



Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 10027/1
Permit type:	Area permit
Applicant name:	Ludlow Holdings Pty Ltd
Application received:	21 December 2022
Application area:	0.66 hectares (revised from 1.89 hectares of native vegetation)
Purpose of clearing:	Sand extraction
Method of clearing:	Mechanical clearing
Property:	Lot 43 on Deposited Plan 69043
Location (LGA area/s):	Shire of Capel
Localities (suburb/s):	Ludlow

1.2. Description of clearing activities

The vegetation proposed to be cleared is distributed across a single parcel of land. The original application was to clear 1.89 hectares of native vegetation within Lot 43 on Deposited Plan 69043, Ludlow, for the purpose of sand extraction. However, the application area was revised to 0.66 hectares during the assessment (Figure 1, Section 1.5). Besides native vegetation, the area of sand extraction includes bare areas and areas covered in pasture grasses and other introduced species, which are not included within the proposed clearing footprint for the clearing application. The vegetation is proposed to be cleared in stages.

1.3. Decision on application

Decision:	Refused
Decision date:	27 June 2024
Decision area:	0.66 hectares

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (the department) advertised the application for 21 days and one public submission was received. The department's consideration of the matters raised in the submission is summarised in Appendix B.

In making this decision, the Delegated Officer had regard to:

- site characteristics (see Appendix C);
- relevant datasets (see Appendix H.1);
- the findings of a Reconnaissance and Targeted Flora and Vegetation Survey (see Appendix G);
- fauna assessment (see Appendix G);
- supporting information provided by MBS Environmental;

- advice received from the Department of Biodiversity, Conservation and Attractions (DBCA), the Shire of Capel and the department's water licencing branch;
- the clearing principles set out in Schedule 5 of the EP Act (see Appendix D); and
- relevant planning instruments and other matters considered relevant to the assessment (see Section 3).

The department's initial assessment identified that the proposed clearing was likely to result in:

- the potential introduction and spread of weeds and dieback into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values;
- the loss of native vegetation that is suitable habitat for *Pseudocheirus occidentalis* (Western Ringtail Possums), three threatened black cockatoo species and other conservation significant fauna species;
- the likely mortality of conservation significant fauna through the clearing activities;
- the loss of native vegetation which, while not formally mapped as such, is likely to support a recognised ecological linkage;
- the loss of significant remnant native vegetation in an area that has been extensively cleared;
- indirect impacts to the Critically Endangered Threatened Ecological Community (TEC) 'Southern *Corymbia calophylla* woodlands on heavy soils' (FCT1b);
- potential impacts to surface and groundwater quality;
- direct and indirect impacts to significant wetland dependent vegetation, including wetland vegetation likely to have values commensurate with a conservation category wetland and including a number of range-end taxa.

Based on the impacts above, the department wrote to the applicant on 21 December 2023 advising that the application is likely to be refused, based on significant environmental impacts. In response, the applicant revised the application area to 0.66 hectares. This resulted in the further avoidance and minimisation of impacts associated with the proposed clearing, in that the revised application area:

- is reduced in its overall extent;
- is limited to clearing only degraded or completely degraded (Keighery, 1994) condition native vegetation;
- does not intercept any mapped wetland;
- has reduced overlap with a 50 meter buffer applied to the FCT1b TEC, (with the remaining overlap being 0.03 ha of vegetation comprising one *Agonis flexuosa* and some associated smaller shrubs); and
- does not include trees with a Diameter at Breast Height (DBH) of greater than 50 centimetres.

Having considered the above revision of the application area, as well as its ability to readily manage certain types of impacts through the conditions of a clearing permit, the department determined that the following significant residual impacts remained and should be key considerations in its decision as to whether to grant a clearing permit:

- the loss of 0.66 ha of habitat suitable for the Critically Endangered Western Ringtail Possum, identified as meeting the definition of 'critical habitat' as per the species recovery plan and noted to be used by the species for feeding, nesting and dispersal as evidenced by dreys and scats throughout the application area;
- the loss of 0.66 ha of native vegetation which represents significant remnant vegetation in an area that has been extensively cleared;
- the loss of 0.66 ha of native vegetation which, while not formally mapped as such, is likely to support a recognised ecological linkage;
- potential to increase sedimentation and nutrient flow into the Ludlow River located approximately 70 metres to the south of the application area, impacting on surface water quality;
- indirect impacts to significant wetland vegetation (with values commensurate with a Conservation Category wetland) as a result of the proposed end land use; and
- indirect impacts to the Critically Endangered TEC FCT1b as a result of the proposed end land use

The department also considered those aspects of the application which related to planning and other matters and the necessity of the proposed clearing. The department noted that the applicant was granted a Development Approval for the proposed sand extraction activities by the Regional Joint Development Assessment Panel (JDAP) on 16 May 2023 and was granted an Extractive Industries Licence at the Council meeting in January 2024. The Shire of Capel has advised that the final instrument is currently in draft form and is pending Ludlow Holdings signature and the payment of the rehabilitation bond (Shire of Capel, 2024).

However, the department also noted that:

- the JDAP's decision to grant the Development Approval did not appear to consider the significant residual impacts identified above, and the decision acknowledged that any proposed clearing of native vegetation is prohibited unless done under a clearing permit (Regional JDAP Minutes No. 96, and see Section 3.2);
- the application area is not mapped within a Significant Geological Supplies (SGS) area or within an extraction site under the State Planning Policy 2.4;

- the purpose of the clearing is to establish a new sand extraction operation that seeks to extract relatively small and short term resource (117, 682 tons of sand over 5 years) (Shire of Capel, 2024); and
- the sand extraction operation is a private activity, for which a genuine and material public benefit has not been identified.

The department considered the history of the application area, noting that the application area was subject to a previous clearing permit application, reference CPS 8474/1, for a larger application area. This previous application was refused on the basis of likely environmental impacts to significant environmental values and the absence of required third party approvals. This decision was not appealed. In the decision report, among other matters, the department advised of its view that the proposed sand extraction activity was likely to degrade the quality of wetland vegetation located adjacent to the application area.

The department also considered other relevant decisions and appeal determinations, noting that previous appeal determination 034/2022, for clearing permit application 8598/1, establishes that while the existence of a Development Approval and Extractive Industry Licence are relevant considerations for a clearing permit decision, these planning decisions do not prioritise the extraction of basic raw materials over maintaining environmental values.

Having had regard to the above information, the Delegated Officer formed the view that, in this case and in the context of the relevant planning and other matters, the severity of the environmental impacts outweighed the necessity of the proposed clearing. Given this, the Delegated Officer determined that these environmental impacts were unacceptable, and it would not be appropriate to manage them through conditions on a clearing permit (including environmental offsets). The Delegated Officer therefore decided that, on balance, it would not be appropriate to grant a clearing permit and, accordingly, refused Ludlow Holdings Pty Ltd's application.

1.5. Site map

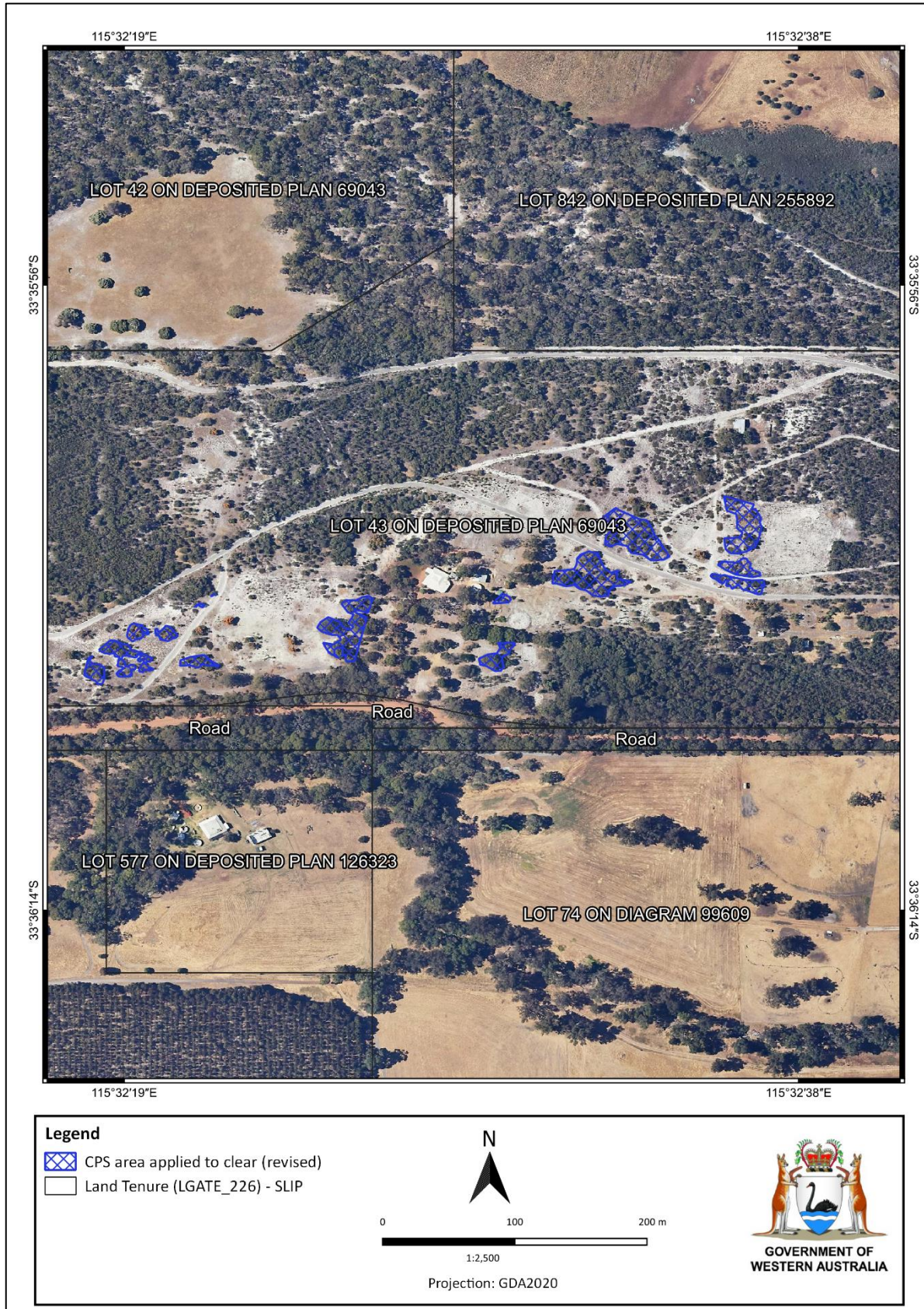


Figure 1 Map of the revised application area

The areas crosshatched blue indicate the areas applied to be cleared under the clearing permit application.

2 Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Soil and Land Conservation Act 1945* (WA)
- *Rights in Water and Irrigation Act 1914* (RIWI Act).
- *Aboriginal Heritage Act 1972* (WA)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

Avoidance, minimisation and mitigation measures proposed by the applicant were submitted to the department by MBS Environmental as outlined below (MBS Environmental, 2022).

Avoidance/minimisation

- The extraction area is proposed for the central section of the property, the majority of which has been previously cleared, 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 (Keighery, 1994) 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 metre 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.
- 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 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 such as weed, dieback, dust and drainage control.

Mitigation

- At least 2.18 hectares of an area will be rehabilitated back to native vegetation.

In addition to the above, the applicant has also minimised the proposed clearing area from 1.89 hectares to 0.66 hectares. An additional site visit was conducted by MBS environmental on 22 January 2024 and determined non-native species within the initial application area. Given non-native vegetation is not regulated under the *Environmental Protection Act 1986* (EP Act), these were removed from the initial application area.



