021).

For a site that is generating uncontaminated dust, such as extractive industry sites, the site classification chart in Appendix 1 of the DWER guideline can be used for assessing the site risk. Appendix 1 also details the provisions and contingency arrangements for dust management which apply to each site classification score.

The site classification assessment is provided below.

Part A. Nature of site

Item	**Score Options**				**Score**
1.Nuisance potential of soil when disturbed	Very low - 1	Low – 2 *Material is of coarse composition*	Medium - 4	High - 6	2
2. Topography and protection provided by undisturbed vegetation	Sheltered and screened - 1	Medium screening – 6	Little screening – 12 *Screening provided by stabilised bunds and roadside vegetation*	Exposed and wind prone - 18	12
3. Area of site disturbed by the works	Less than 1ha - 1	Between 1 and 5ha – 3	Between 5 and 10ha – 6	More than 10ha - 9	3

		Excavation will occur in stages less than 2 ha.			
4. Type of work being done	Roads and trenches - 1	Roads, drains and medium deep sewers - 3	Roads, drains, sewers and partial earthworks - 6	Bulk earthworks – 9 *Sand extraction*	9
Total score for Part A					26

Part B. Proximity of site to other land uses

Item	**Score Options**				**Score**
1.Distance of other land uses from site	More than 1km - 1	Between 1km and 500m – 6	Between 100m and 500m - 12	Less than 100m - 18	18
2. Affect of prevailing wind direction (easterly) on other land uses	Not affected - 1	Isolated land uses affected by one wind direction – 6	Dense land uses affected by one wind direction – 9	Dense/sensitive land uses highly affected by prevailing winds - 12	9
Total score for Part A					27

Site Classification Score (A x B) = 702

Classification 3 (score between 400 and 799, considered **Medium risk**). The provisions, contingency arrangements and monitoring requirements as specified by the DWER (2011) associated with a Classification 3 proposal are provided below.

Provisions:

Appropriate wind fencings of a length specific in the air quality management programme needs to be stored on site or available within one hour of being required by the engineer for the developer/local government/DEC.

All areas of disturbed land should be stabilised to ensure that the disturbed area exposed at any time is kept to a practical minimum to prevent exceedance of dust standards.

The engineer for the develop shall maintain close control of works with dust creating potential (for example allowable length of open trenching).

After all siteworks are completed, and before the contractor has vacated the site, the developer should ensure that the entire site is stable. The develop then retains responsibility for site stability until change of ownership/control takes place. After the change of ownership/control has taken place, the new owner or controlling party will inherit responsibility for site stabilisation.

Contingency arrangements:

Suitable water-carts in good working condition and of not less than 10,000 litres capacity per 7.5 ha of disturbed site, or other suitable alternatives shall be available to commence watering on the site within 18 hours of being required to do so by the engineer for the developer/local government/DEC.

Surface stabilisation equipment shall be available to commence operation on site within 48 hours of being required to do so by the engineer for the developer/local government/DEC and with sufficient capacity to cover the disturbed site area within a further 48 hours.

Wind fencing shall be erected within 18 hours of the contractor being required to do so by the engineer for the developer/local government/DEC. Dust generating works on the site shall cease in the interim.

If dust-related complaints are generated due to activities on the site, the developer may be required by the local government or an authorised DEC officer to distribute advisory notices to adjoining land occupiers within 48 hours. A notice form is provided in Sheet 5 of Appendix 1.

If dust-related complaints are generated due to material which has been excavated for trenching, the developer shall ensure this material is stabilised within 48 hours of being requested to do so by the engineer for the developer, local government or an authorised DEC officer.

Include an allowance for water-cart operation, wind fencing and surface stabilisation during the construction period for the purposes of dust and wind-borne material suppression.

Include an allowance for surface stabilisation for the purposes of dust and wind-borne material suppression to be maintained after the construction period and until change of ownership/control takes place.

Monitoring requirements:

Site dust management system in place.

On-site dust monitoring against short term criteria.

Off-site (compliance) dust monitoring at site boundary (if close to sensitive receptors) or at sensitive receptors.

Complaints management system in place (complaints recorded and acted on promptly).

Exceedances to be reported to the relevant authority – DEC, Local Government or DOH.

Notice to be erected at the site providing contact details of the person to be contacted.

