



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9420/1
Permit Holder:	Kimberley Cotton Company Ltd
Duration of Permit:	From 20 November 2022 to 20 November 2027

The permit holder is authorised to clear *native vegetation* subject to the following conditions of this permit.

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear native vegetation for the purpose of preliminary groundworks and the construction of cotton ginning facilities, including laydown areas for cotton storage.

2. Land on which clearing is to be done

Lot 510 on Deposited Plan 421305 (Crown Reserve 53889), Kununurra.

3. Clearing authorised

The permit holder must not clear more than 65.33 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

PART II – MANAGEMENT CONDITIONS

4. Avoid, minimise, and reduce impacts and extent of clearing

In determining the *native vegetation* authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending order of preference:

- (a) avoid the clearing of *native vegetation*;
- (b) minimise the amount of *native vegetation* to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

5. Weed management

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of introduction and spread of *weeds*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;

- (b) ensure that no known *weed*-affected soil, *mulch*, *fill*, or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

6. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner towards adjacent *native vegetation* to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

7. Wind erosion management

The permit holder must commence activities relating to the proposed purpose no later than three (3) months after undertaking the authorised clearing activities to reduce the potential for wind erosion.

PART III - RECORD KEEPING AND REPORTING

8. Records that must be kept

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities	<ul style="list-style-type: none"> (a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the size of the area cleared (in hectares); (e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 4; (f) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> in accordance with condition 5. (g) actions taken to minimise the risk to fauna in accordance with condition 6. (h) actions taken to minimise the risk of wind erosion in accordance with condition 7.

9. Reporting

The permit holder must provide to the *CEO* the records required under condition 8 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
fill	means material used to increase the ground level, or to fill a depression.
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
weeds	means any plant – (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i> ; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS



Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

27 October 2022

Schedule 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).

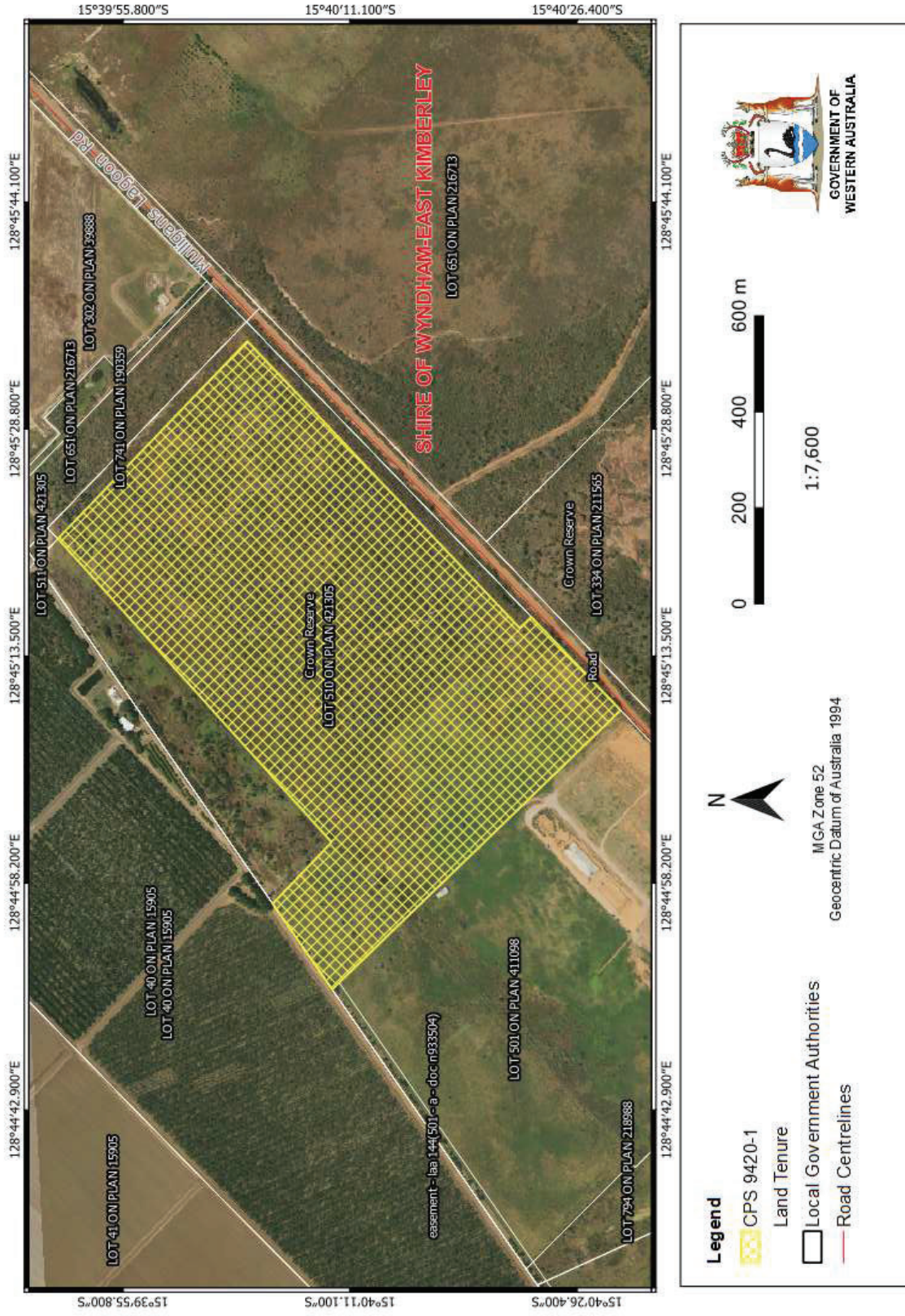


Figure 1: Map of the boundary of the area within which clearing may occur



Clearing Permit: Decision Report

1. Application details and outcome

1.1 Permit application details

Permit number:	CPS 9420/1
Permit type:	Purpose permit
Applicant name:	Kimberley Cotton Company Ltd
Application received:	3 September 2021
Application area:	65.33 hectares of native vegetation (as revised)
Purpose of clearing:	Construction of cotton ginning facilities, including laydown areas for cotton module storage
Method of clearing:	Mechanical removal
Property:	Lot 510 on Deposited Plan 421305 (Crown Reserve 53889 vested by Management Order to Minister for Regional Development for 'agriculture and associated purposes')
Location (LGA area/s):	Shire of Wyndham-East Kimberley
Localities (suburb/s):	Kununurra

1.2 Description of clearing activities

The proposed clearing is to facilitate the construction of cotton ginning facilities, including laydown areas for cotton module storage. The vegetation proposed to be cleared is contained within a single contiguous area and is part of a broader remnant. The original application area of 79.46 hectares was revised to 65.33 hectares during the assessment process. The revised application area has been cleared in the past, with approximately 20.5 hectares currently devoid of native vegetation or in a completely degraded to poor condition (Trudgen, 1991). The local area for this assessment is defined as a 50 kilometre radius from the perimeter of the application area. The extent of the proposed clearing is indicated in Figure 1 (Section 1.5).

1.3 Decision on application

Decision:	Granted
Decision date:	27 October 2022
Assessment area:	Up to 65.33 hectares of native vegetation, as depicted in Section 1.5 below.

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). DWER advertised the application on 13 October 2021 for 21 days and one public submission was received. DWER's consideration of the matters raised in the public submission is summarised in Appendix B.

In making this decision, the Delegated Officer had regard for the site characteristics (Appendix C), relevant datasets (Appendix K), flora and vegetation surveys undertaken over the application area (Appendix A), information and photographs provided by the applicant, the clearing principles set out in Schedule 5 of the EP Act (Appendix D), relevant planning instruments, and any other matters considered relevant to the assessment (Section 3). The Delegated Officer also took into consideration the purpose of the proposed clearing and the State and Commonwealth support for the project.

The assessment identified that the proposed clearing will result in:

- the loss of up to 65.33 hectares of native vegetation that has previously been cleared incorporating approximately 20.5 hectares in a completely degraded to very poor condition, and approximately 44.83 hectares in very poor to good condition;

- areas that are representative of the Ivanhoe Land System PEC, a Priority 3 Priority Ecological Community, have been excluded from the application area. The proposed clearing is not likely to impact significant native vegetation, including the Ivanhoe Land System PEC;
- the loss of at least one individual of a Priority 3 flora taxa, *Brachychiton tuberculatus*. Clearing of this one individual is not likely to be significant;
- the potential introduction and spread of weeds into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values; and
- inadvertent mortality to individual fauna occupying the area at the time of clearing; and
- potential land degradation in the form of wind erosion.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (Section 3.1), the Delegated Officer determined the proposed clearing can be minimised and managed to be unlikely to lead to an unacceptable risk to environmental values.

The Delegated Officer decided to grant a clearing permit subject to the following conditions:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds into adjacent vegetation;
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity; and
- avoid clearing commencing more than three months prior to the commencement of construction works to reduce the potential for wind erosion.

1.5 Site map

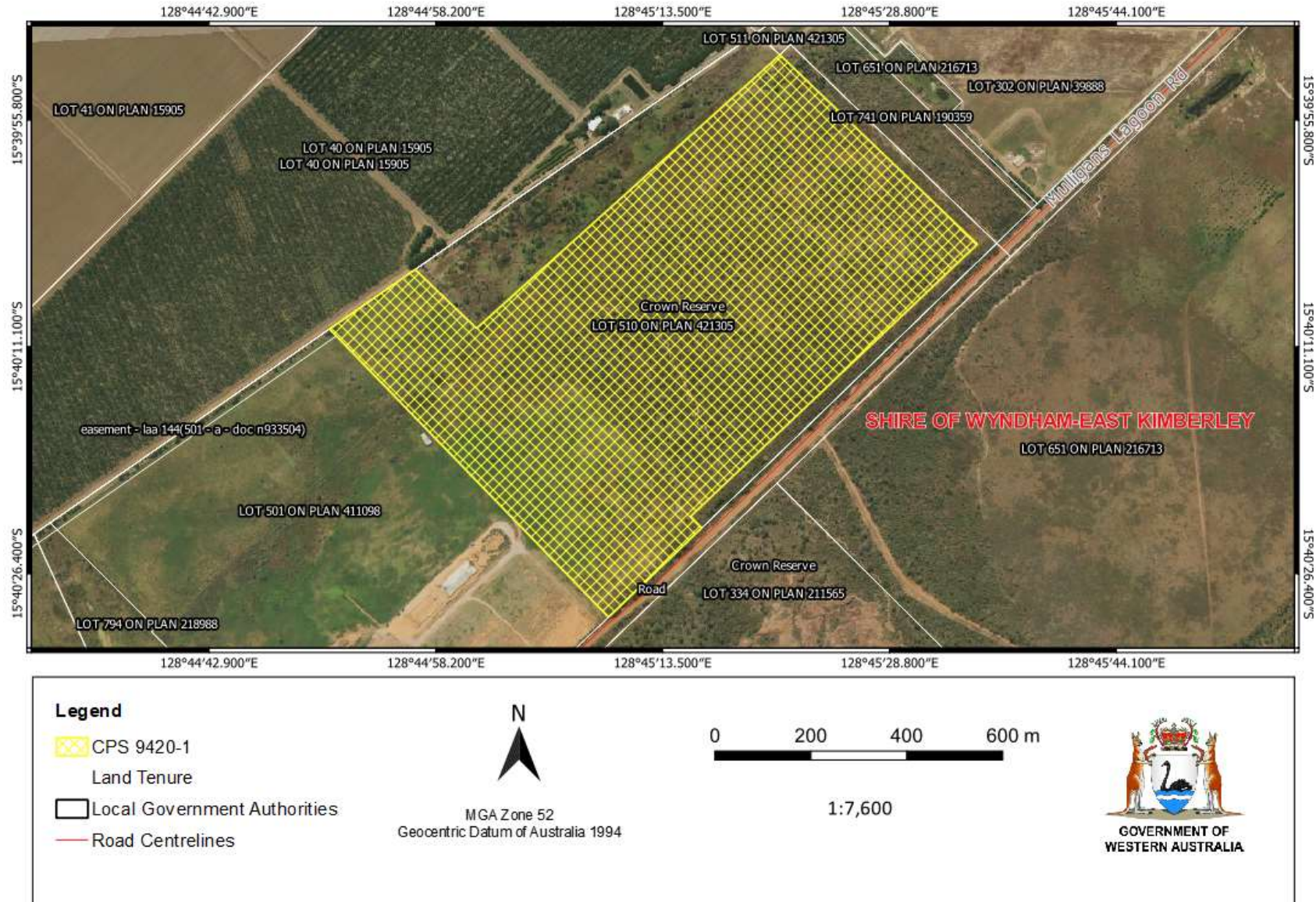


Figure 1: Map of area applied to clear. The area cross-hatched yellow indicates the area authorised to be cleared under the granted clearing permit.

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 (Section 1.4), the assessment 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)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Contaminated Sites Act 2003* (CS Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Rights in Water and Irrigation Act 1914* (RIWI Act)
- *Soil and Land Conservation Act 1945* (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)
- *Environmental Offsets Guidelines* (August 2014)
- 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

The Kimberley Cotton Company Ltd (Kimberley Cotton) is working collaboratively with partners to build the Kununurra Cotton Gin facility. Ord River cotton grown in recent years has been ginned in Queensland, and building a gin will remove the need to transport cotton grown in WA out of the state for processing. The construction of local cotton processing facilities will be the trigger for broader investment in the region and the gin will be a crucial piece of infrastructure for the Ord's cotton-growing industry (Ministerial Media Statement, 2021).

The CPS 9420/1 application form (Kimberley Cotton, 2021) states that clearing will be staged according to need, and will not be undertaken unnecessarily. A site options assessment was undertaken in 2020 to determine the most suitable location for a cotton ginnery in the Ord River Irrigation Area (Kimberley Cotton, 2021).

The site operated as a sugar mill for over 10 years and processing sugar cane ceased in late 2007 (DWER, 2021a). Clearing Permit CPS 2370/1 was granted to the former Department of Agriculture and Food Western Australia on 12 March 2009, authorising the clearing of 48 hectares of native vegetation within the current application area for the purpose of a horticultural crop. Kimberley Cotton (2022a) advises that the location has historically been cleared, farmed and otherwise utilised, and is a very modified habitat. The current vegetation condition includes weed growth in previously cleared areas and site works will require the re-clearing of previously cleared areas (Kimberley Cotton, 2021).

After consideration of the results of a flora and vegetation survey (Willing, 2022) the applicant reduced the application area by 14.13 hectares by excluding an area on the north west boundary to protect the Priority 2 (P2) flora species *Dolichandrone filiformis* (Figure 2 below; Appendix J: Figure A and Figure G). This area represents an area that was not cleared in the past under Clearing Permit CPS 2370/1, and incorporates a swampy western margin that represents a transitional zone of Spear Wattle (*Acacia tumida*) with Silky Grevillea (*Grevillea pteridifolia*), Broad-leaved Paperbark (*Melaleuca viridiflora*) and Glider-wing Tree (*Terminalia platyptera*) (Willing, 2022).

The excluded area also includes soils more likely to support the Threatened flora taxa *Typhonium* sp. Kununurra (A.N. Start ANS 1467), that was not recorded during surveys, and representing the Ivanhoe Land System listed as a Priority Ecological Community (PEC) (Section 3.2.1). The exclusion area will act as a buffer between a neighbouring property and the constructed gin facility (Kimberley Cotton, 2022a), and reducing the clearing required over that portion of the property will limit the clearing of soils more suited to *Typhonium* sp. Kununurra, despite there being no *Typhonium* sp. kununurra recorded (Kimberley Cotton, 2022a).

Vegetation along the north east property boundary has been excluded from the application area, as well as along the south east Mulligan's Lagoon Road boundary that supports stands of stringybark (*Eucalyptus tetradonta*) (Appendix J: Figure A). These areas will be retained for aesthetics and road dust filtration purposes (Kimberley Cotton, 2022a).

The Delegated Officer was satisfied that in revising the application area, the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2 Assessment of impacts on environmental values

The assessment against the clearing principles (Appendix D) identified that the impacts of the proposed clearing may present a risk to biological values including a Priority Ecological Community (PEC), Priority flora, significant fauna habitat and vegetation growing in association with a watercourse, as well as land and water resources.

Surveys, reports, and advice relevant to the assessment include;

- a local soil survey by the Department of Agriculture (2003);
- an assessment of the suitability of the application area as *Typhonium sp.* Kununurra (A.N. Start ANS 1467) habitat by Smolinski (2021);
- a flora and vegetation survey over the application area by Willing (2022) that included targeted searches for flora of conservation significance;
- advice from the Department of Biodiversity, Conservation and Attractions (DBCA, 2021a) in relation to Priority flora, broad-scale mapping of *Typhonium sp.* Kununurra habitat (DPIRD, 2021b);
- a report in respect to potential impacts of land degradation over the application area by DPIRD (2022); and
- a site inspection over the application area by the Department of Environment and Conservation (DEC 2008) in respect to a previous clearing permit that was granted over the application area (CPS 2370/1).

The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1 Biological values – Significant vegetation, and flora (clearing principles a and c)

Significant vegetation

The application area is located adjacent to developed agricultural areas to the west, north and north-east associated with the Ord River which is located approximately 4.2 kilometres to the west of the application area (Appendix J: Figure B). Approximately 21 hectares of the south-western portion of the application area has been recently cleared and is devoid of native vegetation or is in 'completely degraded' to 'very poor' condition (Trudgen, 1991). The remainder of the application area has previously been cleared in approximately 2009 (Appendix C1), under Clearing Permit CPS 2370/1.

Vegetation condition rating was not reported in Willing (2022) however the author describes 22 weed species (representing 17.5 per cent of the flora species present) and describes the disturbed nature of the site (from historic clearing and earthworks) explaining the abundance of weeds. Willing (2022) states that the heavy thatching of both weeds and grasses is considered detrimental for the establishment and survival of many native herb species that might otherwise be expected. In consideration of the vegetation description the remainder of the application area is likely to support regrowth native vegetation ranging in condition from 'very poor' to 'good' (Trudgen, 1991) (Appendix E).

The application area lies within the Ord River catchment on the fertile Ivanhoe Plain. Soils of the Ivanhoe Plain have been described and mapped by Aldrick *et al.* (1990) with sediments associated with the alluvial plain being predominantly clayey alluvium. The Ivanhoe Land System has been listed as a Priority Ecological Community (PEC) (Priority 3) by the DBCA.

The application area is within the mapped extent of an occurrence of the Ivanhoe Land System PEC (Appendix C5). The entire application area is within this PEC occurrence, whereas the north western half is mapped as the Ivanhoe Land System as delineated by Payne and Schoknecht (2011) (Appendix J: Figure E; Figure F).

The Ivanhoe Land System consists of many small to medium areas of gently sloping alluvial 'black soil' plains with some timbered 'red soil' (in the central and northern parts) (DBCA, 2021b).

According to available information, the Ivanhoe Land System PEC is restricted to the broader Ord area of the Kimberley region and is mapped across approximately 124,791 hectares in total, and the native vegetation within the application area represents 0.06 per cent of the mapped extent of the Ivanhoe Land System PEC (Appendix J: Figure F).

Rationale for the listing as a PEC includes the threat posed by agricultural expansion into the alluvial plain of mainly gently sloping alluvial black soil plains (DBCA, 2021b), as the fertile black soils (that is, the grey and brown Cununurra cracking clays) of the Ivanhoe Land System adjacent to the Ord River at Kununurra are favoured for irrigated agriculture (Payne and Schoknecht, 2011).

The assessment of habitat suitability the application area by Smolinski (2021) for the Threatened flora taxa *Typhonium sp.* Kununurra (A.N. Start ANS 1467) concluded that Lot 510 on Deposited Plan 421305 (Lot 510) contains limited areas of clay along the north west boundary. These clays are either non-cracking, or similar in morphology to Aquitaine Clays, and areas of Cununurra clay are insignificant.

The survey over the application area by Willing (2022) that included an assessment of soil types concluded that the grey-phase Aquitaine soils and typical Cununurra Clays situated on the alluvial plain (that is, dark brown cracking clays with high agricultural value) comprise very small areas (approximately 3 per cent of the area surveyed) within the Depressed Peripheral Zone situated on the alluvial plain in areas of the north west of the application area (Appendix J: Figure D). These areas, that are more representative of the Ivanhoe Land System PEC, have been excluded from the application area (Appendix J: Figure A) (Section 3.1).

A DEC (2008) report that details a site visit over the application area prior to the area being cleared in ~2009 (Appendix C1), describes an open Eucalypt Woodland with a wide variety of herbaceous and woody plants in the understorey.

The recent survey by Willing (2022) states that the former pre-clearance vegetation of a scattered Stringybark (*Eucalyptus tetradonta*) open woodland has not had time to re-establish. Willing (2022) describes a regrowth acacia woodland of Spear Wattle (*Acacia tumida*) with occasional Soap Wattle (*Acacia coleii*) and Ghost Wattle (*Acacia platycarpa*), and patches of *Grevillea agrifolia* and Ironwood (*Erythrophleum chlorostachys*) over a dominant understorey of Annual Sorghum (*Sorghum stipoides*) where this has not been displaced by dense, often monotypic, patches of the weed Hyptis (*Mesosphaerum suaveolens*). The heavy thatching of both weeds and grasses is considered detrimental for the establishment and survival of many native herb species that might otherwise be expected.