Figure 2: A map representing the location of the non-native species (orange) identified.

The Delegated Officer is satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values. However, has determined that the proposed clearing and end land use will cause significant residual impacts.

Assessment of impacts on environmental values

In assessing the revised application, the Delegated Officer has had regard for the site characteristics (see Appendix C) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix D) identified the risk of impacts of the proposed clearing to biological values (fauna, flora and ecological community), and land and water resources required further consideration, as set out below.

The local area considered in the assessment below of this revised application is defined as a 10-kilometer radius buffer measured from the perimeter of the revised application area.

3.1.1. Biological values (biodiversity, flora and TEC) - Clearing Principles (a, c and d)

Assessment

The revised application area (0.66 ha) is mapped within the Southern River Vegetation Complex, which is described as open woodland of *Corymbia calophylla* (Marri) - *Eucalyptus marginata* (Jarrah) - *Banksia* species with fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca raphiophylla* (Swamp Paperbark) along creek beds (Government of Western Australia, 2019a).

A reconnaissance and targeted flora and vegetation survey was undertaken by Ecoedge on 9th and 24th September 2020 and subsequently on 27th August and 3rd September 2021. The survey area was approximately 27.2 hectares in size and comprises of approximately 22 hectares of remnant vegetation (Ecoedge, 2022).

According to the vegetation survey, seven vegetation units in total were mapped within the survey area in which two vegetation units were identified within the revised application area as listed below (Ecoedge, 2022):

- Unit D1 (approximately 0.045 ha)- 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; and
- Unit D2 (approximately 0.615 ha): 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.

According to the flora and vegetation survey, the vegetation of the revised application area ranges from completely degraded to degraded (Keighery, 1994) condition (Ecoedge, 2022). With majority of the revised application area mapped as completely degraded (Keighery, 1994).

Flora

According to the available databases, 61 priority flora species and 18 threatened flora species have been recorded within the local area. The time of the targeted flora survey undertaken by Ecoedge (2022) is considered to be appropriate to identify majority of the flora species identified from the local area. The survey was undertaken in accordance with the technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment*.

According to the survey results, one hundred and fifty vascular taxa were recorded within the survey area. The following conservation significant flora species were also recorded within the survey area.

- *Drakaea elastica* listed as a threatened flora under the BC Act was identified at 45 locations within the survey area. It was noted that most plants were in the leaf stage. The habitat for this flora was located within thickets of *Kunzea glabrescens* over a leaf litter on grey sand located outside of the area proposed to be cleared (Ecoedge, 2022). A 50 metre buffer has been provided to the occurrence of this threatened flora species.
- *Dillwynia sp. Capel* (PA Jurjevich 1771) listed as a Priority one flora by DBCA was identified within the vegetation unit D1, outside of the revised application area.
- *Boronia tetragona* listed as a Priority one by DBCA was identified growing on grey sand with *Kunzea glabrescens* in the central, northern part of the survey area but outside of the revised application area.
- *Acacia semitrullata* listed as a priority four flora were scattered through the eastern part of the survey area, mainly in *Kunzea glabrescens* tall shrubland.

Although the above flora species were recorded within the survey area, none of the individuals falls within the area proposed to be cleared. The applicant has also incorporated a 50-metre buffer around the individuals of the threatened flora species *Drakaea elastica*.

Further advice was obtained from DBCA in regard to potential impacts to conservation significant flora species as a result of the proposed clearing. The DBCA recommend that the proposed extraction area footprint and the individuals of *Drakaea elastica* should comprise of a minimum of 50-metre distance, to avoid indirect impact to the *Drakaea elastica* individuals within the property. The current distance between the proposed extraction footprint and the individuals of *Drakaea elastica* is approximately 50 metres (see image below).



Figure 3: The location of the identified *Drakaea elastica* (light blue dots) in comparison to the extraction footprint (pink).

The revised clearing proposal will remove the only recorded populations of *Conospermum teretifolium* and *Macarthuria apetala* known for the location. Whilst these species are not threatened or priority listed, they are not well represented in the region. *Macarthuria apetala* is only known from Capel Nature Reserve and the immediate surrounding locations. The next nearest populations are at Yarloop and Lake Muir. The *Conospermum* is typically found along the south coast, with a disjunct node of scattered populations found in the Bunbury to Busselton area.

Ecological community

The assessment has identified that the revised application area is located immediately adjacent to vegetation that is mapped as Banksia Woodlands of the Swan Coastal Plain ecological community which is a state listed Priority Ecological Community (PEC) by DBCA and a commonwealth listed Threatened Ecological Community (TEC).

The approved conservation advice for the PEC/TEC states that to be considered representative of the PEC/TEC, a remnant in the Swan Coastal Plain bioregion must include at least one of four Banksia species being *Banksia attenuata* (candlestick banksia), *B. menziesii* (firewood banksia), *B. prionotes* (acorn banksia) and/or *B. ilicifolia* (holly-leaved banksia); must include an emergent tree layer often including marri, jarrah, or tuart, and other medium trees including *Eucalyptus todtiana* (pricklybark), *Nuytsia floribunda* (WA Christmas tree), western sheoak, *Callitris arenaria* (sandplain cypress), *Callitris pyramidalis* (swamp cypress) or *Xylomelum occidentale* (woody pear); and must include an often highly species-rich understorey (TSSC, 2016). In addition, it is noted within the conservation advice that if a patch of Banksia woodland vegetation is dominated by *Banksia littoralis*, it is unlikely to be representative of the TEC and may indicate a different dampland community type (TSSC, 2016).

According to the findings from the flora and vegetation survey, the vegetation within the survey area is not representative of the Banksia Woodlands of the Swan Coastal Plain TEC given the condition of the vegetation and no patches exceed the two-hectare minimum extent (Ecoedge, 2022).

Sub-units E1 and E2 (see Appendix F for descriptions of the vegetation units) recorded from the flora and the vegetation survey are considered to represent occurrence of the Southern *Corymbia calophylla* woodland on heavy soil TEC (Ecoedge, 2022). This is a state listed TEC. This ecological community does not fall within the area proposed for clearing and the minimum distance between the occurrence of this TEC and the application area in its current form is approximately 16 metres (see Figure 11 in Appendix F). However, this is due to the occurrence of one *Agonis flexuosa* and some smaller shrubs (totalling 0.03 ha, Completely Degraded) identified for removal. The clearing of this 0.03 hectares at a distance of 16 metres from the TEC is not likely to result in a significant impact on the TEC. However, the department notes that given the absence of a suitable buffer between the extent of the proposed extraction area and the mapped TEC, indirect impacts to the TEC vegetation is still likely to occur from the proposed end land use.

In accordance with section 51O of the EP Act, the Delegated Officer must consider other matters relevant to the application to clear. The significant impact that is likely to result from the operation of sand extraction immediately adjacent to the mapped TEC is considered a relevant matter under section 51O of the EP Act and is further outlined under section 3.2 of the decision report.

Conclusion

Based on the above assessment, the proposed clearing will result in indirect impacts to the Southern *Corymbia calophylla* woodland on heavy soils TEC and wetland vegetation that is highly diverse. It is considered that in the absence of an appropriate buffer from the extraction area to vegetation that consists of high biodiversity value, unacceptable impacts are likely to occur.

3.1.2. Biological values resources (fauna) - Clearing Principles (b)

Assessment

The desktop assessment identified 36 conservation significant fauna species recorded within the local area including 22 birds, ten mammals, two reptiles, one fish and one invertebrate species. Many of the species recorded within the local area are migratory birds and fauna associated with the marine environment that are unlikely to occur within the revised application area. The lack of dense understorey within the revised application area also suggests that it is unlikely to provide significant core habitat for ground dwelling fauna. However, these species may still use the revised application area for dispersal through the landscape.

A black cockatoo habitat assessment was also undertaken by the Zoologist, Greg Harewood on the 30 October 2021 and the 13 December 2021 and consisted of a daytime reconnaissance survey and nocturnal spotlighting. The total

area survey was approximately 27 hectares and included the revised application area and surrounding vegetation (Harewood. G, 2022). According to the fauna assessment, approximately half of the vegetation within the revised application area consists of Kunzea tall shrublands with scarred emergent trees that consist of jarrah, peppermint, Banksia spp and *Nuytsia floribunda* growing on grey sand. It was also observed that a large portion of the vegetation appeared to be regrowth from historical clearing events. According to the flora survey, the majority of the revised application area is mapped within the vegetation unit D2 (see 3.1.2 or C.1 for description). The survey area also consisted of bare ground, open grassland or small areas of other vegetation types (Harewood. G, 2022).

In forming a view on the likelihood of fauna species occurring within the revised application area, the preferred habitat types and typical home ranges of these species and their recorded proximity to the revised application area were considered, along with the type and condition (Keighery, 1994) of the vegetation within the revised application area. The revised application area may contain suitable habitat for the following fauna species:

- Carnaby's cockatoo (*Zanda latirostris*)
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii subsp. naso*)
- Baudin's cockatoo (*Zanda Calyptorhynchus*)
- Chuditch (*Dasyurus geoffroii*)
- Quenda (*Isoodon fusciventer*)
- South-western brush-tailed phascogale, wambenger (*Phascogale tapoatafa wambenger*)
- Western Brush Wallaby (*Macropus irma*)
- Western Ringtail Possums (*Pseudocheirus occidentalis*) (WRP)

Black cockatoos

Carnaby's cockatoo, Baudin's cockatoo and the Forest red-tailed black cockatoo were recorded within the local area. The nearest records are approximately 2.02 kilometres, 2.78 kilometres and 2.63 kilometres from the revised application area, respectively. Black cockatoo habitat can be considered in terms of breeding, roosting and foraging habitat.

A black cockatoo habitat assessment was undertaken and focussed on tree species including marri, jarrah, tuart and flooded gum and any other *Corymbia/Eucalyptus* species of a suitable size that was present. Hollows were examined using binoculars for evidence of actual use by black cockatoos. Trees identified as having potential nest hollows were examined and photographed using a drone, where possible (Harewood. G, 2022).

Black cockatoos are known to nest in hollows of live and dead trees, including marri (*Corymbia calophylla*), jarrah (*Eucalyptus marginata*), karri (*Eucalyptus diversicolor*), wandoo (*Eucalyptus wandoo*), tuart, flooded gum (*Eucalyptus rudis*), and other *Eucalyptus* spp. (Commonwealth of Australia, 2012). 'Breeding habitat' for black cockatoos includes trees of these species that either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow, where suitable DBH for nest hollows is 500 millimetres for most tree species (Commonwealth of Australia, 2012; DAWE, 2022).

Based on the fauna assessment, 49 habitat trees were recorded from the survey area with one tree identified as possibly suitable for nesting by black cockatoos. No habitat trees fall within the revised application area (Harewood.G, 2022). Based on this, the proposed clearing is unlikely to impact trees providing current breeding opportunities for black cockatoo species.

No evidence of black cockatoo roosting within trees located within the survey area was observed during the survey. Some of the larger trees may be suitable for roosting but no actual evidence of use was noticed (Harewood. G, 2022).