4.3 Management Measures

While the potential impacts to amenity from dust emissions are considered medium at some receptors, standard dust suppression measures will be implemented during operation activities, as provided within **Table 3**.

Table 3. Dust management measures.

Legislation and Key Standards		
Environmental Protection Act 1986 (EP Act) *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities* (DEC 2011)		
Objectives		
• Minimise dust lift during all activities. • No adverse dust impacts to sensitive receptors from the pit operations.		
Targets		
• No visible dust beyond the property boundary. • No dust complaints.		
Management Actions		
Description	**Responsibility**	**Timing**
Notice to be erected at the site, providing contact details of the person to be contacted regarding the works. This person will also be available outside of operational hours to address any complaints.	Site Manager	Prior to extraction
Induction for all employees will include information on: • Potential sources of dust • Dust Management Plan • Speed limits onsite and staying on designated roads • Reporting procedure for dust issues	Site Manager	Prior to extraction
Topsoil stripping shall not occur during the following conditions: • Winds in excess of 30 km/hr;	Site Manager	Topsoil stripping and bund construction

Areas of land cleared and the period of time they remain cleared are to be kept to a minimum.	Site Manager	At all times
Water trucks are to water down unsealed roads during operation to reduce dust lift.	Site Manager	As required
Stockpiles, where possible, will be limited to the anticipated cubic volume/vehicle movement for cartage on the following operating day.	Machine Operator	At all times
Temporary stockpiles and exposed areas will be watered and stabilised as required. Stabilisation techniques that will be considered depending on environmental conditions will include hydro-mulching.	Site Manager	As required
Noise bunding will be stabilised with hydro-mulching to avoid dust lift off at all times.	Site Manager	At all times
Transport of dust-prone material will be via covered trucks or dampened prior to transport to prevent dust lift during transport.	Drivers	During soil transport activities
Water trucks are to be available at all times for immediate response during pit activities to water the site on observation of dust lift.	Site Manager	As required
Vehicle speeds will be restricted to no more than 15 km/hr on the site to minimize dust lift off.	Drivers	At all times
Wind fencing and soil stabilsation equipment will be available for commissioning if required.	Site Manager	As required
Maintain a complaints register (refer to **Appendix B**). A Complaints Register will be established for the site to record the following information: • Date, time, location and nature of the exceedance. • Identify the cause (or likely cause) of the exceedance and responsible parties. • Identify the activities that were occurring at the time of the non-compliance. • Determine the activities that were most likely contributing to the non-compliance. • Describe what action has been taken to date. • Describe the proposed measures to address the exceedance.	Site Manager	As required

Monitoring			
Description	**Parameter**	**Responsibility**	**Frequency**
Visual monitoring of dust will be ongoing throughout the day during operations. All monitoring is to be maintained on a logging sheet for reference and proof of compliance.	Dust lift and signs of dust deposition near property boundary. Evidence of no visible dust crossing the site boundary will be used as the monitoring criteria for compliance.	Site Manager	Continuous
Contingency and Corrective Actions			
Incident or Consequence	**Corrective Action**	**Responsibility**	
Observation of excessive dust lift onsite	Report and investigate as incident.	Site Manager	
	Halt work within proximity of the area until cause of dust is addressed.	Site Manager	
	Increase dust mitigation measures (e.g. additional watering of exposed areas).	Site Manager	
Complaint received	Report and investigate as incident. To determine the validity of the complaint, the wind direction, wind speed and activities being undertaken on site at the time of the complaint will be established.	Site Manager	
	If required, halt work until cause of dust is addressed.	Site Manager	
	If the complaint is verified as being due to a site source, remedial action will be undertaken within 2 hours. The Shire of Capel will be advised of all complaints as soon as they are received. If a complaint cannot be resolved within the 2 hour response period, it may be necessary to cease operations.	Site Manger	
	Review dust management procedures and adjust if deemed necessary.	Site Manager	