In consideration of the extent of clearing, soil types present, the areas excluded from the application area, and the type and condition of the regrowth native vegetation present, proposed clearing is not likely to impact significant native vegetation, including the adjacent Ivanhoe Land System PEC.

Significant flora

One Threatened and 70 priority flora species have been recorded from the local area. Thirty-one (31) species have been recorded from a habitat, vegetation and/or soil types broadly similar to those mapped within the application area, and 13 of these have been recorded within 10 kilometres of the application area (Appendix C3).

The DBCA (2021) advised that site observations indicate that approximately 10 to 11 hectares of habitat over the application area is potentially suitable to the presence of the Threatened (Endangered) *Typhonium sp.* Kununurra and the remainder of the site may comprise habitat for the Priority 1 flora taxa; *Cyperus digitatus*, *Echinochloa kimberleyensis*, *Goodenia durackiana*, *Goodenia Malvina* and *Typhonium sp.* Middle Creek.

The western half of the application area is mapped as 'Very Low' suitability habitat for the Endangered *Typhonium sp.* Kununurra (Appendix H), and the nearest known record is located approximately 2.2 kilometres from the application area. Advice from the DBCA (2021) following a site visit indicated that 'Very High' suitability habitat for this species occurs approximately 0.6 kilometres north west of the application area (Appendix H), and that approximately 10 to 11 hectares along the north-western boundary of Lot 510 comprises suitable habitat.

A survey and assessment to determine the suitability of Lot 510 as *Typhonium sp.* Kununurra habitat, including an assessment of soil types, was undertaken by Smolinski (2021). The assessment concluded that Lot 510 contains only minor areas of clay which are non-cracking, areas of Cununurra clay are insignificant, and that on the basis of land use history, weed impact and soil suitability Lot 510 represents poor habitat for the species (Smolinski 2021). The flora survey of Willing (2022) was undertaken by suitably qualified experts familiar with the species and did not record *Typhonium sp.* Kununurra within the application area. Given the results of a suitably timed flora survey, *Typhonium sp.* Kununurra is unlikely to occur within the application area. To further reduce the risk of the proposed clearing on this species the applicant has reduced the application area by 14.13 hectares (Section 3.1) to exclude areas on the north west boundary which represent potentially suitable habitat for this species.

Willing (2022) did not record the priority flora taxa identified by DBCA (2021), but recorded two Priority flora species; Single individuals of *Dolichandrone filiformis* (P2) and *Brachychiton tuberculatus* (P3). The location of the *Dolichandrone filiformis* individual has been excluded from the application area (Figure 2 below). The location of the *Brachychiton tuberculatus* individual is within the proposed Cotton Module laydown area (Figure 2 below).

Dolichandrone filiformis is a shrub or tree to four metres in height that occurs on sandstone and sandy soils. Nine records of *Dolichandrone filiformis* are included within the WAH (1998-) database over a range of approximately 210 kilometres (Appendix J: Figure H and Figure I). The *Dolichandrone filiformis* location will be avoided with a separation distance of over 65 metres, and in consideration of the extent of clearing, soil types present, and the type and condition of the native vegetation present, proposed clearing is not likely to impact *Dolichandrone filiformis* populations.

One specimen of *Brachychiton tuberculatus* (P3) was recorded over the application area. However, it is possible that a seed bank is stored within the soil profile. *Brachychiton tuberculatus* is a shrub or tree growing from two to seven metres in height on red or yellow sands on undulating plains. The individual is located near the north east corner of the application area within an area proposed for the Cotton Module laydown area (Figure 2 below). The cotton laydown area will be developed as required, however it is unknown if, and when, clearing will be required.

There are seventeen recorded populations of *Brachychiton tuberculatus* currently within available databases (WAH 1998) over a range of approximately 115 kilometres (Appendix J: Figure H and Figure J). Sixteen of these recorded populations are within 50 kilometres of the application area, which is in the middle of the known range for the species. Recent flora surveys within the local area have identified multiple locations with large numbers of *Brachychiton tuberculatus*. A total of 1,433 individual plants were recorded nearby at a site on Crossing Falls Road (approximately 27 kilometres south of the application area) with other large populations in nearby parcels of undisturbed native vegetation. It is highly likely that this species has a greater range and population size than that currently recorded within available databases, with suitable habitat found extensively within the local area.

Given the above information, it is considered that if and when clearing of a *Brachychiton tuberculatus* individual occurs, it is not likely to affect local populations or the conservation status of this species. In consideration of the one *Brachychiton tuberculatus* location proposed to be cleared, the extent of clearing, soil types present, and the type and condition of the native vegetation present, proposed clearing is not likely to affect local populations or the conservation status of this species.

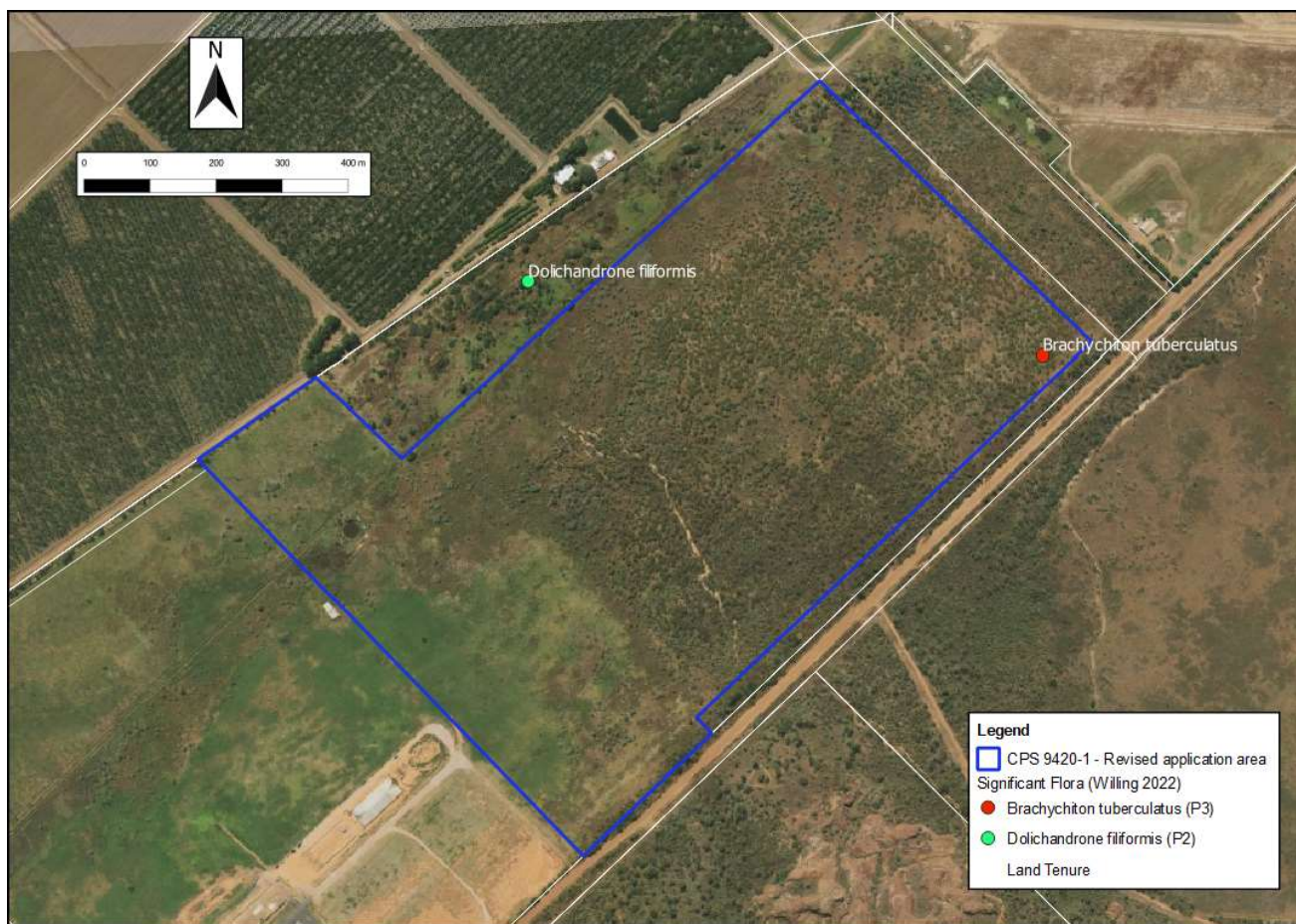


Figure 2: Locations of Priority flora identified by Willing (2022)

Conclusion

For the reasons set out above, it is considered that impacts of proposed clearing to significant ecological communities, significant vegetation or Threatened or priority flora populations are unlikely, and that the application area is unlikely to comprise a high level of biodiversity or be necessary for the continued existence of Threatened flora. It is noted that the application area has been previously cleared, that Willing (2022) recorded 22 weed species, and that the application area is located immediately adjacent to extensive areas of remnant vegetation that is likely to be in better condition. Proposed clearing may facilitate the introduction or spread of weed species that may

compromise the condition of adjacent native vegetation in better condition than that of the application area. Actions to minimise the risk of the introduction and/or spread of weeds will assist to mitigate this potential impact.

Conditions

It is considered that the potential impacts outlined above can be managed to be environmentally acceptable. To address the above potential impacts, the following management measures will be required as conditions on the clearing permit:

- avoid, minimise to reduce the impacts and extent of clearing; and
- take hygiene steps to minimise the risk of the introduction and spread of weeds into adjacent vegetation.

3.2.2 Biological values – Significant fauna habitat (clearing principle b)

Nineteen Threatened, 13 priority and three 'other specially protected' fauna, and 29 fauna that are migratory/protected under an international agreement, have been recorded in the local area. A likelihood of occurrence assessment was undertaken (Appendix C4) that considered preferred habitat types and typical home ranges, recorded proximity to the application area, and the condition of the vegetation and associated habitats within the application area.

Due to the presence of the Ord Estuary System and Parry Floodplain numerous bird species (>30) protected under International Agreements (particularly the Families: Scolopacidae, Charadriidae, and Glareolidae) have been recorded within 50 kilometres of the application area (Appendix C4). The majority of the members from these Families are migratory (including Threatened) shorebirds that breed in northern latitudes. Most of these species inhabit littoral, estuarine and wetland habitats that are not present within the application area. Most are coastal, but some species will also utilise inland waters and flooded areas (Appendix C4). It is these species that may possibly occur intermittently in areas of the application area that become seasonally inundated (Birdlife Australia, 2021). This includes six migratory wading shorebirds as well as generalist wetland species protected under International Agreements such as the Glossy Ibis (*Plegadis falcinellus*). The swampy western margins within the Depressed Peripheral Zone soil phase that have a higher likelihood of becoming seasonally inundated have been excluded from the application area (Appendix J: Figure A) (Section 3.1). No suitable wetland habitat is present for wetland specialists such as bitterns, nor intact creekline habitat to support the Threatened Purple-crowned Fairy-wren (*Malurus coronatus subsp. coronatus*) (TSSC, 2015), and there is no estuarine habitat available for crocodiles or tern species.

The application area has historically been cleared of native vegetation and the former, pre-clearance, vegetation of a scattered emergent canopy formed by eucalypts has not had time to re-establish (Willing 2022). In consideration of the remaining regrowth Acacia woodland, no large eucalypts are present to provide hollows as breeding or roosting habitat for owls of conservation significance (NT Government, 2012), nor substantial eucalypts, caves or breakaways to provide roosting sites for bats of conservation significance (TSSC, 2016a; 2016b) or denning sites for the Northern Quoll (*Dasyurus hallucatus*) (TSSC, 2005).

Similarly, no intact eucalypt woodland is present within the application area to support the Gouldian Finch (*Erythrura gouldiae*) or Crested Shrike-tit (*Falcunculus frontatus subsp. whitei*) (Birdlife Australia, 2021), nor deep cracking clays to provide habitat for the Northern Short-tailed Mouse (*Leggadina lakedownensis*) (DEC, 2012).

Raptors (birds of prey) of conservation significance known to occur in the local area may forage over, and overfly the application area intermittently without utilising any particular habitat present. The Peregrine Falcon (*Falco peregrinus*) does not build a nest but requires cliffs, rocky outcrops, or large tree hollows to breed (Australian Museum, 2020), none of which are present within the application area. No large eucalypts along riparian zones are present to provide breeding habitat for the Grey Falcon (*Falco hypoleucos*) (DEC, 2019). Migratory swallows and swifts identified do not breed in Australia but may overfly the application area without utilising any particular habitat present. The migratory Oriental Cuckoo (*Cuculus optatus*) breeds in northern latitudes with a non-breeding wintering range that includes northern Australia. Although the species utilises both forest and woodland it mainly inhabits forests (BirdLife International, 2021), and the application area would represent marginal habitat for this species.

Conclusion

Significant habitat refers to the resources, connectivity or habitat area for a species or community that is critical for its survival. Noting the overall poor condition of the habitats present, the extent of native vegetation proposed to be cleared, and expansive areas of adjacent remnant vegetation in better condition, the application area is not likely to comprise the whole or a part of, nor be necessary for the maintenance of a significant habitat for fauna. Willing (2022) recorded 22 weed species over the application, and the application area is located immediately adjacent to extensive areas of remnant vegetation. Proposed clearing may facilitate the introduction or spread of weed species that may compromise the condition of adjacent fauna habitat in better condition than that of the application area and may inadvertently impact fauna species occupying the area at the time of clearing. Actions to minimise the risk of the introduction and/or spread of weeds, and avoid fauna mortality at the time of clearing, will assist to mitigate potential impacts.

Conditions

It is considered that the potential impacts outlined above can be managed. To address these impacts, the following management measures will be required as a condition on the clearing permit:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds into adjacent vegetation; and
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity.

3.2.3 Biological values – Vegetation associated with a watercourse or wetland (clearing principle f)

Two natural minor ephemeral rivers and two man-made waterlines traverse the application area (Appendix J: Figure C). Drainage is from south east to north west and watercourses are tributaries of a series of other watercourses which eventually enter the Ord River approximately 4.2 kilometres to the west. A further two man-made perennial waterbodies (dams) occur approximately 30 metres and 120 metres from the application area (Appendix J: Figure C).

The vegetation and flora survey by Willing (2022) over the application area did not record riparian vegetation. The western margin of Lot 501 consists of a more mesic transitional zone of Spear Wattle with Silky Grevillea, Broad-leaved Paperbark, and Glider-wing Tree (Willing, 2022), and (DPIRD, 2022a) refer to a strip along the wetter north western boundary associated with the Depressed Peripheral Zone soil phase (Appendix C1; Appendix J: Figure D). This area has been excluded from the application area (Appendix J: Figure A) (Section 3.1).

The DEC (2008) report detailing a site visit prior to the area being cleared states that the vegetation is not riparian and that the drainage lines dissecting the application area do not possess watercourse-like characteristics.

Conclusion

The vegetation and flora survey of Willing (2022) did not record riparian vegetation and DEC (2008) state that the vegetation is not riparian. The application area has been previously cleared with regrowth native vegetation ranging in condition from 'very poor' to 'good' (Trudgen, 1991) (Appendix E). Native vegetation over a minor portion of the application area is growing in, or in association with, an environment associated with a watercourse. However the native vegetation is not likely to be riparian. That is, the distinctive vegetation associated with a wetland or watercourse, and the drainage lines do not possess watercourse-like characteristics. Riparian vegetation is not likely to be present and the potential impacts to native vegetation growing in, or in association with, an environment associated with a watercourse are minimal. It is noted that Willing (2022) recorded 22 weed species over the application, and that drainage lines continue from the application area into adjacent areas of remnant vegetation. Proposed clearing may facilitate the introduction or spread of weed species that may compromise the condition of adjacent native vegetation in better condition than that of the application area. Actions to minimise the risk of the introduction and/or spread of weeds will assist to mitigate this potential impact.

Conditions

It is considered that the potential impacts outlined above can be managed to be environmentally acceptable. To address these impacts, the following management measures will be required as a condition on the clearing permit:

- avoid, minimise to reduce the impacts and extent of clearing; and
- take hygiene steps to minimise the risk of the introduction and spread of weeds into adjacent vegetation.

3.2.4 Land and water resources (clearing principles g, i, and j)

Soils within the application area are mapped predominantly as sandy soils, loamy sands to sandy loams, with minor areas of clay, the majority of which have been avoided. The landform is described as very gently sloping. Two natural minor ephemeral rivers, and two man-made drains, traverse the application area (Appendix J: Figure C). These watercourses are tributaries of a series of other watercourses which eventually enter the Ord River approximately 4.2 kilometres to the west.

Noting the location and extent of the application area, landform, mapped soil types, and mapped land degradation risks (Appendix C1) the proposed clearing may result in land degradation in the form of water and wind erosion in the window between clearing activities and when development of the site occurs.

The soil types mapped within the application area have a moderate to high risk of flooding, and a moderate to very high risk of waterlogging (Appendix C1). Noting the presence of mapped watercourses within the application area and its position low in the landscape, the potential risk of water and wind erosion in combination with a potential for increased surface water run-off on cleared land may lead to a change in the quality of surface water through the transport of sediments and nutrients, which may impact on watercourses within the application area and downstream dams.

In consideration of the potential for land degradation associated with the proposed clearing advice was sought from Commissioner of Soil and Land Conservation (DPIRD, 2022).

The Department of Primary Industries and Regional Development (DPIRD, 2022) undertook an assessment on the potential land degradation impacts of the proposed clearing. DPIRD (2022) provide evidence (Appendix C1) of the likely total clearing of Lot 510 in the year 2009, apart from a strip along the wetter north-western edge which has been avoided (Appendix J: Figure A) (Section 3.1).

The application area is predominantly located on the sloping Cockatoo Sands, Pago/Cockatoo intergrade and Duplex Sandy Margin intergrade soil units (Appendix C1) (Appendix J: Figure D). DPIRD (2022) conclude that these sandy/loamy textured soils have inherent low salt storage, good drainage and a low risk of permanent shallow water-tables or salinity developing (DPIRD, 2022).

Water erosion consisting of gulying has occurred over the application area on the steeper slopes of the Cockatoo Sands and Pago/Cockatoo units following the previous clearing (Figure 3 below). This was likely caused predominantly by run on from upslope (shallow soils, rock outcropping, steeper slopes, cleared land, and a road), plus some onsite contribution during large rainfall events causing infiltration excess (DPIRD, 2022).

Evidence of transient inundation, and transient shallow water-tables, along the lower, flatter areas in the north west, was identified by DPIRD (2022) corresponding to (but to the south of) the mapped Depressed Peripheral Zone phase soil unit (Figure 3 below) (Appendix J: Figure D). The risks of inundation and transient water-logging may increase if surface runoff is not adequately controlled or allowed to pond in this area (Figure 3). DPIRD (2022) advise that risks relate more to possible effects on the infrastructure of the proposed development (if it extended into that area) rather than land degradation issues.