Significant foraging habitat for black cockatoo species includes foraging material that is within an approximate 6-12 kilometre radius of breeding trees and within six kilometres of a night roosting site (DAWE, 2022). The preferred foraging habitat for each of the species is described below:

- Carnaby's cockatoo – native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as Banksia spp, Hakea spp. and Grevillea spp. The species also forages in pine plantations and eucalypt woodland (DAWE, 2022).
- Forest red-tailed black cockatoo – jarrah and marri woodlands and forest, edges of karri forests including wandoo and blackbutt within the range of the species (DAWE, 2022).
Baudin's cockatoo – eucalypt woodlands and forest, proteaceous woodland, and heath. Primarily feeding on marri during the breeding season and non-native species outside of the breeding season (DAWE, 2022).

According to the fauna assessment, primary foraging habitat for all three black cockatoo species, in the form of jarrah, banksia and marri, were present within the survey area (Harewood, 2022). However, the majority of the vegetation

within the revised application area consists of vegetation unit D2: Medium very open woodland of *Agonis flexuosa*, *Banksia ilicifolia* or *Nuytsia floribunda* over tall shrubland of *Kunzea glabrescens* (Ecoedge, 2022) with approximately 0.035 hectares of the vegetation consisting of the vegetation 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 *Dasyopogon bromeliifolius* low shrubland and *Phlebocarya ciliata* open forbland. Although the flora and vegetation survey (Ecoedge, 2022) recorded *Banksia* sp. and *Eucalyptus* sp, which are preferred food sources for the black cockatoos within a small section of the revised application area, the quantity of foraging habitat available for black cockatoos to forage on is considered to be small in comparison to the vegetation within the remainder of the survey area. The evidence of Baudin's and Forest red-tailed black cockatoo foraging was observed within the survey area at a number of locations. The evidence of foraging was in the form of chewed fruits from marri fruits (Harewood. G, 2022). No evidence of Carnaby's black cockatoos were recorded (Harewood. G 2022).

Food resources within the range of breeding sites and roost sites are important to sustain black cockatoo populations. The importance of foraging resources are therefore, viewed in the context of known breeding and night roosting sites. It is considered that foraging habitat within 6 to 12 kilometres of known breeding and rooting sites are a significant food source to support black cockatoo populations (DAWE, 2022). According to the available databases, there are two known naturally formed, and confirmed white tailed-black cockatoo breeding sites and two black cockatoo roost sites mapped within the 12-kilometre radius of the revised application area.

A key focus for the Swan Coastal Plain is the ongoing viability of foraging resources for black cockatoos, particularly Carnaby's cockatoo (DAWE, 2022). However, only a small area (0.045) hectares is mapped as containing habitat suitable for black cockatoos. Considering the small area and the likelihood of better-quality vegetation within adjacent vegetation in good or better condition than the vegetation under application, the proposed clearing is unlikely to result in a significant residual impact to black cockatoo habitat.

Western Ringtail possums (WRP)

Western Ringtail Possum (WRP) is listed as Critically Endangered under the BC Act, as well as the EPBC Act. According to the WRP recovery plan (DPaW, 2017), habitat critical for survival of WRP is not well understood and is therefore, based on the habitat variables observed where WRP are most commonly recorded. These appear to vary between key management zones. Three key management zones have been identified in the WRP Recovery Plan as areas known to currently, or previously support large numbers of WRPs and are considered the most important extant populations at present. The 'Swan Coastal Plain zone' is one of the key management zones currently identified (DPaW, 2017) and the revised application area falls within this zone. The populations of WRP that occur within the 'Swan Coastal Plain management zone' are associated with stands of myrtaceous trees (usually peppermint trees (*Agonis flexuosa*)) growing near swamps, watercourses or floodplains. Vegetation communities critical to WRP include long unburnt mature remnants of peppermint woodlands with high canopy continuity, high nutrient foliage availability for food and habitat connecting patches of remnants (DPaW, 2017). The immediate surrounding of the revised application area is mapped as containing vegetation of medium suitability for the WRP.

WRP resting sites include constructed dreys and tree hollows, with dreys constructed in the canopy when hollows are not available. According to the WRP survey, ten dreys and 14 hollow bearing 'habitat trees' were recorded within the survey area. Three dreys falls within the revised application area while the hollow bearing trees are outside of the revised application area. Some of these trees may have hollows suitable for WRP to use for daytime refuge (Harewood. G, 2022). Evidence of WRP were also observed during the day survey in the form of scats. During the night time survey, five WRP's were observed within the survey area, these sightings were not recorded within the revised application area. However, two individuals were sighted adjacent to the revised application area (within 15 meters), close to the wetland vegetation. The fauna assessment determined that most of the remnant native vegetation present within the survey area and revised application area appears to be suitable for WRP (Harewood. G, 2022).

The Swan Coastal Plain population of WRP has undergone a substantial range contraction since the early 1990s, which is predominantly due to habitat loss and fragmentation from clearing for urban development and mining (DPaW, 2017). The fauna survey has concluded that most of the remnant vegetation within the survey area represents suitable habitat for the WRP, but the quality of the vegetation appears to vary considerably and overall to be low (Harewood. G, 2022).

According to the advice received by DBCA, WRP's home ranges are often relatively small (between 0.5 -2.5 hectares on the Swan Coastal Plain) and the clearing proposed will likely displace individuals residing in this habitat. Individuals are at a risk of both direct and indirect impacts from the proposed clearing. The DBCA has concluded that the

proposed clearing is likely to have a locally significant impact on the WRP species from clearing vegetation on this site (DBCA, 2022).

According to the WRP recovery plan, any habitat where WRP occur naturally is considered critical and worthy of protection (DPaW, 2017). Findings from the fauna survey indicates that WRP are known to naturally occur within the revised application area (Harewood, G, 2022). Based on the above, advice received by the DBCA (DBCA, 2022) and according to the WRP recovery plan (DPaW, 2017), the assessment considers the vegetation proposed to be cleared and the location in which the application area is located to be significant habitat for this species.

Chuditch

The *Dasyurus geoffroii* (chuditch/western quoll) is listed as vulnerable under both BC Act and the EPBC Act. Chuditch are present in approximately five per cent of their former range, with most chuditch now found in varying densities in jarrah forests and woodlands in the south west corner of Western Australia, in woodlands, mallee shrublands and heaths along the south coast, east to the Ravensthorpe area, and at lower densities in drier woodland and mallee shrubland in the Wheatbelt and Goldfield regions. Chuditch require large areas of intact habitat to survive and are rarely found where habitat is severely fragmented by clearing, except as transient visitors (DEC, 2012a). Suitable habitat for the chuditch may be present within the wetland vegetation mapped to the south of the revised application area. Noting the degraded open understorey of the 'Woodland' vegetation type recorded within the revised application area, it is not likely the revised application area would support significant habitat for this species. The Banksia woodland remnant vegetation located to the north of the proposed clearing area is likely to provide suitable habitat in a better condition than that of the revised application area. This species is likely to be a transient visitor throughout the revised application area and the proposed clearing may increase the risk of injury to the Chuditch individuals, if present at the time of clearing.

Quenda

The *Isoodon fusciventer* (quenda) is listed as a priority four fauna species. On the Swan Coastal Plain, the quenda has a preference for a dense understorey often associated with wetland vegetation (Atlas of Living Australia, n.d) that is mapped to the south of the revised application area.

According to the fauna survey, digging associated with quenda were observed within the survey area (Harewood G, 2022). Therefore, there is a high likelihood the quenda would be an occasional visitor to the revised application area. According to the DBCA advice, quenda are likely present within the revised application area even though the vegetation is in a degraded to completely degraded (Keighery, 1994) condition (DBCA, 2023).

Noting the very open and degraded condition (Keighery, 1994) of the understorey within the majority of the revised application area, it is not considered likely that the revised application area will provide core habitat for this ground dwelling fauna species. The significant wetland vegetation located adjacent to the revised application area is likely to provide better quality habitat for this species. Indirect impacts of the proposed clearing to this adjacent wetland habitat may result in impacts to significant quenda habitat. The inclusion of a 50-metre vegetative buffer to the surrounding wetland from the revised application area would protect the fauna values of the wetland habitat. The department notes that the activities associated with the sand extraction are proposed up to the mapped wetland habitat, and the extraction associated activities may degrade the value of the wetland habitat that supports Quenda individuals.

The Western Brush Wallaby

The *Notamacropus Irma* (western brush wallaby) is listed as a priority four fauna species by DBCA and this species inhabits open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland. Noting that this species is highly mobile and does not rely on specialist niche habitats (DEC, n.d), the proposed clearing is not likely to impact on significant habitat for this species.

Western false pipistrelle

The *Falsistrellus mackenziei* (western false pipistrelle) is listed as priority four fauna species by DBCA. According to the fauna survey, habitat that appears suitable for this species was present therefore, it was assumed that this species maybe present within the revised application area and the surrounding vegetation as well. All sections of the survey area were identified to represent potential foraging habitat for this species and any of the hollow bearing trees were representative of daytime roost sites (Harewood, G, 2022). The Western false pipistrelle is known to inhabit wet sclerophyll forests dominated by karri, jarrah, tuart and utilise tree hollows for diurnal refuge and breeding. This species is usually identified in colonies of 5-30 individuals and feed on flying-insects (Atlas of Living Australia, n.d). The revised application area is within the western false pipistrelle documented range (Harewood.G, 2022). Based on the above findings, the hollow bearing tree identified within the survey area maybe utilised by the western false

pipistrelle and given the lack of hollow bearing trees within the revised application area, it is unlikely that vegetation that support this species would be removed.

Brush tailed Phascogales

The *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale, wambenger) is a Conservation Dependent species. The South-western brush-tailed phascogale is known to inhabit dry sclerophyll forests and open woodlands, with hollow-bearing trees (usually eucalypts) and sparse understorey, including karri forest (Bradshaw, 2015). They are opportunistic feeders, foraging on invertebrates, nectar, small birds and small mammals and utilise tree hollows for breeding (DEC, 2012b).

The DBCA has advised that although not recorded during the survey, the proposed clearing has the potential to impact on suitable habitat for this species (DBCA, 2023). Hollow bearing trees that maybe utilised by Brush tailed Phascogale are present within the survey area but no hollow bearing trees are identified within the revised application area. There were 33 records of the wambenger from the local area with the closest record identified 1.76 kilometres from the revised application area. However, no evidence of use by this species or any sightings of this species was recorded during the fauna survey (Harewood. G, 2022).

Conclusion

Based on the above assessment, the proposed clearing is likely to result in significant impacts to critical habitat for the Western Ringtail Possum.

3.1.3. Significant remnant vegetation - Clearing Principles (e)

Assessment

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

The area under revised application is located within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) bioregion. This IBRA bioregion has approximately 38.6 percent of its pre-European vegetation extent remaining (Government of Western Australia, 2019a).

According to the available data, the revised application area is mapped as the Southern River vegetation complex which retains less than 30 per cent their pre-European extent (at 18.43 per cent). It is noted that a site inspection by the department officers was conducted on 19 November 2019, as part of the previous clearing permit application CPS 8474/1 (see section 3.2 for further details). It is considered that the vegetation within the revised application area is not considered to be representative of the Southern River vegetation complex given its degraded condition (Keighery, 1994). However, the local area retains less than 30 per cent of its pre-European native vegetation cover (at 22.72%) and is considered to be an extensively cleared landscape.

The revised application area is located approximately 270 metres from a Greater Bunbury Regional Scheme regionally significant east to west ecological linkage. This linkage is known as the Wonnerup/Ludlow River/Gibson corridor. Given that the majority of the revised application area is mapped as completely degraded (Keighery, 1994) condition, the area under application is not formally mapped as supporting this ecological linkage. However, given the application area provides critical habitat for Western Ringtail Possums and is located adjacent to better condition vegetation that supports this ecological linkage, the vegetation within the application area is still considered to contribute to the ecological linkage's landscape function. DBCA has advised that regardless of the degraded condition (Keighery, 1994) of the vegetation within the application area, small clearing areas such as this result in cumulative impacts on ecological corridors (DBCA, 2023).

