LOT 43 PLANTATION ROAD, LUDLOW
CLEARING PERMIT APPLICATION
SUPPORTING DOCUMENTATION

PREPARED FOR:

LUDLOW HOLDINGS PTY LTD

DECEMBER 2022

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LOT 43 PLANTATION ROAD, LUDLOW
CLEARING PERMIT APPLICATION SUPPORTING DOCUMENTATION

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Final Report	Kirsi Kauhanen Sharon Rose	Kirsi Kauhanen	20 December 2022

EXECUTIVE SUMMARY

Ludlow Holdings Pty Ltd (Ludlow Holdings) is proposing to extract sand on Lot 43 (Plan 69043) Plantation Road in Ludlow approximately 5 km south of the Capel town site in the Shire of Capel. A Development Application (DA) and associated Extractive Industry Licence (EIL) application has been submitted to the Shire of Capel.

Lot 43 covers 27.13 ha in total with a proposed extraction area of 6.79 ha, the majority of which has been cleared in the past. The proposed extraction area boundary has been delineated so that it focuses on the previously cleared and disturbed areas. Stockpiles and turnaround areas are proposed to be placed within the extraction area and therefore will require no further vegetation clearing. Up to 1.89 ha of native vegetation is proposed to be cleared for the project, comprised of mainly native regrowth of which over 96% is in Completely Degraded to Degraded condition. The project will require a Native Vegetation Clearing Permit (NVCP) from the Department of Water and Environmental Regulation (DWER). This report provides supporting information for the NVCP application.

The extraction area has been designed to avoid the identified population of Threatened *Drakaea elastica* (listed under both state and federal legislation) and maintain a 50 m separation distance from all recorded individuals of the species. No Threatened or Priority flora species or Threatened or Priority Ecological Communities (TEC, PEC) will be directly impacted.

The key impacts of the proposed clearing are:

- The removal of up to 1.89 ha of mostly Degraded to Completely Degraded native vegetation.
- The removal of up to 1.89 ha of black cockatoo foraging habitat of varying quality.
- The removal of seven trees with a diameter at breast height of >50 cm (no hollows suitable for Black Cockatoo nesting).
- The removal of up to 1.89 ha of Western Ringtail Possum habitat of varying quality.
- The removal of plants representing one potential range extension and two potential range ends.

The proposed clearing, extraction and rehabilitation will occur gradually in stages and thereby will minimise the area of disturbance at any particular time and ensure that the duration of habitat loss will be as short as possible. A range of environmental management measures will be implemented (as detailed in the DA and EIL application package) targeting, for example, dust, dieback, weeds, and drainage. These will further minimise environmental impacts associated with the clearing.

Approximately 15.9 ha (89%) of the mapped extent of native vegetation will be retained on the property. This vegetation will continue to provide suitable habitat for the significant flora and fauna, along with connectivity through the property during the operations. Further, a portion of the 6.79 ha extraction area will be revegetated back to native vegetation. At this stage, this portion is expected to be 2.18 ha; however, this will be determined as part of the NVCP process with DWER.

The proposed clearing of 1.89 ha of native vegetation was assessed as either 'not at variance' or 'not likely to be at variance' to nine of the ten clearing principles. It is assessed as at variance to Principle (f), as the proposed clearing area intersects a mapped wetland and contains wetland type vegetation, though the impacts of the proposed clearing on the wetland environment are expected to be negligible to nil. Overall, given the small scale of the proposed clearing and the largely degraded condition of vegetation within the proposed clearing area, the impacts resulting from the proposed clearing will be minor and localised.

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FIGURES

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1. INTRODUCTION

Ludlow Holdings is proposing to extract sand on Lot 43 (Plan 69043) Plantation Road in Ludlow, approximately 5 km south of the Capel town site within the Shire of Capel (Figure 1, Figure 2). A Development Application (DA) and associated Extractive Industry Licence (EIL) application has been submitted to the Shire of Capel.

The property totals 27.13 ha and the proposed extraction area covers 6.79 ha (Figure 3), of which 1.89 ha is native vegetation (Figure 4). This area has been largely cleared previously (Figure 10) and the current vegetation comprises mainly of native regrowth, of which over 96% is in Completely Degraded to Degraded condition.

The project will require an NVCP from DWER. This report provides supporting information for the NVCP application.

Scale: 1:125000
Original Size: A4
Image: Copernicus Sentinel Data 2020
Grid: GDA94 / MGA zone 50
0 1 2 km

Ludlow Holdings
Lot 43 Plantation Road,
Ludlow

Figure 1

Location Plan

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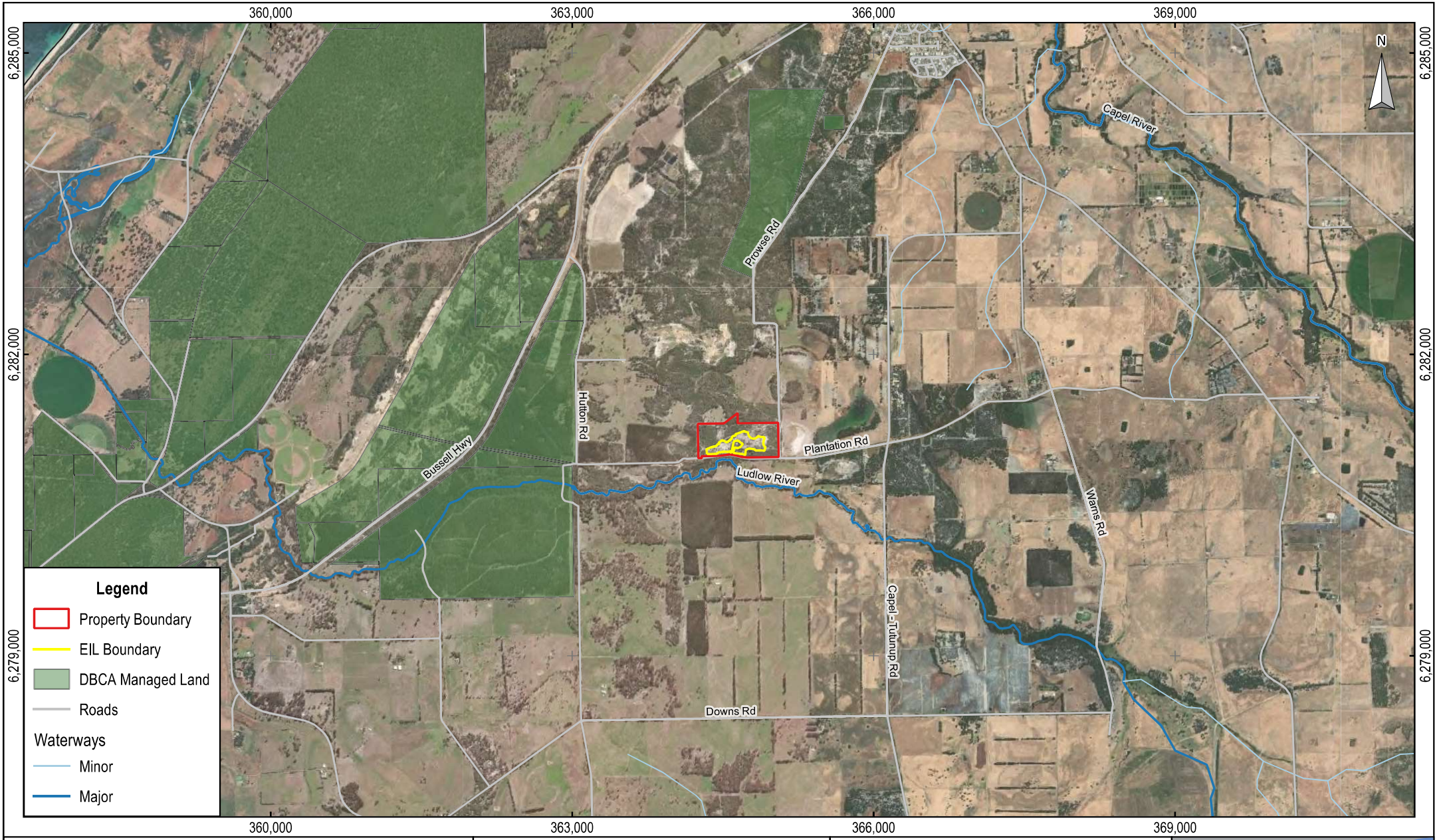

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Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 1 2 km

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 2

Local Context

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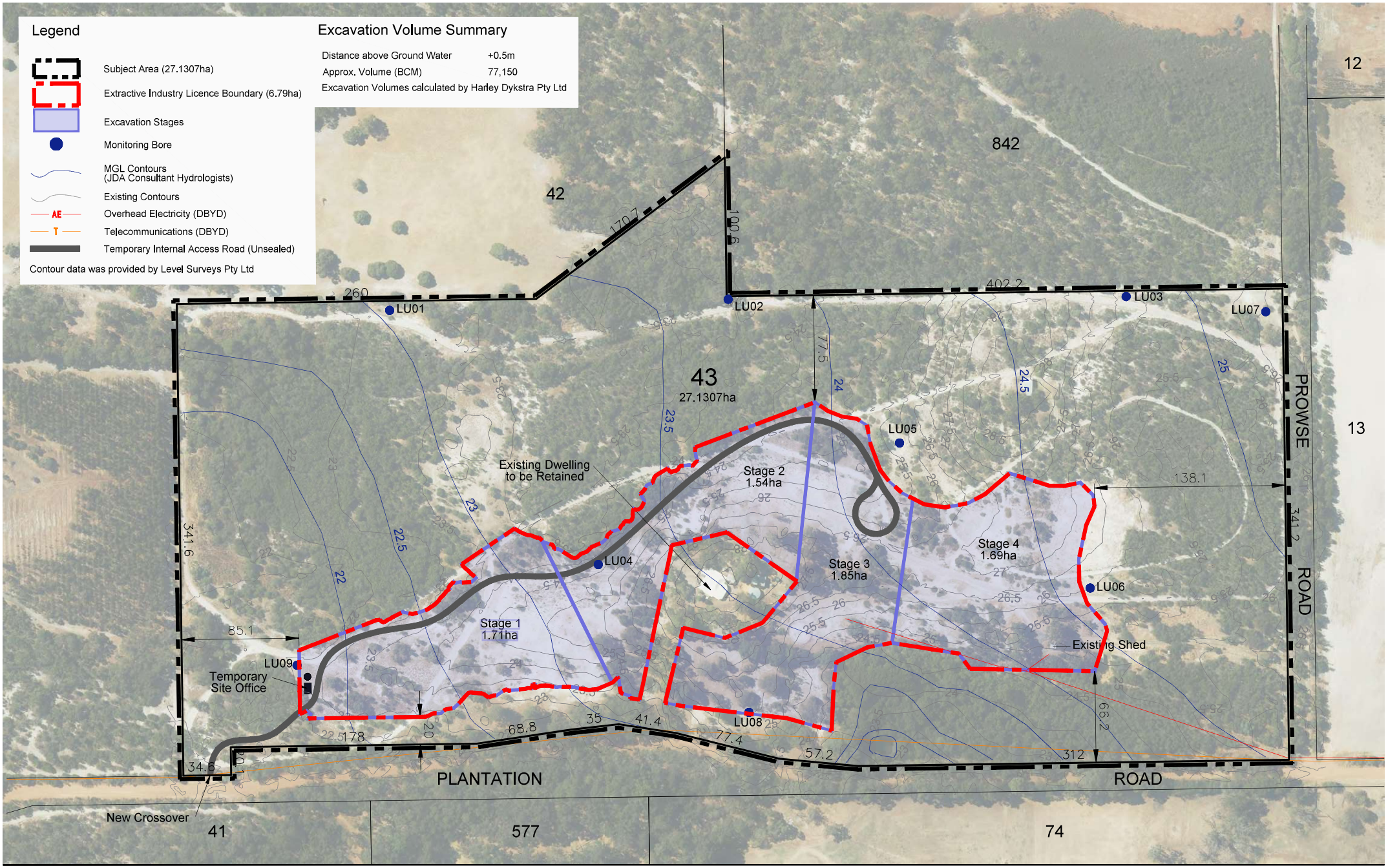

Excavation Works Plan

Lot 43 (546) Plantation Road, Ludlow

Date: 1 Nov 2022 Scale: 1:2500 @ A3 File: 22-336 CP02B Staff: DL GW Checked: DL

element.