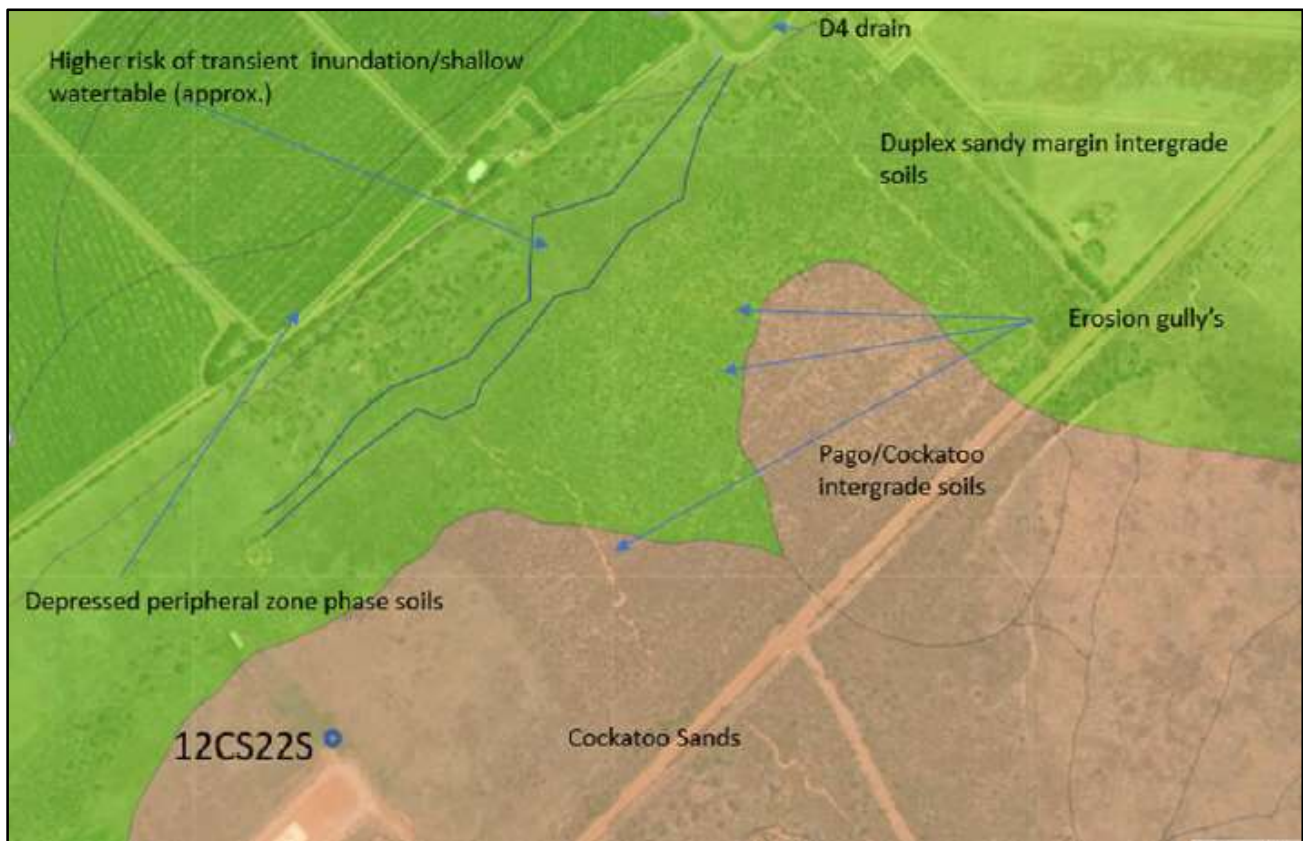


Figure 3: Soil Landscape Systems and the location of other features on Lot 510 (DPIRD 2022a)

Water erosion is likely to reactivate following proposed clearing associated with CPS 9420/1. However, water erosion risk and transient inundation in the lower slope area can be substantially mitigated by engineering design, and the associated earthworks necessary for the development (DPIRD, 2022). The risk of further erosion in these areas could be mitigated if surface water flows are disposed into the existing artificial drainage system. DPIRD (2022) note that a large D4 drain abuts the location at the north-east corner, with a feeder drain running along north west boundary (Figure 3). Assuming that runoff generated by the development and from upslope is suitably controlled and safely disposed into the existing artificial drainage system there is likely to be minimal adverse impacts caused by runoff on adjoining lands (DPIRD, 2022).

Following clearing, any changes to the groundwater balance under the adjacent, irrigated farmland are likely to be insignificant in comparison to the existing altered groundwater balance beneath these areas (DPIRD, 2022). Based on the available information DPIRD (2022) advise that the risk of land degradation associated with clearing vegetation associated with CPS 9420/1 is low, and that the proposed clearing is not likely to be at variance with Clearing Principle (g).

Conclusion

DPIRD (2022) advise that the risk of land degradation associated with clearing vegetation associated with CPS 9420/1 is low and can be managed. Risks to groundwater or the development of salinity are low. Residual risks of water erosion (Clearing Principle g), potential impacts to the quality of surface water (Clearing Principle i) or flooding (Clearing Principle i) can be mitigated by appropriate engineering design and the associated earthworks required for the development. Approvals under Part V Division 3 of the EP Act for a works approval will be required to construct and commission the facility, and a regulatory licence will be required to operate the facility. Associated engineering solutions can mitigate any residual risk.

The land degradation risk categories indicate that soil units have a high to extreme wind erosion risk. The proposed removal of vegetation has the potential to expose soils, particularly in the Cotton Module laydown area (Appendix I: Figure C), and increase the risk of wind erosion impacting the application area itself, as well as adjacent vegetation, until soils are stabilised by the development construction. Wind erosion risk can be managed by undertaking staged clearing as required (and particularly over the Cotton Module laydown area) to minimise the time that soils are exposed. The revised application area will act as a buffer between neighbouring properties and the constructed gin facility, and a 25 metre strip of native vegetation along the north east property boundary and along Mulligan's Lagoon Road will be retained for dust filtration purposes.

Conditions

It is considered that the potential impacts outlined above can be managed to be environmentally acceptable. To address these impacts, the following management measure will be required as a condition on the clearing permit:

- To reduce the potential for wind erosion clearing must not commence more than two months prior to the commencement of construction works.

3.3 Relevant planning instruments and other matters

The original application was advertised on DWER's website on 13 October 2021 for a 21-day submission period. One public submission was received in response to the advertisement for the original application area, seeking thorough/additional consideration in relation to flora and fauna, avoidance and mitigation, and cumulative impacts (Appendix B).

Background

The development of a sustainable cotton industry in northern Australia is supported at both Commonwealth and State levels. The Commonwealth Government's Northern Australia Infrastructure Facility (NAIF) has approved a \$32 million loan to the applicant to construct the proposed cotton ginning facilities. The State Government has provided land for the facility and a further \$4 million towards a clean and reliable power supply and to assist the development of a business model, preliminary design work and approvals (Ministerial Media Statement, 2021).

The application area is located within Crown Reserve 53889 which is vested by Management Order to the Minister for Regional Development for 'agriculture and associated purposes'. DPIRD are highly supportive of the establishment of a Cotton Gin in Kununurra as it will underpin the economic sustainability of irrigated agriculture in the Ord. The site identified as a strategic land parcel for value add processing by the Ord Responsible Agencies Group in 2019 and subsequently held by the State for this strategic purpose (DPIRD, 2022b).

A Reserve was created over the land and vested in DPIRD to enable a lease to the Kimberley Cotton Company. In August 2021 DPIRD advised the applicant that the Management Order is currently being updated, and on completion of the update, DPIRD will offer the applicant a lease over Lot 510 subject to conditions (DPIRD, 2021a). In September 2022 DPIRD advised that the lease had been issued (DPIRD, 2022b).

Previous approvals

Clearing Permit CPS 2370/1 was granted to the former Department of Agriculture and Food Western Australia on 12 March 2009, authorising the clearing of 48 hectares of native vegetation within the current application area for the purpose of a horticultural crop. The assessment for this clearing permit concluded that the proposed clearing (at that time) was not likely to be at variance with the clearing principles. The CPS 2370/1 permit (now expired) was not subject to conditions.

Planning and development

Under the Shire of Wyndham-East Kimberley's Local Planning Scheme No. 9 (LPS 9), Lot 510 is zoned 'Agriculture – State or Regional Significance'. The Shire of Wyndham-East Kimberley (the Shire) have advised that the proposed use and development of a cotton gin is 'Industry – Primary Production', which is listed as a discretionary (D) land use

under the local planning scheme (LPS 9) (Shire of Wyndham-East Kimberley, 2021). The Shire have advised that a development approval is required for the use and development of the land and that a development application has been submitted by the applicant. Due to the development costs associated with the project, the application must be determined under the Development Assessment Panel (DAP) process via the Department of Planning, Lands and Heritage (DPLH).

The Shire is satisfied with what has been submitted by the applicant, and has forwarded the relevant documents to the DAP secretariat to be lodged. In light of the previous clearing and agricultural land use which has been undertaken over the property, the Shire has no in-principle objection to the issue of a clearing permit to the Kimberley Cotton Company to undertake clearing of native vegetation in accordance with the plans submitted by the applicant to the Shire (Shire of Wyndham-East Kimberley, 2022).

The proponent has expressed a legitimate need to commence preliminary ground works in advance of the 2022 wet season to avoid significant and costly project delays (Kimberley Cotton, 2022b). It is considered that there is a very low risk of the project not proceeding, given the significant State and Commonwealth investments made (Ministerial Media Statement, 2021). There is no indication of any issues associated with the granting of the submitted development approval, given that the Shire has indicated that it is satisfied with what has been submitted by the applicant, and has no in principle objection to the issue of a clearing permit (Shire of Wyndham-East Kimberley, 2022).

Prescribed premises

Industrial premises with the potential to cause emissions and discharges to air, land or water are known as 'prescribed premises'. The EP Act requires a works approval to be obtained before constructing a prescribed industrial premises and makes it an offence to cause an emission or discharge unless a licence (or registration) is held for the premises. A works approval application under Part V of the EP Act was submitted by the applicant to DWER on 9 August 2022 that is currently under validation (application W6728/2022/1) (DWER, 2022; Kimberley Cotton, 2022a). If granted, the works approval will have time-limited operations allowing the facility to operate whilst applying for a relevant licence (DWER 2022). The works approval application will require finalisation prior to construction of the prescribed industrial premises commencing. The preliminary groundworks that is required to commence prior to the wet season will not impact the assessment of the works approval.

Water licencing

The application is within the proclaimed Canning-Kimberley Groundwater Area and Ord Irrigation District surface water areas proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act). It is understood that the project's water requirements will be sourced from the channel irrigation supply, which is licenced to the Ord Irrigation Cooperative. However, if additional water resources are required, or if disturbance to the bed or banks of a watercourse is required to facilitate the taking or diverting of water, the proponent should contact DWER's Kununurra office on (08) 9166 4100 to discuss any requirements under the RIWI Act (Department of Water and Environmental Regulation, 2021b).

As the application is within the Ord Irrigation District surface water area, it is recommended that during the disturbance and operation activities, hydrocarbons, chemicals and potentially hazardous substances are stored and disposed of in accordance with DWER's Guidelines and Water Quality Protection Notes (including WQPN 10: *Contaminant spills – emergency response*, WQPN 65: *Toxic and hazardous substances – storage and use*, and WQPN 83: *Infrastructure corridors near sensitive water resources*). These publications provide recommendations on best practice measures to protect water resources, and are available from: <http://www.water.wa.gov.au/search-publications> (Department of Water and Environmental Regulation, 2021b).

Contaminated sites

The site operated as a sugar mill for over 10 years and finished processing sugar cane in late 2007. In the process of facility closure a large amount of water was discharged to an onsite mud containment pond, which failed and spilled 250,000 litres of waste sugars and hydrochloric acid into surrounding drainage channels. The spill effluent was managed, and subsequent investigation undertaken in 2009 demonstrated that no potential contaminants were detected in soil or groundwater above regional background levels established in 2006. In October 2010, Lot 510 was classified under the *Contaminated Sites Act 2003* as '*Not contaminated - unrestricted use*', and is considered suitable for continued commercial/agricultural land use (DWER, 2021a).

Aboriginal rights and interests

The application area is within the boundary of the 'Ord Final Agreement' (WI2005/003) Indigenous Land Use Agreement. A large number of Aboriginal heritage places are mapped in the local area. Two registered sites 'Kununurra Shelter' and 'Morung' traverse the application area. Where clearing permits are granted, 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 clearing processes.

Appendix A: Additional information provided by applicant

Summary of information provided	Consideration of information provided
<p>The applicant submitted a flora and vegetation survey that considered the whole of the original application area:</p> <p><i>Willing, T. (2022) A Botanical Survey of Lot 510 Mulligan's Lagoon Road (Proposed Cotton Gin Block) Kununurra. Tim Willing and Henry Smolinski. PO Box 702. Broome, WA, 6725 (DWERDT590843)</i></p>	<p>The Willing (2022) report and associated data was submitted via the Index of Biodiversity Surveys for Assessments (IBSA). Portal Reference: IBSA-2022-0193</p> <p>The Willing (2022) report was utilised to assess impacts under Appendix D and Section 3.2 of the decision report.</p>
<p>The applicant submitted survey report that assessed the suitability of the application area as <i>Typhonium sp.</i> Kununurra habitat.</p> <p><i>Smolinski, H. (2021) Land and Habitat Condition Assessment of Lot 510 - Suitability as a viable habitat for <u>Typhonium sp.</u> Kununurra. Henry Smolinski, Senior Research Scientist. DPIRD (DWER ref. A2065756).</i></p>	<p>The Smolinski (2021) report was utilised to assess impacts under Appendix D and Section 3.2 of the decision report.</p>
<p>The applicant submitted an amended application area that reduced the clearing area by 14.13 hectares.</p>	<p>The CPS 9420/1 application area was revised on 31 May 2022 to exclude an area on the north west boundary to protect the location of a Priority 2 flora species identified by Willing (2022). This area represents an area that was not cleared in the past and incorporates a swampy western margin and soils more likely to support a Threatened flora taxon. The exclusion area will act as a buffer between the neighbouring property and the constructed gin facility and vegetation along the north east property boundary and along Mulligan's Lagoon Road will be retained for aesthetics and road dust filtration purposes.</p>
<p>The applicant submitted additional avoidance and minimisation details.</p>	<p>Avoidance and minimisation details provided are summarised in Section 3.1.</p>

Appendix B: Details of public submissions

One public submission was received in response to the advertisement for the original application area. The submitter's comments, and DWER's consideration of these, are set out below.

Summary of comments	Consideration of comment
<p>The submitter is seeking thorough/ additional consideration in relation to the following matters:</p> <ul style="list-style-type: none"> The need to complete a more detailed assessment of flora and fauna given the proposed extent of the clearing is an additional 79.5 hectares. In the permit application, a partially cleared parcel of Crown Land Reserve has been slated for further clearing of the remaining vegetation (79.5 hectares). Within the application documentation, a site walk and some photography has been undertaken, however this is only within the envelope of existing clearing. As a result there is no additional information regarding the condition and composition of the remaining vegetation, aside from a brief reference to "substantial weed growth in previously cleared areas". The principal issues for a clearing permit application should relate primarily to existing vegetation and uncleared areas. 	<p>A vegetation and flora report has been submitted by the applicant (Willing, 2022) that describes and assesses the condition and composition of native vegetation occurring over the application area, and included targeted searches for flora of conservation significance (IBSA-2022-0193).</p> <p>A report has also been submitted that assesses the suitability of the application area as habitat for the Threatened flora taxa <i>Typhonium sp.</i> Kununurra (Smolinski, 2021)</p> <p>An assessment of impacts of proposed clearing on significant vegetation, significant flora, and fauna habitats is detailed in Section 3.2 of the decision report.</p>
<ul style="list-style-type: none"> A sufficient assessment of the considerations to avoid or mitigate the proposed extent of the clearing, beyond several references to a proponent-initiated site option assessment. However it is not clear in this documentation what those alternatives (and their consequences) are and therefore it is impossible to ascertain whether these are sufficient. 	<p>After consideration of the results of a flora and vegetation survey over the application area (Willing, 2022) and the assessment of the suitability of the application area as habitat for <i>Typhonium sp.</i> Kununurra (Smolinski, 2021), the applicant submitted a revised application area that reduced the area required for clearing by 14.13 hectares and excluded an area on the north west boundary to protect the location of a Priority 2 flora species identified by Willing (2022). This area represents an area that has not been cleared in the past and also incorporates a mesic western margin and soils more likely to support <i>Typhonium sp.</i> Kununurra and the Ivanhoe Land System PEC.</p> <p>The exclusion area will act as a buffer between a neighbouring property and the constructed gin facility and vegetation along the north east property boundary and along Mulligan's Lagoon Road will be retained for aesthetics and road dust filtration purposes.</p> <p>Avoidance and mitigation measures are detailed in Section 3.1.</p>
<ul style="list-style-type: none"> A consideration of the cumulative impact arising from this application, given the proposed project may lead to subsequent clearing for cotton production. 	<p>The cumulative impact of the proposed clearing and other native vegetation clearing within the local area has been considered in the assessment by utilising calculations of potential impacts to remnant vegetation, significant ecological communities, Priority flora and fauna habitat and the consideration of other Clearing Permits granted within the local area (Section 3.3; Appendix C; Appendix D) including clearing permit Clearing Permit CPS 2370/1 granted over the majority of the application area in 2009.</p> <p>The development of a sustainable cotton industry in northern Australia is supported by both Commonwealth and State Governments (Section 3.3). A strategic regional approach has been implemented for the</p>













Summary of comments	Consideration of comment
	<p>environmental impacts and placement of the cotton industry whereby DPIRD, working closely with DBCA, has led environmental surveys for Endangered flora in the region with a focus on <i>Typhonium</i> sp. Kununurra that occurs within the soil types adjacent to the Ord River that are favoured for irrigated agriculture. The outcome of the strategic approach will provide guidance to government agencies and developers with regard to future development in the Ord Valley. The strategic approach has not been finalised and associated mapping has not been validated, however, <i>Typhonium</i> sp. Kununurra has not been recorded within the application area and given the site attributes the species is unlikely to occur (Section 3.2.1).</p>

Appendix C: 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 DWER at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D.

C.1. Site characteristics

Characteristic	Details
Local context	The application area is adjacent to developed agricultural areas to the west, north and north-east associated with the Ord River which is located approximately 4.2 kilometres to the west. Large areas of remnant native vegetation are adjacent to the south east (Appendix J: Figure B). The vast majority of the application area has been cleared in the past. The site operated as a sugar mill for over 10 years and finished processing sugar cane in late 2007 (DWER, 2021a) with the area to the north east cleared in approximately 2009 in association with Clearing Permit 2370/1.
Ecological linkage	No ecological linkages are mapped within the local area. To the south east the application area is contiguous with an expansive tract of remnant vegetation, in the broader extensive landuse zone of Western Australia.
Conservation areas	A number of conservation areas are mapped within the local area, comprising of lands managed by DBCA. The nearest conservation area is DBCA-managed un-named Conservation Reserve 52321 approximately 4.7 kilometres north of the application area.
Regional vegetation (Shepherd <i>et al.</i> 2001)	The vegetation type over the application area as mapped and described by Shepherd <i>et al.</i> 2001 consists of vegetation association 909: <ul style="list-style-type: none"> Grasslands, high grass savanna woodland; bloodwood (possibly <i>Corymbia polycarpa</i>), <i>Eucalyptus tetradonta</i> (stringybark) and <i>Eucalyptus miniata</i> (woollybutt) over upland tall grass and <i>Triodia</i> sp. (curly spinifex) on sandplain.
Vegetation description of the application area	A land and habitat condition assessment undertaken by Smolinski (2021) noted the presence of the following vegetation over Lot 510, and advised that this emergent vegetation is typical of sandy soils and wet transitional areas: <ul style="list-style-type: none"> <i>Eucalyptus tetradonta</i> (stringybark), <i>Acacia tumida</i> (Pindan wattle), <i>Melaleuca viridiflora</i> (broadleaf paperbark), <i>Melaleuca leucadendra</i>(?), <i>Atalaya hemiglauc</i> (whitewood), <i>Ficus</i> sp. and <i>Grevillea</i> sp. (<i>Bauhinia cunninghamii</i> was absent). <p>The vegetation and flora of the application area as described by the survey of Willing (2022) consisted of:</p> <ul style="list-style-type: none"> Sandy soils (Cockatoo Sands) supported regrowth woodland of Spear Wattle (<i>Acacia tumida</i>) with occasional Soap Wattle (<i>Acacia coleii</i>) and Ghost Wattle (<i>Acacia platycarpa</i>), and patches of <i>Grevillea agrifolia</i> and Ironwood (<i>Erythrophleum chlorostachys</i>) over an dominant understorey of Annual Sorghum (<i>Sorghum stipoides</i>) (where this has not been displaced by dense, often monotypic, patches of the weed Hyptis (<i>Mesosphaerum suaveolens</i>) <ul style="list-style-type: none"> Note: The former, pre-clearance, vegetation of a scattered, emergent canopy formed by Stringybark (<i>Eucalyptus tetradonta</i>) has not had time to re-establish itself. However, isolated remnant clumps occur adjoining Mulligan's Lagoon Road. In the south isolated Boabs (<i>Adansonia gregorii</i>) are present that escaped previous clearing. Earth mounds, ditches and ponds occur creating a mosaic of dense weedy grasslands with the weed Rosella (<i>Hibiscus sabdariffa</i>) well established along the eastern margins. <p>A swampy western margin represents a transitional zone of Spear Wattle (<i>Acacia tumida</i>) with Silky Grevillea (<i>Grevillea pteridifolia</i>), Broad-leaved Paperbark (<i>Melaleuca viridiflora</i>) and Glider-wing Tree (<i>Terminalia platyptera</i>) (Willing,2022) has been excluded from the application area.</p> <p>Drone photography of the application area and photographs of the vegetation in the more degraded area of the application area are available in Appendix F, and flora and vegetation extracts from the survey of Willing (2022) are available in Appendix G.</p>

Characteristic	Details																				
Vegetation condition	<p>Vegetation condition rating was not reported in Willing (2022), however, the author describes 22 weed species (representing 17.5 per cent of the flora species present) and states that the disturbed nature of the site, from historic clearing and earthworks, explains the abundance of weeds. A regrowth woodland of Spear Wattle has established with the former woodland of Stringybark (<i>Eucalyptus tetradonta</i>) not having had time to re-establish. The author reports that the heavy thatching of both weeds and grasses is considered detrimental for the establishment and survival of many native herb species that might otherwise be expected to occur.</p> <p>DPIRD (2022) report that records of aerial photography (below) indicate that the application area was likely cleared in approximately 2009 in association with Clearing Permit CPS 2370/1.</p> <table border="1"> <thead> <tr> <th>2005</th> <th>2010</th> <th>2013</th> <th>~2019</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Figure 1. Aerial photography showing past clearing activity on Lot 510</i></p> <p>From the information and photographs provided by the applicant (Appendix F) and the survey of Willing (2022) (Appendix G) approximately 21 hectares in the south-western portion of the application area has more recently been cleared, is disturbed, and is considered to be in 'completely degraded' to 'very poor' condition (Trudgen, 1991) (Appendix E). The remainder of the application area has been cleared previously in approximately 2009, but is in better condition than the approximately 21 hectares in the south-western portion of the application area and is considered to range in condition from 'very poor' to 'good' (Trudgen, 1991) (Appendix E).</p>	2005	2010	2013	~2019																
2005	2010	2013	~2019																		
																					