The proposed clearing may also result in indirect impacts to the adjacent vegetation which may contribute to the degradation of vegetation within a formally recognised ecological linkage.

As discussed under section 3.1.1, 3.1.2 and 3.1.5, the revised application area is considered to contain vegetation that provides habitat for conservation significant fauna species and provides a significant role as a buffer to conservation significant wetland vegetation and a TEC. Given this, it is considered for the revised application area to be a significant remnant of native vegetation.

Conclusion

Given the above assessment and noting the local area retains less than 30 per cent of their pre-European vegetation extent, the revised application area is considered to be within an extensively cleared landscape and based on the values the vegetation provides to fauna, flora, an ecological linkage and the wetland communities nearby, the revised application area is considered to be a significant remnant.

3.1.4. Land and water resources - Clearing Principles (g)

Assessment

The soils within the revised application area are dominated by the Bassendean B1b phase map unit. The soil of this map unit is described as sand plain with deep bleached grey sandy A2 horizons and pale-yellow B horizons (DPIRD, 2019). Small section to the north of the revised application area is mapped within the Bassendean B3 Phase described as poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam (DPIRD, 2019). The primary land degradation risks identified with these soil types include, phosphorus export and wind erosion.

Advice was sought from the Commissioner of Soil and Land Conservation (CSLC) and a land degradation assessment was undertaken on 6 May 2019 as part of a previous clearing permit application CPS 8474/1 made by the applicant for the same purpose in 2019, that was subsequently refused (CSLS, 2019a; CSLS 2019b) (see section 3.2 for further details).

Based on the land degradation assessment report, it is considered that the risk of wind erosion is high given the sandy surface soils associated with the mapped subsystems. However, the CSLC concluded that the risk of wind erosion is unlikely to increase as a result of the nature of the proposed clearing and the degraded to completely degraded condition (Keighery, 1994) of the vegetation (CSLS, 2019b).

The mapped soils within the revised application area are also considered to have a high risk of eutrophication. The land degradation assessment concluded that the proposed clearing is unlikely to increase the risk of eutrophication given that the water table is not intercepted, and an adequate ground cover is maintained following rehabilitation of the site (DPIRD, 2019b).

Conclusion

Noting the relatively small size of the revised application area, the absence of intact understorey within the revised application area, the better-quality native vegetation surrounding the proposed clearing area, the risk of appreciable land degradation in the form of wind erosion and waterlogging is likely to be minimal.

3.1.5. Land and water resources - Clearing Principles (f and i)

Assessment

According to available databases and as demonstrated in Figure 12 Appendix F, the immediate surrounds of revised application area is mapped within the Geomorphic Wetlands Swan Coastal Plain dataset as a multiple-use wetland with the Unique Feature Identifier (UFI) 15809. UFI 15809 is characterised as a seasonally waterlogged flat that forms part of an extensive wetland system that extends along the Swan Coastal Plain from Boyanup in the northeast down to Carburnup River to the west.

Multiple use category wetlands are wetlands with few important ecological attributes and functions remaining. Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare (Water and Rivers Commission, 2001).

The flora and vegetation survey (Ecoedge, 2022) found that vegetation unit C, which mainly comprises of woodland dominated by *Melaleuca preissiana*, is likely to represent one of the relictual wetlands of the Busselton Plain mentioned in the Vegetation and flora of the Swan Coastal Plain report conducted for the Swan Bioplan Project. This report was a subject of number of studies, reports and publications and is a resource for the ongoing conservation planning in the Swan Coastal Plain region (Webb et al, 1994). Several disjunct or "range end" taxa, including *Beaufortia squarrosa*, *Sporadanthus strictus* and *Taxandria fragrans* occur in this vegetation unit. It is recommended that this wetland vegetation is protected during any development within the survey area (Ecoedge, 2022). It is considered that much of the wetland vegetation is in good or better condition (Keighery, 1994). The vegetation unit C is located adjacent to the south of the revised application area (see Figure 13 Appendix F).

Advice received from the department's regional office (DWER, 2023) and DBCA (DBCA, 2023) advised that based on the information provided, the wetlands mapped on Lot 43 have higher values than the assigned Multiple Use category; likely meeting the criteria for Conservation Category Wetlands. It is therefore likely that a reassessment of this wetland would lead to a modification of its management category from multiple use to conservation category. The protection of conservation significant wetlands includes the provision of a wetland buffer. This is crucial to maintain or improve wetland values such as surface water quality and hydrological regime. The proposed extraction activities occurs up to the boundary of the wetland and therefore, no buffer exist between the proposed extraction activities and this significant wetland vegetation to ensure that no indirect impacts occurs to the wetland.

The end land use may also alter the hydrology of this wetland. Altering the hydrology of a wetland can result in degradation of its flora and fauna values. A site-specific investigation to determine the impact of the revised application on the hydrological viability of the wetland and suitability of a 50-meter buffer is recommended (DBCA, 2023).

The revised application area is mapped within the Busselton Capel groundwater area proclaimed under the RiWI Act. According to the supporting information provided by the applicant, the maximum groundwater levels vary from 24.5 meters AHD in the east of the revised application area to 22 metre AHD in the west of the revised application area and consist of a separation distance of 0.5 metres above the maximum groundwater level (MBS, 2022). The advice received from the internal water specialists at the department recommends that given the lack of longer-term groundwater data within the revised application area, a conservative and a precautionary separation distance should be considered and suggests a separation distance of two metres (DWER, 2023). The surrounding soils and hydrology are a key factor for the survival of the wetlands. If groundwater is intercepted, the proposed clearing related to the extraction activities poses a risk on the adjacent wetland from the disturbed hydrological function. To mitigate the indirect impacts to the wetland, a 50-meter buffer from the extraction activities, as mentioned above, is required to prevent impact to the vegetation of the wetland.

The Ludlow River is located approximately 70 metres to the south of the revised application area. The recorded soils and the mapped soil landscape mapping suggests that there is a high risk of nutrient enrichment of surface waterbodies from the removal of native vegetation in the case subsequent rehabilitation does not occur post extraction (CSLC, 2019b). This is because the vegetation within the revised application area is likely to be supporting the nutrient filtration and by removing this vegetation, there is a risk of nutrient and sedimentation runoff into the Ludlow River (DBCA, 2023). The applicant has proposed the revegetation of the application area with pasture and native vegetation (MBS, 2022) and therefore, the likely impact on the surface water bodies from the proposed clearing is likely to be mitigated with this management measure.

Conclusion

The proposed clearing and the associated extractive industry activities is likely to degrade the quality of the wetland vegetation located adjacent to the revised application area through changes to the hydrological regime, water quality and sedimentation. Nutrient enrichment is likely to result in the deterioration of surface water of the nearby Ludlow River. A suitable buffer to the nearby wetland has not been taken into account with the proposed activities.

3.2. Relevant planning instruments and other matters

Previous clearing application

It is noted that a similar clearing permit application within the same property (Lot 43 on Deposited Plan 69043, Ludlow) was submitted on 16 April 2019. Based on the department's assessment at the time, it was determined that the proposed clearing to be at variance with principals (f) and (i), may be at variance with principles (a), (b), (c) and is not likely to be at variance with the remaining principles. In the absence of receiving a targeted flora survey to verify the presence of conservation significant flora within the revised application area, planning approvals not being obtained and in consideration of the environmental impacts, the Delegated Officer determined to refuse to grant the clearing permit CPS 8474/1 on 04 September 2020.

Planning Instruments

Other relevant authorisations required for the proposed land use include:

- Development approval under the *Planning and Development Act 2005* (issued by the Shire of Capel)
- Extractive Industry Licence (EIL) (issued by the Shire of Capel)
- Licence to abstract water under the *Rights in Water and Irrigation Act 1914*.

The Shire of Capel (the Shire) advised that local government approvals are required, and that the proposed clearing is inconsistent with the Shire's Local Planning Scheme No.7. The Shire provided the department with a copy of meeting minutes to outline the reasons as to why the Shire objects to granting of the clearing permit and these are listed below (Shire of Capel, 2023).

- The proposed development does not meet clause 5.7.2(e) for the objectives of the Rural Zone in the Shire of Capel Town Planning Scheme No. 7.
- The proposed development is not consistent with the objectives for the Priority Agriculture Zone or Special Control Areas SCA6 – Strategic Minerals and Basic Raw Materials or SCA8 – Regional Ecological Linkages of the Shire's draft Local Planning Scheme No.8.
- The proposed development does not meet the policy provisions of the Shire of Capel Draft Local Planning Policy 6.2 - Extractive Industries.
- The proposed development does not satisfactorily address the requirements of SPP2.4 Planning for Basic Raw Materials.
- The proposed development does not satisfactorily address the requirements of the Planning and Development (Local Planning Schemes) Regulations 2015 Clause 67(2) sub clauses (b), (c), (g), (n), (o), (p), (q), (y) and (za).

The development application associated with this clearing permit application was referred to the Joint Development Assessment Panel (JDAP). The proposal was referred to number of local and state government agencies for a period of 42 days and in total seven submissions were received by JDAP. The department, DBCA and the Capel Land Conservation District Council did not support the proposal for the following reasons (Shire of Capel, 2023).

- The wetland vegetation is of high conservation value. The proposed setback is not acceptable.
- There is concern that the proposal would allow extraction to within 0.5 metres of the maximum groundwater level meaning the risk of groundwater exposure is significant.

The JDAP approved the development approval on 16 May 2023. The applicant has advised the department that the EIL was granted to Ludlow Holdings.

The Shire advised that the applicant has prepared a rehabilitation management plan as part of the EIL application for the Shire. The Shire conducted a review of the revegetation plan and identified that the final use of the land is pasture, the proposed extraction pit is close to groundwater table and that there is a risk of groundwater and surface water contamination by fertilisers or agricultural chemicals with the proposed land use. If the soil profile is modified (by sand extraction) and becomes more porous with reduced organic matter, then impacts are considered likely. If rehabilitation to native vegetation is the preferred outcome, the species list will have to be tailored to suit a shallowed distance to groundwater and new soil profile (Syrinx, 2023). The wetland and the Ludlow River is located in close proximity to the revised application area. Based on this and the high groundwater table, further soil testing is required within the proposed extraction area to determine if further clay lenses or coffee rock may be present as these would affect the final separation distance to groundwater as well as the rehabilitation species choices (Syrinx, 2023).

Water licencing

The revised application area falls within the Busselton-Capel Groundwater Area, as proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Any activity that would either impact or intercept the water table would be subject to regulation under the RiWI Act. No application(s) have been lodged to construct wells or take water under the RiWI Act at this stage. There are no current existing licensed water supplies present at this site. The applicant is therefore required to obtain these licences if intercepting the water table, prior to the commencement of any activities (DWER, 2023).

The department's water licencing team has further advised that the site contains areas mapped as Class 1 and Class 2 Acid Sulphate Soil (ASS) risk therefore, the proposed sand extraction will need to undertake ASS investigations and the potential management of the ASS in accordance with the department's ASS guidelines (DWER, 2023). If the subsoil are prone to oxidation and the rainfall is low, there is a risk that these soils can oxidise and create issues for establishing the proposed revegetation on site and also impact on the Ludlow river (Syrinx, 2023)

- Class 1: High to moderate risk of ASS occurring within 3m of natural soil surface which could be disturbed by most land development activities.
- Class 2: Moderate to low risk of ASS occurring within 3m of the natural surface but a high to moderate risk of ASS occurring beyond 3m that could be disturbed by soil excavation and dewatering associated with infrastructure works.