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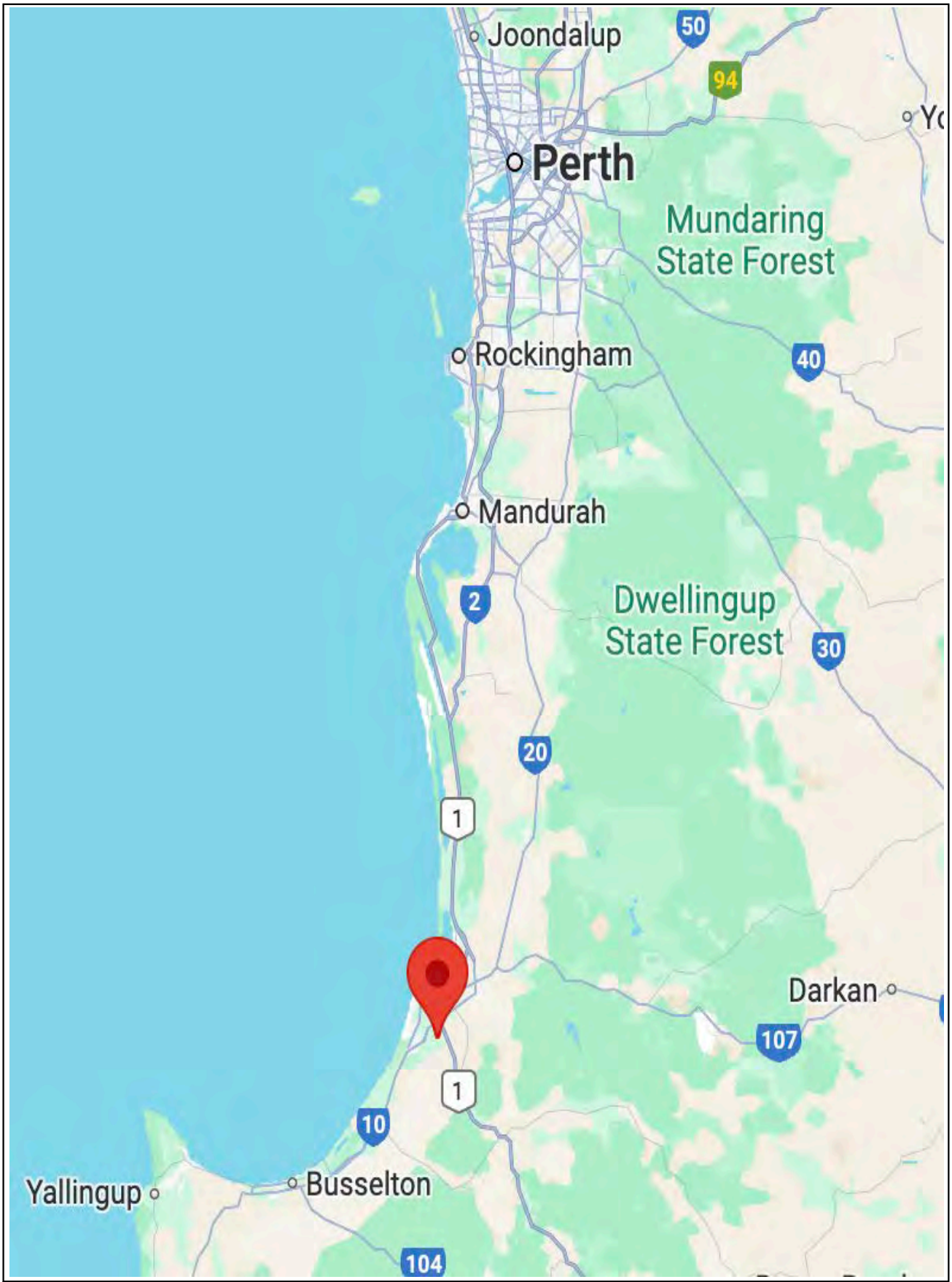
FIGURES