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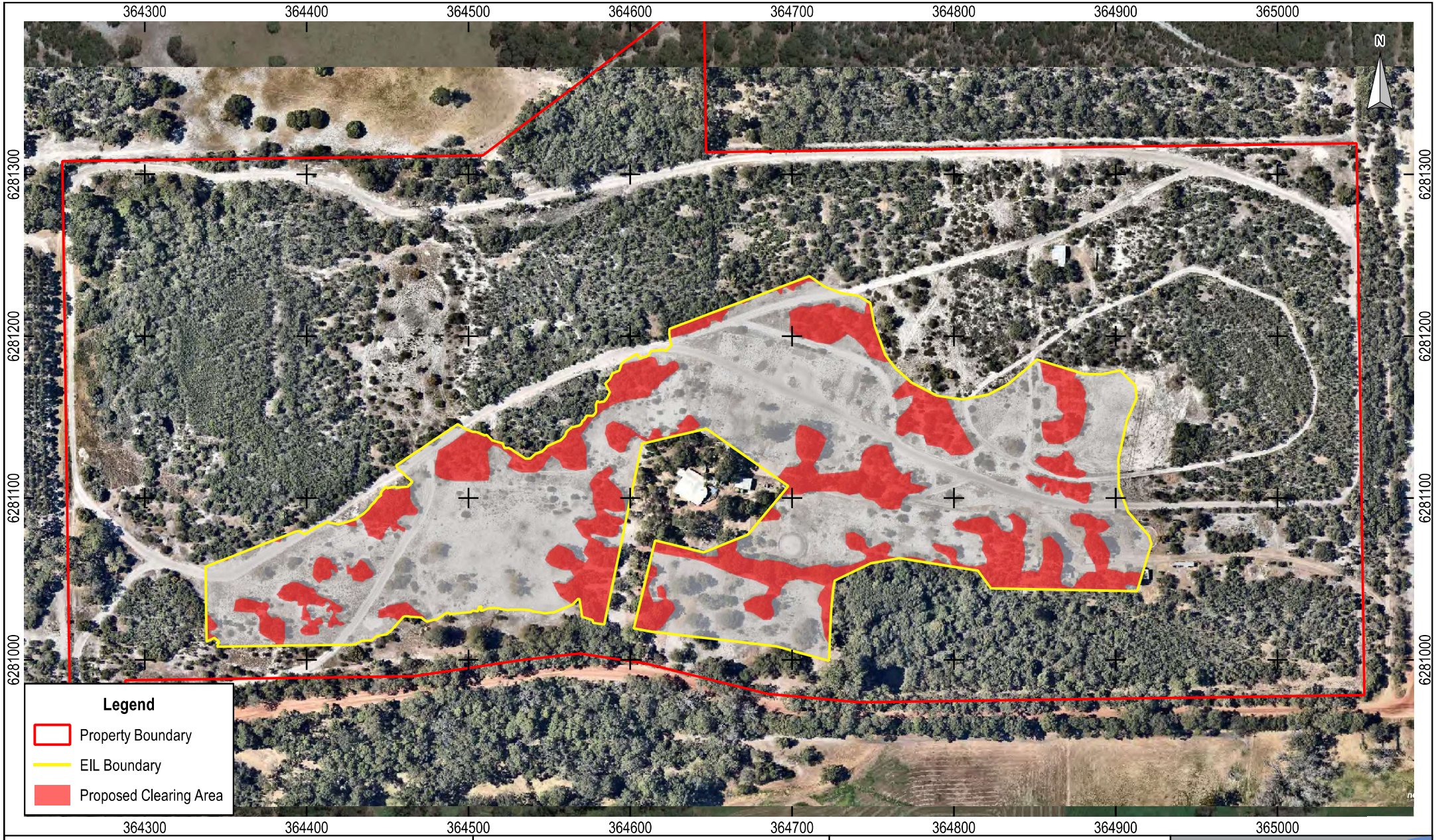

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Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 4

Clearing Permit Application Area

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F:\Kirsi\PROJECTS\Ludlow Holdings\GIS\NVCP\Clearing Area.qgz 14/12/2022 Clearing Area

2. EXISTING ENVIRONMENT

2.1 BIOREGIONAL CONTEXT

The property is located within the Swan Coastal Plain Bioregion as classified by the Interim Biogeographic Regionalisation for Australia (IBRA) and is described as a low lying coastal plain mainly covered by *Banksia* or Tuart woodlands over sandy soils with paperbark prevalent in swampy areas (Thackway and Cresswell 1995).

The Swan Coastal Plain Bioregion is divided into two subregions, the Dandaragan Plateau (SWA01) and Perth (SWA02), of which the proposed extraction area is located within the Perth subregion. This subregion is comprised of colluvial and aeolian sands, alluvial river flats, and coastal limestone. Native vegetation varies from Heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah woodlands on Quaternary marine dunes of various ages, and Marri on colluvial and alluvials. This subregion also includes a complex series of seasonal wetlands (Mitchell, Williams, and Desmond 2002). The primary land use associated with this subregion includes dry land agriculture, conservation, and crown reserve, as well as urban and rural residences (Mitchell, Williams, and Desmond 2002).

2.2 LAND USE

The property is zoned as 'Rural' in the Shire of Capel's Town Planning Scheme No. 7. Under the proposed Draft Local Planning Scheme No.8, which will eventually replace Scheme No. 7, the property is zoned 'Priority Agriculture' and is located in 'Special Control Area (6) - Basic Raw Materials (6.1 Resource Area)' and 'Special Control Area (8) - Environment'.

Lot 43 has a total area of 27.13 ha, of which the extraction area encompasses 6.79 ha. The property currently includes patches of remnant native vegetation, one residential dwelling, various outbuildings, several horse-holding paddocks, and an equestrian training track.

Surrounding properties are also zoned 'Rural' and support a range of rural land uses, including paddocks for grazing and hay production, timber plantations, a sand extraction site, and bushland (Figure 2). The sand extraction site to the east is currently undergoing rehabilitation to pasture. The closest residential dwelling outside of Lot 43 is located approximately 138 m south of the proposed extraction area. Apart from this dwelling and the dwelling on Lot 43, no other residential dwellings are located within 500 m.

2.3 LANDFORM AND SOIL

Lot 43 is located on the Busselton Plain, which is part of the Swan Coastal Plain between Dunsborough and Capel River, and is part of the larger Perth Basin. The proposed extraction area and the proposed clearing area are situated within the Bassendean System (212Bs) (DPIRD-064), which is characterised by sand dunes and sandplains with pale deep sand, semi-wet, and wet soil (DPIRD-064). The western and southern edges of Lot 43 intersect the Abba System (213Ab); however, this is outside the proposed extraction area.

There are five soil landscape units within Lot 43 (Figure 5, DPIRD-027), of which the proposed extraction area intersects two Bassendean phases: B1b and B3 (Table 1). The majority of the proposed extraction area is located on phase B1b.

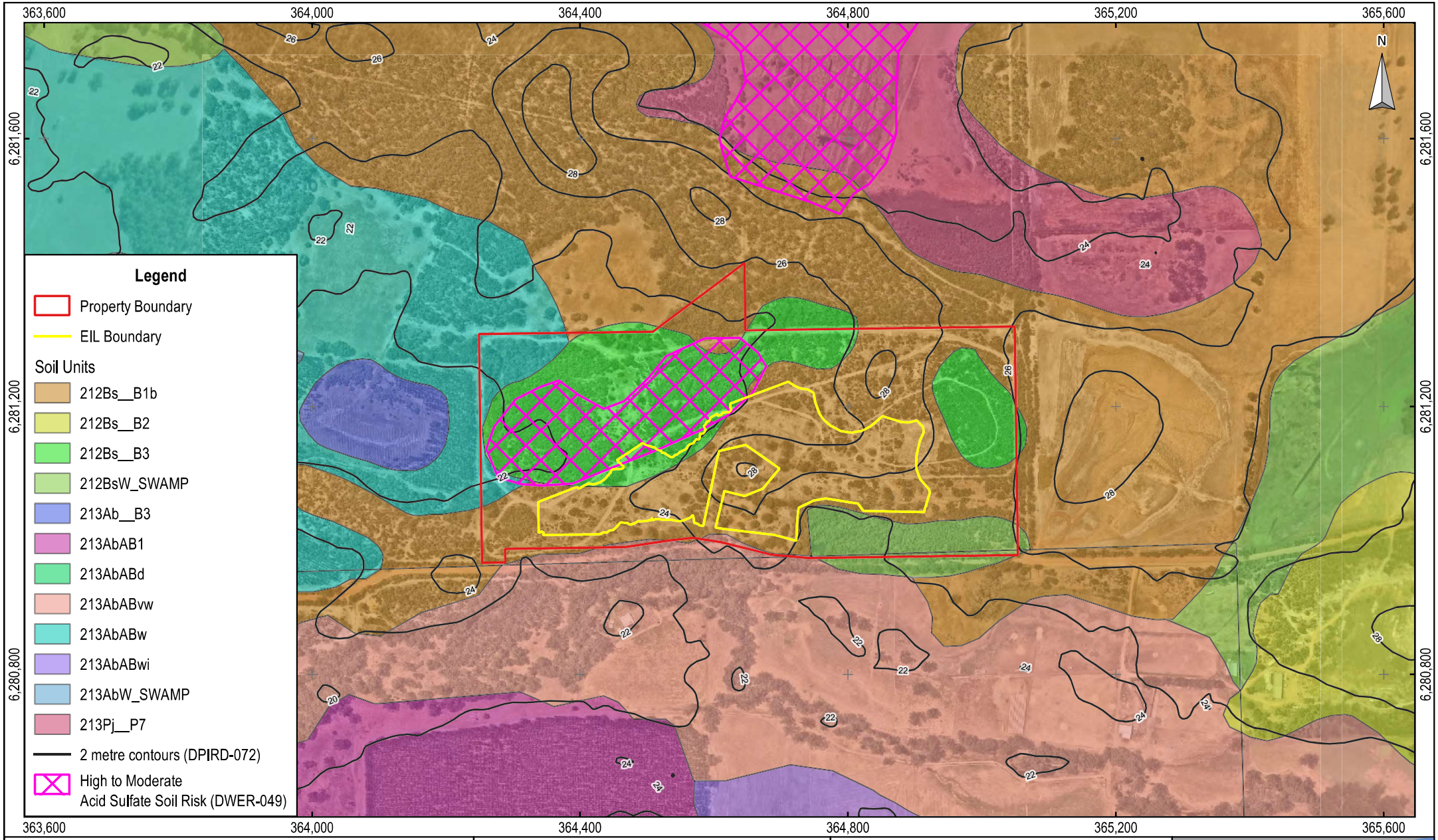
The elevation of the property ranges from 22 m to 28 m Australian Height Datum (AHD) (Figure 3) with the highest elevation recorded on a sand ridge extending north from the central part of Lot 43 into the neighbouring property (Lot 842, Plan 255892). The proposed extraction area is positioned along this ridgeline between the two highest points and through the 26 m to 24 m AHD area (Figure 3, Figure 4) (DPIRD 2019a; DPIRD-072).