State Planning Policy 2.4

The revised application area is not mapped within a Significant Geological Supplies (SGS) area or within an existing extraction site under State Planning Policy 2.4. SGSs are Basic Raw Material areas identified by the Department of Mines, Industry, Regulation and Safety (DMIRS) as having State significance due to the size of the resource, relative scarcity, demand and/or location near growth areas and transport routes (Data WA, 2021).

Other Matters - Impacts from the end land use

The DBCA has advised (DBCA, 2023) that the vegetation unit C is indicative of a “relictual wetlands” and contains *Beaufortia squarrosa*, *Grevillea manglesioides* and *Taxandria fragrans*, which are vegetation of high conservation value due to their disjunct nature. The wetland community further supports several disjunct or range end species that should be protected from direct and indirect impacts associated with this proposal, including altered wetland hydrology and the spread of dust, weeds and dieback.

DBCA (2023) advised that the wetland vegetation is likely to contain higher values than the assigned Multiple Use category; likely meeting the criteria for Conservation Category Wetlands. The protection of conservation significant wetlands includes the provision of a suitable wetland buffer to minimise impacts of the clearing and end land use which is crucial to maintain wetland values. DBCA advised that it is considered for the end land use to alter the hydrology of this wetland resulting in degradation of its flora and fauna values and that a minimum of a 50- metre buffer is required to protect this wetland. The sand extraction activities are proposed up to the boundary of the wetland community as per the figure 4 below.



Figure 4: A figure representing the mapped wetland community (green) in comparison to the proposed sand extraction area (pink)

Disturbance and movement during the extraction activities is likely to increase weed invasion resulting from edge effects, impacts from dust, hydrological changes and the spread of dieback. The DBCA (2023) has advised that a minimum of 50 metres buffer is also required to prevent indirect impacts to the Southern *Corymbia calophylla woodland* on heavy soils TEC that occurs adjacent to the area proposed for extraction (see Figure 5 below). It was further advised that dieback (caused by *Phytophthora* spp.) is present at the site and the proposed clearing and the extraction activities is likely to disturb the soil. Soil movement during the extraction and vegetation clearing has the potential to increase the spread of dieback into the vegetation that is representative of the TEC (DBCA, 2023). These impacts are considered to result in significant impacts to the mapped TEC and would likely be considered a modification of the TEC under the BC Act requiring an authorisation. The extractive industry boundary does not provide an adequate buffer to the vegetation representative of the TEC. Management of hydrological and potential dust impacts to this TEC from the end land use has not been adequately demonstrated by the applicant and therefore there is uncertainty regarding the long-term impacts of the extractive industry on adjacent vegetation that contains significant biodiversity.



Figure 5: A figure representing the mapped TEC (blue) in comparison to the proposed sand extraction area (pink)

Aboriginal sites

No Aboriginal sites of significance have been mapped within the revised application area. It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972 (WA)* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

End

Appendix A. Additional information provided by applicant

Information	Description
Reconnaissance and Targeted Flora and Vegetation Survey (Ecoedge, 2022)	Ecoedge Environmental services were engaged to undertake targeted and reconnaissance flora and vegetation survey over Lot 43 Plantation Road. The survey was undertaken on 9 and 24 September 2020 and subsequently on 27 August and 3 September 2021.
Fauna assessment (Harewood.G, 2022)	A fauna assessment was undertaken by the Zoologist, Greag Harewood on 30 October and the 13 December 2021 and consisted of a daytime reconnaissance survey and nocturnal spotlighting. The survey area include of approximately 27 hectares and contains remnant native vegetation, regrowth and cleared land. The survey area is approximately 27.2 hectares (ha) in size
Lot 43 plantation road, Ludlow , Clearing permit application Supporting documentation (MBS Environmental, 2022).	MBS Environmental has prepared a document to support the clearing permit application, which include the consultant's assessment against the ten clearing principals.
Revised proposal	Ludlow Holdings revised the clearing permit application area from 1.89 hectares to 0.66 hectares.

Appendix B. Details of public submissions


Summary of comments	Consideration of comment
This is a very low-profile location with a limited area in the western end, two metres above the Maximum Groundwater Level (MGL), with the balance of the location declining to one metre above MGL in the eastern end	Consideration of issue raised by submission were considered in section 3.1.5 and Appendix D.
Other conditions set out in the Shire's EIL local law stipulate a 40-metre buffer from a roadway and a 50-metre buffer from a wetland must be maintained on extractive industry licences. However the applicant proposed to: <ul style="list-style-type: none"> excavate down to only 0.5 metres above the MGL; excavate only 20 metres from a roadway; and leave zero distance from a wetland. 	Consideration of issue raised by submission were considered in section 3.2.5 and Appendix D.
Rehabilitation with pasture will increase the risk of weed invasion into the many rare flora species in the remnant bushland on Location 43, including the very rare and threatened <i>Drakaea elastica</i> orchid	Consideration of issue raised by submission were considered in section 3.1.1 and Appendix D.
There are significant number of priority and threatened flora at this location	Consideration of issue raised by submission were considered in section 3.1.1 and Appendix D.
Important habitat exist for the three endangered black cockatoo species and the Western Ringtail Possums, with individuals detected during the survey. Used by other rare birds and animals including the Quenda.	Consideration of issue raised by submission were considered in section 3.1.2 and Appendix D.

Appendix C. Site characteristics

C.1. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to the department at the time of the assessment. This information was used to inform the assessment of the clearing against the Clearing Principals, contained in Appendix D.

Characteristic	Details
Local context	<p>The area proposed to be cleared is located within a rural landform approximately five kilometres southwest of the Capel town centre. The proposed clearing consists of isolated remnant in a highly cleared landscape.</p> <p>Aerial imagery and Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 22.72 per cent of the original native vegetation cover.</p> <p>The property is zoned as 'Rural' in the Shire of Capel's Town Planning Scheme No. 7.</p>
Ecological linkage	Approximately 260 m north of the revised application area, the South West Regional Ecological Linkage is mapped. There is still remaining vegetation within the surrounding of the revised application area that would provide ecological linkage and value for fauna dispersal.
Conservation areas	The closest conservation area mapped to the revised application area is the Coolinup state forest located 1.4 km to the west of the revised application area.
Vegetation description	<p>Vegetation survey (Ecoedge, 2022) indicate the vegetation within the proposed clearing area consists of the following vegetation units within the revised application area.</p> <ul style="list-style-type: none"> Unit D1 - Medium woodland of <i>Eucalyptus marginata</i> over open low woodland of <i>Banksia attenuata</i> and/or <i>Banksia ilicifolia</i> and <i>Nuytsia floribunda</i> over <i>Kunzea glabrescens</i> tall shrubland over shrubland of <i>Adenanthos meisneri</i> <i>Brachyloma preissii</i> and <i>Melaleuca thymoides</i> over <i>Dasyopogon bromeliifolius</i> low shrubland and <i>Phlebocarya ciliata</i> open forbland on grey sand. Unit D2 - Medium very open woodland of <i>Agonis flexuosa</i>, <i>Banksia ilicifolia</i> or <i>Nuytsia floribunda</i> over tall shrubland of <i>Kunzea glabrescens</i> over low shrubland of <i>Acacia semitrullata</i>, <i>A. stenoptera</i>, <i>Adenanthos meisneri</i>, <i>Dasyopogon bromeliifolius</i>, <i>Hypocalymma angustifolium</i>, <i>Melaleuca thymoides</i> and <i>Xanthorrhoea brunonis</i> over open forbland of <i>Patersonia occidentalis</i>, <i>Phlebocarya ciliata</i> on grey sand. <p>Representative photos and the full survey descriptions and maps are available in Appendix G.</p> <p>The broad scale mapped vegetation type within the revised application area is the Southern River complex which is described as open woodland of <i>Corymbia calophylla</i> (Marri) - <i>Eucalyptus marginata</i> (Jarrah) - <i>Banksia</i> species with fringing woodland of <i>Eucalyptus rudis</i> (Flooded Gum) - <i>Melaleuca raphiophylla</i> (Swamp Paperbark) along creek beds.</p> <p>The mapped vegetation type retains approximately 18.43 per cent of the original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>Vegetation survey/mapping (Ecoedge, 2022) indicate the vegetation within the proposed clearing area is in degraded to completely degraded condition (Keighery, 1994).</p> <p>The full Keighery (1994) condition rating scale is provided in Appendix E.</p> <p>Representative photos and the full survey descriptions and mapping are available in Appendix G.</p>
Climate and landform	<p>The revised application area is situated near the 850 mm rainfall isohyet (DPIRD, 2019)</p> <p>The revised application area is mapped within two landforms, which are</p>

Characteristic	Details
	<ul style="list-style-type: none"> Bassendean B3 phase: closed depressions and poorly defined stream channels, poorly to very poorly drained. Bassendean B1b phase: very low relief dunes of undulating sand plain. <p>The elevation of the property ranges from 22 m to 28 m Australian Height Datum (AHD)</p>
Soil description	<p>The revised application area falls within one soil landform.</p> <ul style="list-style-type: none"> Bassendean B1b Phase described as sand plain with deep bleached grey sandy A2 horizons and pale-yellow B horizons (DPIRD, 2019). Bassendean B3 Phase described as poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam (DPIRD, 2019).
Land degradation risk	<p>Table C.5 below provides the risk level for each land degradation category.</p> <p>A review of the Acid Sulfate Soil (ASS) risk mapping indicates that the revised application area falls within a 'Moderate to low' risk of containing ASS.</p>
Waterbodies	<p>The desktop assessment and aerial imagery indicated that no watercourses transect the area proposed to be cleared. The closest watercourse is the Ludlow River, approximately 70 m to the south of the revised application area.</p> <p>The revised application area is located surrounding the Geomorphic Wetlands Swan Coastal Plain dataset as a multiple-use wetland with the Unique Feature Identifier (UFI) 15809.</p>
Hydrogeography	<p>Lot 43 lies within the Busselton-Capel Groundwater Area, proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (RIWI Act) (DWER-034). The unconfined 'Perth - Superficial Swan' aquifer overlies the more confined 'Perth - Leederville' aquifer and the deep 'Perth - Yarragadee South' aquifer.</p> <p>The revised application area lies within the Busselton Coast Water Management Area and in the Ludlow River sub management area of the Vasse/Wonnerup Estuary Catchment.</p> <p>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).</p>
Flora	<p>According to the available databases, 79 flora records are identified within the local area. There are records of 18 threatened flora records and 61 priority flora records within the 10-kilometre radius of the revised application area. Four flora species were recorded within the survey area during the flora and vegetation survey.</p>
Ecological communities	<p>As shown in the figure 6 below, the DBCA mapped Banksia Woodlands of the Swan Coastal Plain priority ecological community is mapped within close proximity to the revised application area. The TEC <i>Corymbia calophylla</i> woodlands on heavy soils of the southern Swan Coastal Plain (floristic community type 1b as originally described in Gibson et al. 1994) also occurs within close proximity to the revised application area.</p>  <p>Figure 6: The location of the DBCA mapped PEC (green) and the TEC (red).</p>

Characteristic	Details
Fauna	<p>According to the desktop assessment, 36 fauna species were recorded in the local area, consisting of 22 bird species, one fish, one invertebrate, 10 mammal and two reptile species. The revised application area is mapped within the distribution zone of all three black cockatoo species.</p> <ul style="list-style-type: none"> • Carnaby's Cockatoo (<i>Zanda latirostris</i>) • Baudin's Cockatoo (<i>Zanda Calyptorhynchus</i>) • Forest red-tailed Black-cockatoo (<i>Calyptorhynchus banksia naso</i>) <p>Two black cockatoo breeding sites and two black cockatoo roost sites are mapped within the 12 km radius buffer of the revised application area.</p> <p>The surrounding vegetation of the revised application area are mapped as containing a medium habitat suitability for the Western Ringtail Possum.</p>

C.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
IBRA bioregion*					
Swan Coastal Plain	1,501,221.93	579,813.47	38.62	222,916.97	14.85
Vegetation complex					
Southern River 42	58,781.48	10,838.18	18.43	940.36	1.60
Local area					
10km radius	30,676.66	6,971.45	22.72	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

C.3. Flora analysis table

According to the flora and vegetation survey (Ecoedge, 2022) and the Department's desktop assessment, the following conservation significant flora species were considered likely to occur within the revised application area given the records within a ten kilometres radius of the revised application area and the suitable habitat in terms of preferred vegetation and soil type within the revised application area.