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		2538	Figure 1	A
DRAWING TITLE	Figure 1 – Site Locality	Designed NC	Checked	
		Drawn PN	Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	05/06/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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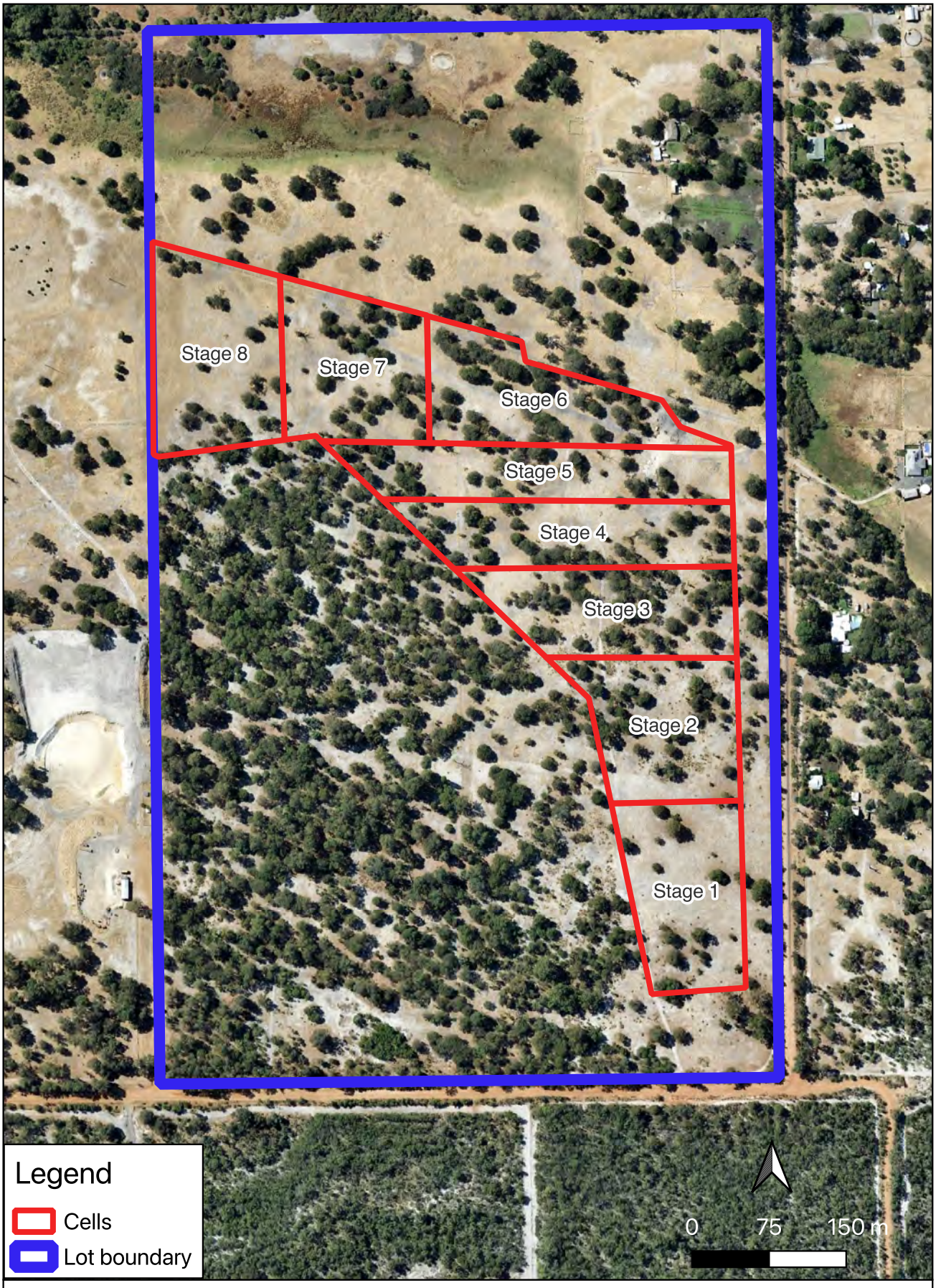

PROJECT	Lot 262 (220) Queelup Rd, North Boyanup	Project Number	Drawing Number	Revision
		2538	Figure 2	B
DRAWING TITLE	Figure 2- Site Extent	Designed NC Drawn PN	Checked Approved	
CLIENT	JW Cross Maintenance Pty Ltd	Date	23/09/2025	
		Local Authority	Shire of Capel	
		Sheet 1 of 1		