The majority of the proposed extraction area is mapped as having a moderate to low risk of acid sulphate soils (ASS), while a small section of the property (of which 0.12 ha intersects with the proposed extraction area) is

mapped as having high to moderate risk of ASS (DWER-055). The area of high to moderate risk of ASS partly coincides with phase B3 (Figure 5).

Table 1: Soil Landscape Units on Lot 43

Soil Type	Description	Within Extraction Area	Area (ha) within Proposed Clearing Area
Bassendean B1b Phase (212Bs_B1b)	Very low relief dunes of undulating sand plain with deep bleached grey sandy A2 horizons and pale yellow B horizons.	Yes	1.60 ha
Bassendean B3 Phase (212Bs_B3)	Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam.	Yes	0.29 ha
Abba wet flats Phase (213AbABw)	Winter wet flats and slight depressions with sandy grey brown duplex (Abba) and gradational (Busselton) soils.	No	0
Abba wet vales Phase (213AbABvw)	Small narrow swampy depressions along drainage lines. Alluvial soils.	No	0
Sw - Swamp (Bassendean) (212Bs_Swamp)	Swamp	No	0



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Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 100 200 m

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 5

Landform and Soils

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2.4 GROUNDWATER

Lot 43 lies within the Busselton-Capel Groundwater Area, proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act) (DWER-034). The unconfined 'Perth - Superficial Swan' aquifer overlies the more confined 'Perth - Leederville' aquifer and the deep 'Perth - Yarragadee South' aquifer (Department of Water 2022).

Regional groundwater flow direction in the area is generally east to west (Commander 1984) and groundwater monitoring on site in 2021 (JDA 2021) indicated that this was the case for Lot 43. Maximum groundwater levels within Lot 43 were estimated to vary from 25 m AHD in the east to 22 m AHD in the west and south (JDA 2021). Based on JDA (2021) hydrology modelling, the maximum groundwater levels within the proposed extraction area vary from 24.5 m AHD in the east to 22 m AHD in the west.

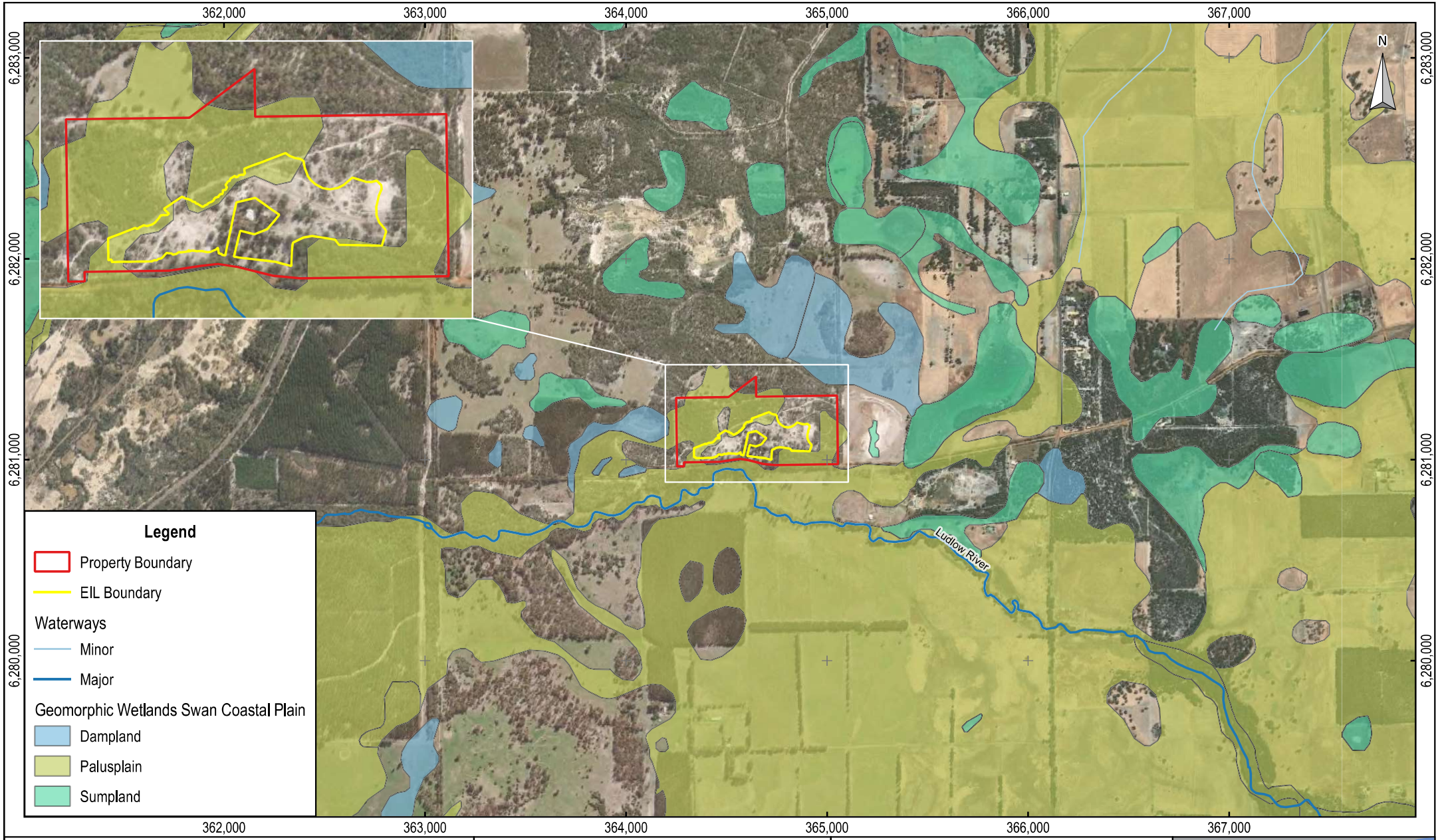
2.5 SURFACE WATER

The property lies within the Busselton Coast Water Management Area and in the Ludlow River sub management area of the Vasse/Wonnerup Estuary Catchment (DWER-027; DWER-028; DWER-029; DWER-030). The property does not fall within a RIWI Surface Water Proclamation Area (DWER-037) and does not intersect a Public Drinking Water Source Area (DWER-033).

There are no watercourses or drainage lines within the property or the proposed extraction area. The closest watercourse is the Ludlow River, approximately 70 m to the south of the extraction area, on the southern side of the Plantation Road (Figure 6).

The property intersects an extensive Multiple Use palusplain wetland (Unique Feature ID 15809) that is described as a seasonally waterlogged flat covering over 42,000 ha in the southern Swan Coastal Plain (Figure 6, Figure 7, DBCA-019). The wetland has been largely cleared of native vegetation. The majority of the proposed extraction area is outside the mapped extent of this wetland, with approximately 1.26 ha being intersected, of which 0.43 ha contains vegetation.

No Conservation category or Resource Enhancement category wetlands intersect the property (Figure 7, DBCA-019). The closest Conservation category wetland is located approximately 1.3 km north from the proposed extraction area.



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Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 0.5 1 km

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 6

Wetlands and Waterways

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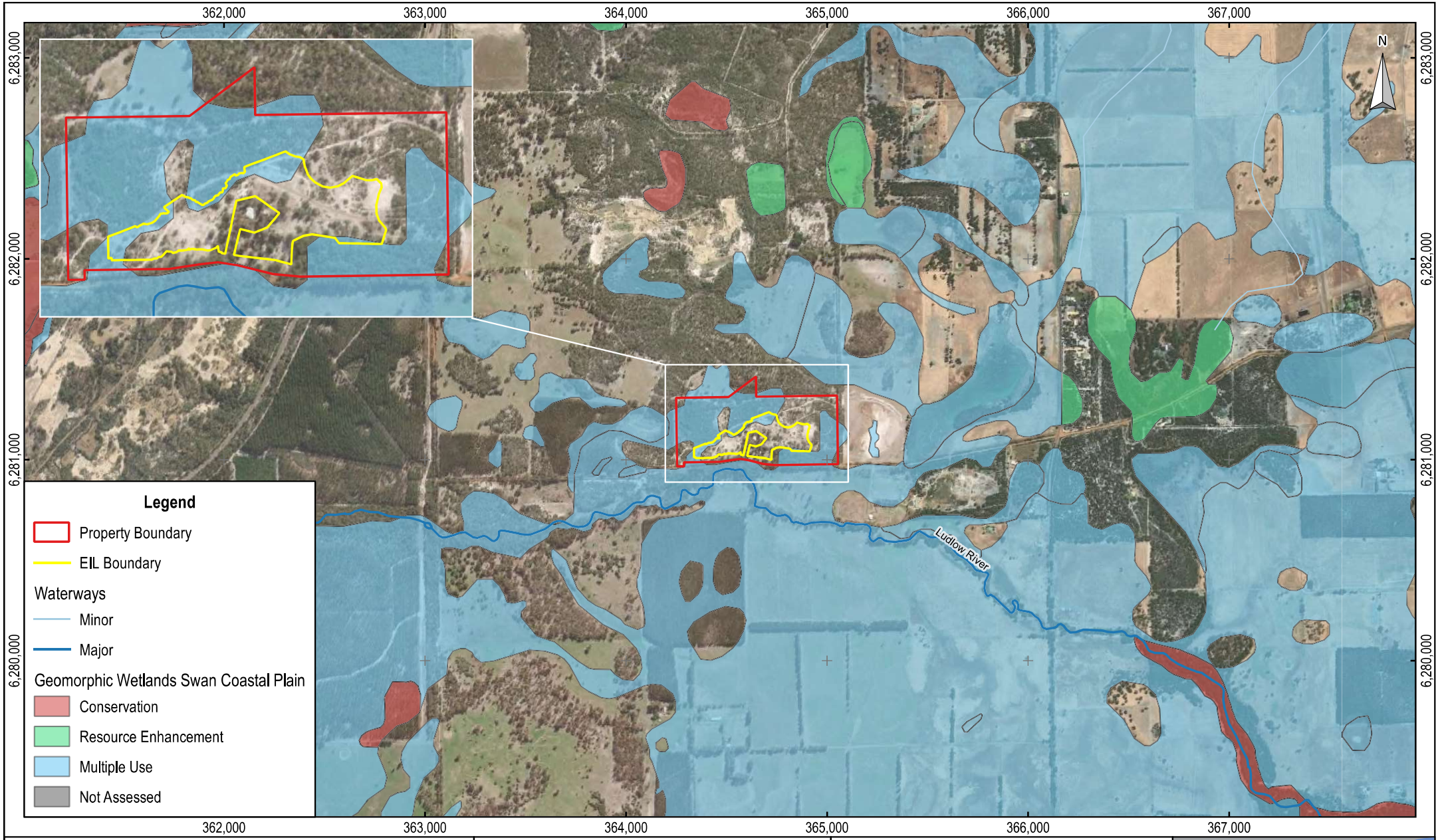

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Original Size: A4

Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 0.5 1 km

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 7

Status of Wetlands

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2.6 ENVIRONMENTALLY SENSITIVE AREAS

Currently, there are no Environmentally Sensitive Areas (ESAs) mapped on the property (DWER-046). However, it is noted that there is potential for an ESA to be present on the property due to the confirmed presence of *Drakaea elastica* (Ecoedge 2022), listed as Threatened under the *Biodiversity Conservation Act 2016* (WA) (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). These plants have been excluded from the extraction area by a 50 m buffer. A Threatened Ecological Community has also been recorded on the property (Ecoedge 2022) and is expected to be considered an ESA. This community has also been excluded from the extraction area. Further information on *Drakaea elastica* and the Threatened Ecological Community identified on the property is provided in Section 2.7.