Species name	Conservation status	Distance of closest record to revised application area (km)	Number of known records (total)	Did survey identify? [Y, N, N/A]
<i>Acacia flagelliformis</i>	P4	2.04	5	No
<i>Acacia semitrullata</i>	P4	3.30	8	Yes
<i>Acacia</i> sp. <i>Binningup</i> (G. Cockerton et al. WB 37784)	P1	7.46	1	No
<i>Adelphacme minima</i>	P3	1.37	2	No
<i>Amperea micrantha</i>	P2	2.55	4	No
<i>Aponogeton hexatepalus</i>	P4	1.67	3	No
<i>Banksia meisneri</i> subsp. <i>ascendens</i>	P4	5.66	2	No

Species name	Conservation status	Distance of closest record to revised application area (km)	Number of known records (total)	Did survey identify? [Y, N, N/A]
<i>Banksia nivea</i> subsp. <i>uliginosa</i>	T	4.93	7	No
<i>Banksia squarrosa</i> subsp. <i>argillacea</i>	T	5.28	14	No
<i>Boronia anceps</i>	P3	-	-	No
<i>Boronia tetragona</i>	P3	1.64	7	Yes
<i>Caladenia huegelii</i>	T	5.31	2	No
<i>Caladenia speciosa</i>	P4	1.94	5	No
<i>Calothamnus quadrifidus</i> subsp. <i>teretifolius</i>	P4	1.80	18	No
<i>Chordifex gracilior</i>	P3	2.10	1	No
<i>Dillwynia</i> sp. Capel (P.A. Jurjevich 1771)	P3	6.01	3	Yes
<i>Drakaea elastica</i>	T	1.19	4	Yes
<i>Franklandia triaristata</i>	P4	1.79	10	No
<i>Grevillea brachystylis</i> subsp. <i>brachystylis</i>	P3	3.58	5	No
<i>Grevillea elongata</i>	T	5.28	19	No
<i>Isopogon formosus</i> subsp. <i>dasylepis</i>	P3	1.84	10	No
<i>Jacksonia gracillima</i>	P3	6.01	6	No
<i>Lambertia echinata</i> subsp. <i>occidentalis</i>	T	7.83	3	No
<i>Leucopogon</i> sp. Busselton (D. Cooper 243)	P2	1.23	7	No
<i>Loxocarya magna</i>	P3	3.37	10	No
<i>Microtis quadrata</i>	P4	2.19	1	No
<i>Montia australasica</i>	P2	3.04	1	No
<i>Olearia strigosa</i>	P3	1.97	2	No
<i>Ornduffia submersa</i>	P4	1.67	1	No
<i>Schoenus benthamii</i>	P3	1.97	2	No
<i>Schoenus loliaceus</i>	P2	-	-	No
<i>Schoenus natans</i>	P4	1.67	1	No
<i>Stylidium paludicola</i>	P3	1.09	8	No
<i>Synaphea hians</i>	P3	1.43	4	No
<i>Synaphea petiolaris</i> subsp. <i>simplex</i>	P3	4.24	9	No
<i>Thysanotus glaucus</i>	P4	3.21	1	No
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234)	P4	3.99	3	No
<i>Verticordia attenuata</i>	P3	0.96	23	No
<i>Verticordia densiflora</i> var. <i>pedunculata</i>	T	2.30	11	No
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P4	1.80	1	No
<i>Verticordia plumosa</i> var. <i>vassensis</i>	T	4.92	19	No

C.4. Fauna analysis table

The following fauna species were considered likely to occur within the revised application area.

Species name (common)	Species name (scientific)	Conservation status	Year of the most recent record	Distance of closest record to revised application area (km)	Number of known records (total)	Did survey identify [Y, N, N/A]
Carnaby's cockatoo	<i>Zanda latirostris</i>	EN	2014	2.02	104	N
Forest red-tailed black cockatoo	<i>Calyptorhynchus banksii</i> subsp. <i>naso</i>	VU	2015	2.62	4	Y – foraging evidence

Species name (common)	Species name (scientific)	Conservation status	Year of the most recent record	Distance of closest record to revised application area (km)	Number of known records (total)	Did survey identify [Y, N, N/A]
Baudin's cockatoo	<i>Zanda Calyptorhynchus</i>	EN	2013	2.77	26	Y - foraging evidence
Chuditch	<i>Dasyurus geoffroii</i>	VU	1990	6.00	3	N
Masked owl	<i>Tyto novaehollandiae novaehollandiae</i>	P3	1989	5.60	3	N
Peregrine Falcon	<i>Falco peregrinus</i>	OS	2014	3.40	4	N
Western Ringtail Possums	<i>Pseudocheirus occidentalis</i>	CR	2020	0.37	384	Y – dreys and sightings
Quenda	<i>Isoodon fusciventer</i>	P4	2020	1.67	42	digging
Western Brush Wallaby	<i>Notamacropus irma</i>	P4	1995	1.67	14	N
Western False Pipistrelle	<i>Falsistrellus mackenziei</i>	P4	1986	5.23	3	N
South-western brush-tailed phascogale, wambenger	<i>Phascogale tapoatafa wambenger</i>	CD	2017	1.48	33	N

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

C.5. Land degradation risk table

Risk categories	212Bs_B3	212Bs_B1b
Wind erosion	5% of map unit has a high to extreme hazard	50% of map unit has a high to extreme hazard
Water erosion	40% of map unit has a very high to extreme hazard	0% of map unit has a very high to extreme hazard
Salinity	0% of map unit has a moderate to extreme risk	0% of map unit has a moderate to extreme risk
Subsurface Acidification	100% of map unit has a high susceptibility	100% of map unit has a high susceptibility
Flood risk	46% of the map unit has a moderate to high hazard	0% of the map unit has a moderate to high hazard
Water logging	91% of map unit has a moderate to very high risk	0% of map unit has a moderate to very high risk
Phosphorus export risk	97% of map unit has a high to extreme hazard	70% of map unit has a high to extreme hazard

Appendix D. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> "Native vegetation should not be cleared if it comprises a high level of biodiversity."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared contain habitat for conservation significant fauna species and provides a buffer to a TEC and significant wetland vegetation that contains high biodiversity. <i>In addition, the</i> application area contains the flora species <i>Conospermum teretifolium</i> and <i>Macarthuria apetala</i> that have been identified as having limited distribution.</p>	At variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (b):</u> "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."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared contains critical habitat for the Western Ringtail Possum.</p>	At variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (c):</u> "Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared is not likely to contain habitat for flora species listed under the BC Act. The application area occurs in close proximity to threatened flora but an adequate 50 metre buffer has been provided.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (d):</u> "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."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared does not contains species that can indicate a TEC. However, the TEC-Southern <i>Corymbia calophylla</i> woodlands on heavy soils (FCT20a) is recorded directly adjacent to the south of the revised</p>	At variance	Yes <i>Refer to Section 3.2.3, above.</i>

Assessment against the clearing principles	Variance level	Is further consideration required?
<p>application area. The proposed clearing is likely to indirectly impact on the vegetation representative of the TEC community through the weed invasion, dieback invasion, dust impacts and hydrological changes.</p>		
<p>Environmental value: significant remnant vegetation and conservation areas</p>		
<p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u></p> <p>The extent of the mapped vegetation type and the native vegetation in the local area is inconsistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is considered a significant remnant in a highly cleared landscape. The application area is likely to support a recognised ecological linkage.</p>	<p>At variance</p>	<p>Yes</p> <p><i>Refer to Section 3.2.3, above.</i></p>
<p><u>Principle (h):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas. Although there is unlikely to be impacts to conservation areas from the proposed clearing, the disturbance caused by the proposed clearing is likely to increase the risk of weeds and dieback being introduced into adjacent areas of remnant vegetation.</p>	<p>Not likely to be at variance</p>	<p>No</p>
<p>Environmental value: land and water resources</p>		
<p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>The revised clearing area avoids the clearing of native vegetation that is associated with a watercourse or wetland. However, wetland vegetation is recorded approximately 16 metres from the revised application area. Indirect impacts to the wetland is likely to occur from the proposed clearing and end land use activities.</p>	<p>At variance</p>	<p>Yes</p> <p><i>Refer to Section 3.2.5, above.</i></p>
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils have a high risk of land degradation in the forms of wind erosion, eutrophication and subsurface acidification</p>	<p>May be at variance</p>	<p>Yes</p> <p><i>Refer to Section 3.2.4, above.</i></p>
<p><u>Principle (i):</u> <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.”</i></p> <p><u>Assessment:</u></p> <p>Given the recorded wetland vegetation within close proximity to the revised application area, the proposed clearing may impact surface or ground water quality. A 50-meter buffer is required from the wetland to the proposed activities to reduce the impacts to surface water quality through increased nutrient enrichment and to ensure the groundwater table is not intercepted. The proposed clearing may also increase the sedimentation and</p>	<p>May be at variance</p>	<p>Yes</p> <p><i>Refer to Section 3.2.5, above.</i></p>

Assessment against the clearing principles	Variance level	Is further consideration required?
eutrophication of the Ludlow River which occurs 70 m south of the application area.		
<p><u>Principle (j):</u> “Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</p> <p><u>Assessment:</u></p> <p>The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding.</p>	Not likely to be at variance	No

Appendix E. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation’s ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees or shrubs.