Climate and landform	<p>Rainfall is approximately 840 millimetres per year (http://www.bom.gov.au/climate/data/).</p> <p>Groundwater Salinity (Total Dissolved Solids) is mapped at 500-1,000 milligrams per litre.</p> <p>Topography is approximately 40 metres above sea level, very gentle slope.</p>																				
Land Systems	<p>Two Land Systems have been mapped over the application area (DPIRD 2021c) (Appendix J: Figure D):</p> <ul style="list-style-type: none"> Ivanhoe Land System (north-western portion of the application area), described as: Alluvial flood plains with black cracking clay soils supporting blue grass grasslands and minor eucalypt woodlands. Cockatoo Land System (south-eastern portion of the application area), described as: Gently undulating plains with deep sand soils on sandstone and calcareous sandstone supporting stringybark-bloodwood woodlands over upland tall grass. 																				
Soil description	<p>Three soil types dominate the application area (DPIRD 2021c) with a very minor occurrence of a fourth (Depressed peripheral zone phase) (Appendix J: Figure D)</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Name</th> <th>Description</th> <th>Occurrence</th> </tr> </thead> <tbody> <tr> <td>711lv72_2cky8b</td> <td>Duplex Sandy Margin phase</td> <td>Complex zone between unit 8a and sandy land systems; soils very variable, mostly duplex soils: variable woodland with <i>Eucalyptus polycarpa</i> and <i>E. microtheca</i>.</td> <td>Major occurrence</td> </tr> <tr> <td>711Cc6C_CS</td> <td>Cockatoo Sand phase</td> <td>Cockatoo, well drained loamy sands to sandy loams on crests and upper to mid slopes</td> <td>Moderate occurrence - Southern section</td> </tr> <tr> <td>711Cc6C_PCS</td> <td>Pago Sand - Cockatoo Sand intergrade phase</td> <td>Pago/Cockatoo intergrade.</td> <td>Minor occurrence - Eastern area</td> </tr> <tr> <td>711lv72_2cky8a</td> <td>Depressed Peripheral Zone phase</td> <td>Complex, depressed peripheral zones adjoining 8a & sandy or lateritic land systems; soils very variable, but mainly</td> <td>Extremely minor occurrence - Along</td> </tr> </tbody> </table>	Code	Name	Description	Occurrence	711lv72_2cky8b	Duplex Sandy Margin phase	Complex zone between unit 8a and sandy land systems; soils very variable, mostly duplex soils: variable woodland with <i>Eucalyptus polycarpa</i> and <i>E. microtheca</i> .	Major occurrence	711Cc6C_CS	Cockatoo Sand phase	Cockatoo, well drained loamy sands to sandy loams on crests and upper to mid slopes	Moderate occurrence - Southern section	711Cc6C_PCS	Pago Sand - Cockatoo Sand intergrade phase	Pago/Cockatoo intergrade.	Minor occurrence - Eastern area	711lv72_2cky8a	Depressed Peripheral Zone phase	Complex, depressed peripheral zones adjoining 8a & sandy or lateritic land systems; soils very variable, but mainly	Extremely minor occurrence - Along
Code	Name	Description	Occurrence																		
711lv72_2cky8b	Duplex Sandy Margin phase	Complex zone between unit 8a and sandy land systems; soils very variable, mostly duplex soils: variable woodland with <i>Eucalyptus polycarpa</i> and <i>E. microtheca</i> .	Major occurrence																		
711Cc6C_CS	Cockatoo Sand phase	Cockatoo, well drained loamy sands to sandy loams on crests and upper to mid slopes	Moderate occurrence - Southern section																		
711Cc6C_PCS	Pago Sand - Cockatoo Sand intergrade phase	Pago/Cockatoo intergrade.	Minor occurrence - Eastern area																		
711lv72_2cky8a	Depressed Peripheral Zone phase	Complex, depressed peripheral zones adjoining 8a & sandy or lateritic land systems; soils very variable, but mainly	Extremely minor occurrence - Along																		

Characteristic	Details																																																										
			heavy clays with sand inclusions; depressions are seasonally inundated; <i>Eucalyptus microtheca/Excoecaria parvifoli</i> woodland	the north west boundary	<p>A land and habitat condition assessment undertaken by Smolinski (2021) noted the presence of the Aquitaine (A) soil unit along the northern boundary of Lot 510. Soils mapping by Aldrick <i>et al.</i> (1990) and Smolinski (2003) over the application area, as described by the flora and vegetation report of Willing (2022) (Appendix G), consists of:</p> <ul style="list-style-type: none"> • Cockatoo Sands (CS): Red-brown sands to sandy loams, occurring on very gentle inclined slopes beneath sandstone hills towards the alluvial plain; soil pH is acid to neutral. • Junction Complex (JC): Sandy duplex soils and deep red to yellow sands, moderately well-drained to poorly-drained. • Aquitaine (A): grey-phase Aquitaine soils and typical Cununurra Clay, situated on the alluvial plain; Aquitaine soils are typically olive-grey, coarse-structured, poorly-drained clays with significant salinity, while Cununurra Clay soils are typically alkaline dark brown cracking clays with high agricultural value. 																																																						
Land degradation risk	<p>The application area is mapped as having a very high to extreme risk of water erosion, high to extreme risks of wind erosion and phosphorus export, moderate to high/very high risks of waterlogging and flooding, and a moderate risk of salinity (DPIRD 2021c).</p>																																																										
	<table border="1"> <thead> <tr> <th data-bbox="384 853 608 972">Land degradation hazard</th> <th data-bbox="612 853 778 972">Level of risk for mapped unit</th> <th data-bbox="783 853 938 972">Duplex sandy margin</th> <th data-bbox="943 853 1082 972">Cockatoo sand</th> <th data-bbox="1086 853 1257 972">Pago sand - Cockatoo sand intergrade</th> <th data-bbox="1262 853 1433 972">Depressed peripheral zone (MINOR)</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 978 608 1043">Water erosion</td> <td data-bbox="612 978 778 1043">Very high to extreme</td> <td data-bbox="783 978 938 1043">99% of map unit</td> <td data-bbox="943 978 1082 1043">99% of map unit</td> <td data-bbox="1086 978 1257 1043">99% of map unit</td> <td data-bbox="1262 978 1433 1043">99% of map unit</td> </tr> <tr> <td data-bbox="384 1050 608 1115">Wind erosion</td> <td data-bbox="612 1050 778 1115">High to extreme</td> <td data-bbox="783 1050 938 1115">99% of map unit</td> <td data-bbox="943 1050 1082 1115">99% of map unit</td> <td data-bbox="1086 1050 1257 1115">99% of map unit</td> <td data-bbox="1262 1050 1433 1115">99% of map unit</td> </tr> <tr> <td data-bbox="384 1122 608 1187">Phosphorus export</td> <td data-bbox="612 1122 778 1187">High to extreme</td> <td data-bbox="783 1122 938 1187">99% of map unit</td> <td data-bbox="943 1122 1082 1187">99% of map unit</td> <td data-bbox="1086 1122 1257 1187">99% of map unit</td> <td data-bbox="1262 1122 1433 1187">99% of map unit</td> </tr> <tr> <td data-bbox="384 1193 608 1258">Subsurface acidification</td> <td data-bbox="612 1193 778 1258">High</td> <td data-bbox="783 1193 938 1258">0% of map unit</td> <td data-bbox="943 1193 1082 1258">0% of map unit</td> <td data-bbox="1086 1193 1257 1258">0% of map unit</td> <td data-bbox="1262 1193 1433 1258">0% of map unit</td> </tr> <tr> <td data-bbox="384 1265 608 1330">Water repellence</td> <td data-bbox="612 1265 778 1330">High</td> <td data-bbox="783 1265 938 1330">0% of map unit</td> <td data-bbox="943 1265 1082 1330">0% of map unit</td> <td data-bbox="1086 1265 1257 1330">0% of map unit</td> <td data-bbox="1262 1265 1433 1330">0% of map unit</td> </tr> <tr> <td data-bbox="384 1337 608 1402">Waterlogging</td> <td data-bbox="612 1337 778 1402">Moderate to very high</td> <td data-bbox="783 1337 938 1402">99% of map unit</td> <td data-bbox="943 1337 1082 1402">99% of map unit</td> <td data-bbox="1086 1337 1257 1402">99% of map unit</td> <td data-bbox="1262 1337 1433 1402">99% of map unit</td> </tr> <tr> <td data-bbox="384 1408 608 1473">Flooding</td> <td data-bbox="612 1408 778 1473">Moderate to high</td> <td data-bbox="783 1408 938 1473">99% of map unit</td> <td data-bbox="943 1408 1082 1473">99% of map unit</td> <td data-bbox="1086 1408 1257 1473">99% of map unit</td> <td data-bbox="1262 1408 1433 1473">99% of map unit</td> </tr> <tr> <td data-bbox="384 1480 608 1545">Salinity</td> <td data-bbox="612 1480 778 1545">Moderate</td> <td data-bbox="783 1480 938 1545">99% of map unit</td> <td data-bbox="943 1480 1082 1545">99% of map unit</td> <td data-bbox="1086 1480 1257 1545">99% of map unit</td> <td data-bbox="1262 1480 1433 1545">99% of map unit</td> </tr> </tbody> </table>					Land degradation hazard	Level of risk for mapped unit	Duplex sandy margin	Cockatoo sand	Pago sand - Cockatoo sand intergrade	Depressed peripheral zone (MINOR)	Water erosion	Very high to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit	Wind erosion	High to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit	Phosphorus export	High to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit	Subsurface acidification	High	0% of map unit	0% of map unit	0% of map unit	0% of map unit	Water repellence	High	0% of map unit	0% of map unit	0% of map unit	0% of map unit	Waterlogging	Moderate to very high	99% of map unit	99% of map unit	99% of map unit	99% of map unit	Flooding	Moderate to high	99% of map unit	99% of map unit	99% of map unit	99% of map unit	Salinity	Moderate	99% of map unit	99% of map unit	99% of map unit	99% of map unit
Land degradation hazard	Level of risk for mapped unit	Duplex sandy margin	Cockatoo sand	Pago sand - Cockatoo sand intergrade	Depressed peripheral zone (MINOR)																																																						
Water erosion	Very high to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Wind erosion	High to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Phosphorus export	High to extreme	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Subsurface acidification	High	0% of map unit	0% of map unit	0% of map unit	0% of map unit																																																						
Water repellence	High	0% of map unit	0% of map unit	0% of map unit	0% of map unit																																																						
Waterlogging	Moderate to very high	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Flooding	Moderate to high	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Salinity	Moderate	99% of map unit	99% of map unit	99% of map unit	99% of map unit																																																						
Waterbodies	<p>Two primary wetland systems of significance are recorded in the local area, being the Ord River Floodplain / Ord Estuary System / Parry Floodplain (Ramsar and Directory listed), and Lake Argyle and Lake Kununurra (Ramsar and Directory listed). The nearest of these is Lake Kununurra, approximately 11.6 kilometres south of the application area.</p> <p>Two natural minor ephemeral rivers and two man-made waterlines traverse the application area (Appendix J: Figure C). Drainage is from south east to north west and watercourses are tributaries of a series of other watercourses which eventually enter the Ord River approximately 4.2 kilometres to the west. A further two man-made perennial waterbodies (dams) occur approximately 30 metres and 120 metres from the application area.</p>																																																										
Hydrogeography	<p>The application area is within the 'Lower Ord' sub-catchment of the Ord River Irrigation Area. The application area is also within the 'Ord Irrigation District' surface water area and 'Canning-Kimberley' groundwater area, and approximately 0.18 kilometres from the 'Ord River and Tributaries' surface water area, proclaimed under the RIWI Act.</p>																																																										

Characteristic	Details
	The application area is mapped as having a very high to extreme risk of water erosion, moderate to high/very high risks of waterlogging and flooding, and a moderate risk of salinity (refer 'Land degradation risk table' above).
Flora	One hundred and twenty-six flora taxa were recorded over the application area by Willing (2022) of which 104 were native species and 22 were introduced (weeds). One Threatened flora taxa and 70 Priority flora taxa have previously been recorded from the local area (Appendix C3), the closest of these being one Threatened and one Priority species located approximately 2.2 kilometres from the application area. Two Priority flora taxa were recorded over the application area by Willing (2022).
Ecological communities	A total of nine Priority (and no Threatened) Ecological Communities have been recorded from the local area (Appendix C5). The application area is located within one of these; the Priority 3 Ivanhoe Land System. The remaining eight are comprised of different flora species and/or are from soil and landform types that are not present within the application area.
Fauna	A total of 19 Threatened, 13 Priority and three 'other specially protected' fauna, and 29 fauna that are migratory/protected under an international agreement, have been recorded in the local area (Appendix C4).

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*					
Victoria Bonaparte	1,870,996.1	1,847,137.0	98.72	319,201.6	17.0
Vegetation complex*					
Vegetation association 909 (extent within IBRA bioregion)	281,414.8	278,753.2	99.05	21,935.3	7.79
Local area (calculation)					
50 kilometres radius	803,452.7	635,589.1	79.1	-	-

*Government of Western Australia (2019)

C.3. Flora analysis

Prior to the survey of Willing (2022) a desktop analysis determined that thirty-one (31) flora taxa of conservation significance were recorded from a habitat, vegetation and/or soil types broadly similar to those mapped within the application area, with 13 recorded within 10 kilometres of the application area. DBCA (2021) advised that site observations indicate that approximately 10 to 11 hectares of habitat is potentially suitable to the presence of *Typhonium sp.* Kununurra (Appendix H), and the remainder of the site may comprise habitat for the Priority 1 flora taxa; *Cyperus digitatus*, *Echinochloa kimberleyensis*, *Goodenia durackiana*, *Goodenia Malvina* and *Typhonium sp.* Middle Creek. The application area is considered to contain suitable habitat for one Threatened and 14 priority flora species (below). The vegetation and flora survey of Willing (2022) recorded two Priority flora species; the Priority 2 *Dolichandrone filiformis* and the Priority 3 *Brachychiton tuberculatus*.

- *Typhonium sp.* Kununurra (Endangered): The Florabase website (WAH, 1998-) indicates that this species is known from 43 recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as an erect perennial, herb (with hastate, basal leaves) to 0.2 metres (m) high, growing in dark grey clay and black soil, associated with sites which are waterlogged in summer and inundated after rain (WAH 1998-). Start (2017) describes the taxa growing on grey vertisols 'black soils' on the ancestral flood plain of the lower Ord River. The nearest record is approximately 2.2 kilometres from the application area. Advice from the DBCA (2021) following a site visit indicated that 'Very High' suitability habitat for this species occurs approximately 0.6 kilometres north west of the application area (Appendix H), and that approximately 10 to 11 hectares along the north-western boundary of Lot 510 comprises suitable habitat. An assessment to determine the suitability of Lot 510 as *Typhonium sp.* Kununurra habitat,

including an assessment of soil types, was undertaken by Smolinski (2021). Smolinski (2021) concluded that Lot 510 contains minor areas of clay which are non-cracking, areas of Cununurra clay are insignificant and that on the basis of land use history, weed impact and soil suitability Lot 510 represents poor habitat for the species (Smolinski 2021). The flora survey of Willing (2022) was undertaken by participants familiar with the species, and *Typhonium* sp. Kununurra was not recorded.

- *Typhonium* sp. Middle Creek (Priority 1): The Florabase website indicates that this species is known from six (6) recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as being associated with the junction of cracking clay plain and yellowish clay plain. The nearest record is approximately 23.3 kilometres from the application area.
- *Cyperus digitatus* (Priority 1): The Florabase website indicates that this species is known from two (2) recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as grass-like or herb (sedge) to one metres high, growing at waters' edge. The nearest record is approximately seven (7) kilometres from the application area.
- *Echinochloa kimberleyensis* (Priority 1): The Florabase website indicates that this species is known from six (6) recorded populations (some records may overlap) from the local government areas of Halls Creek and Wyndham-East Kimberley. The Florabase website describes this species as a tufted or single-stemmed annual grass-like or herb to 0.7-2 metres high, with flowers in April to July, growing in black soils, associated with swamps. The nearest record is approximately five (5) kilometres from the application area.
- *Goodenia brachypoda* (Priority 1): The Florabase website indicates that this species is known from 16 recorded populations (some records may overlap) from the local government areas of Derby-West Kimberley and Wyndham-East Kimberley. The Florabase website describes this species as a prostrate herb, stems to 25 centimetres, with yellow flowers in September, growing in red sandy loam. The nearest record is approximately 8.5 kilometres from the application area, from a soil type similar to that mapped within the application area.
- *Goodenia durackiana* (Priority 1): The Florabase website indicates that this species is known from four (4) recorded populations (some records may overlap) from the local government areas of Halls Creek and Wyndham-East Kimberley. The Florabase website describes this species as an erect, short-lived annual herb to approximately 0.3 metres high, with yellow flowers in March to May, growing in black clay, associated with grassland. The nearest record is approximately 4.5 kilometres from the application area.
- *Goodenia malvina* (Priority 1): The Florabase website indicates that this species is known from 16 recorded populations (some records may overlap) from the local government areas of Derby-West Kimberley, Halls Creek and Wyndham-East Kimberley. The Florabase website describes this species as an erect or spreading to prostrate annual (ephemeral) herb to 0.07-0.8 metres high, with blue, purple and yellow flowers in January to May, growing in cracking black clay, associated with seasonally wet areas. The nearest record is approximately five (5) kilometres from the application area.
- *Heliotropium alcyonium* (Priority 1): The Florabase website indicates that this species is known from one recorded population from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as an ascending annual, herb to 0.3 metres high, with flowers in February to May. The nearest record is approximately 5.7 kilometres from the application area. Little information is published about the habitat preferences of this species, however it is included noting that related species *H. cupressinum* has been recorded from a soil type broadly similar to that mapped within the application area.
- *Heliotropium cupressinum* (Priority 1): The Florabase website indicates that this species is known from 11 recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as a perennial herb to 0.6 metres high, with flowers in March to May, growing in stony sandy soils and sandstone. The nearest record is approximately 9.7 kilometres from the application area, from a soil type broadly similar to that mapped within the application area.
- *Zornia areolata* (Priority 1): The Florabase website indicates that this species is known from one recorded population from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as a herb to 0.5 metres high, growing in grey silt associated with a plain. The nearest record is approximately 8.2 kilometres from the application area, from a soil type broadly similar to that mapped within the application area.
- *Dolichandrone filiformis* (Priority 2): The Florabase website indicates that this species is known from nine recorded populations (one location overlaps) in the Kimberley, and it has also been recorded in the Northern Territory. The Florabase website describes this species as a shrub or tree to 4 metres height producing white flowers in December, and occurring on sandstone and sandy soils. The taxa was recorded by Willing (2022), with the closest database record occurring over 45 kilometres distant.

- *Brachychiton tuberculatus* (Priority 3): The Florabase website indicates that this species is known from 17 recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as a shrub or tree at 2 to 7 metres high, with cream, green, orange and red flowers in April or August to November, growing in red or yellow sand, associated with undulating plains. The taxa was recorded by Willing (2022), with the closest database record approximately 10.3 kilometres from the application area, from a soil type broadly similar to that mapped within the application area.
- *Euphorbia stevenii* (caustic bottle tree) (Priority 3): The Florabase website indicates that this species is known from 13 recorded populations (some records may overlap) from the local government areas of Ashburton, East Pilbara, Karratha and Wyndham-East Kimberley. The Florabase website describes this species as a somewhat succulent perennial, herb to 0.1-0.5 metres high, growing in clay and sandy soils. The nearest record is approximately 2.2 kilometres from the application area, from vegetation and soil types broadly similar to those mapped within the application area.
- *Synostemon hubbardii* (Priority 3): The Florabase website indicates that this species is known from five recorded populations (some records may overlap) from the local government areas of Derby-West Kimberley and Wyndham-East Kimberley. The Florabase website describes this species as an erect, single stemmed shrub to 0.5-1.5m high and 50cm across with alternate leaves, with green flowers, growing on flat areas in red sand, and in a yellow sand in a disturbed area along the edge of a track. The nearest record is approximately 5.1 kilometres from the application area, from a soil type broadly similar to that mapped within the application area.
- *Ficus lilliputiana* forma *pilosa* (Priority 4): The Florabase website indicates that this species is known from four recorded populations (some records may overlap) from the local government area of Wyndham-East Kimberley. The Florabase website describes this species as a prostrate to ascending shrub, leaves hairy; other parts variously hairy, with flowers in April to October, growing in sandstone, associated with rock crevices by water, escarpments, ledges and outcrops. The nearest record is approximately 5.1 kilometres from the application area, from a soil type broadly similar to that mapped within the application area. Noting that this species prefers rocky habitats, it is unlikely to be present within the application area.