2.7 VEGETATION

2.7.1 Regional Context

Lot 43 contains a mosaic of remnant native vegetation, regrowth, and cleared land around an array of existing infrastructure. There are two sets of broad scale (1:250,000) vegetation mapping available for this part of the southwest. The first set maps the entirety of Lot 43 including the proposed extraction area as Vegetation Association 1000 (Pre-European vegetation dataset DPIRD-006, Shepherd *et al*. 2002), described as Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree (*Melaleuca* spp.). The second set maps the majority of the property including the proposed extraction area as Southern River Complex (DBCA-046, Heddle *et al*. 1980, Webb *et al*. 2016). This complex is described as: Open woodland of *Corymbia calophylla* (Marri) - *Eucalyptus marginata* (Jarrah) - *Banksia* species with fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark) along creek beds. The remainder of the property is mapped as Abba Complex.

2.7.2 Vegetation Units and Condition

Ecoedge (2022) conducted a flora and vegetation survey of Lot 43 in August to October 2021. The survey covered an area of 27.41 ha, which is slightly larger than the property (27.13 ha). Key findings of the survey were following:

- Five vegetation units, A, B, C D1, D2, E1 and E2, were described for the survey area, with two of these units, D and E, being sub-units (Table 2, Figure 8).
  - E1 and E2 are considered to represent occurrences of the "Southern *Corymbia calophylla* woodlands on heavy soils", a State-listed TEC.
  - C does not correspond with any TEC or PEC; however, contains several disjunct or "range end" taxa.
  - B and C and sub-unit E2 considered to represent wetland or riparian vegetation because of the presence of typical wetland species.
  - Other significant ecological communities known from records within 5 km of the site were not recorded on the property.
- Approximately one-third (34.8%) of the survey area was Cleared, another third (33.8%) was classed as Degraded or Completely Degraded, and the remainder was Good to Excellent condition vegetation (Table 3, Figure 9).

It is noted that while the Ecoedge mapping based on 2021 aerial photograph showed that 34.8% of the property is cleared; aerial photographs from 2003 show approximately 75% of the property was cleared (Figure 10). This indicates that the B and D2 vegetation communities are largely regrowth.

The proposed extraction area intersects vegetation units B, C, D1 and D2, with the majority of the extraction area being D2 (Table 2). Of those vegetation units, only 0.07 ha is assessed as being in Good condition, with 0.56 ha assessed as Degraded, and 1.26 ha as Completely Degraded (Table 3). The extraction area has

been purposefully delineated to minimise impacts on native vegetation while still achieving reasonable resource extraction.

Table 2: Vegetation Units (Ecoedge 2022)

Vegetation Units	Description	Within Lot 43 (ha)*	Within Extraction Area (ha)
Unit A	Medium open forest of *Corymbia calophylla* over very open low woodland of *Xylomelum occidentale* over tall sparse shrubland of *Kunzea glabrescens* and *Xanthorrhoea brunonis* over *Pteridium esculentum* fernland or grassland of **Avena barbata*, **Briza maxima* and **Ehrharta longiflora* on grey sandy loam. [Condition mainly Degraded - Good].	0.85	None
Unit B	Open low woodland of *Melaleuca preissiana* over *Leptocarpus coangustatus*, *Lepidosperma longitudinale* sedgeland with patches of *Kunzea glabrescens* tall shrubland over *Hypocalymma angustifolium* low shrubland over open grassland/forbland of introduced taxa on grey sand (winter wet). [Condition mainly Degraded - Good].	0.63	0.002
Unit C	Very open medium woodland of *Corymbia calophylla* over medium woodland of *Melaleuca preissiana* over *Aotus gracillima*, *Astartea scoparia*, *Kunzea glabrescens* tall shrubland over *Hypocalymma angustifolium* low shrubland over open sedgeland of *Lepidosperma longitudinale*, *Pteridium esculentum* and *Schoenus efoliatus* open forbland on grey sand (winter damp). [Condition Degraded - Very Good].	1.16	0.02
Unit D1	Medium woodland of *Eucalyptus marginata* over open low woodland of *Banksia attenuata* and/or *Banksia ilicifolia* and *Nuytsia floribunda* over *Kunzea glabrescens* tall shrubland over shrubland of *Adenanthos meisneri*, *Brachyloma preissii* and *Melaleuca thymoides* over *Dasypogon bromeliifolius* low shrubland and *Phlebocarya ciliata* open forbland on grey sand. [Degraded-Good]	0.21	0.05
Unit D2	Medium very open woodland of *Agonis flexuosa*, *Banksia ilicifolia* or *Nuytsia floribunda* over tall shrubland of *Kunzea glabrescens* over low shrubland of *Acacia semitrullata*, *A. stenoptera*, *Adenanthos meisneri*, *Dasypogon bromeliifolius*, *Hypocalymma angustifolium*, *Melaleuca thymoides* and *Xanthorrhoea brunonis* over open forbland of *Patersonia occidentalis*, *Phlebocarya ciliata* on grey sand. [Condition mainly Completely Degraded-Good]	13.11	1.82
Unit E1	Medium woodland of *Corymbia calophylla* over very open medium shrubland of *Kingia australis* over low shrubland of *Acacia pulchella*, *Hardenbergia comptoniana*, *Leucopogon propinquus*, *Macrozamia riedlei*, *Pimelea angustifolia*, and *Xanthorrhoea brunonis* over open forbland of *Conostylis aculeata*, *Craspedia variabilis* and *Senecio quadridentatus* and very open sedgeland of *Schoenus grandiflorus* and *Tetraria octandra* and scattered *Microlaena stipoides* low grass on grey sandy loam. [Condition Very Good to Excellent]. (Southern *Corymbia calophylla* woodlands TEC).	1.09	0
Unit E2	Medium woodland of *Corymbia calophylla* and *Eucalyptus rudis* over low woodland of *Agonis flexuosa* and *Melaleuca preissiana* over open medium shrubland of *Astartea scoparia*, *Acacia extensa* and *Grevillea manglesioides* over low sedgeland of *Anarthria prolifera* and *Lepidosperma longitudinale* and open forbland of *Burchardia multiflora* and *Opercularia hispidula* on grey-brown sandy loam or red-brown loam. [Condition ranges from Completely Degraded-Excellent]. (Southern *Corymbia calophylla* woodlands on heavy soils TEC).	0.80	0
Existing Cleared Areas		9.55	4.90
Total		**27.41**	**6.79**

**Includes the entire survey that was slightly larger than the property*

Table 3: Vegetation Condition (Ecoedge 2022)

Vegetation Condition	Total within Lot 43 (ha)*	Within Extraction Area (ha)
Excellent	0.70	0.00
Very Good	2.46	0.00
Good	5.44	0.07
Degraded	6.68	0.56
Completely Degraded	2.58	1.26
Cleared	9.55	4.90
Total	**27.41**	**6.79**

**Includes the entire survey that was slightly larger than the property.*

2.7.3 Significant Vegetation

Ecoedge (2022) found one significant ecological community on Lot 43, namely 'Southern *Corymbia calophylla* woodlands on heavy soils' (FCT1b) (Figure 8) that is a state listed TEC (Vulnerable) but not listed federally. This community aligned with vegetation Units E1 and E2 (Table 2). The proposed extraction area does not intersect this ecological community. Other significant ecological communities known from records within 5 km of the site were not recorded on the property (Ecoedge 2022).

2.7.4 Flora Assemblage

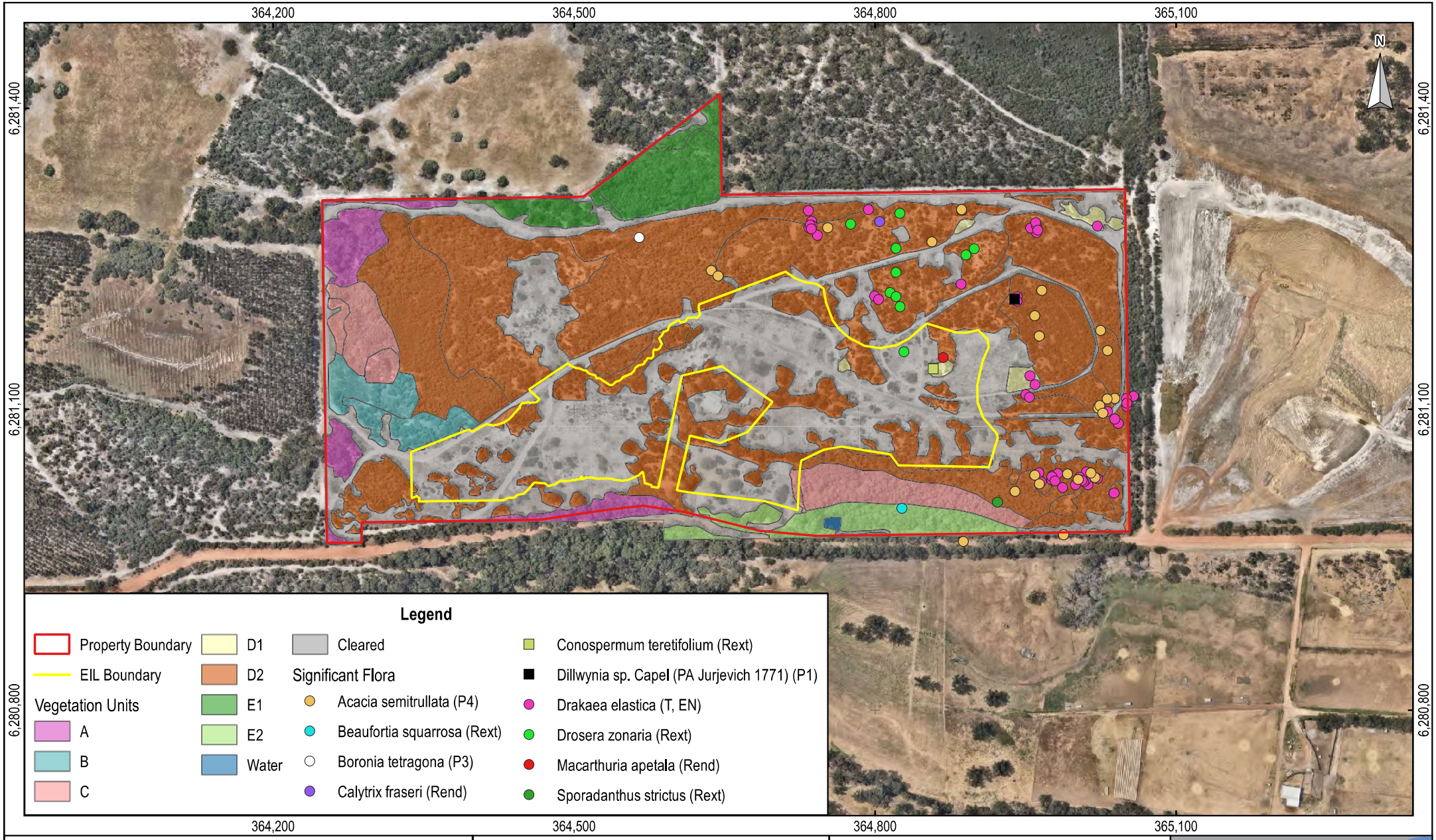
Ecoedge (2022) identified 153 vascular flora taxa within Lot 43, of which twelve (≈ 7.8%) were introduced taxa. Two Declared pest plants listed under the *Biosecurity and Agriculture Management Act 2007* (WA), **Asparagus asparagoides* (Bridal creeper) and **Zantedeschia aethiopica* (Arum Lily), were recorded on Lot 43, outside the proposed extraction area. Bridal creeper is also a Weed of National Significance (Weeds Australia 2021).