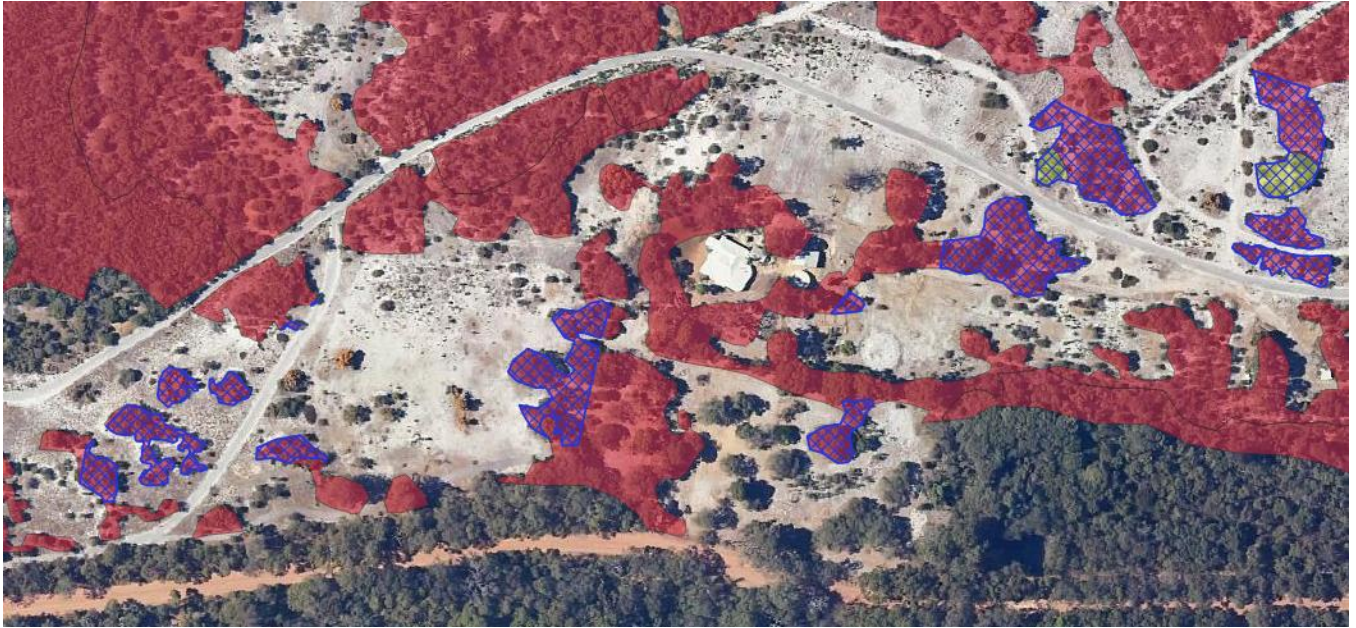
Appendix F. Maps produced by the department.

Figure 7: Mapped vegetation units within the revised application area (cross hatched blue)

- Veg Unit D1 – Yellow
- Veg Unit D2 - Red



Figure 8: The mapped vegetation condition (Keighery, 1994) within the revised application area (cross hatched blue).

- Completely Degraded – Pink
- Degraded – Blue



Figure 9: Fauna habitat mapped within the revised application area (cross hatched blue)

- Veg Unit D1: Brown
- Veg Unit D2: Pink



Figure 10: Map of the locations of WRP dreys (yellow dots) within the revised application area (cross hatched blue)



Figure 11: Map of the location of the TEC, “*Southern Corymbia calophylla* woodland on heavy soils” (pink) in comparison to the revised application area (cross-hatched blue).



Figure 12: extent of the mapped multiple use wetland (blue) within Lot 43 on Deposited Plan 69043.



Figure 13: extent of the mapped wetland vegetation (green) within Lot 43 on Deposited Plan 69043.

Appendix G. Biological survey information excerpts and photographs of the vegetation (Ecoedge, 2022), (Harewood.G, 2022) and (MBS, 2022)



Figure 14: Area proposed for the sand extraction.



Figure 15: Photograph of the vegetation within the vegetation unit C



Figure 16: Photograph of the vegetation within the vegetation unit D1.



Figure 17: Photograph of the vegetation within vegetation unit D2.

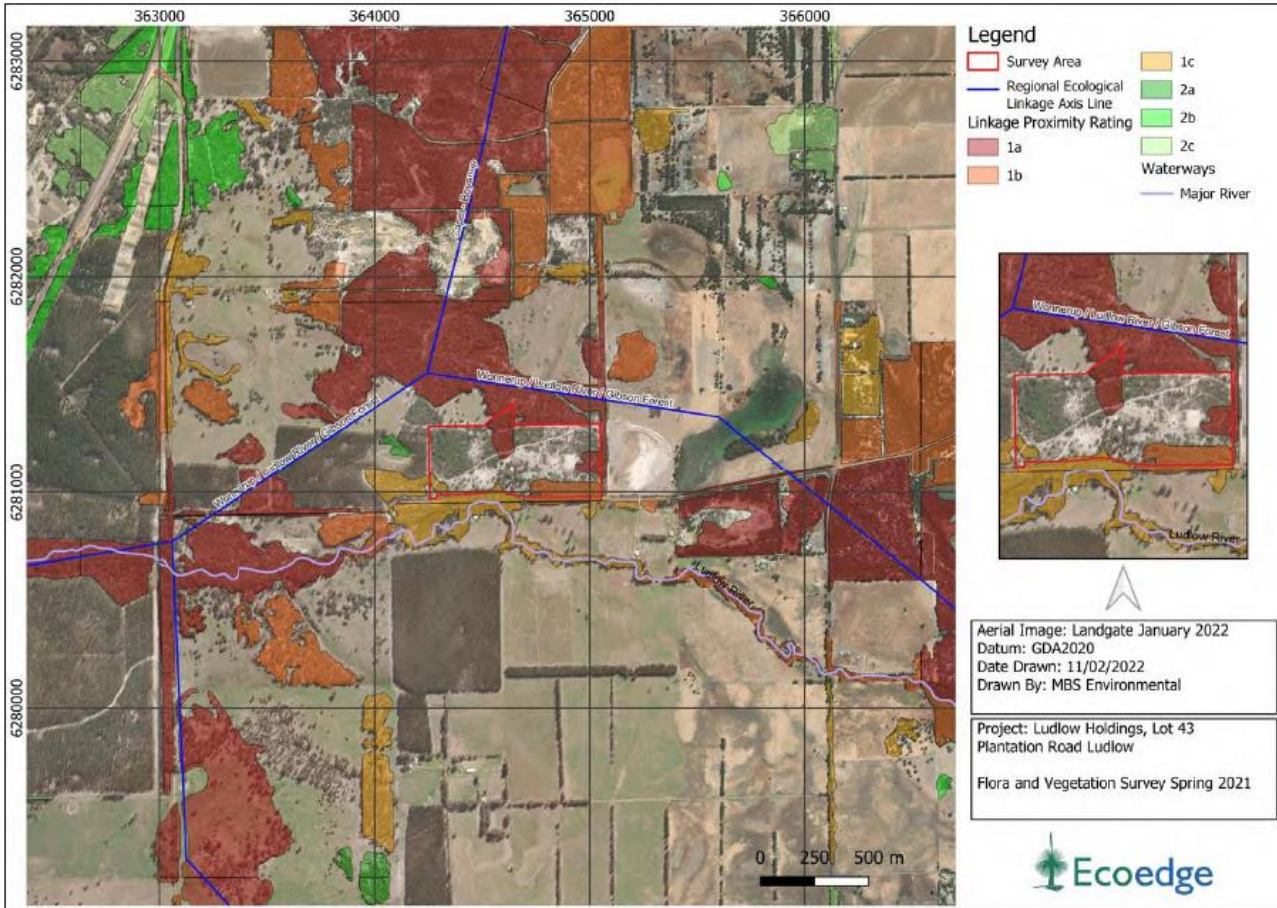


Figure 18: A map representing South West Regional Ecological Linkage Axis line and the linkage proximity ratings.



Figure 19: Photographs taken during the flora survey of the conservation significant flora species.

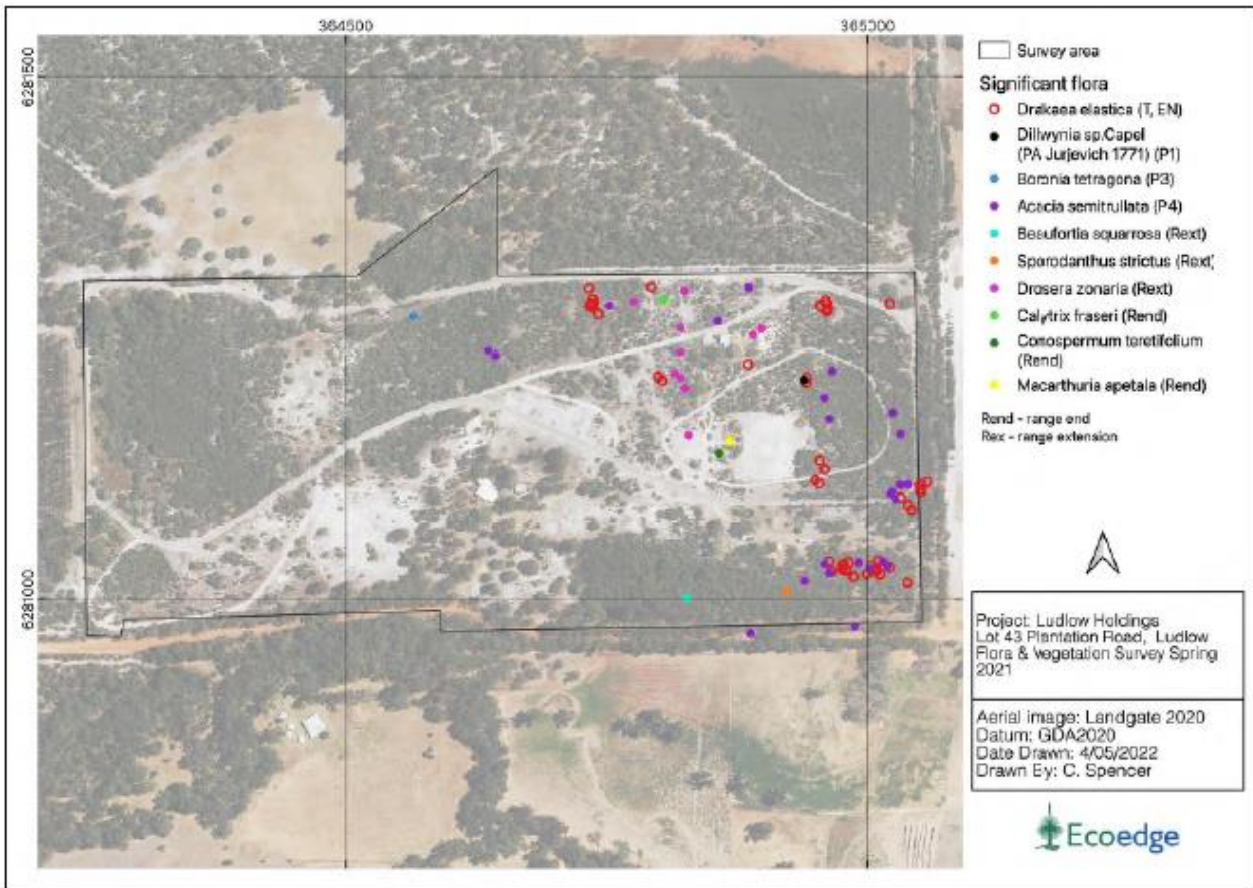


Figure 20: A map representing the conservation significant flora species recorded within the survey area