Flora of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)
<i>Typhonium</i> sp. Kununurra (A.N. Start ANS 1467)	Endangered	N	Y	N	2.2 km	43
<i>Euphorbia stevenii</i> (caustic bottle tree)	Priority 3	Unclear	Y	Y	2.2 km	13
<i>Goodenia durackiana</i>	Priority 1	N	Y	N	4.5 km	4
<i>Ipomoea gracilis</i>	Priority 4	N	N	N	4.9 km	16
<i>Echinochloa kimberleyensis</i>	Priority 1	N	Not available (N/a)	N	5 km	6
<i>Fimbristylis laxiglumis</i>	Priority 2	Unclear	N/a	N	5 km	3
<i>Goodenia malvina</i>	Priority 1	N	N/a	N	5 km	16
<i>Grona flagellaris</i>	Priority 1	N	N/a	N	5 km	2
<i>Triodia triticoides</i>	Priority 1	N	N/a	N	5 km	7
<i>Ficus lilliputiana</i> forma <i>pilosa</i>	Priority 4	N	N/a	Y	5.1 km	4
<i>Synostemon hubbardii</i>	Priority 3	N	N/a	Y	5.1 km	5
<i>Triodia racemigera</i> (rock spinifex)	Priority 1	N	N/a	N	5.3 km	10
<i>Heliotropium alcyonium</i>	Priority 1	N	N/a	Unclear	5.7 km	1
<i>Sphenoclea zeylanica</i>	Priority 1	N	N	N	6.1 km	3
<i>Acacia richardsii</i>	Priority 3	N	N/a	N	6.2 km	19
<i>Cyperus digitatus</i>	Priority 1	N	N/a	N	7 km	2

Flora of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)
<i>Zornia areolata</i>	Priority 1	N	N/a	Y	8.2 km	1
<i>Goodenia brachypoda</i>	Priority 1	Unclear	N/a	Y	8.6 km	16
<i>Platysace saxatilis</i>	Priority 2	N	N/a	N	8.6 km	13
<i>Heliotropium cupressinum</i>	Priority 1	Unclear	N/a	Y	9.7 km	11
<i>Schoenus punctatus</i>	Priority 3	N	N/a	N	9.9 km	6
<i>Ficus lilliputiana</i> forma <i>lilliputiana</i>	Priority 4	N	N/a	Y	10.1 km	4
<i>Hullsia argillicola</i>	Priority 1	N	N	N	10.1 km	1
<i>Solanum pugiunculiferum</i>	Priority 1	N	N/a	N	10.1 km	4
<i>Brachychiton tuberculatus</i>	Priority 3	N	N/a	Y	Recorded (10.3 km)	17
<i>Utricularia muelleri</i>	Priority 3	N	N/a	N	10.5 km	11
<i>Utricularia tubulata</i>	Priority 1	N	N/a	N	10.5 km	3
<i>Acacia jasperensis</i>	Priority 3	N	N/a	N	10.7 km	4
<i>Hibiscus panduriformis</i> (yellow hibiscus)	Priority 1	N	N/a	N	11.2 km	3
<i>Heliotropium tachyglossoides</i>	Priority 1	N	N/a	Y	12.5 km	1
<i>Clerodendrum inerme</i>	Priority 1	N	N/a	N	15.2 km	4
<i>Utricularia tridactyla</i>	Priority 1	N	N/a	N	16.8 km	6
<i>Polygala crassitesta</i>	Priority 1	N	N/a	Y	16.9 km	4
<i>Goodenia byrnesii</i>	Priority 3	N	N/a	N	17.0 km	26
<i>Stylidium prophyllum</i>	Priority 3	N	N/a	N	18.6 km	9
<i>Iseilema trichopus</i>	Priority 1	N	N/a	Y	19.5 km	2
<i>Jacquemontia</i> sp. Keep River (J.L. Egan 5015)	Priority 1	N	N/a	Y	20.4 km	8
<i>Typhonium</i> sp. Middle Creek (M.D. Barrett MDB 3246)	Priority 1	N	N/a	N	23.3 km	6
<i>Fuirena nudiflora</i>	Priority 3	N	N/a	N	23.6 km	4
<i>Scleria annularis</i>	Priority 1	N	N/a	N	23.7 km	2
<i>Eucalyptus ordiana</i>	Priority 2	N	N/a	N	25.5 km	15
<i>Kunzea petrophila</i>	Priority 1	N	N/a	N	26.2 km	5
<i>Lepturus copeanus</i>	Priority 1	N	N/a	N	26.7 km	2
<i>Tephrosia</i> sp. Kununurra (T. Handasyde TH00 250)	Priority 2	N	N/a	Y	28.2 km	8
<i>Goodenia purpurascens</i>	Priority 3	N	N/a	N	29.6 km	11
<i>Zeuxine oblonga</i>	Priority 2	N	N	N	31.3 km	3
<i>Adenostemma lavenia</i> var. <i>lanceolatum</i>	Priority 3	N	N	N	31.8 km	13
<i>Scaevola</i> sp. Cockburn Range (G.W. Carr 3369 & A.C. Beaglehole 47147)	Priority 1	N	N/a	N	31.9 km	3
<i>Minuria macrorrhiza</i>	Priority 2	N	N/a	Y	32.1 km	19

Flora of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)
<i>Hydrolea zeylanica</i>	Priority 1	N	N/a	N	33.8 km	2
<i>Acacia hypermeces</i>	Priority 1	N	N/a	Y	34.6 km	17
<i>Enteropogon minutus</i>	Priority 1	N	N/a	N	36.4 km	1
<i>Solanum carduiforme</i>	Priority 2	N	N/a	Y	37.1 km	7
<i>Calycopeplus collinus</i>	Priority 1	N	N/a	Y	39.4 km	2
<i>Tephrosia valleculata</i>	Priority 3	N	N/a	Y	39.6 km	10
<i>Eleocharis ochrostachys</i>	Priority 3	N	N/a	N	42.2 km	4
<i>Eragrostis schultzei</i>	Priority 3	N	N/a	N	43.5 km	2
<i>Dendrophthoe odontocalyx</i>	Priority 3	N	N	N	43.7 km	17
<i>Goodenia sepalosa</i> var. <i>glandulosa</i>	Priority 3	N	N/a	Y	43.9 km	15
<i>Acacia mackenziei</i> (Norm's whorled wattle)	Priority 1	N	N/a	Y	44.2 km	7
<i>Paspalidium distans</i>	Priority 4	N	N/a	N	45.1 km	3
<i>Dolichandrone filiformis</i>	Priority 2	N	N/a	Y	Recorded (47.1 km)	9
<i>Utricularia aurea</i> (golden bladderwort)	Priority 2	N	N/a	N	47.7 km	9
<i>Pityrodia obliqua</i>	Priority 3	N	N/a	N	48.3 km	7
<i>Acacia seclusa</i>	Priority 1	N	N/a	N	48.5 km	3
<i>Triodia fitzgeraldii</i>	Priority 1	N	N/a	Y	48.6 km	3
<i>Tephrosia cardiophylla</i> (romantic tephrosia)	Priority 1	N	N/a	Y	49.5 km	8
<i>Lophostemon grandiflorus</i> subsp. <i>grandiflorus</i>	Priority 3	N	N/a	N	50+ km	9
<i>Micraira</i> sp. Purnululu (M.D. Barrett & R.L. Barrett 1507)	Priority 1	N	N/a	N	50+ km	11
<i>Triodia prona</i>	Priority 1	N	N/a	Y	50+ km	1
<i>Utricularia stellaris</i>	Priority 1	N	N/a	N	50+ km	4

C.4. Fauna analysis table

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
Birds						
<i>Calidris ferruginea</i> (curlew sandpiper)	Critically Endangered	N	12.1 km	2,333	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Curlew Sandpiper is a common summer migrant from north-eastern Siberia and Alaska, found in many Australian coastal sites and may also be seen inland in suitable habitats. It is most common in the far south-east and north-west of Australia. It is also found in Africa, across southern Asia to Indonesia and New Guinea, and in New Zealand. The Curlew Sandpiper is found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. Its breeding habitat is the lowland tundra of Siberia. The Curlew Sandpiper feeds on insects and their larvae when breeding. Otherwise, it feeds on small marine invertebrates, especially polychaete worms (Birdlife Australia, 2021).
<i>Numenius madagascariensis</i> (eastern curlew)	Critically Endangered	N	33.5 km	1,784	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves. The birds are also found in coastal saltworks and sewage farms (Marchant & Higgins, 1993). The eastern curlew mainly forages during the non-breeding season on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The birds are rarely seen on near-coastal lakes or in grassy areas (Marchant & Higgins, 1993). The eastern curlew roosts during high tide periods on sandy spits, sandbars and islets, especially on beach sand near the high-water mark, and among coastal

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						vegetation including low saltmarsh or mangroves. They occasionally roost on reef-flats, in the shallow water of lagoons and other near-coastal wetlands. Eastern curlews have occasionally been recorded roosting in trees and on the upright stakes of oyster-racks (Marchant & Higgins, 1993).
<i>Rostratula australis</i> (Australian painted snipe)	Endangered	N	8.2 km	117	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Endemic to Australia, the Australian Painted Snipe has been recorded in all mainland states, where the records are widely and sparsely scattered, though most records have come from eastern Australia, and most of these records are from the Murray–Darling Basin. There are also historical records from Tasmania. The Australian Painted Snipe inhabits many different types of shallow, brackish or freshwater terrestrial wetlands, especially temporary ones which have muddy margins and small, low-lying islands. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and canegrass. The Australian Painted Snipe usually remains among the cover of wetland vegetation while foraging. It feeds at night, probing the soft mud with its long bill as it walks, pecking at seeds and taking small invertebrates (Marchant & Higgins, 1993).
<i>Botaurus poiciloptilus</i> (Australasian bittern)	Endangered	N	8.4 km	419	Unlikely	Appropriate wetland habitat unlikely to occur. The Australasian Bittern is found in coastal and sub-coastal areas of south-eastern and south-western mainland Australia, and the eastern marshes of Tasmania. The Australasian Bittern frequents reedbeds, and other vegetation in water such as cumbungi, lignum and sedges. Australasian Bitterns forage mainly at night on a wide range of small animals, including birds, mammals, fish, frogs, yabbies, snails, insects and spiders (Birdlife Australia, 2021).
<i>Malurus coronatus</i> subsp. <i>coronatus</i> (purple-crowned fairy-wren (western))	Endangered	N	25 km	325	Unlikely	Dense riparian habitat unlikely to occur. The purple-crowned fairy-wren (western) is patchily distributed in the Kimberley region of Western Australia - along the Fitzroy, Isdell, Drysdale, Durack and Pentecost River systems - and in the north-west Northern Territory along the Victoria River system. This species inhabits dense, riparian vegetation in the wet-dry tropics of Western Australia and the Northern Territory. Its preferred habitat comprises a well-developed mid-storey under a dense canopy of emergent

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						Eucalyptus and Melaleuca species. In the Kimberley region, it usually occurs where the mid-storey is dominated by Pandanus aquaticus or <i>Barringtonia acutangula</i> , a freshwater mangrove, accompanied by a variety of shrubs. Along the Victoria River, and formerly on the lower Fitzroy River, it is usually associated with areas of dense river grass, <i>Chionachne cyanthropoda</i> (Threatened Species Scientific Committee, 2015).
<i>Falco peregrinus</i> (peregrine falcon)	Other Specially Protected	Y	8.2 km	1,786	Possible	No breeding habitat likely present. May overfly the application area. The Australian Museum website states that this species 'is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings' (Australian Museum, 2020).
<i>Falco hypoleucos</i> (grey falcon)	Vulnerable	Y	9.7 km	190	Possible	No breeding habitat likely present. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter. The nests chosen are usually in the tallest trees along watercourses, particularly River Red Gum (<i>Eucalyptus camaldulensis</i>) and Coolibah (<i>E. coolabah</i>), but falcons also nest in telecommunication towers. Grey Falcons feed almost exclusively on birds while breeding (including doves, pigeons, small parrots and cockatoos, finches, and a variety of other species), and rarely on non-avian prey including small mammals (DEC, 2019).
<i>Erythrura gouldiae</i> (Gouldian finch)	Vulnerable	N	5.8 km	556	Unlikely	No breeding habitat likely to occur. The Gouldian Finch is patchily distributed in tropical northern sub-coastal areas from Derby, Western Australia, to the Gulf of Carpentaria and thinly to central Cape York Peninsula, but is locally common in the north and north-western parts of its range. As with most other grassfinch species, the Gouldian Finch is seldom found far from water, and needs to drink several times during the day. Throughout its range the species inhabits the edges of mangroves and thickets, and savannas dotted with trees (Birdlife Australia: Birds in Backyards, 2021).

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
<i>Tyto novaehollandiae</i> subsp. <i>kimberli</i> (masked owl (northern))	Priority 1	N	31 km	8	Unlikely	No breeding habitat likely to occur. The masked owl occurs mainly in eucalypt tall open forests (especially those dominated by Darwin woollybutt <i>Eucalyptus miniata</i> and Darwin stringybark <i>E. tetradonta</i>), but also roosts in monsoon rainforests, and forages in more open vegetation types, including grasslands. Although it may roost in dense foliage, it more typically roosts, and nests, in tree hollows. Mammals, up to the size of possums, constitute the bulk of its diet (Northern Territory Government, 2012).
<i>Tyto novaehollandiae</i> subsp. <i>novaehollandiae</i> (masked owl)	Priority 3	N	31.3 km	92	Unlikely	No breeding habitat likely to occur. This species is a nocturnal, secretive bird. It roosts by day in dense foliage of tall trees (forest and woodland with adjacent clearings) or in hollow tree trunks, or sometimes in caves and holes between rocks (Owl Pages, 2016). The Masked Owl inhabits forests, woodlands, timbered waterways and open country on the fringe of these areas. The main requirements are tall trees with suitable hollows for nesting and roosting and adjacent areas for foraging. Masked Owls are territorial, and pairs remain in or near the territory all year round. Masked Owls feed mainly on small mammals, such as rodents, rabbits and bandicoots. Other prey animals include possums, reptiles, birds and insects, with hunting taking place in the early hours of night. The birds sit on low perches listening for prey which, once detected, is taken from the ground or from the tree branches (Birdlife Australia, 2021).
<i>Ninox connivens</i> subsp. <i>connivens</i> (barking owl (southwest subpopulation))	Priority 3	N	13.1 km	14	Unlikely	No breeding habitat likely to occur. Barking Owls are widely distributed throughout Australia, but are absent from central areas. Barking Owls are found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat. They are usually found in habitats that are dominated by eucalyptus species, particularly red gum, and, in the tropics, paperbark species. They prefer woodlands and forests with a high density of large trees and particularly sites with hollows that are used by the owls as well as their prey. Roost sites are often located near waterways or wetlands. The Barking Owl feeds on a variety of small to medium-sized mammals, birds, reptiles and insects. Diet is largely insects during the non-breeding season, with larger prey more commonly taken when breeding. Prey is located

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						either from the air or from an exposed perch. Most hunting is performed in the first few hours of the night and the last hours before dawn. Occasionally, birds may even be seen hunting in daylight. The Barking Owl prefers to hunt in clearings, including waterways and other open areas (Birdlife Australia, 2021).
<i>Falcunculus frontatus</i> subsp. <i>whitei</i> (crested shrike-tit - northern)	Priority 3	N	38.2 km	11	Unlikely	Eucalypt woodland habitat unlikely to occur. The Crested Shrike-tit is endemic to mainland Australia. The species is separated into three geographically isolated subspecies. The endangered Northern Shrike-tit, <i>whitei</i> , is found in the Top End of the Northern Territory and, sparsely, in the far north of Western Australia, including the Kimberley. The Crested Shrike-tit is found in eucalypt forests and woodlands, forested gullies and along rivers in drier areas. It can also be found in rainforests. It is sometimes seen in parks and gardens, on farms with scattered trees, and on pine plantations (Birdlife Australia: Birds in Backyards, 2021).
<i>Elanus scriptus</i> (letter-winged kite)	Priority 4	Y	4.4 km	55	Possible	The Letter-winged Kite is an endemic species, found in the arid inland regions of western Queensland, northern South Australia and the south of Northern Territory. However it is an irruptive species (has sudden population increases), dispersing to the coast when food is plentiful and there are rat or mouse plagues. The Letter-winged Kite is a bird of open country and grasslands in arid and semi-arid Australia, where there are tree-lined streams or water courses. When food is plentiful, the species irrupts and birds may disperse to higher rainfall coastal regions. This kite roosts by day in the high canopy of leafy trees and is the only member of its family that hunts at night. The Letter-winged Kite is a nocturnal hunter, pouncing on small rodents and marsupials. Its main prey is the Long-haired Rat (Birdlife Australia, 2021).
<i>Geophaps smithii</i> subsp. <i>smithii</i> (partridge pigeon (eastern))	Priority 4	N	10.4 km	1	Unlikely	The partridge pigeon occurs across the Top End of the Northern Territory and Kimberley. It forages entirely on the ground, and, except when flushed in alarm, rarely flies. The diet of the partridge pigeon comprises seeds, mostly of grasses but also from Acacia and other woody plants. It nests on the ground, mostly in the early dry season, with "nest" location preferentially in sites with relatively dense grass cover (Northern Territory Government, 2006).

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
<i>Erythrotriorchis radiatus</i> (red goshawk)	Priority 4	N	28.1 km	26	Unlikely	The Red Goshawk (<i>Erythrotriorchis radiatus</i>) is probably the rarest Australian bird of prey. It is found mainly in the savanna woodlands of northern Australia, particularly near watercourses. It takes a broad range of live prey, mostly birds (Avibase: The World Bird Database, 2021).
<i>Ixobrychus dubius</i> (Australian little bittern)	Priority 4	N	12.4 km	102	Unlikely	Appropriate wetland habitat unlikely to occur.
<i>Numenius minutus</i> (little curlew/little whimbrel)	Migratory	Y	2.1 km	589	Possible	May occur intermittently on inundated plains. The Little Curlew is widespread in the north of Australia and scattered elsewhere. It is an irregular visitor to New Zealand and Tasmania. It breeds in Siberia and is seen on passage through Mongolia, China, Japan, Indonesia and New Guinea. Little Curlews may gather in large flocks on coastal and inland grasslands and black soil plains in northern Australia, near swamps and flooded areas. They also feed on playing fields, paddocks and urban lawns (Birdlife Australia: Birds in Backyards, 2021).
<i>Tringa stagnatilis</i> (marsh sandpiper/little greenshank)	Migratory	Y	2.6 km	983	Possible	May occur intermittently on inundated plains. The Marsh Sandpiper is common across the far north of Australia though more scattered on other coastal areas and sparse inland. Breeding occurs from east Europe to east Siberia. In the non-breeding period they also occur throughout southern Africa, the Indian subcontinent, southern Indochina, Borneo and Sumatra and New Guinea. Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps. Marsh Sandpipers eat aquatic insects, larvae, molluscs and crustaceans. They feed by wading briskly in shallow water, pecking from the surface or sometimes sweeping the bill from side to side. They may wade deeper and feel for prey (Birdlife Australia, 2021).
<i>Charadrius veredus</i> (oriental plover)	Migratory	Y	5.8 km	9	Possible	May occur intermittently on inundated plains. The Oriental Plover has been recorded in all states but most common in coastal areas and northern Australia. It breeds in Mongolia, and passes through east China on migration. The Oriental Plover is found generally inland; in open grasslands in arid and semi-arid zones; and less often in estuarine or littoral environments. This species prefers flat

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						inland plains, sparsely vegetated short grass with hard bare ground including claypans, playing fields, lawns and cattle camps. The Oriental Plover may move to lightly-wooded grasslands with the onset of the wet season (Birdlife Australia: Birds in Backyards, 2021).
<i>Glareola maldivarum</i> (oriental pratincole)	Migratory	Y	2.3 km	443	Possible	May occur intermittently on inundated plains. The oriental pratincole, also known as the grasshopper bird or swallow plover, is a wader in the pratincole family (Avibase: The World Bird Database, 2021).
<i>Actitis hypoleucos</i> (common sandpiper)	Migratory	N	0.3 km	3,487	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand. In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers. The Common Sandpiper hunts by day, eating small molluscs, aquatic and terrestrial insects. It is a very active bird and will follow its prey over rocks and has also been known to swim under water (Birdlife Australia, 2021).
<i>Calidris acuminata</i> (sharp-tailed sandpiper)	Migratory	N	1.1 km	2,140	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand. In Australia, the Common Sandpiper is found in coastal or The Sharp-tailed Sandpiper is a summer migrant from Arctic Siberia, being found on wetlands throughout Australia. It is also found in Indonesia, Papua New Guinea, the Solomon Islands, New Caledonia and New Zealand. It is a vagrant to India, Europe, western North America, Fiji and other parts of the central Pacific region. The Sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches. Its breeding habitat in Siberia is the peat-hummock and lichen tundra of the high Arctic. The Sharp-tailed Sandpiper feeds on aquatic insects and their larvae, as well as worms, molluscs, crustaceans and sometimes,

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						seeds. It is often found in large flocks, often with other waders, foraging in shallow waters (Birdlife Australia, 2021).
<i>Tringa glareola</i> (wood sandpiper)	Migratory	N	2.2 km	1,280	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Wood Sandpipers are more numerous in the north than the south of Australia and are also found in New Guinea, Africa, the Indian subcontinent and South-east Asia. They breed widely across the north of Europe and Asia, mostly in Scandinavia, Baltic countries and Russia. They are the most abundant migratory wader in non-coastal areas of Asia. Wood Sandpipers are seen in small flocks or singly on inland shallow freshwater wetlands, often with other waders. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber. Wood Sandpipers feed mainly on aquatic insects and their larvae and molluscs in moist or dry mud. They high-step daintily through shallow water, probing in mud or picking at the surface. They also swim well and may feed by sweeping their bill from side to side under water (Birdlife Australia, 2021).
<i>Tringa nebularia</i> (common greenshank)	Migratory	N	5.7 km	5,487	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Common Greenshank is a large, rather heavily built wader. Greenshanks eat insects, worms, molluscs, small fish and crustaceans, feeding both by day and night. They feed by picking from the surface, probing, sweeping and lunging at the edges of mudflats or shallows. They may walk along the shoreline and even chase small fish in the shallow water. Common Greenshanks are found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops (Birdlife Australia, 2021).
<i>Pluvialis fulva</i> (Pacific golden plover)	Migratory	N	7.3 km	1,129	Possible	May occur intermittently on inundated plains. The Pacific Golden Plover breeds on the Arctic tundra in western Alaska. It winters in South America and islands of the Pacific Ocean to India, Indonesia and Australia. In Australia it is widespread along the coastline. The Pacific Golden Plover is found on muddy, rocky and sandy wetlands, shores, paddocks, saltmarsh, coastal golf courses, estuaries and lagoons (Birdlife Australia: Birds in Backyards, 2021).