2.7.5 Significant Flora

Significant flora recorded by Ecoedge (2022) on Lot 43 are listed in Table 4 and shown in Figure 8. The significant flora included one Threatened species, three Priority species, three species that were potential range extensions and three potential range end species.

Table 4: Significant Flora on Lot 43 (Ecoedge 2022)

Species	Individuals within Lot 43	Individuals within Extraction Area
Drakaea elastica (T)	193	0
Dillwynia sp. Capel (P1)	1	0
Boronia tetragona (P3)	1	0
Acacia semitrullata (P4)	88	0
Beaufortia squarrosa (Range extension)	5	0
Sporadanthus strictus (Range extension)	3	0
Drosera zonaria (Range extension)	1140	100
Calytrix fraseri (Range end)	5	0
Conospermum teretifolium (Range end)	4	4
Macarthuria apetala (Range end)	1	1



Scale: 1: 5,000
Original Size: A4

Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 100 200 m

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 8

Vegetation Units and Significant Flora

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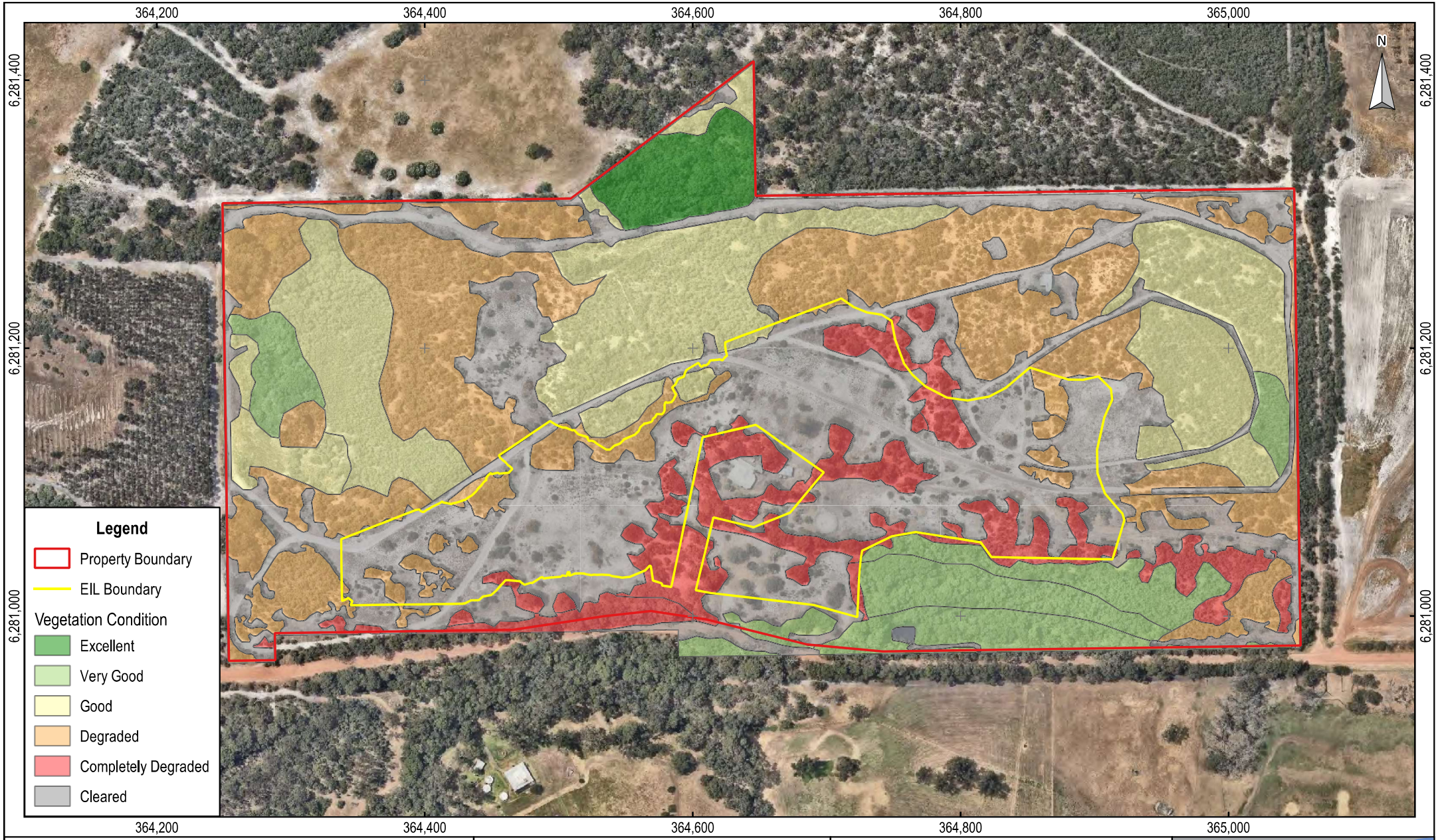

Scale: 1: 3,750
Original Size: A4

Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 100 200 m

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 9

Vegetation Condition

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Figure 10: Clearing Extent in 2003

2.8 FAUNA

A fauna assessment of Lot 43 was completed by Greg Harewood (Harewood 2022), which included a desktop assessment, basic fauna assessment, identification of fauna habitats, and a targeted survey for Black Cockatoos and Western Ringtail Possums. A total of 32 native fauna species, mainly common birds, was recorded within the survey area.

2.8.1 Fauna Habitats

The survey by Harewood (2022) found that Lot 43 contained a mosaic of remnant native vegetation, regrowth, and cleared land around an array of existing infrastructure. A total of seven fauna habitat types were recorded within Lot 43, of which three are within the proposed extraction area (Table 5, Figure 11).

The fauna habitats on Lot 43 range from Completely Degraded (existing cleared areas) to Very Good (intact remnant native vegetation); however, the majority is Degraded, largely a consequence of historical clearing and livestock grazing (Harewood 2022, Figure 11). Given the degree of disturbance, the original fauna assemblage within the survey area is likely to be depauperate in many aspects, particularly the ground dwelling species that rely on dense native understorey (midstorey and ground cover) vegetation, which is absent/sparse in many areas on the property.

Table 5: Habitat Types within Lot 43

Habitat type	Description	Total within Lot 43 (ha)*	Within Extraction Area (ha)
Unit A	Medium open forest of marri over a very open low woodland over a tall sparse shrubland over a fernland or grassland on grey sandy loam.	0.85	0
Unit B	Open low woodland of paperbark over a sedgeland with patches of tall shrubland over a low shrubland over an open grassland/forbland on grey sand.	0.63	0.002
Unit C	Very open medium woodland of marri over medium woodland of paperbark over a tall shrubland over a low shrubland over an open sedgeland and open forbland on grey sand	1.16	0.02
Unit D	Tall shrubland with scattered emergent trees such as jarrah, peppermint, Banksia and Nuytsia on grey sand	13.32	1.87
Unit E	Medium woodland of marri and flooded gum over low woodland of peppermint and paperbark over open medium shrubland over a low sedgeland and open forbland on grey-brown sandy loam or red-brown loam.	1.89	0
Existing Cleared Areas		9.53	4.90
Artificial Dam (Soak)		0.02	0
	Total	**27.41**	**6.79**

**Includes the entire survey (27.41 ha) that was slightly larger than the property (27.13 ha).*

Approximately 15.9 ha of native vegetation will be retained on Lot 43, which is 89% of the mapped extent. This vegetation will continue to provide suitable habitat for the significant flora and fauna, and connectivity

through the property during the operations. Further, a portion of the 6.79 ha extraction area will be revegetated back to native vegetation; this will be at least 2.18 ha. The areas of more consistent remnant vegetation were noted as likely to be utilised by a wider array of fauna species to some degree, with the majority fauna present being common bird species (Harewood 2022).

2.8.2 Significant Fauna

Evidence of four significant fauna species were recorded on Lot 43 in the fauna survey (Harewood 2022, Figure 11). Of the four significant species identified, three are threatened (T) - Baudin's Black Cockatoo, the Forest Red-tailed Black Cockatoo, and the Western Ringtail Possum - and one is Priority 4 (P4) - the Quenda. A further seven significant fauna species were assessed as 'Possibly Occurs' based on habitat and known records; however, no evidence of their presence was recorded during the survey. Table 6 presents the significant fauna species recorded or possibly occurring within the survey area.

Table 6: Significant Fauna Likelihood of Occurrence

Common Name *(Species Name)*	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence
	EPBC Act	BC Act/DBCA Priority			
Baudin`s Black Cockatoo *(Calyptorhynchus baudinii)*	T(EN)	T(EN)	Mainly eucalypt forests where it feeds primarily on the marri seeds.	Yes	Known to Occur.
Carnaby`s Black Cockatoo (*Calyptorhynchus latirostris)*	T(EN)	T(EN)	Forests, woodlands, heathlands, farms; feeds on Banksia, Hakea and Marri.	Yes	Possibly Occurs.
Coastal Plains Skink *Ctenotus ora*	-	P3	Sandy substrates with low vegetation (including heath) in open Eucalyptus/Corymbia woodland over Banksia	Yes	Possibly Occurs
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	T(VU)	T(VU)	Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble	Yes	Known to Occur.
Masked Owl (SW population) *Tyto n. novaehollandiae*	-	P3	Roosts and nests in heavy forest, hunts over open woodlands and farmlands.	Yes	Possibly Occurs.
Peregrine Falcon *Falco peregrinus*	-	OS	Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.	Yes	Possibly Occurs.
Quenda *Isoodon fusciventer*	-	P4	Dense scrubby, often swampy, vegetation with dense cover	Yes	Known To Occur
South-west Brush-tailed Phascogale *Phascogale tapoatafa wambenger*	-	CD	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.	Yes	Possibly Occurs.
Swan Coastal Plain Shield-backed Trapdoor Spider *Idiosoma sigillatum*	-	P3	Burrows of this species usually found in Banksia woodland and heathland on sandy soils.	Yes/Marginal	Possibly Occurs.