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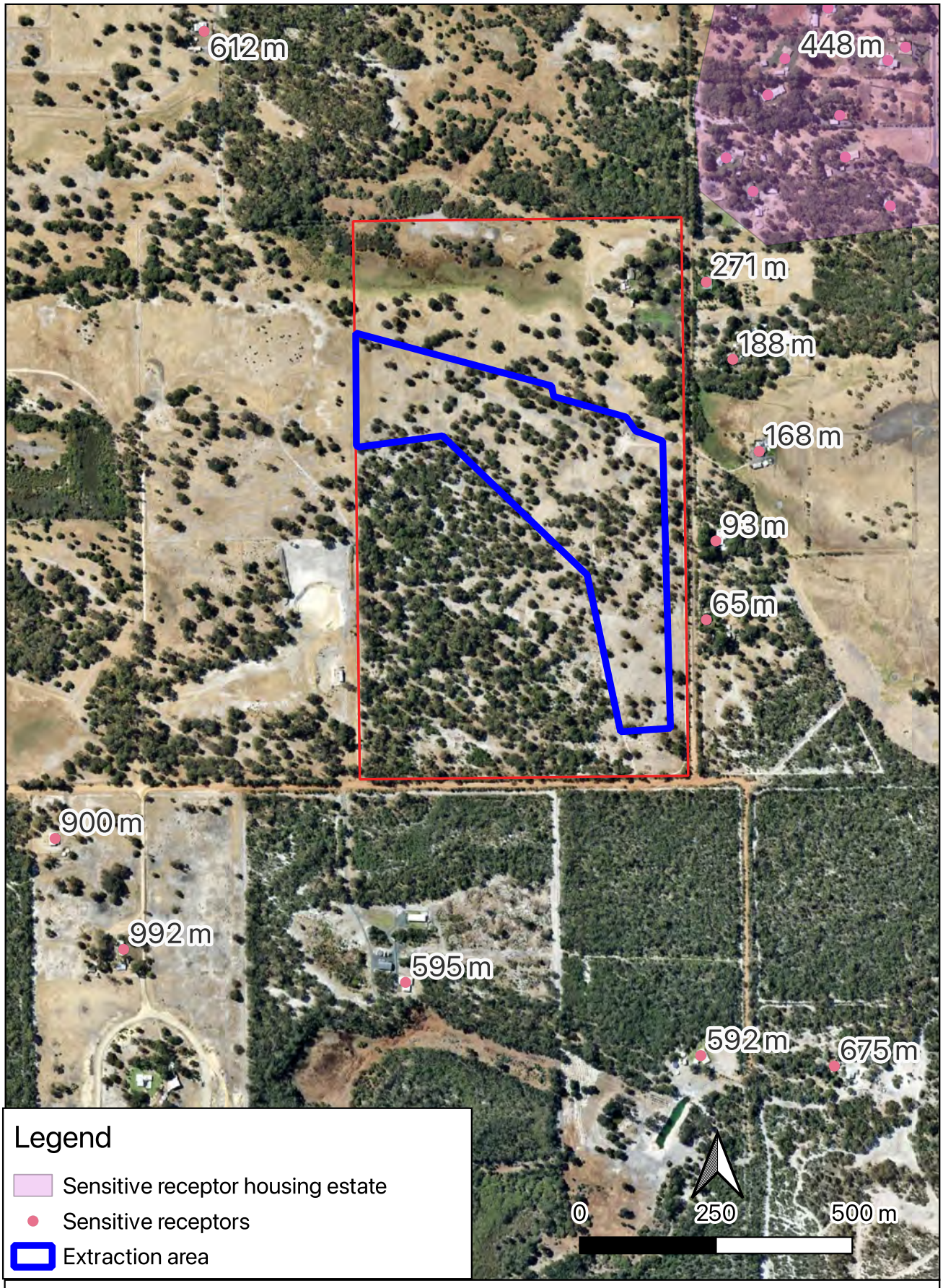

PROJECT	Lot 262 (220) Queelup Rd,Boyanup	Project Number	Drawing Number	Revision
DRAWING TITLE	Figure 3 - Sensitive receptors	2538	Figure 3	A
CLIENT	JW Cross Maintenance Pty Ltd	Designed NC Drawn PN	Checked Approved	
		Date Local Authority Sheet 1 of 1	23/09/2025 Shire of Capel	