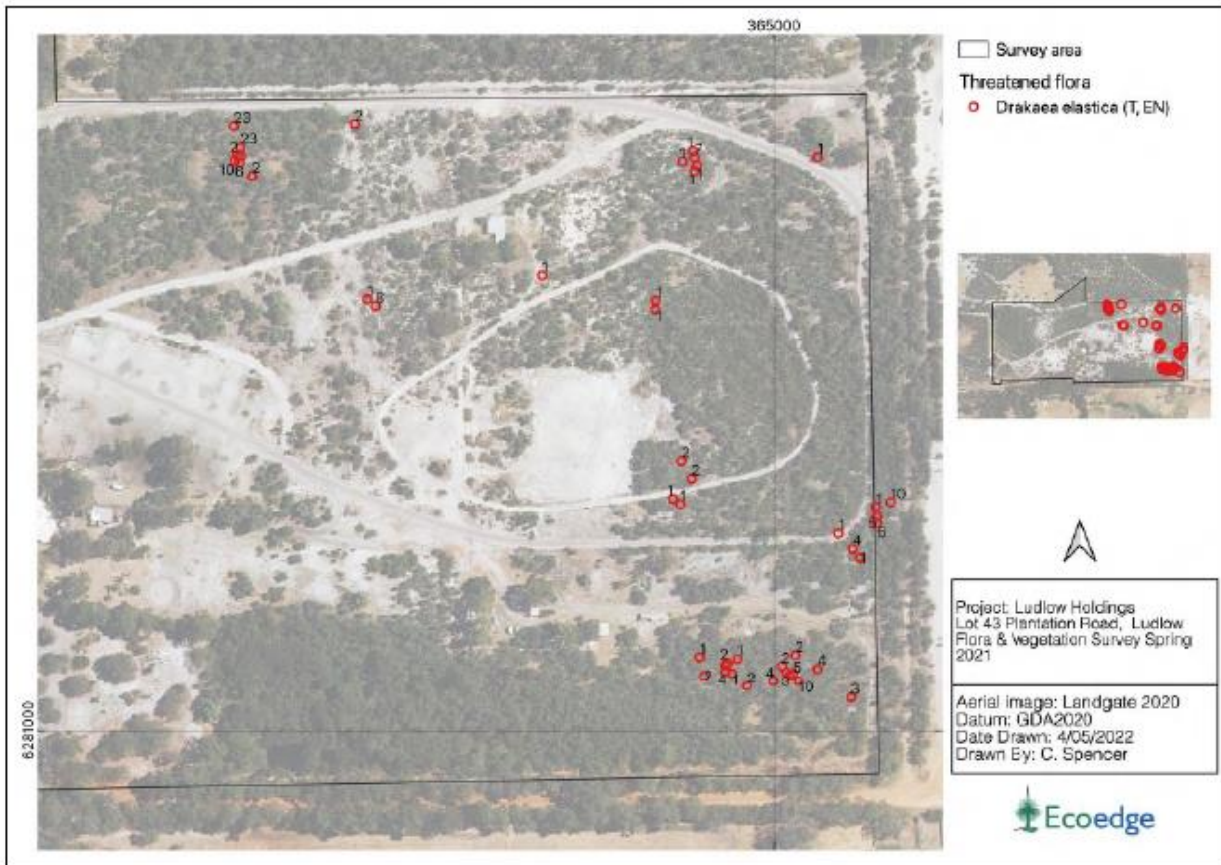


Figure 21: A map representing the location of the identified *Drakea elastica*.



<p>Unit D: Tall shrubland with scattered emergent trees such as jarrah, peppermint, <i>Banksia</i> and <i>Nuytsia</i> on grey sand.</p> <p>Area – 13.31 ha (48.6%)</p>	 A photograph showing a dense stand of tall, dark green trees and shrubs. The ground is covered in green grass and some dry, fallen branches. The sky is overcast.
<p>Existing Cleared Areas.</p> <p>Area – 9.53 ha (34.8%)</p>	 A photograph of a cleared area with a fence line in the foreground. The ground is covered in green grass and some dry, fallen branches. In the background, there are several tall, dark green trees under an overcast sky.

Figure 22: fauna habitat mapped within the revised application area.



Foraging Evidence Description	Example Image
<p>Marri fruits – foraging activity attributed to Baudin’s Black Cockatoo.</p>	
<p>Marri fruits – foraging activity attributed to the Forest Red-tailed Black Cockatoo.</p>	

Figure 23: Photographs of the foraging habitat identified from the survey area.

Unit/Sub-unit	Description
A	Medium open forest of <i>Corymbia calophylla</i> over very open low woodland of <i>Xylomelum occidentale</i> over tall sparse shrubland of <i>Kunzea glabrescens</i> and <i>Xanthorrhoea brunonis</i> over <i>Pteridium esculentum</i> fernland or grassland of * <i>Avena barbata</i> , * <i>Briza maxima</i> and * <i>Ehrharta longiflora</i> on grey sandy loam. [Condition mainly Degraded - Good].
B	Open low woodland of <i>Melaleuca preissiana</i> over <i>Leptocarpus coangustus</i> , <i>Lepidosperma longitudinale</i> sedgeland with patches of <i>Kunzea glabrescens</i> tall shrubland over <i>Hypocalymma angustifolium</i> low shrubland over open grassland/forbland of introduced taxa on grey sand (winter wet). [Condition mainly Degraded - Good].
C	Very open medium woodland of <i>Corymbia calophylla</i> over medium woodland of <i>Melaleuca preissiana</i> over <i>Aotus gracillima</i> , <i>Astartea scoparia</i> , <i>Kunzea glabrescens</i> tall shrubland over <i>Hypocalymma angustifolium</i> low shrubland over open sedgeland of <i>Lepidosperma longitudinale</i> , <i>Pteridium esculentum</i> and <i>Schoenus efolius</i> open forbland on grey sand (winter damp). [Condition Degraded - Very Good].
D1	Medium woodland of <i>Eucalyptus marginata</i> over open low woodland of <i>Banksia attenuata</i> and/or <i>Banksia ilicifolia</i> and <i>Nuytsia floribunda</i> over <i>Kunzea glabrescens</i> tall shrubland over shrubland of <i>Adenanthos meisneri</i> , <i>Brachyloma preissii</i> and <i>Melaleuca thymoides</i> over <i>Dasyopogon bromeliifolius</i> low shrubland and <i>Phlebocarya ciliata</i> open forbland on grey sand. [Degraded-Good]
D2	Medium very open woodland of <i>Agonis flexuosa</i> , <i>Banksia ilicifolia</i> or <i>Nuytsia floribunda</i> over tall shrubland of <i>Kunzea glabrescens</i> over low shrubland of <i>Acacia semitrullata</i> , <i>A. stenoptera</i> , <i>Adenanthos meisneri</i> , <i>Dasyopogon bromeliifolius</i> , <i>Hypocalymma angustifolium</i> , <i>Melaleuca thymoides</i> and
E1	<i>Xanthorrhoea brunonis</i> over open forbland of <i>Patersonia occidentalis</i> , <i>Phlebocarya ciliata</i> on grey sand. [Condition mainly Completely Degraded-Good] Medium woodland of <i>Corymbia calophylla</i> over very open medium shrubland of <i>Kingia australis</i> over low shrubland of <i>Acacia pulchella</i> , <i>Hardenbergia comptoniana</i> , <i>Leucopogon propinquus</i> , <i>Macrozamia riedlei</i> , <i>Pimelea angustifolia</i> , and <i>Xanthorrhoea brunonis</i> over open forbland of <i>Conostylis aculeata</i> , <i>Craspedia variabilis</i> and <i>Senecio quadridentatus</i> and very open sedgeland of <i>Schoenus grandiflorus</i> and <i>Tetraria octandra</i> and scattered <i>Microlaena stipoides</i> low grass on grey sandy loam. [Condition Very Good to Excellent]. (Southern <i>Corymbia calophylla</i> woodlands TEC).
E2	Medium woodland of <i>Corymbia calophylla</i> and <i>Eucalyptus rudis</i> over low woodland of <i>Agonis flexuosa</i> and <i>Melaleuca preissiana</i> over open medium shrubland of <i>Astartea scoparia</i> , <i>Acacia extensa</i> and <i>Grevillea manglesioides</i> over low sedgeland of <i>Anarthria prolifera</i> and <i>Lepidosperma longitudinale</i> and open forbland of <i>Burchardia multiflora</i> and <i>Opercularia hispidula</i> on grey-brown sandy loam or red-brown loam. [Condition ranges from Completely Degraded-Excellent]. (Southern <i>Corymbia calophylla</i> woodlands on heavy soils TEC).

Figure 24: Description of vegetation units within the survey area.

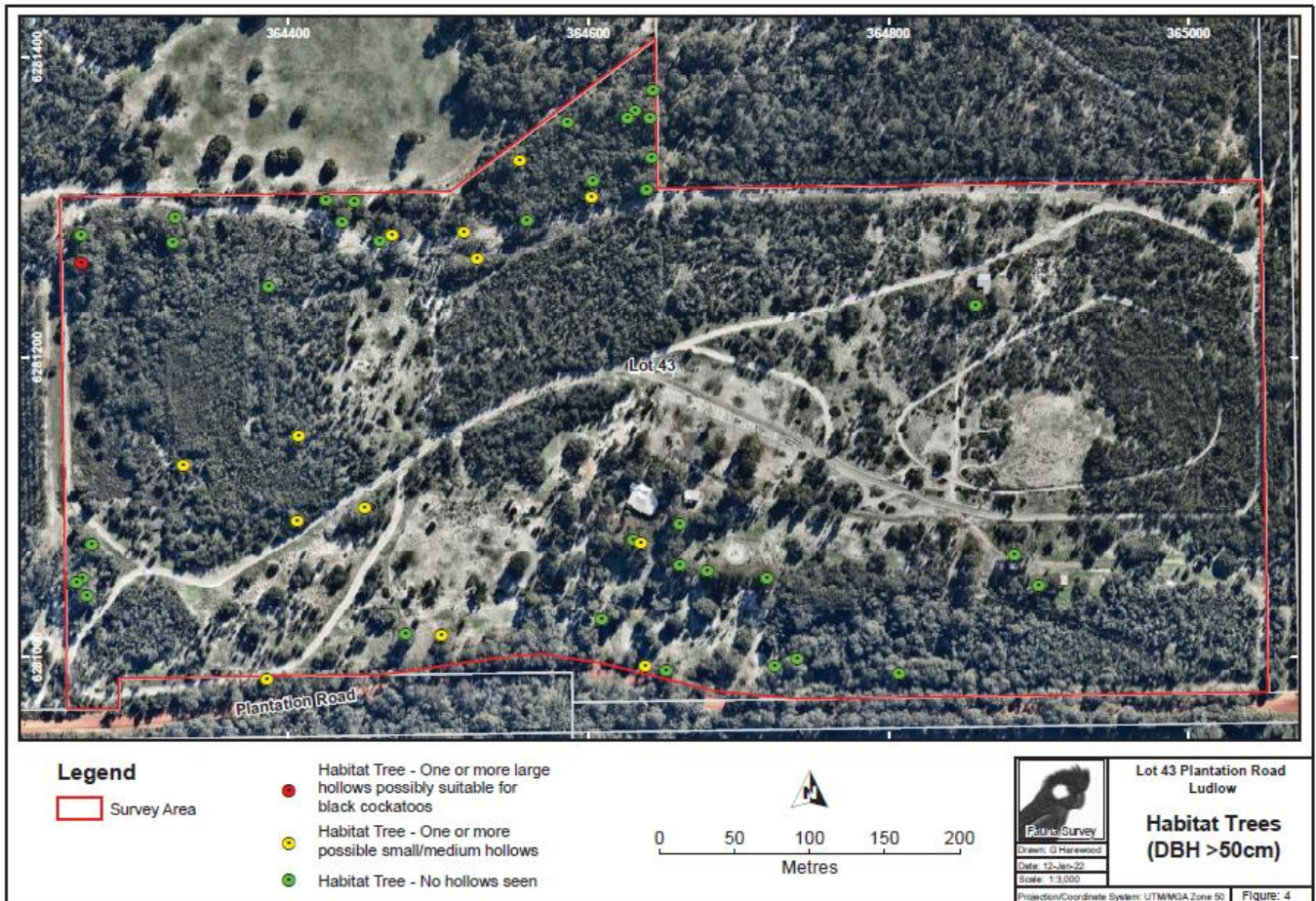


Figure 25: The recorded habitat trees within the survey area.

Appendix H. Sources of information

H.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)

- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

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