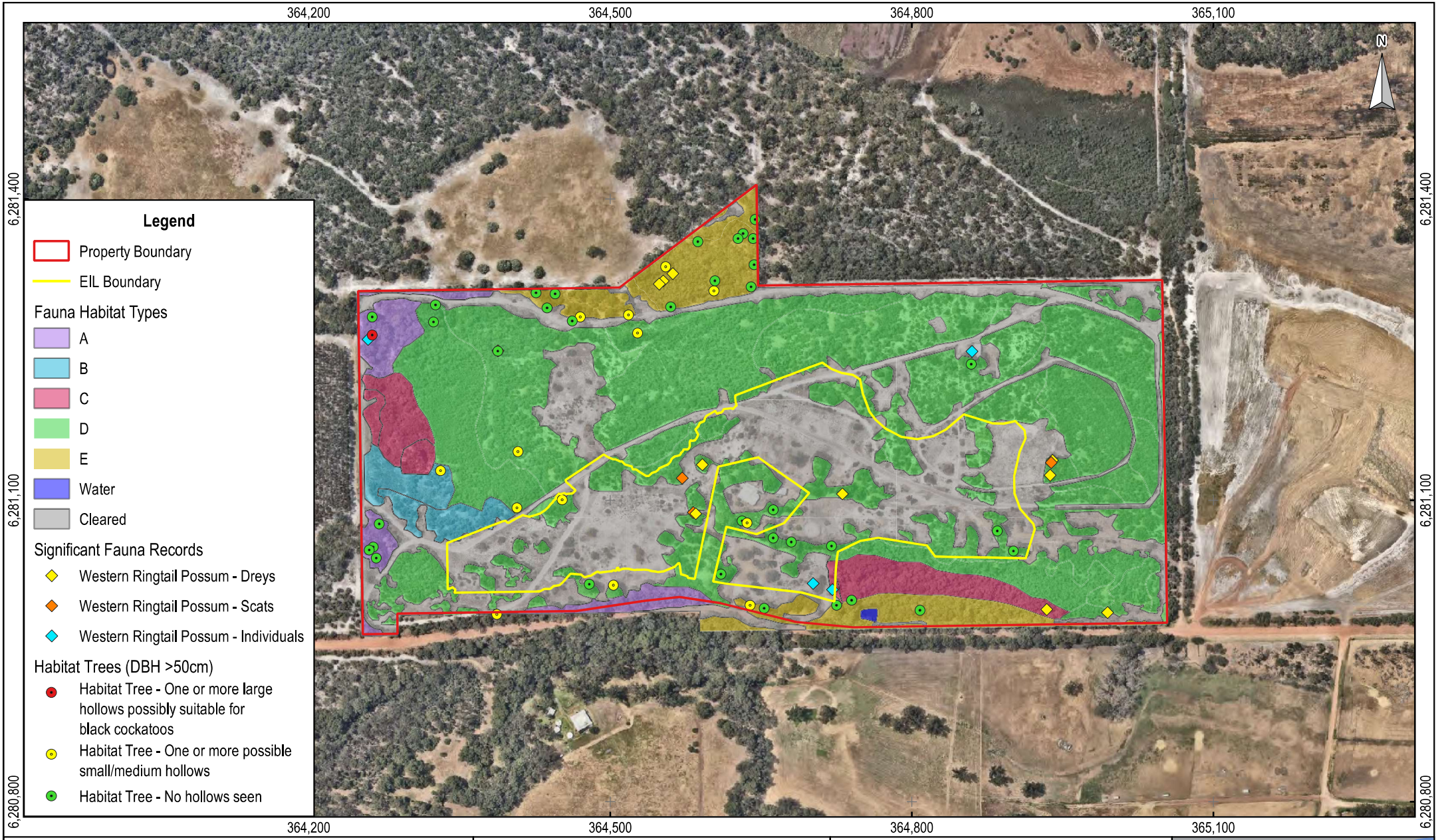
Common Name *(Species Name)*	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence
	EPBC Act	BC Act/DBCA Priority			
Western Ringtail Possum *Pseudocheirus occidentalis*	T(CR)	T(CR)	Coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee.	Yes	Known To Occur
Western False *Pipistrelle Falsistrellus mackenziei*	-	P4	Wet sclerophyll forest dominated by karri and in high rainfall zones of the jarrah and marri forest.	Yes	Possibly Occurs.

Diggings attributed to the Quenda were observed within the survey area. It was noted that this species potentially utilises all areas with dense groundcover in the survey area.

Evidence of Black Cockatoo foraging was observed in the survey area, in the form of chewed marri fruits, attributed to either the Forest Red-tailed Black Cockatoo or the Baudin's Black Cockatoo (Harewood 2022). No previously documented evidence of Black Cockatoo roosting was found within the survey area, nor were signs of roosting noted during the field assessment (Harewood 2022).

A total of 49 trees within the survey area were recorded as having a DBH of >50 cm (Figure 11, Harewood 2022). These trees are considered large enough to develop a hollow suitable for Black Cockatoo breeding at some future point. The majority of these trees (35) appeared to contain no hollows, and 13 trees contained apparent hollows that were assessed as unlikely to be suitable for nesting due to their small size, unsuitable orientation, or low height to ground level. One tree contained at least one hollow potentially suitable for Black Cockatoo nesting; however, no signs of use were recorded (Harewood 2022). Of the trees recorded as having a DBH > 50 cm (Harewood 2022), seven are located within the proposed extraction area, including one tree with hollows too small for Black Cockatoo breeding. The tree containing the potentially suitable hollow is located outside the proposed extraction area (Figure 11).

Evidence of Western Ringtail Possums was recorded during the daytime survey in the form of scats and dreys (Figure 11). In addition, some of the hollow bearing DBH > 50 cm trees recorded, were considered likely to provide suitable daytime refuge for the possum (Harewood 2022). A total of five individuals were observed across Lot 43 during the nocturnal survey, including two within the proposed clearing area (Figure 11). The fauna habitat assessment also noted that most of the remnant vegetation present appeared to be suitable for Western Ringtail Possums, although occupancy within the survey area is likely varied, with favouritism for denser native woodland/low woodland habitat (and to an extent tall shrubland). It was noted that overall occupancy in the survey area is likely to be low.



Scale: 1: 5,000
Original Size: A4

Grid: GDA2020 / MGA zone 50 (EPSG:7850)

0 100 200 m

Ludlow Holdings
Lot 43 Plantation Road, Ludlow

Figure 11

Fauna Values

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3. PROJECT DESCRIPTION

3.1 PROPOSED SAND EXTRACTION

McDougall Quarries are proposing to extract approximately 77,150 bank cubic metres (BCM) of sand from the 6.79 ha extraction area on Lot 43 Plantation Road. The extraction is proposed to occur gradually in four stages, each approximately 2 ha in size (Figure 3). Post-extraction batter slopes will be no steeper than 1:6 and the pit floor level will remain at least 0.5 m above the maximum groundwater level. Following extraction, the sand extraction area is proposed to be gradually rehabilitated to a mixture of native vegetation and pasture areas.

Further details regarding the proposed extractive operations are included in the DA and EIL application package prepared by Emerge WA, which also includes a document prepared by MBS Environmental covering the environmental impacts of the project, environmental management measures to be implemented and an indicative rehabilitation plan. This DA and EIL package will be submitted to DWER with the NVCP application.

3.2 PROPOSED CLEARING OF NATIVE VEGETATION

The project requires clearing of up to 1.89 ha of native vegetation ('proposed clearing area') within the extraction area as shown in Figure 4. The remainder of the extraction area has been cleared of native vegetation and is either bare or covered in pasture grasses and other introduced species. The vegetation is proposed to be removed mechanically in stages (matching the extraction stages), mulched, and stockpiled for later use in rehabilitation unless agreed otherwise with DWER. Topsoil will also be removed and stockpiled for later use in rehabilitation. Sand extraction and rehabilitation will proceed gradually in stages. Once extraction of sand has been completed in a stage, it will be rehabilitated as extraction moves forward. At this stage, it is expected that at least 2.18 ha of the extraction area will be rehabilitated with native vegetation to mitigate the proposed clearing; however, this and other mitigation measures will be further defined as part of the NVCP application with DWER.

4. AVOIDANCE AND MITIGATION

Project planning and the design of the proposed clearing area have considered the impact mitigation sequence of avoidance, minimisation, rehabilitation, and offsetting (DER 2014) as detailed in Table 7.

Table 7: Implementation of Mitigation Hierarchy Sequency

Mitigation Hierarchy Sequency	Implementation of Mitigation Hierarchy in Project Design
Avoid	• The extraction area is proposed for the central section of the property, the majority of which has been previously cleared (Figure 10), in order to avoid impacts on the better-quality native vegetation and associated fauna habitat located elsewhere on the property. • The need for vegetation clearing has been further minimised by utilising existing access tracks and other cleared areas. • All areas where vegetation is in Very Good or higher condition have been excluded from the extraction area. • The identified population of Threatened *Drakaea elastica* has been excluded from the extraction area completely and an additional 50 m separation distance has been applied. • All trees with hollows suitable for Black Cockatoo nesting have been avoided. • No Threatened or Priority flora species are included in the extraction area. • All Threatened or Priority Ecological Communities have been excluded from the extraction area. • Stockpiles and turnaround areas have been located within extraction area to prevent further clearing of native vegetation.
Minimise	• Some of the above avoidance measures are also impact minimisation measures. • Minimising any potential indirect impact on the identified population of *Drakaea elastica* by including a 50 m separation from extraction area. • Minimising impacts to local fauna, particularly the Threatened Western Ringtail Possum and Black Cockatoos, by clearing majority Degraded to Completely Degraded vegetation. • Further minimising impacts to local fauna by retaining 89% of native vegetation on the property and ensuring that habitat connectivity to surrounding properties is maintained to support fauna movement. • Gradual clearing, extraction and rehabilitation in stages rather than e.g. clearing the entire area in one go, will be used to minimise the area of disturbance at any particular time and ensure that the duration of habitat loss will be as short as possible. • A range of environmental management measures will be implemented (as detailed in the DA and EIL application package) targeting e.g. dust, dieback, weeds, and drainage. These will minimise environmental impacts associated with the clearing.
Rehabilitate	• A portion of the 6.79 ha extraction area will be rehabilitated back to native vegetation. This portion will be at least 2.18 ha, though will be determined as part of the NVCP process with DWER.
Offset	• At this stage, no offsets are being proposed. This will be resolved as part of the NVCP in consultation with DWER.

5. ASSESSMENT OF CLEARING PRINCIPLES

5.1 OVERVIEW

Clearing applications are assessed against 10 principles outlined in Schedule 5 of the *Environmental Protection Act 1986* (EP Act). These principles aim to ensure that all potential impacts resulting from removal of native vegetation are assessed in an integrated way and apply to all lands throughout Western Australia.

The following sections provide an assessment of the impacts of the proposed clearing against the clearing principles. Where relevant, reference is made to the state *Biodiversity Conservation Act 2016* (BC Act) and the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A summary of the outcomes of the assessment against the 10 Clearing Principles are provided in Table 8.

Table 8: Summary of Clearing Assessment Against Clearing Principles

Principle Number	Clearing Principle	Outcome
A	Native vegetation should not be cleared if it comprises a high level of biological diversity.	Not likely at variance.
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Not likely at variance.
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	Not likely at variance.
D	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a Threatened Ecological Community (TEC).	Not likely at variance.
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	Not likely at variance.
F	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	At variance.
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Not likely at variance.
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation areas.	Not at variance.
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Not likely at variance.
J	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Not at variance.