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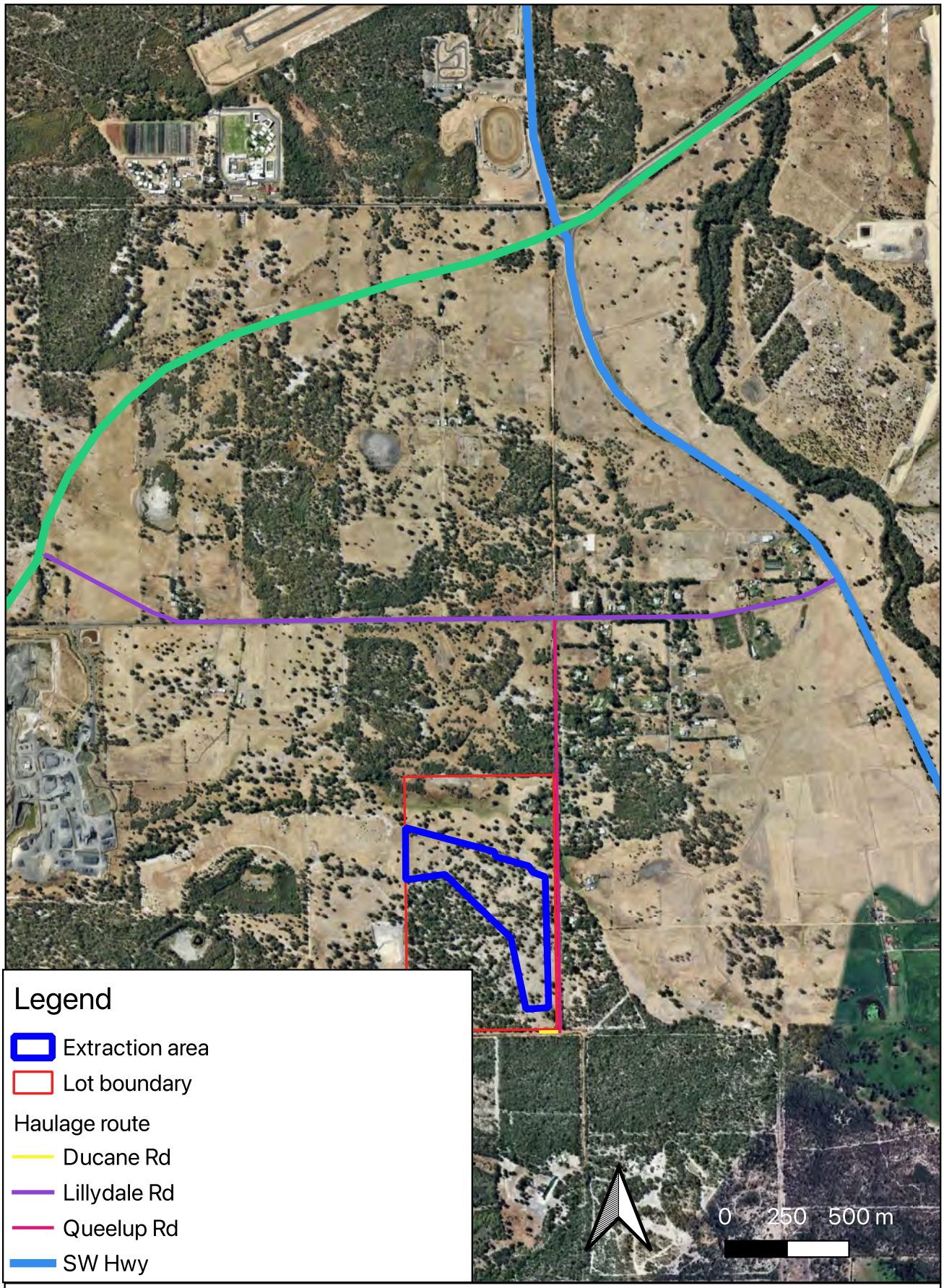

PROJECT	Lot 262 (220) Queelup Rd,Boyanup	Project Number	Drawing Number	Revision
DRAWING TITLE	Figure 4 - Haulage Route	2538	Figure 4	A
CLIENT	JW Cross Maintenance Pty Ltd	Designed NC Drawn PN	Checked Approved	
		Date Local Authority Sheet 1 of 1	30/09/2025 Shire of Capel	