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
<i>Gallinago megala</i> (Swinhoe's snipe)	Migratory	N	7.6 km	79	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Swinhoe's Snipe, <i>Gallinago megala</i> , also known as Forest Snipe or Chinese Snipe, is a medium-sized (length 27–29 centimetres, wingspan 38–44 centimetres, weight 120 grams), long-billed, migratory wader (Avibase: The World Bird Database, 2021).
<i>Philomachus pugnax</i> (ruff/reeve)	Migratory	N	8.1 km	67	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Ruff (<i>Philomachus pugnax</i>) is a medium-sized wading bird that breeds in marshes and wet meadows across northern Eurasia. This highly gregarious sandpiper is migratory and sometimes forms huge flocks in its winter grounds, which include southern and western Europe, Africa, southern Asia and Australia. It is usually considered to be the only member of its genus, and the Broad-billed and Sharp-tailed Sandpipers are its closest relatives (Avibase: The World Bird Database, 2021).
<i>Calidris ruficollis</i> (red-necked stint)	Migratory	N	8.2 km	5,551	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Red-necked Stints are omnivorous, taking seeds, insects, small vertebrates, plants in saltmarshes, molluscs, gastropods and crustaceans. They forage on intertidal and near-coastal wetlands. They usually feed for the entire period that mudflats are exposed, often feeding with other species. Red-necked Stints are found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. They may also be seen in saltworks, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats, flooded paddocks or damp grasslands. (Birdlife Australia, 2021).
<i>Calidris subminuta</i> (long-toed stint)	Migratory	N	8.4 km	374	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur.
<i>Limosa limosa</i> (black-tailed godwit)	Migratory	N	8.4 km	870	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur.

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
<i>Limosa lapponica</i> (bar-tailed godwit)	Migratory	N	33.4 km	3317	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Bar-tailed Godwits arrive in Australia each year in August from breeding grounds in the northern hemisphere. Birds are more numerous in northern Australia. Bar-tailed Godwits inhabit estuarine mudflats, beaches and mangroves. They are common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders. Bar-tailed Godwits feed on molluscs, worms and aquatic insects. Birds wade through the shallows or over exposed mud and probe their long bills rapidly into the bottom to find food. Feeding parties may number up to 30 or more birds, and include non-breeding migrants and young birds that remain all year round (Birdlife Australia, 2021).
<i>Xenus cinereus</i> (terek sandpiper)	Migratory	N	33.4 km	1241	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Terek Sandpipers are more common on the northern and eastern Australian coasts than in the south, but nowhere in large numbers. They breed mainly in Russia and Finland and migrate to coastal Africa, India, the Malayan peninsula and Australia. Terek Sandpipers are found on the coast in mangrove swamps, tidal mudflats and the seashore (Birdlife Australia: Birds in Backyards, 2021).
<i>Numenius phaeopus</i> (whimbrel)	Migratory	N	33.5 km	2,714	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Whimbrels are common across northern Australia and uncommon to rare further south. They breed in central Siberia to Iceland. The subspecies <i>variegatus</i> is the one mainly found in Australia and also the Bay of Bengal through to Melanesia, Micronesia and to New Zealand in small numbers. Whimbrels are found mainly on the coast, on tidal and estuarine mudflats, especially near mangroves. They are sometimes found on beaches and rocky shores (Birdlife Australia: Birds in Backyards, 2021).
<i>Gelochelidon nilotica</i> (gull-billed tern)	Migratory	N	8.3 km	1164	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Gull-billed Tern occurs on all continents except Antarctica. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean (Birdlife Australia: Birds in Backyards, 2021).

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
<i>Sternula albifrons</i> (little tern)	Migratory	N	50+ km	903	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Little Tern breeds in North America, Eurasia, Western Africa and Australasia and winters in northern South America, Africa, Southern Asia and Australasia. In Australia, it breeds from Tasmania to the Gulf of Carpentaria and has bred in the Coorong and near Adelaide, South Australia. It has been recorded across Northern Australia to Shark Bay, Western Australia. The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas (Birdlife Australia: Birds in Backyards, 2021).
<i>Chlidonias leucopterus</i> (white-winged black tern)	Migratory	N	11.9 km	657	Unlikely	Associated with marine/aquatic habitats
<i>Hydroprogne caspia</i> (Caspian tern)	Migratory	N	7.9 km	4,497	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Caspian Terns feed almost entirely on fish. They usually feed by shallow plunging; hovering up to 15 metres above the water with bill pointing down, before folding wings in and diving, fully submerged, to quickly re-emerge. They usually swallow fish in flight, head first. Caspian Terns are found throughout Australasia, North America, Eurasia and Africa (Birdlife Australia, 2021).
<i>Plegadis falcinellus</i> (glossy ibis)	Migratory	Y	0.6 km	1,700	Possible	May occur intermittently on inundated plains. The Glossy Ibis frequents swamps and lakes throughout much of the Australian mainland, but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis requires shallow water and mudflats, so is found in well-vegetated wetlands, floodplains, mangroves and ricefields. Glossy Ibis feed on frogs, snails, aquatic insects and spiders in damp places. They feed by probing the water and mud with their long, curved bill (Birdlife Australia, 2021).
<i>Anas querquedula</i> (garganey)	Migratory	N	8.4 km	10	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Garganey (<i>Anas querquedula</i>) is a small dabbling duck. It breeds in much of Europe and western Asia, but is strictly migratory, with the entire population moving to southern Africa, India (in particular Santragachi), and Australasia in winter, where large flocks can occur. This species was first described by Linnaeus in 1758 under its current scientific name. Like other small ducks such as the

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						Common Teal, this species rises easily from the water with a fast twisting wader-like flight (Avibase: The World Bird Database, 2021).
<i>Motacilla flava</i> (yellow wagtail)	Migratory	Y	10.6 km	20	Possible	May occur intermittently on plains. The Western Yellow Wagtail (<i>Motacilla flava</i>) is a small passerine in the wagtail family Motacillidae, which also includes the pipits and longclaws (Avibase: 2021).
<i>Apus pacificus</i> (fork-tailed swift)	Migratory	Y	10.8 km	437	Possible	Aerial - may overfly the application area
<i>Cuculus optatus</i> (Oriental cuckoo)	Migratory	Y	12.5 km	40	Possible	Preferred habitat includes forest, woodland, and riverside trees (OzAnimals, 2021).
<i>Cecropis daurica</i> (red-rumped swallow)	Migratory	Y	6.4 km	15	Possible	The Red-rumped Swallow is a small passerine bird in the swallow family. It breeds in open hilly country of temperate southern Europe and Asia from Portugal and Spain to Japan, India and tropical Africa. The Indian and African birds are resident, but European and other Asian birds are migratory. They winter in Africa or India and are vagrants to Christmas Island and northern Australia (Avibase 2021).
<i>Hirundo rustica</i> (barn swallow)	Migratory	Y	6.5 km	275	Possible	The Barn Swallow is the most widespread species of swallow in the world. It is a distinctive passerine bird with blue upperparts, a long, deeply forked tail and curved, pointed wings. It is found in Europe, Asia, Africa and the Americas. In Anglophone Europe it is just called the Swallow; in Northern Europe it is the only common species called a "swallow" rather than a "martin" (Avibase 2021).
<i>Pandion cristatus</i> (osprey)	Migratory	N	6.9 km	4,402	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. The Osprey feeds mainly on medium-sized live fish, which it does not swallow whole, but rips apart to eat. The Osprey patrols the coast, searching for prey. It folds its wings, then drops headlong, with its feet forward to snatch a fish with its talons. It may go right under the water or snatch a fish from the surface, before lifting off again, with strong wing strokes. The Osprey is cosmopolitan, being found in many coastal and lake areas of the world. In Australia, it is found on the north and east coast from Broome to the south coast of New South Wales. Ospreys are found on the coast and in terrestrial wetlands of tropical and temperate Australia and off-shore islands, occasionally ranging inland along rivers, though mainly in the north of the country (Birdlife Australia, 2021).

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
Mammals						
<i>Dasyurus hallucatus</i> (northern quoll)	Endangered	Y	20.5 km	8,187	Unlikely	No breeding or denning habitat likely present. In Western Australia, the Northern Quoll is restricted to the Pilbara and Kimberley regions. The species' preferred habitat consists of rocky escarpment, open forest and open woodland (Threatened Species Scientific Committee, 2005).
<i>Macroderma gigas</i> (ghost bat)	Vulnerable	N	20.6 km	949	Unlikely	No breeding or roosting habitat likely present. The species' current range is discontinuous, with geographically disjunct colonies occurring in the Pilbara, Kimberley (including several islands), northern Northern Territory (including Groote Eylandt), the Gulf of Carpentaria, coastal and near coastal eastern Queensland from Cape York to near Rockhampton, and western Queensland. They occupy habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines. (Threatened Species Scientific Committee, 2016a).
<i>Hipposideros stenotis</i> (northern leaf-nosed bat)	Priority 2	N	38.7 km	167	Unlikely	No breeding or roosting habitat likely present. This species is associated with rocky outcrops and roosts in shallow caves, boulder piles and disused mines. It forages in a variety of habitats from monsoon vine thickets and woodlands to open grasslands (Northern Territory Government, 2012).
<i>Rhinonicteris aurantia</i> (orange leaf-nosed bat)	Priority 4	N	4.8 km	148	Unlikely	No breeding or roosting habitat likely present. Underground diurnal roosts. Some roosts are important for breeding, and others may only be used in certain seasons or conditions. This species does not roost in overhangs - shallow structures where the rear wall can be observed from the entrance - as these do not support warm, humid microclimates. (Threatened Species Scientific Committee, 2016b).
<i>Leggadina lakedownensis</i> (northern short-tailed mouse)	Priority 4	N	10.5 km	978	Unlikely	The Lakeland Down's short-tailed mouse occurs across northern Australia, from Cape York (Qld) to the Pilbara (WA), with one population on Thevenard Island (WA). A population has been established on Serrurier Island (WA) by translocation of Thevenard Island individuals. Known to occur on sandy soils and cracking clays in Western Australia, and tropical tussock grasslands or woodlands

Fauna of significance recorded within 50 kilometres of the application area						
Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						in Queensland. On Thevenard Island, occupies Acacia shrublands and low shrubs on deep sandy soils (DEC, 2012).
<i>Hydromys chrysogaster</i> (water-rat/rakali)	Priority 4	N	10.8 km	813	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Lives in burrows on low banks of rivers, lakes, wetlands, estuaries and even along the coast. Intact riparian vegetation and associated bank stability is critical to their survival. A nocturnal species, hunting macroinvertebrates, fish and crustaceans, molluscs frogs and even water birds and bird eggs (DWER 2020).
Reptiles						
<i>Anilius troglodytes</i> (Sandamara blind snake (Napier Range))	Priority 1	N	14.6 km	8	Unlikely	This species is found in the Kimberley. Little information is published about this species, however general information on the Anilius genus in the Kimberley suggests that these species may prefer in open savannah woodland habitats on compacted clay-loam soils (Ellis, 2019).
<i>Crocodylus johnstoni</i> (Australian freshwater crocodile)	Other Specially Protected	N	5.8 km	1,435	Unlikely	Inland wetlands, estuaries and floodplains unlikely to occur. Freshwater Crocodiles inhabit various freshwater environments, including rivers, creeks, pools, billabongs, lagoons, and swamps. During the wet season these habitats become inundated with flood waters which allow the crocodiles to move throughout the flood plains. As the water levels drop the crocodiles tend to congregate in the larger and deeper water bodies, where they prefer to inhabit the shallower waters at the pool edges. They may shelter in burrows among the roots of trees fringing the water bodies they inhabit (Australian Museum, 2020)
Invertebrates						
<i>Ordrtrachia elegans</i> (a camaenid land snail (Jeremiah Hills))	Critically Endangered	N	26.3 km	1	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum grossum</i> (Buryill Point camaenid land snail (Ningbing Ranges))	Critically Endangered	N	42.2 km	12	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum primum</i> (Buryill Point camaenid land snail (Ningbing Ranges))	Critically Endangered	N	42.4 km	16	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum monodon</i> (Buryill Point camaenid land snail (Ningbing Ranges))	Critically Endangered	N	43.7 km	10	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum simplex</i> (Buryill Point camaenid land snail (Ningbing Ranges))	Critically Endangered	N	45.3 km	9	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum buryillum</i> (Buryill Point camaenid land snail (Ningbing Ranges))	Critically Endangered	N	45.9 km	1	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum spectaculum</i> (a camaenid land snail (Jeremiah Hills))	Endangered	N	20.9 km	12	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum isolatum</i> (a camaenid land snail (Sandy Creek))	Endangered	N	28.7 km	7	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Cristilabrum bubulum</i> (a camaenid land snail (Ningbing Ranges))	Endangered	N	42.5 km	14	Unlikely	Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East

Fauna of significance recorded within 50 kilometres of the application area

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Likelihood of occurrence	Notes
						Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).
<i>Turgenitubulus pagodula</i> (Pagoda camaenid land snail (The Gorge, central Ningbing Ranges)	Vulnerable	N	50+ km	2	Unlikely	H Hills and ranges habitat not present. Twenty-five Threatened Camaenid taxa occur in the Ningbing Range and Jeremiah Hills area north of Kununurra, and one occurs to the south of Lake Argyle. These species are short-range endemics and have been recorded only in the limestone ranges and outcrops of the East Kimberley. Critical habitat includes shaded rubble and crevices, leaf litter accumulation and associated vegetation assemblages found throughout the Upper Devonian Ningbing Limestone outcrops (CALM 2005).

C.5. Ecological community analysis table

Nine Priority Ecological Communities have been recorded in the local area of a 50 kilometre radius of the application area. No Threatened Ecological Communities have been recorded. In forming a view on the likelihood of these ecological communities occurring within the application area, the preferred habitat types of these ecological communities and their recorded proximity to the application area were considered, along with the vegetation/soil types and landforms within the application area.

- Eight ecological communities are characterised by suites of species and preferred habitats (including geomorphology) that do not occur within the application area.
- The application area is within the mapped extent of an occurrence of the 'Ivanhoe Land System' Priority Ecological Community (PEC) (Priority 3).

Community name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Ivanhoe Land System	Priority 3	Y	Y	Y	0 km	2	Y
Willeroo Land System	Priority 3	N	N	N	12.7 km	9	Y
Camaenid land snail and vine thicket assemblage of limestone hills (Jeremiah Hills and Ningbing Ranges)	Priority 3	N	N	N	19.7 km	3	Y
Tanmurra Land System	Priority 3	N	N	N	20.3 km	18	Y
<i>Oryza australiensis</i> (wild rice) grasslands on alluvial flats of the Ord River	Priority 1	N	N	N	28.4 km	2	Y
Kimberley Vegetation Association 918	Priority 1	N	N	N	38.1 km	2	Y
Kimberley Vegetation Association 838	Priority 3	N	N	N	38.2 km	12	Y
Kimberley Vegetation Association 908	Priority 3	N	N	N	42.8 km	15	Y
Plant assemblages on vertical sandstone surfaces	Priority 1	N	N	N	45.1 km	3	Y

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> <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p><u>Assessment:</u> The application area consists of native vegetation that provides habitat for at least one Priority flora species. The entire application area is mapped as a Priority Ecological Community (PEC), which extends more broadly into adjacent remnant vegetation.</p>	May be at variance	Yes Refer to Section 3.2.1
<p><u>Principle (b):</u> <i>“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.”</i></p> <p><u>Assessment:</u> Noting the types, condition and extent of the native vegetation proposed to be cleared, the application area comprises suitable habitat for indigenous fauna. However, with regard to the extensive areas of adjacent native vegetation, the application area is unlikely to be significant for the survival of indigenous fauna.</p>	Not likely to be at variance	Yes Refer to Section 3.2.2
<p><u>Principle (c):</u> <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p><u>Assessment:</u> One species of Threatened flora (<i>Typhonium</i> sp. Kununurra) has been recorded within 2.2 kilometres of the application area. This species prefers dark grey clay and black soil, associated with sites which are waterlogged in summer and inundated after rain. <i>Typhonium</i> sp. Kununurra was not located over the application area during botanical surveys.</p>	Not likely to be at variance	Yes Refer to Section 3.2.1
<p><u>Principle (d):</u> <i>“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.”</i></p> <p><u>Assessment:</u> No Threatened Ecological Communities (State or Commonwealth listed) have been recorded from the local area.</p>	Not at variance	No
Environmental value: significant remnant vegetation and conservation areas		
<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> The extent of native vegetation cover in the local area, and the extent of the mapped vegetation association within the application area, are greater than 30 per cent and therefore consistent with the national objectives and targets for biodiversity conservation in Australia. The application area is part of a broader remnant, however is unlikely to be part of a significant ecological linkage in the local area.</p>	Not at variance	No
<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> The nearest conservation area is DBCA-managed un-named Conservation Reserve 52321 approximately 4.7 kilometres north of the application area. Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on its environmental values.</p>	Not at variance	No
Environmental value: land and water resources		
<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>	May be at variance	Yes Refer to Section 3.2.3

Assessment against the clearing principles	Variance level	Is further consideration required?
<p><u>Assessment:</u> Two natural ephemeral minor rivers traverse the application area. A small portion of the native vegetation within the application area is growing in association with these watercourses.</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> Noting the landform and mapped soil type, and with regard for the extent of the application area, the proposed clearing may cause land degradation in the form of water and wind erosion in the window between clearing activities and when development of the site occurs.</p>	May be at variance	Yes Refer to Section 3.2.4
<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> The potential risk of water and wind erosion, in combination with a potential for increased surface water run-off on cleared land, may lead to a change in the quality of surface water through the transport of sediments and nutrients, which may impact on watercourses within the application area and downstream dams.</p>	May be at variance	Yes Refer to Section 3.2.4
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u> The soil types mapped within the application area have a moderate to high risk of flooding, and a moderate to very high risk of waterlogging. The application area includes watercourses.</p>	May be at variance	Yes Refer to Section 3.2.4

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 Trudgen (1991).