5.2 CLEARING PRINCIPLE A – BIODIVERSITY

Clearing principle (a): Native vegetation should not be cleared if it comprises of a high level of biodiversity.
Assessment: Proposed clearing is not likely at variance to this principle

The application is to clear up to 1.89 ha of native vegetation on Lot 43 (Plan 69043) Plantation Road in Ludlow for the purposes of sand extraction. The vegetation proposed to be cleared is primarily regrowth from being previously cleared (Figure 10). The proposed clearing area intersects four mapped vegetation units (Ecoedge 2022) as described in Table 9. As summarised in Table 9, of the 1.89 ha of vegetation to be cleared, 1.82 ha is in Degraded to Completely Degraded condition, with 0.07 ha in Good condition (Ecoedge 2022).

The vegetation proposed to be cleared is not representative of any state or federally listed Threatened Ecological Community or DBCA listed Priority Ecological Community.

Table 9: Vegetation Proposed to be Cleared

Vegetation Units	Description	Within Proposed Clearing Area (ha)	
Unit B*	Open low woodland of *Melaleuca preissiana* over *Leptocarpus coangustatus*, *Lepidosperma longitudinale* sedgeland with patches of *Kunzea glabrescens* tall shrubland over *Hypocalymma angustifolium* low shrubland over open grassland/forbland of introduced taxa on grey sand (winter wet).	0.002	Degraded: 0.002
Unit C*	Very open medium woodland of *Corymbia calophylla* over medium woodland of *Melaleuca preissiana* over *Aotus gracillima*, *Astartea scoparia*, *Kunzea glabrescens* tall shrubland over *Hypocalymma angustifolium* low shrubland over open sedgeland of *Lepidosperma longitudinale*, *Pteridium esculentum* and *Schoenus efoliatus* open forbland on grey sand (winter damp).	0.02	Completely Degraded: 0.02
Unit D1	Medium woodland of *Eucalyptus marginata* over open low woodland of *Banksia attenuata* and/or *Banksia ilicifolia* and *Nuytsia floribunda* over *Kunzea glabrescens* tall shrubland over shrubland of *Adenanthos meisneri*, *Brachyloma preissii* and *Melaleuca thymoides* over *Dasypogon bromeliifolius* low shrubland and *Phlebocarya ciliata* open forbland on grey sand.	0.05	Degraded: 0.033 Completely Degraded: 0.013
Unit D2	Medium very open woodland of *Agonis flexuosa*, *Banksia ilicifolia* or *Nuytsia floribunda* over tall shrubland of *Kunzea glabrescens* over low shrubland of *Acacia semitrullata*, *A. stenoptera*, *Adenanthos meisneri*, *Dasypogon bromeliifolius*, *Hypocalymma angustifolium*, *Melaleuca thymoides* and *Xanthorrhoea brunonis* over open forbland of *Patersonia occidentalis*, *Phlebocarya ciliata* on grey sand.	1.82	Good: 0.07 Degraded: 0.39 Completely Degraded: 1.36
Total		**1.89**	**Good: 0.07 Degraded: 0.42 Completely Degraded: 1.40**

*Vegetation units denoted with * are considered to represent wetland / riparian type vegetation.*

Ecoedge (2022) survey of the entire Lot 43 found 153 flora species of which approximately 7.8% were introduced. The proposed clearing area is expected to support only a small subset of the native flora species, due to the proposed clearing area being limited to the most degraded areas of the property. Due to the disturbance history of the site, the extraction area supports a range of weed species, most of which are common in the local area.

Declared pest plants **Asparagus asparagoides* (Bridal creeper) and **Zantedeschia aethiopica* (Arum lily), were recorded on Lot 43; however, both were located outside the proposed extraction area.

There are no state or federally listed Threatened flora within the proposed clearing area or 50 m of it. There are also no DBCA listed Priority flora species within the proposed clearing area. These have all been avoided through project design. The proposed clearing is expected to remove 100 individuals of one potential range extension species -*Drosera zonaria* - and individuals from two range end species: four *Conospermum teretifolium* and one *Macarthuria apetala*.

The fauna assemblage utilising the proposed clearing area is likely to be limited. This is due to 96% of the native vegetation within the proposed clearing area being in Degraded to Completely Degraded condition, only 4% in Good condition, and the remainder of the proposed extraction area being already Cleared. Ground dwelling fauna species that rely on dense native understorey (midstorey and ground cover) vegetation are likely to be absent/sparse. Overall fauna diversity of the proposed clearing area is expected to be significantly lower than that of the surrounding areas, which consist of better quality vegetation.

Four significant fauna species have been recorded on Lot 43 (Harewood 2022), of which three are threatened (T) - Baudin's Black Cockatoo, the Forest Red-tailed Black Cockatoo, and the Western Ringtail Possum - and one is Priority 4 (P4) - the Quenda. A further seven significant fauna species were assessed as 'Possibly Occurs' based on habitat and known records (Table 6); however, no evidence of their presence was recorded during the survey. It is noted that the survey by Harewood (2022) covered the entire Lot 43 whereas the proposed clearing area is limited to the most degraded parts of the property. The significant fauna known to occur or having potential to occur on the property are expected to be less likely to utilise the cleared and degraded areas compared to the better quality habitat provided by surrounding vegetation in better condition.

Overall, the project footprint has been designed to avoid the environmental values of the property and the proposed clearing is limited the most degraded and disturbed areas of the property. The proposed clearing is not considered to represent a high level of biological diversity, particularly in comparison to the remainder of the property. Therefore, the proposed clearing is not likely to be at variance to clearing principle (a).

5.3 CLEARING PRINCIPLE B – SIGNIFICANT FAUNA HABITAT

Clearing principle (b): Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

Assessment: Proposed clearing is not likely to be at variance to this principle.

Harewood (2022) found that Lot 43 contained a mosaic of remnant native vegetation, regrowth, and cleared land around an array of existing infrastructure. Three fauna habitat types, reflecting the vegetation types, were recorded within the proposed clearing area (Table 10). Of the 1.89 ha of vegetation to be cleared, 1.82 ha is in Degraded to Completely Degraded condition, with 0.07 ha in Good condition (Ecoedge 2022).

Table 10: Fauna Habitat Types to be Cleared

Habitat Type	Description	Within Proposed Clearing (ha)
Unit B	Open low woodland of paperbark over a sedgeland with patches of tall shrubland over a low shrubland over an open grassland/forbland on grey sand.	0.002
Unit C	Very open medium woodland of marri over medium woodland of paperbark over a tall shrubland over a low shrubland over an open sedgeland and open forbland on grey sand	0.02

Habitat Type	Description	Within Proposed Clearing (ha)
Unit D	Tall shrubland with scattered emergent trees such as jarrah, peppermint, Banksia and Nuytsia on grey sand	1.87
	Total	**1.89**

Given the degree of historical disturbance, the original fauna assemblage within the survey area is likely to be depauperate in many aspects, particularly the ground dwelling species that rely on dense native understorey vegetation, which is absent/sparse in many areas on the property. This is particularly true for the proposed clearing area covering some of the most degraded parts of the property.

Evidence of four significant fauna species were recorded on Lot 43 in the fauna survey (Harewood 2022):

- Baudin's Black Cockatoo (*Calyptorhynchus baudinii* – Endangered).
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso* – Vulnerable).
- Western Ringtail Possum (*Pseudocheirus occidentalis* – Critically Endangered).
- Quenda (*Isoodon fusciventer* – Priority Four).

Evidence of Black Cockatoo foraging was observed in the survey area, in the form of chewed marri fruits, attributed to either the Forest Red-tailed Black Cockatoo or the Baudin's Black Cockatoo. Fauna habitat types C and D, (totalling 1.89 ha) provide suitable foraging habitat for the three species of Black Cockatoos; however, the density of suitable foraging species is low due to previous clearing and other disturbance. Approximately 11,000 ha of native vegetation is estimated to remain within 12 km radius of the site, of which the majority is expected to provide suitable foraging habitat for the Black Cockatoo species (Harewood 2022).

No previously documented evidence of Black Cockatoo roosting was found within the survey area, nor were signs of roosting noted during the field assessment (Harewood 2022). The proposed clearing area and surrounding native vegetation provide habitat suitable for roosting, and the closest known roosting site is within 3 km (DBCA 2018a, 2018b, 2019; DBCA-050, DBCA-051, DBCA-064).

Of the trees recorded as having a DBH > 50 cm (Harewood 2022), seven are located within the proposed clearing area, including two trees with hollows too small for Black Cockatoo breeding. Forty two DBH > 50 cm trees will be retained on the property outside the extraction area, including one tree containing a potentially suitable hollow for nesting (Figure 11). All three species of Black Cockatoo have potential to breed in the local area (DAWE 2022), and DBCA data (2018d; DBCA-054) indicates known Carnaby's breeding area overlaps the proposed clearing area.

Evidence of Western Ringtail Possums was recorded during the daytime survey in the form of scats and dreys (Figure 11). In addition, some of the hollow bearing DBH trees recorded, were considered likely to provide suitable daytime refuge for the species (Harewood 2022). A total of five individuals were observed across Lot 43 during the nocturnal survey, including two within the proposed clearing area (Figure 11). The fauna habitat assessment also noted that most of the remnant vegetation present appeared to be suitable for Western Ringtail Possums, although occupancy within the survey area is likely varied, with favouritism for denser native woodland/low woodland habitat (and, to an extent, tall shrubland). It was noted that overall occupancy in the survey area is likely to be low. Based on this, the Western Ringtail Possum is expected to utilise the proposed clearing area (1.89 ha) to some degree but is not likely to depend on it for its ongoing survival considering the retention of approximately 15.9 ha of mostly better quality native vegetation on the property.

Diggings attributed to the Quenda were observed within the survey area. It was noted that this species potentially utilises all areas with dense groundcover in the survey area. As the proposed clearing area is largely Degraded to Completely Degraded in quality and lacking dense groundcover, Quenda are not expected to depend on it.

A further seven significant fauna species were considered to 'Possibly Occur' on the property (Table 6); however, no evidence of them was recorded (Harewood 2022). It is noted that the survey by Harewood (2022) covered the entirety of Lot 43 whereas the proposed clearing area is limited to the most degraded parts of the property.

Considering the degraded nature of the vegetation proposed to be cleared, it is unlikely to comprise significant habitat for any fauna species, particularly as approximately 15. 9 ha of mostly better quality habitat is being retained on the property. This vegetation will continue to provide suitable habitat for fauna and connectivity through the property during the operations.
The proposed operations are subject to a range of environmental management measures detailed in the DA and EIL application package that will be submitted with the NVCP application. These include measures to reduce impacts to fauna, e.g. engaging a licenced and appropriately qualified fauna specialist to inspect the clearing area ahead of vegetation disturbance and to be present during the vegetation clearing to move along or capture and relocate fauna.

Overall, considering that the majority of the extraction site is already cleared, and the native vegetation proposed to be cleared is in mostly Degraded condition, the proposed clearing is unlikely to have significant impacts on most fauna species inhabiting the local area. The proposed clearing area may provide some limited habitat for the Western Ringtail Possum and Black Cockatoo species, but suitable habitat in better condition is retained elsewhere on Lot 43. Therefore, the proposed clearing is not likely to be at variance to clearing principle (b).

5.4 CLEARING PRINCIPLE C – THREATENED FLORA

Clearing principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.
Assessment: Proposed clearing is not likely to be at variance to this principle.

Threatened *Drakaea elastica* was recorded on Lot 43 by Ecoedge (2022). The extraction area has been designed to not impact on the *Drakaea elastica* and maintains a 50 m separation distance from all the individuals or clusters. Therefore, the proposed clearing will not require removal of any *Drakaea elastica*, nor are they likely to be impacted during the sand extraction process. No other Threatened flora species have been recorded or are considered likely to occur on the property. Therefore, the vegetation proposed to be cleared is not expected to be necessary for the continued existence of the Threatened species.