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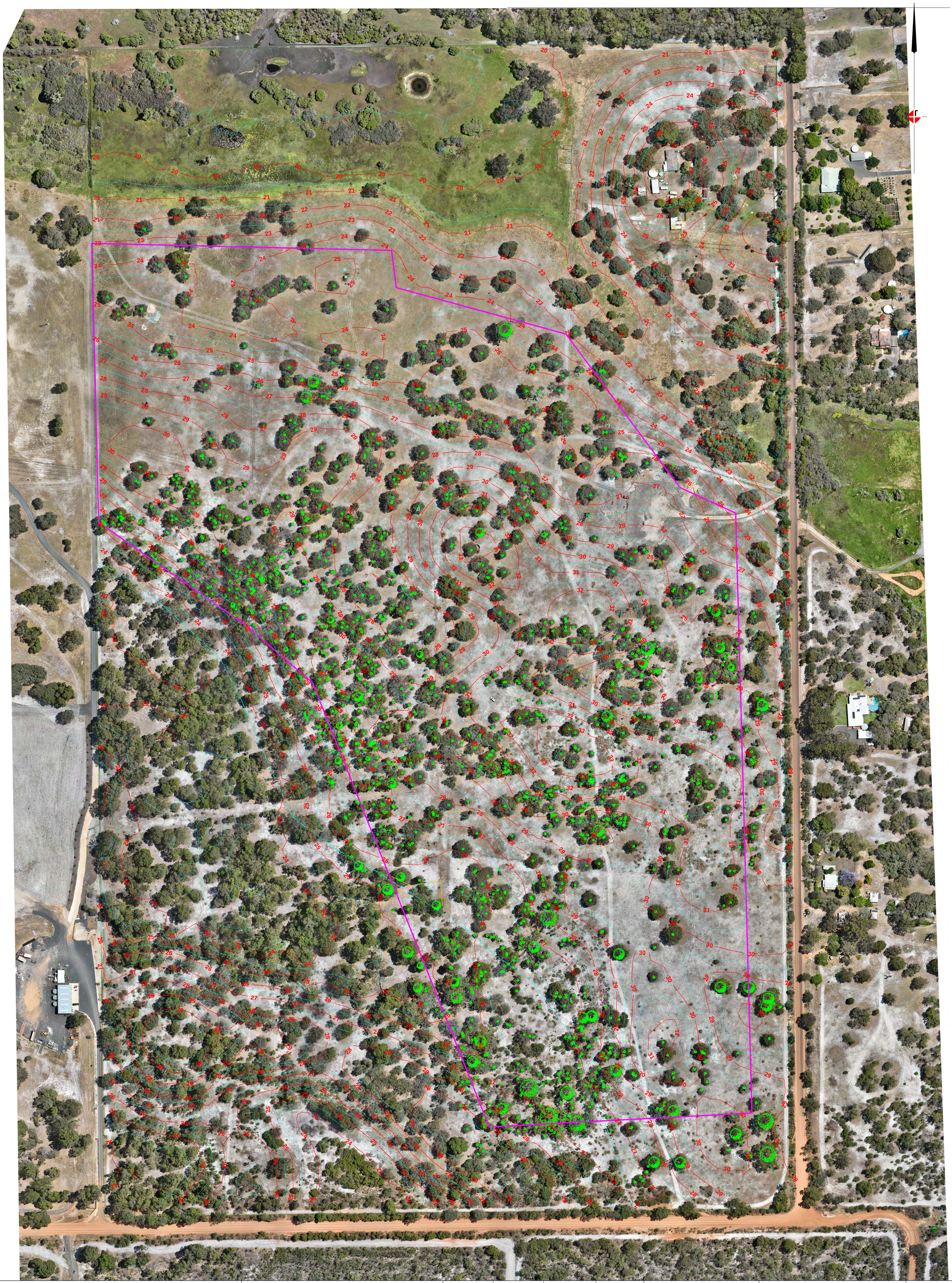
APPENDIX A – SITE CONTOUR SURVEY



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CLIENT:	J.W CROSS	Date: 09/12/2024	Drawn: PS	Surveyor: RRe	CHKd: PS
PROJECT:	LOT 262 (#220) QUEELUP ROAD NORTH BOYANUP	File: 23017 MGA94 DATA - Drawing001			
		Scale (@A1)	1:1500		
TITLE:	FEATURE SURVEY				
DATUM	HOR: M.G.A. 94 Z50	VERT: A.H.D.			
A.H.D. HEIGHTS DERIVED FROM :	SSM HASTIES 21				

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REVISION SCHEDULE — Sheet 1 of 1

No.	Date	Description

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APPENDIX B – COMPLAINTS REGISTER

Complaints Register

Ref. No.	Date	Name & Address of Complainant	Time/Date of Complaint	Detail of Complaint	Summary of Actions Taken	Shire Notified	Person Responsible