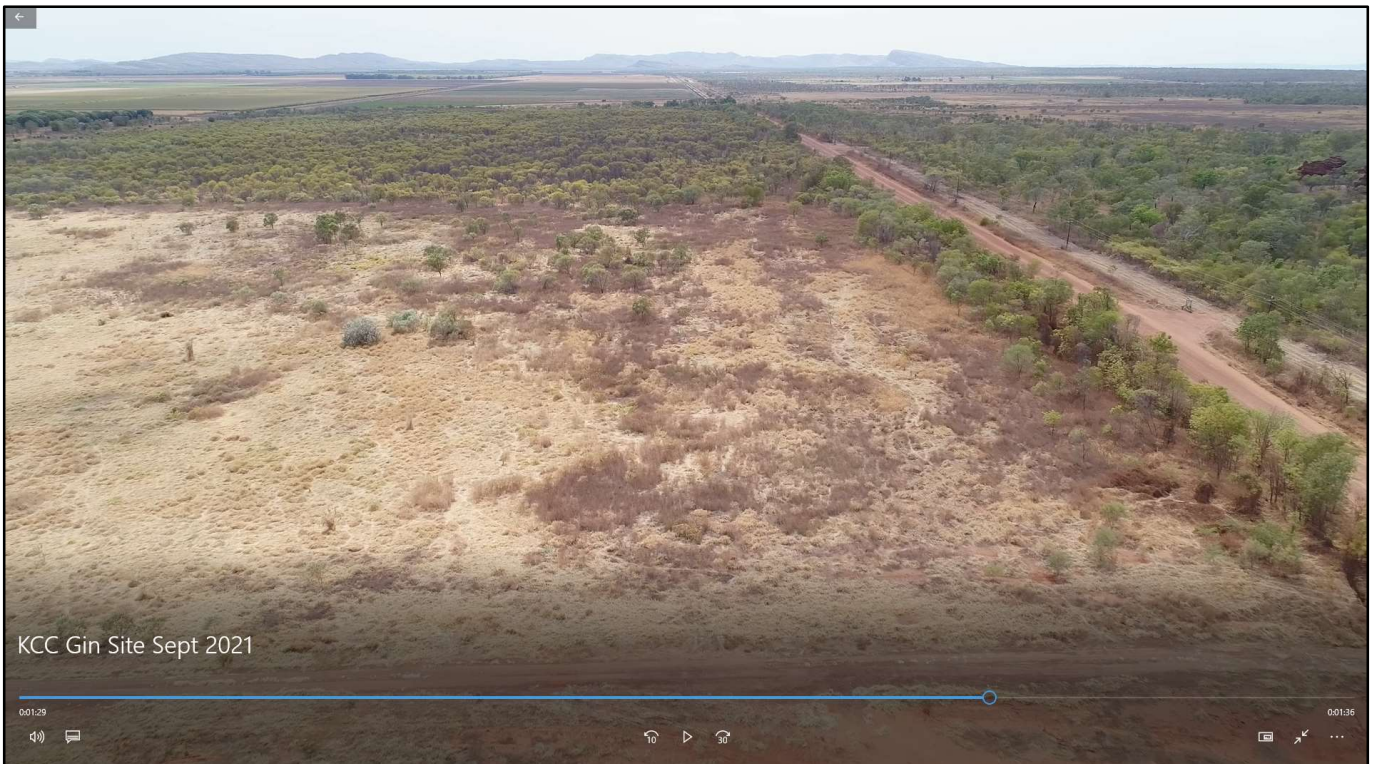
Measuring vegetation condition for the Eremaean and Northern Botanical Provinces (Trudgen, 1991)

Condition	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix F: Photographs of the vegetation



Drone footage provided by the applicant – Application area looking south



Drone footage provided by the applicant – Application area looking north

Aerial photographs (by drone) of the vegetation within the original application area provided by the applicant.





Photographs of vegetation within the original application area provided by the applicant.



Lot 510: Location of waypoints relevant to photographs below (yellow line added indicating Lot 510 boundary and extent of original application area). It is noted that waypoints KCC1, KCC2, KCC12 to KCC15, and the road reserve, are outside of the original application area; photographs from these locations are included for directional reference.



View north from waypoint KCC1



View north-east from waypoint KCC1



View along Mulligan's Lagoon Road boundary



South-west corner



Near Mulligan's Lagoon Road



Near Mulligan's Lagoon Road



Old pump shed at waypoint KCC10



Looking north-east (to Letchford's) from waypoint KCC10



Dam at waypoint KCC10



Pump shed and old diesel tank at waypoint KCC10

3.2 Flora

A total of one hundred and twenty-six (126) plant species were identified, which are listed in Appendix 1. This total includes twenty-two (22) introduced, naturalised weed species. None of the targeted Priority Flora species were found. It is concluded that the disturbed nature of the site - from both historic clearing and earthworks - explains the abundance of weeds. In addition, the heavy thatching of both weeds and grasses is considered detrimental for the establishment and survival of both *Typhonium* species, as well as many native herb species that might otherwise be expected. However, two other non-targeted Priority Flora species were identified at sites CG075 & CG089.

The author collected plant specimens under Flora Taking (Biological Assessment) Licence No. FB62000260, issued on 18/5/2020 for a period of three years.

3.3 Vegetation

The sandy sector of the site, underlain by **Cockatoo Sands (CS)** is dominated by a regrowth woodland of Spear Wattle (*Acacia tumida*), typically reaching 8m in height. Occasional specimens of Soap Wattle (*Acacia coleii*) and Ghost Wattle (*Acacia platycarpa*) occur, as well as patches of *Grevillea agrifolia* and Ironwood (*Erythrophleum chlorostachys*). Annual Sorghum (*Sorghum stipoideum*) to 3m height is the dominant understorey, where it has not been displaced by dense – often monotypic - patches of weedy Hyptis (**Mesosphaerum suaveolens*).

The former [pre-clearance] scattered, emergent canopy formed by Stringybark (*Eucalyptus tetradonta*) to 14m height has not had time to re-establish itself. However isolated remnant clumps were noted at CG109 & 110, adjoining Mulligan's Lagoon Road, and a young regrowth specimen at CG096.

Proceeding from South-east to North-west, as the swampy western margin is approached, the vegetation community changes. Although Spear Wattle (*Acacia tumida*) is still present, stands of Silky Grevillea (*Grevillea pteridifolia*), Broad-leaved Paperbark (*Melaleuca viridiflora*) and Glider-wing Tree (*Terminalia platyptera*) are a feature of the **Junction Complex (JC)** transition zone soils, especially in the northern area. Further South, occasional isolated Boabs (*Adansonia gregorii*) evidently escaped previous clearing. However, numerous earth mounds, ditches and ponds occur in this zone, creating a mosaic of dense weedy grasslands. Rosella (**Hibiscus sabdariffa*), a weedy species of African origin, is well-established along the eastern margin of this transition zone. It is evident that these communities indicate the presence of clay layers at depth, beneath the surface sands.

Most of the very minor area of **Aquitaine (A)** clay soils, which only occurs in the extreme North-west of the site has been modified by earthworks to form a drainage sump.

3.4 Priority Flora

Targeted searches on 14 & 20 February failed to locate any of the following species:

- *Cyperus digitatus* (sedge)
- *Echinochloa kimberleyensis* (grass)
- *Goodenia durackiana* (herb)
- *Goodenia malvina* (herb)
- *Typhonium* sp. Kununurra (A.N. Start ANS 1467)
- *Typhonium* sp. Middle Creek (M.D. Barrett MDB 3246)

It should be noted that *Typhonium* sp. Kununurra has not been recorded on Junction Complex (JC) soils (Henry Smolinski, pers. comm.).

However, single individuals of two other Priority Flora species were recorded as follows:

- CG075 *Dolichandrone filiformis* – Wire-leaf Lemonwood (Priority One)
- CG089 *Brachychiton tuberculatus* – Warty-fruited Kurrajong (Priority Three)

3.5 Weeds

A total of twenty-two (22) introduced, naturalised weedy species were recorded during the survey.

Appendix 3. Photos



Plate 1: General view Lot 510.



Plate 2: NW corner of Lot 510 showing swamp with Melaleucas.



Plate 3: Eastern view of Lot 510.



Plate 4: Lot 510 showing Northern sector.



Plate 5: Lot 510 from Western side.



Plate 6: Weedy flat.



Plate 7: Melaleuca swamp.



Plate 8: CG089 Priority 3 Species; *Brachychiton tuberculatus*.



Plate 9: CG075 Priority 1 Species; *Dolichandrone filiformis*.



Plate 10: *Grevillea agrifolia* on Lot 510 (20 Feb 2023).

Ord Valley Irrigation - Lot 510 - *Typhonium sp.* Kununurra

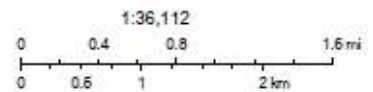


10/20/2021, 1:39:10 PM

Override 1

Typhonium Density by soil group under 50m elevation

- Very high
- Moderate
- Moderate-low
- Low
- Very low



Map

DPIRD Geospatial Information Services
Marr | Department of Biodiversity, Conservation and Attractions

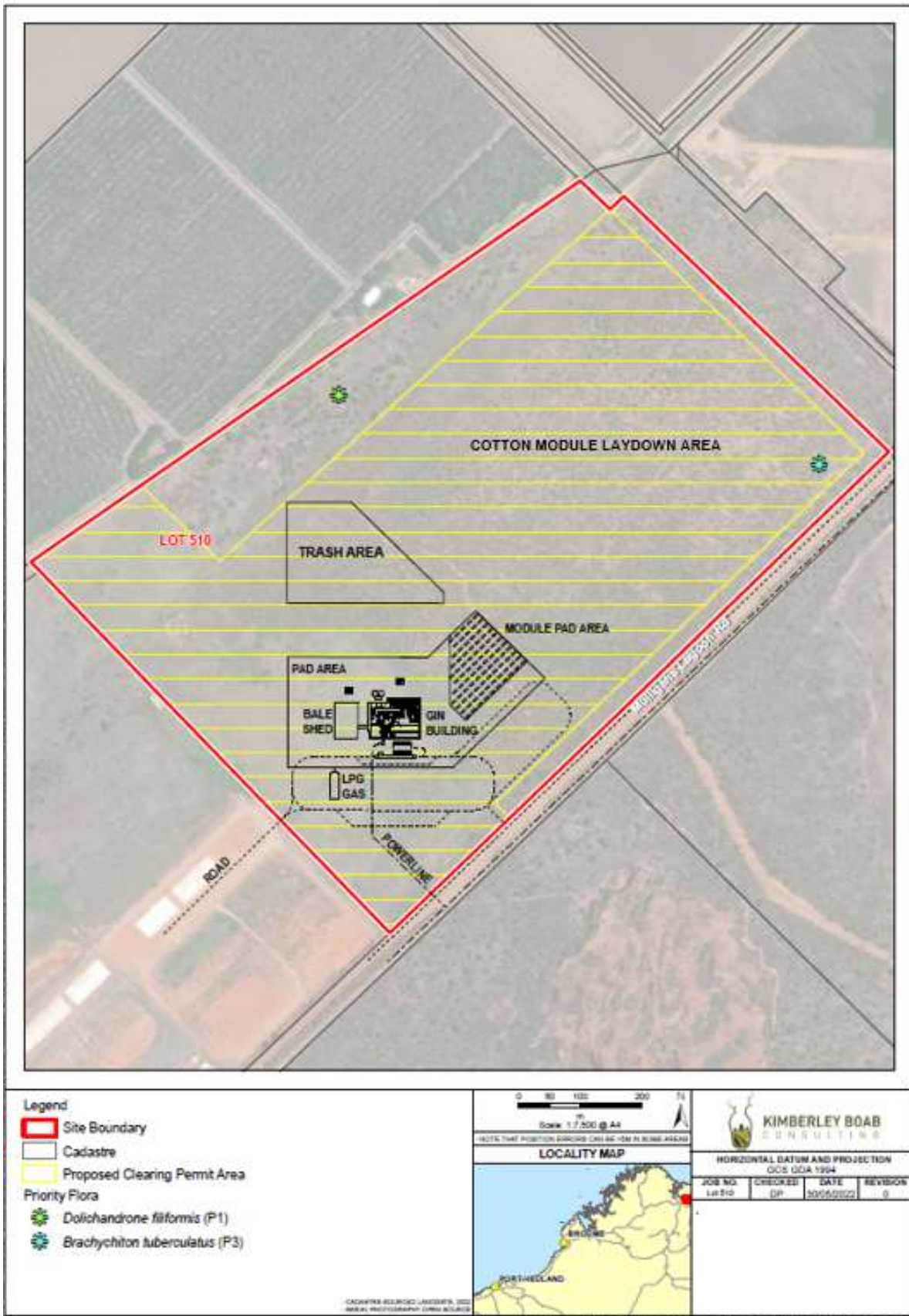


Figure A: Proposed site layout (1)



Figure B: Proposed site layout (2)