Based on the above, the proposed clearing is not likely to be at variance to principle (c).

5.5 CLEARING PRINCIPLE D - THREATENED ECOLOGICAL COMMUNITIES

Clearing principle (d): Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.
Assessment: Proposed clearing is not at variance to this principle.

Ecoedge (2022) found one significant ecological community on Lot 43, 'Southern *Corymbia calophylla* woodlands on heavy soils' (Figure 8) that is a state listed Vulnerable Threatened Ecological Community (TEC) but not listed federally. The proposed extraction boundary has been deliberately delineated so that it does not intersect this ecological community and therefore the proposed clearing area does not contain TEC.

The vegetation proposed to be cleared has already been largely cleared in the past (Figure 10) and is mostly regrowth vegetation in Degraded to Completely Degraded condition (96%). Therefore, the vegetation proposed to be cleared is not likely to be necessary for the maintenance of the adjacent TEC.

The proposed operations are subject to a range of environmental management measures detailed in the DA and EIL application package that will be submitted with the NVCP application. These include measures to avoid off site impacts, such as demarcation of clearing areas, weed and dieback controls, and dust management.

Based on the above, the proposed clearing of 1.89 ha is considered not likely to be at variance to principle (d).

5.6 CLEARING PRINCIPLE E - REMNANT VEGETATION

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

Assessment: Proposed clearing is not at variation with this principle.

The Environmental Protection Authority (EPA) uses a standard level of native vegetation retention of at least 30% of the pre-clearing extent of an ecological community as a benchmark. The levels of native vegetation retention have most recently been recognised in the *National Objectives and Targets for Biodiversity Conservation 2001-2005*, which suggests the retention of 30% or more, of the pre-clearing extent of an ecological community is necessary if Australia's biological diversity is to be protected (DoEH 2001).

In broadscale vegetation mapping datasets, the proposed clearing area is located within mapped extent of Vegetation Association 1000 (Pre-European vegetation dataset DPIRD-006, Shepherd *et al*. 2002), and Southern River Complex (DBCA-046, Heddle *et al*. 1980, Webb *et al*. 2016). Both the Vegetation Association 1000 and the Southern River Complex have less than 30% of their pre-European extent remaining (Table 11).

It is noted that the vegetation proposed to be cleared has been largely cleared in the past, as illustrated in Figure 10, and comprises of mostly regrowth vegetation in Completely Degraded (1.26 ha) and Degraded (0.56 ha) condition, with only 0.07 ha in Good condition (as mapped by Ecoedge 2022). Approximately 15. 9 ha of native vegetation, mostly better in condition, is proposed to be retained on the property.

The proposed clearing of 1.89 ha of native vegetation represents approximately 0.009% of Vegetation Association 1000 remaining in the IBRA region, and approximately 0.02% of the Southern River Complex remaining on the Swan Coastal Plain.

Table 11: Remaining Extent of Vegetation Association and Complex

Vegetation Association / Complex	Pre-European (ha)	Current Extent (ha)	% Remaining	% remaining in DBCA Managed Land*
Vegetation Association 1000				
State-wide	99,835.86	27,768.84	27.81	5.19
IBRA region: Swan Coastal Plain (SWA)	94,175.31	24,869.20	26.41	5.06
IBRA sub-region: Perth (SWA02)	94,175.31	24,869.20	26.41	5.19
Shire of Capel	15,173.76	3,189.87	21.02	1.53
Southern River Complex				
Swan Coastal Plain	58,781.48	10,832.18	18.43	1.60
Shire of Capel	7,876.12	1,794.33	22.78	N/A

** Excludes Crown Freehold Department Interest Lands that are managed under Section 8(a) of the CALM Act (1984).*

Overall, the local and regional area have been extensively cleared, including the vegetation association and complex mapped across the proposed clearing area. Therefore, remnant native vegetation in these areas would typically be considered a significant remnant. However, the proposed clearing area has been largely cleared in the past and now contains mostly regrowth native vegetation in Degraded to Completely Degraded condition. Further, the better condition vegetation on the property is being retained. Based on this, the vegetation proposed to be cleared is not considered significant as a remnant of native vegetation in an area that has been extensively cleared and, therefore, the proposed clearing is not likely to be at variance to clearing principle (e).

5.7 CLEARING PRINCIPLE F - WATERCOURSE OR WETLAND ENVIRONMENTS

Clearing principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
Assessment: Proposed clearing is at variance to this principle.

There are no watercourses or drainage lines within the property or the proposed extraction area. The closest watercourse is the Ludlow River, approximately 70 m to the south of the extraction area, on the southern side of the Plantation Road (Figure 2).

The proposed clearing area intersects a mapped multiple-use, palusplain wetland (Unique Feature ID 15809; Figure 6, Figure 7). Multiple-use wetlands are considered to be wetlands that have few remaining important attributes, functions, or values. This wetland covers an area of 42,322.2 ha, of which 0.43 ha is within the proposed clearing area (0.001% of the wetland's total area). This 0.43 ha is in largely Completely Degraded (0.15 ha) or Degraded (0.21 ha) condition, with only 0.06 ha in Good condition. This 0.06 ha is vegetation unit D2, which is not wetland type vegetation. On the basis of vegetation mapping by Ecoedge (2022), the proposed clearing area contains 0.022 ha of vegetation (vegetation units B and C) that contains species that are associated with wetlands. This is all in Completely Degraded (0.02 ha) or Degraded (0.002 ha) condition. Considering the very small amount of clearing associated with the very large Multiple Use wetland, the proposed sand extraction is not expected to have a significant impact on the wetland.

As the proposed clearing area intersects a mapped wetland and contains wetland type vegetation, the proposed clearing is at variance with clearing principle (f). However, considering the type and condition of vegetation to be removed and the vegetation proposed to be retained on the property, the impacts of the proposed clearing on the wetland environment are expected to be negligible to nil.

5.8 CLEARING PRINCIPLE G - LAND DEGRADATION

Clearing principle (g): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.
Assessment: Proposed clearing is not likely to be at variance to this principle.

The proposed extraction site has been cleared in the past as demonstrated in imagery from 2003 (Figure 10). The area is still majority cleared and the native regrowth that is proposed to be removed consists of mainly Degraded to Completely Degraded condition with small sections that are in Good condition (Table 9).

Based on 'soil landscape and quality' mapping (various DPIRD data layers), there are various potential risks of land degradation applicable to the proposed clearing area (e.g. wind and water erosion). However, it is noted that the previous extensive clearing across the property does not appear to have resulted in appreciable land degradation. The main land degradation risk within the proposed extraction area as a result of the proposed clearing is likely to be wind erosion. The proposed operations are subject to a range of environmental management measures detailed in the Development Application and associated documentation, which will be provided with the NVCP application. These include specific measures to prevent and mitigate wind erosion and other forms of land degradation, including:

- Clearing of native vegetation will be staged to minimise the area of bare ground open to the elements at any one point in time.
- Conducting topsoil-stripping activities during periods of low winds.
- Post-extraction rehabilitation will be undertaken gradually as extraction progresses to minimise the area of bare ground open to the elements at any time. In the native vegetation rehabilitation areas, mulch will be applied for a range of purposes, including to reduce wind erosion.
- A water truck will be available for dust suppression when required to minimise wind erosion.
- Soil binding agents may be utilised if necessary to provide further reduction in wind erosion.
- Confining vehicle movements to defined roads, tracks, and areas cleared for project development.
- Monitoring of high-risk erosion events, such as extreme weather, to mitigate impacts as far as reasonably practicable.

Given the above and the small size of the proposed clearing area, the proposed clearing is considered unlikely to cause appreciable land degradation. Therefore, the proposed clearing is not likely to be at variance to this clearing principle (g).

5.9 CLEARING PRINCIPLE H - ENVIRONMENTAL VALUES

Clearing principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
Assessment: Proposed clearing is not at variance to this principle.

The closest conservation areas (Coolilup State Forest and Capel Nature Reserve) are located over 1.5 km away from the proposed clearing area. Given the distance, the proposed vegetation clearing will not impact on these areas and therefore the proposed clearing is not at variance to clearing principle (h).

5.10 CLEARING PRINCIPLE I - SURFACE AND GROUNDWATER VALUES

Clearing principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
Assessment: Proposed clearing is not likely to be at variance to this principle.

There are no watercourses or drainage lines within the property and no signs of permanent, seasonal, or ephemeral surface water within the proposed extraction area. The closest surface water consists of two small soaks constructed for farming purposes in the past and now largely overgrown with vegetation on the property outside of the proposed extraction site. The closest watercourse is the Ludlow River, approximately 70 m south of the extraction area on the southern side of the Plantation Road. No Conservation category or Resource Enhancement category wetlands intersect Lot 43 and none are present within 1 km of the proposed extraction area (DBCA-019). The closest Conservation category wetland is located approximately 1.3 km north from the proposed extraction area.

Due to the free draining nature of the sandy soil and the gently sloping surface, stormwater is expected to infiltrate into the soil with nil to minimal runoff.

There are no surface water management areas or Public Drinking Water Source Areas within the proposed clearing area; however, the clearing area is located within the proclaimed Busselton Capel Groundwater Area. Based on JDA (2021) hydrology modelling, the maximum groundwater levels within the proposed extraction area vary from 24.5 m AHD in the east to 22 m AHD in the west. The proposed operations will not intercept groundwater and no dewatering or abstraction will be undertaken.

Groundwater salinity is mapped between 500 – 1,000 milligrams per litre total dissolved solids (DWER-026), which is considered to be marginal. Noting this, the proposed clearing is not likely to result in deterioration in the quality of groundwater in the form of salinity.

The proposed extraction area is already mostly cleared of native vegetation and the vegetation that remains is in patches and largely (96%) Degraded to Completely Degraded in condition. The scale of the proposed clearing is also small compared to the scale of native vegetation retained on the property and the surrounds. Due to the free draining nature of the sandy soil and the gently sloping surface, stormwater is expected to infiltrate into the soil with nil to minimal runoff and with all stormwater to be contained on site.

Given the above, the proposed clearing is not likely to be at variance with clearing principle (i).

5.11 CLEARING PRINCIPLE J - FLOODING POTENTIAL

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

Assessment: Proposed clearing is not at variance to this principle.

Considering the small area proposed to be cleared and the low density of vegetation present, the clearing is unlikely to result in significant changes in hydrology that could impact on flooding. There are no signs of surface water (permanent, seasonal, or ephemeral) within the proposed clearing area and this reflects the free draining nature of the sandy soil.

Based on the above, the proposed clearing of vegetation is not likely to cause, or exacerbate, the incidence or intensity of flooding. Therefore, the proposed clearing will not be at variance to clearing principle (j).

6. CONCLUSION

The proposed clearing of up to 1.89 ha of native vegetation for the purposes of sand extraction on Lot 43 Plantation Road, is assessed as 'not likely to be at variance' or 'not at variance' to nine of the ten clearing principles. It is assessed as at variance to Principle (f), as the proposed clearing area intersects a mapped wetland and contains wetland type vegetation, though the impacts of the proposed clearing on the wetland environment are expected to be negligible to nil. Overall, given the small scale of the proposed clearing and the condition of the native vegetation being majority Completely Degraded to Degraded (1.82 ha) with only small sections in Good condition (0.07 ha), the impacts resulting from the proposed clearing will be minor and localised.

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