Figure C: Representative example of a cotton module laydown area

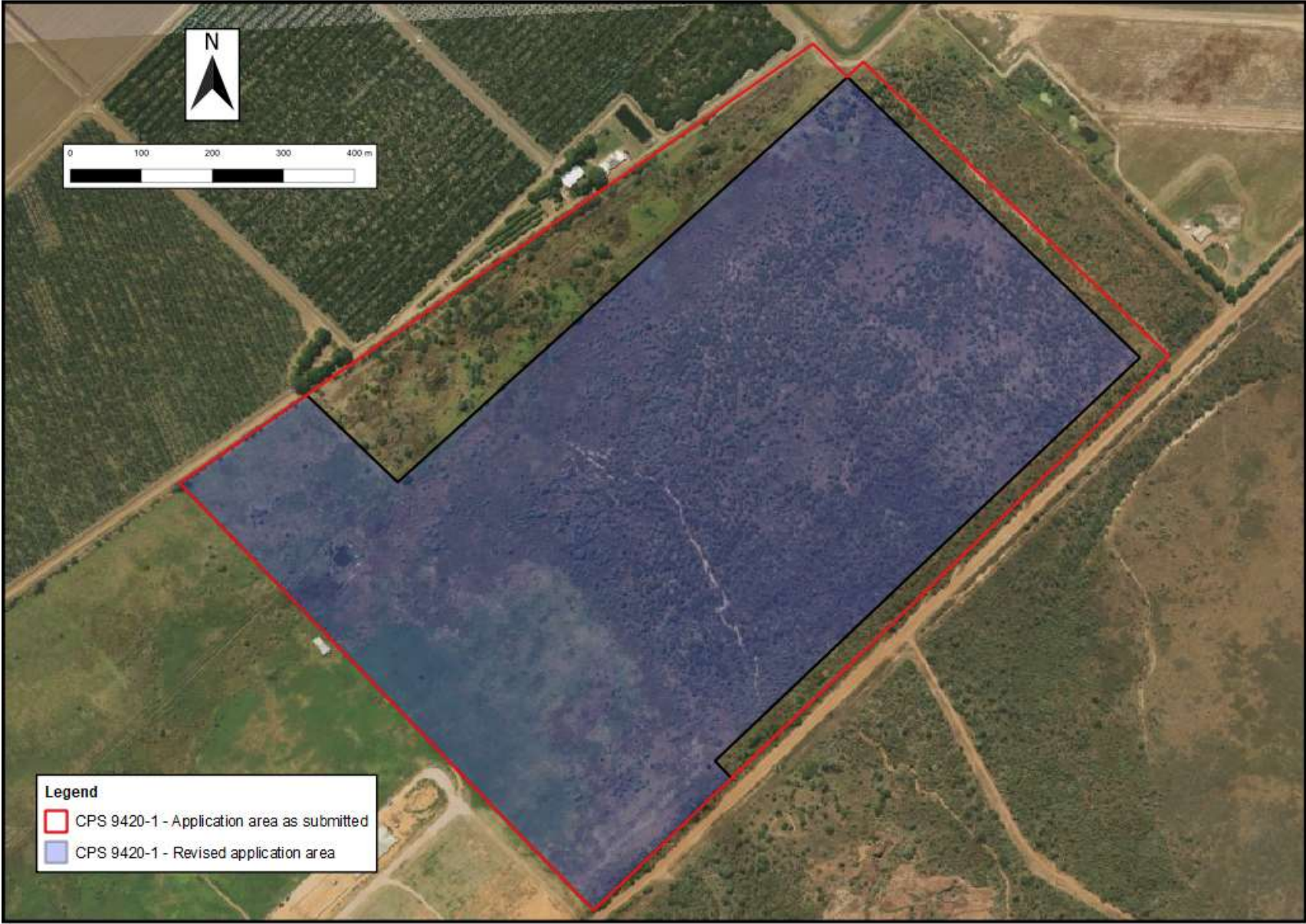


Figure A: CPS 9420/1 – Revised application area

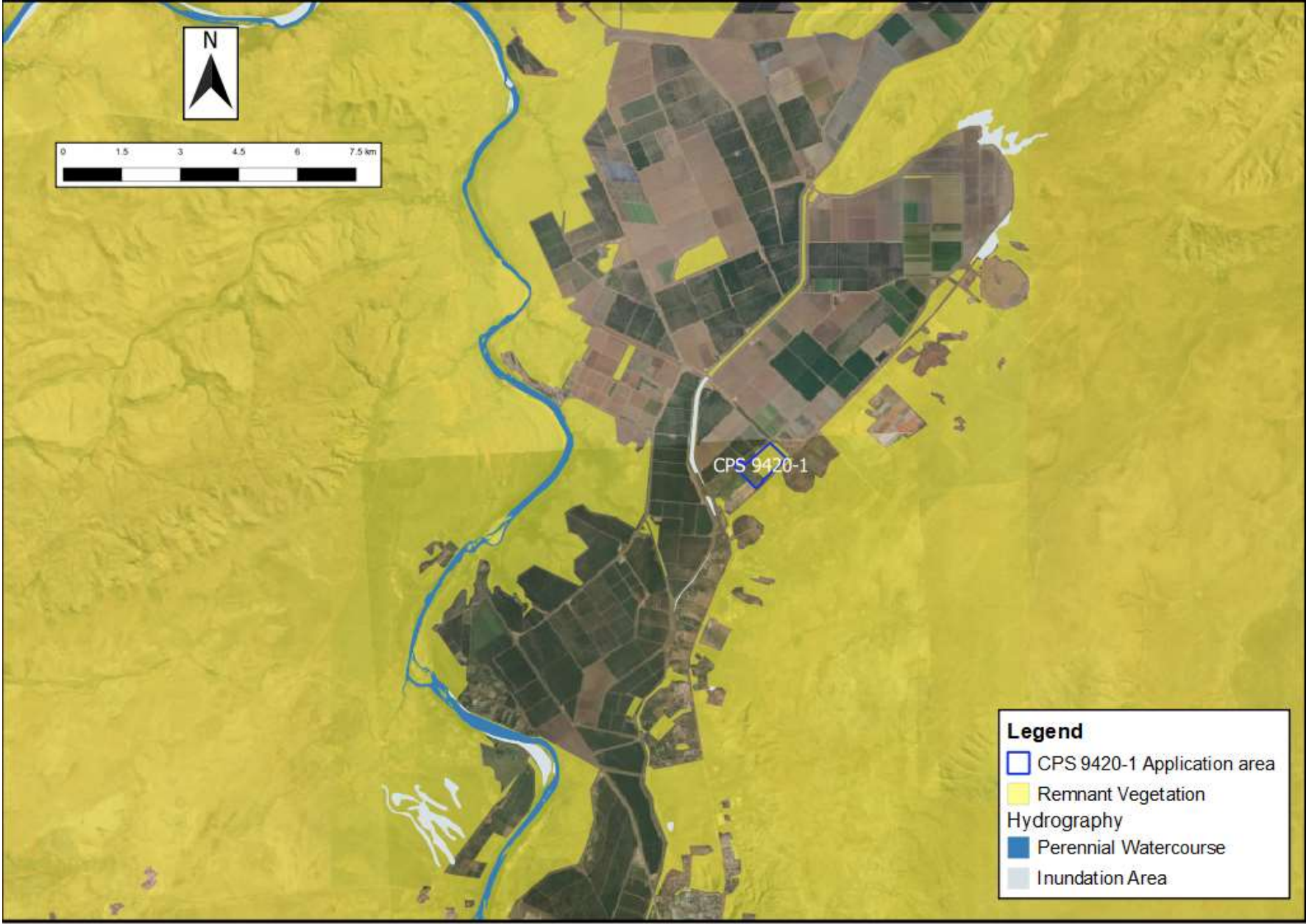


Figure B: Remnant vegetation

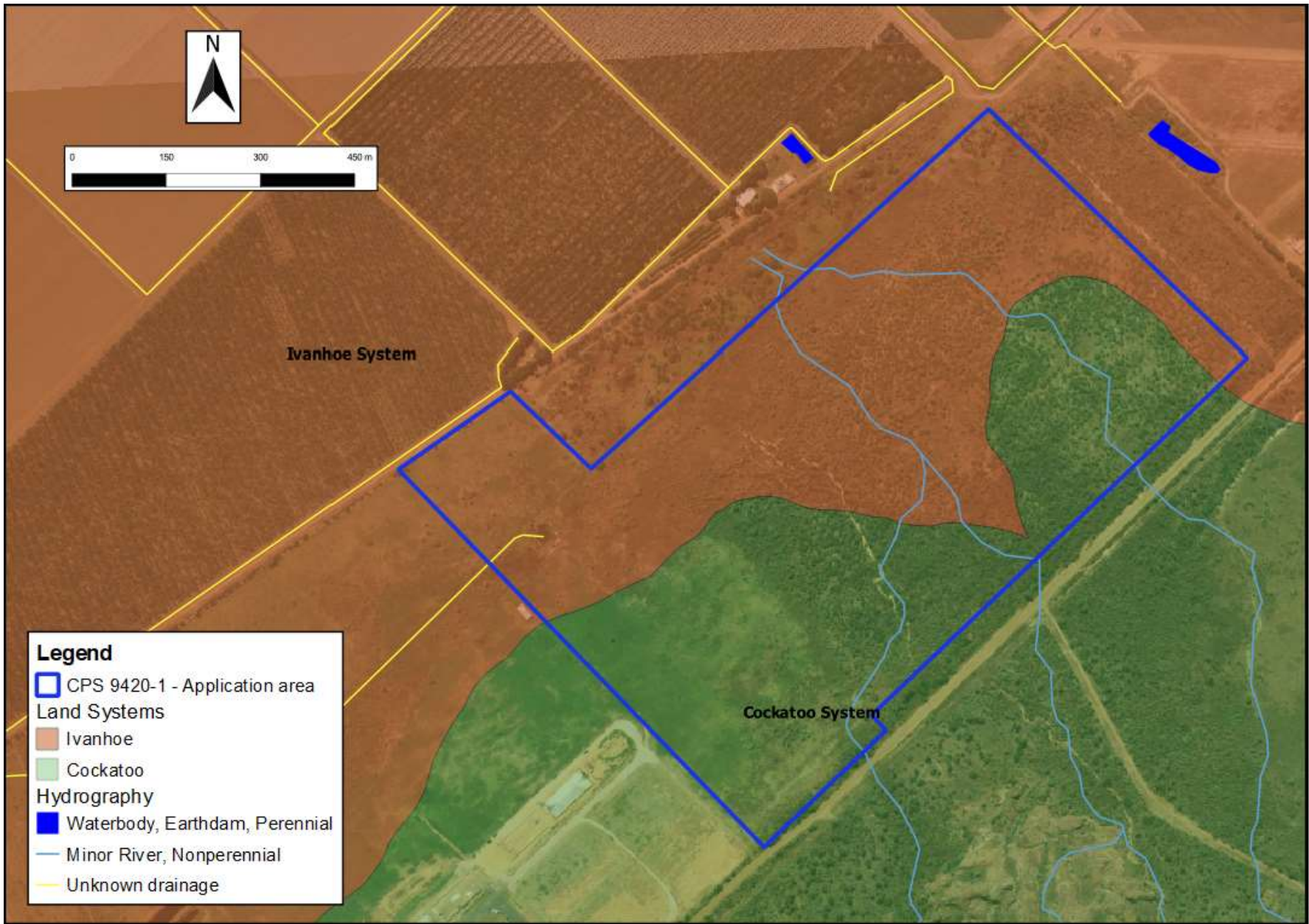


Figure C: Mapped Land Systems and drainage

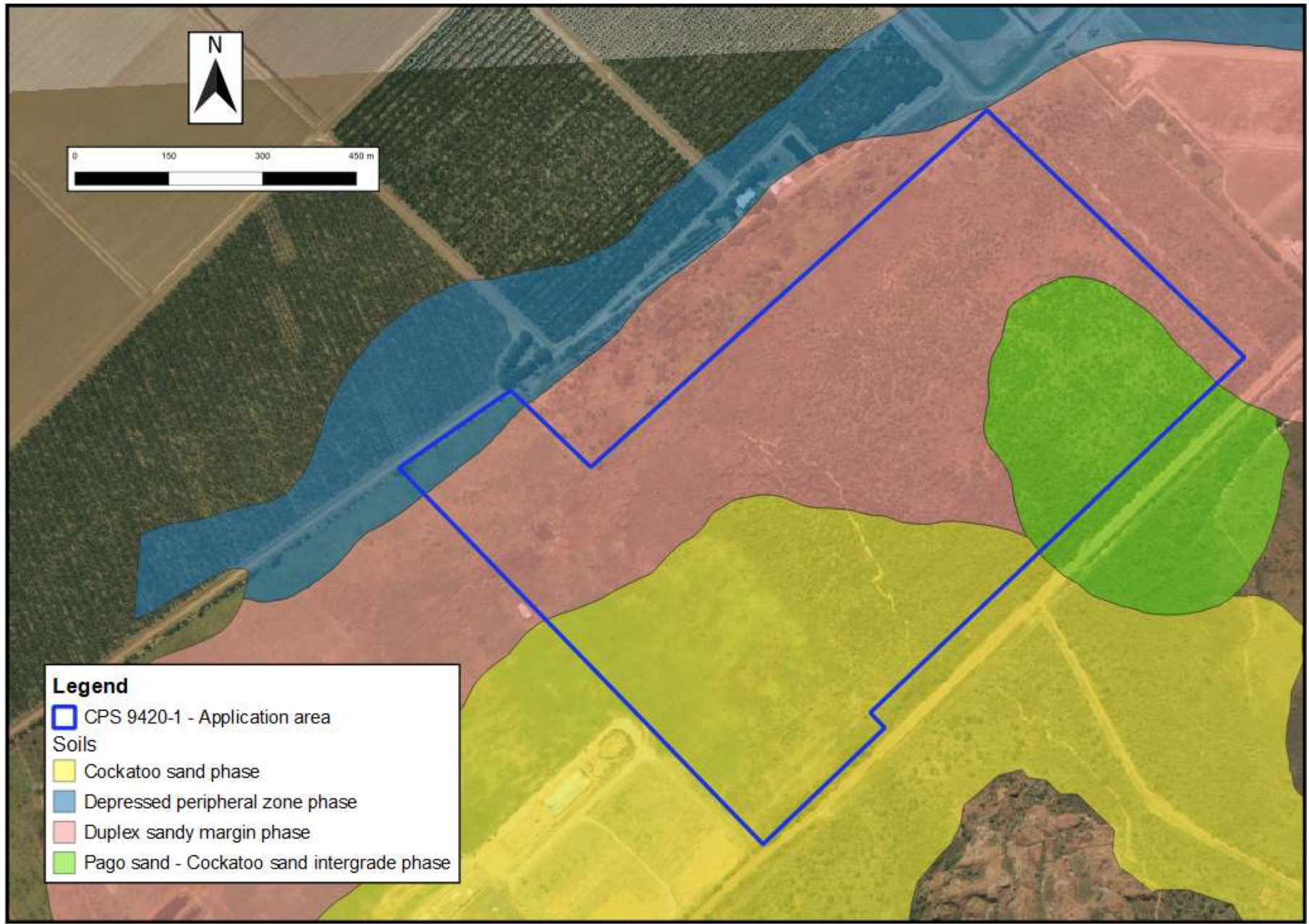


Figure D: Mapped soil types

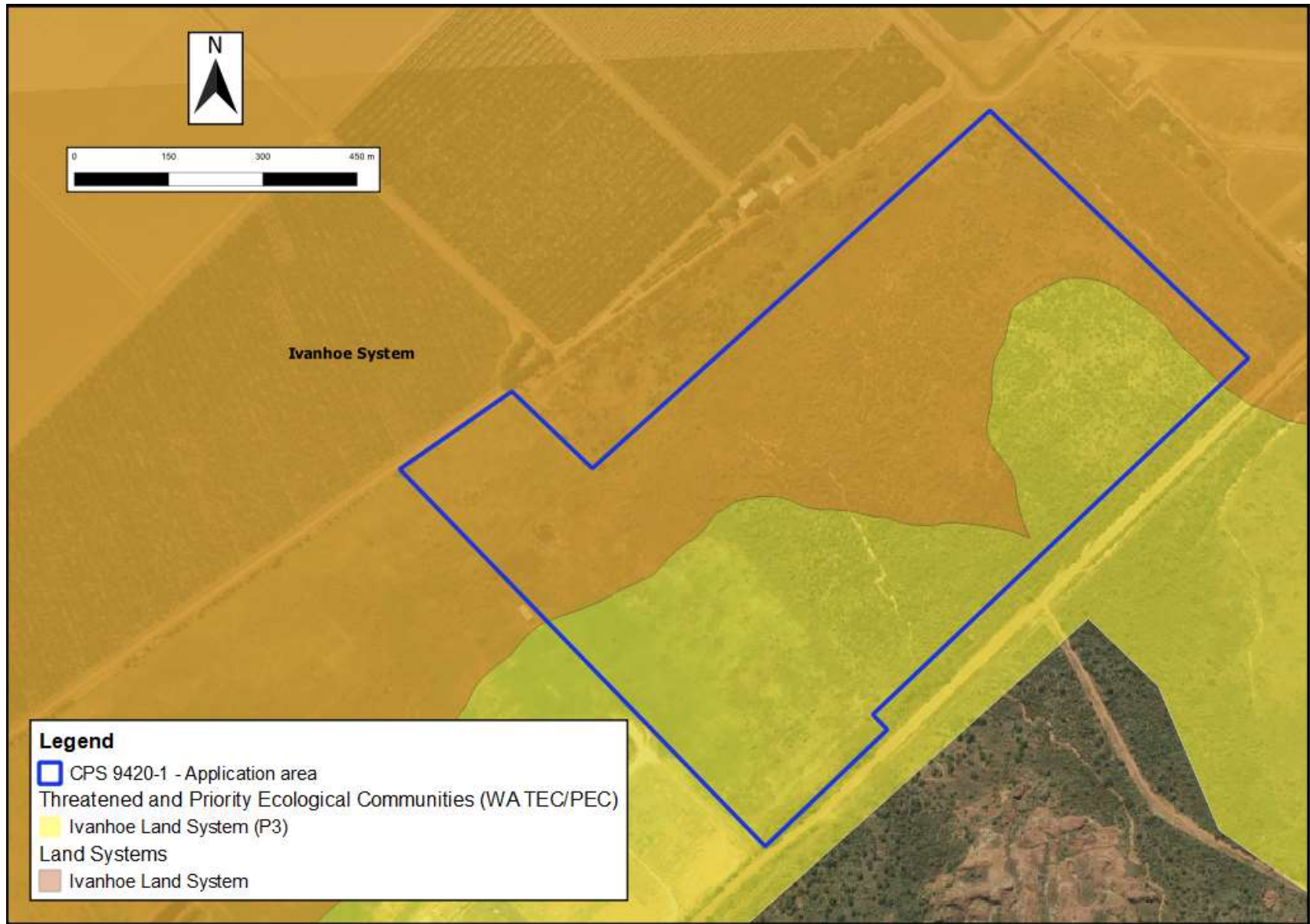


Figure E: Mapped Ivanhoe Land System, and the Ivanhoe Land System Priority Ecological Community (PEC)

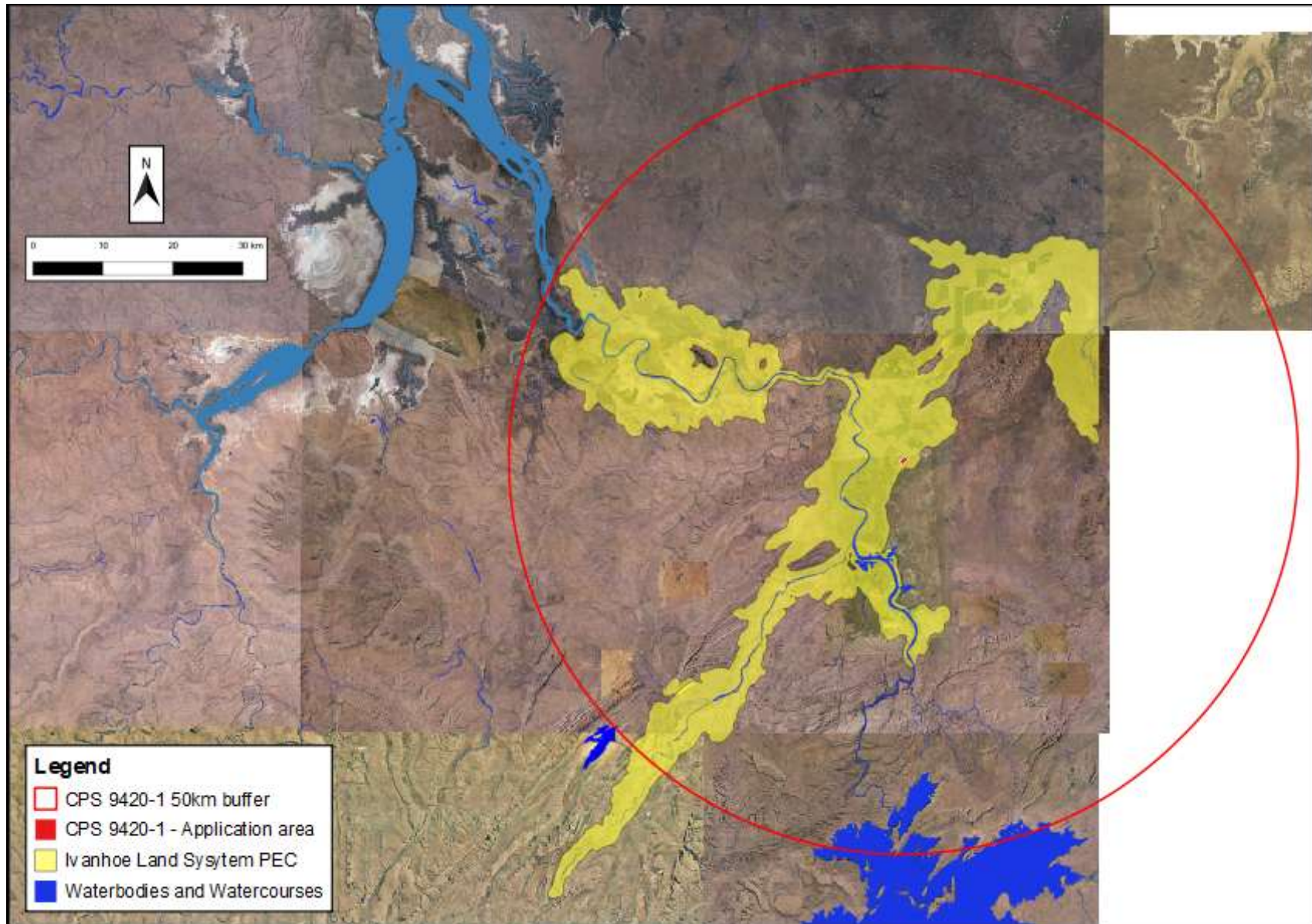


Figure F: Mapped Ivanhoe Land System Priority Ecological Community (PEC)

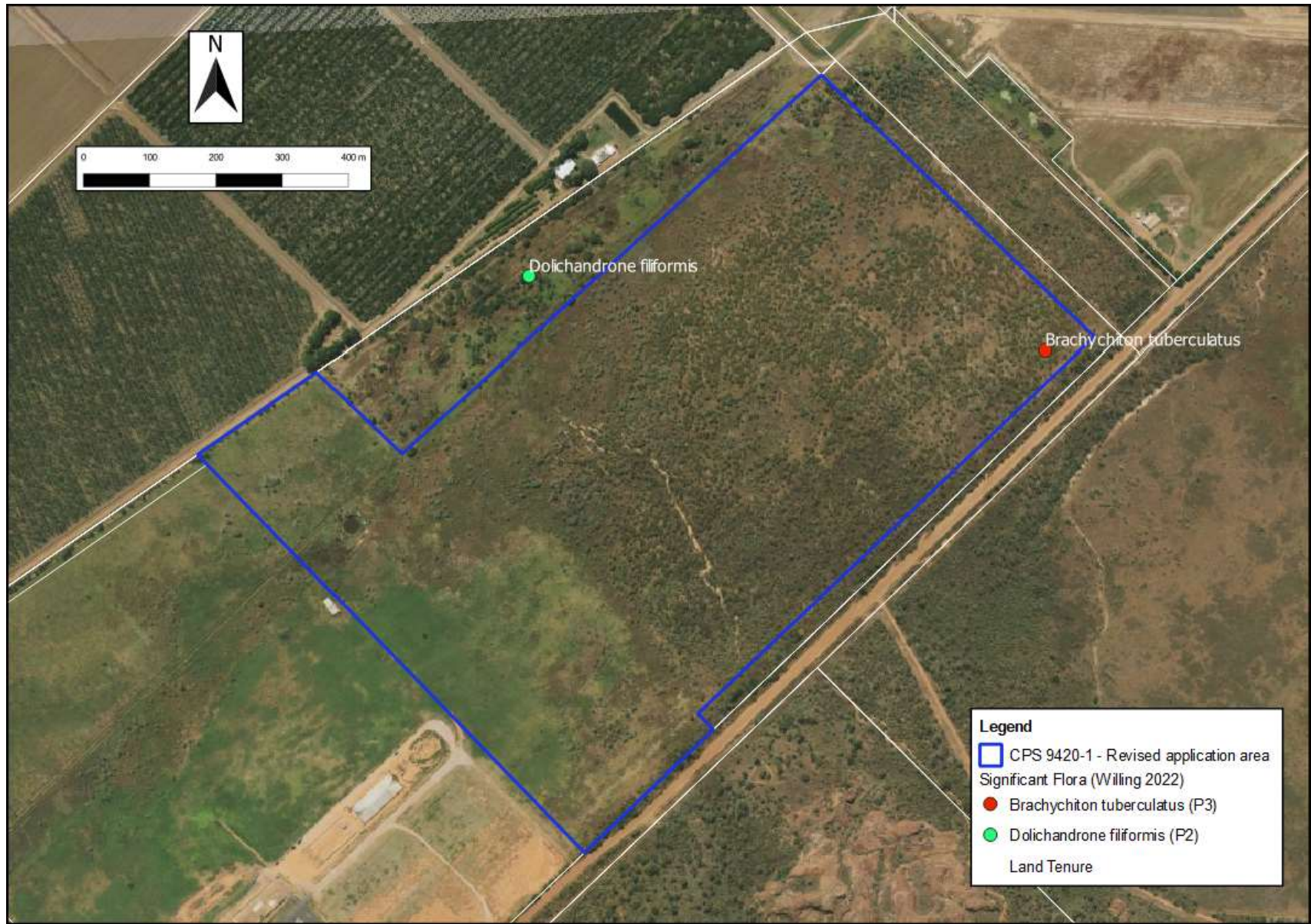


Figure G: Priority flora records within and adjacent to the application area

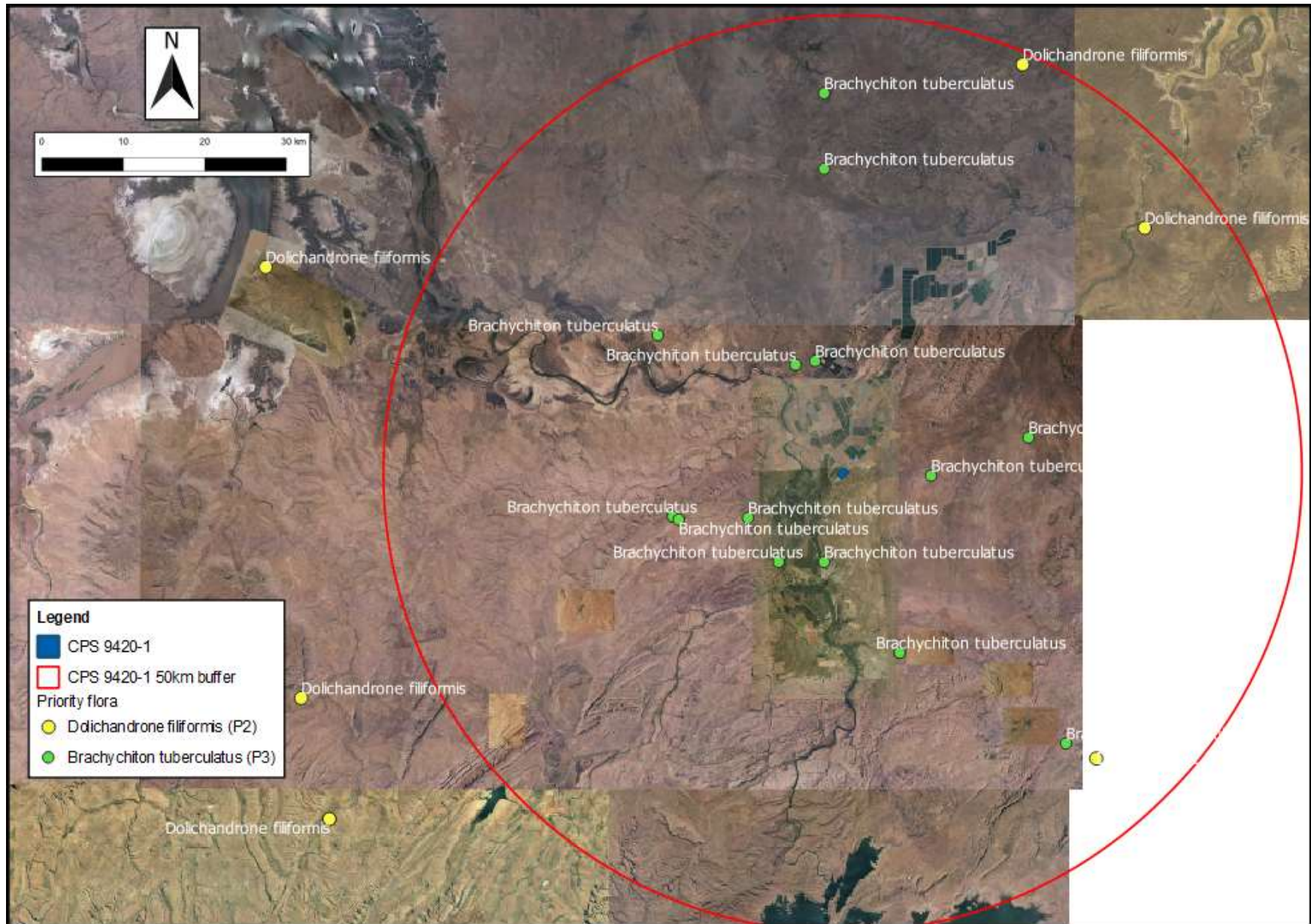


Figure H: *Dolichandrone filiformis* and *Brachychiton tuberculatus* records in the local area

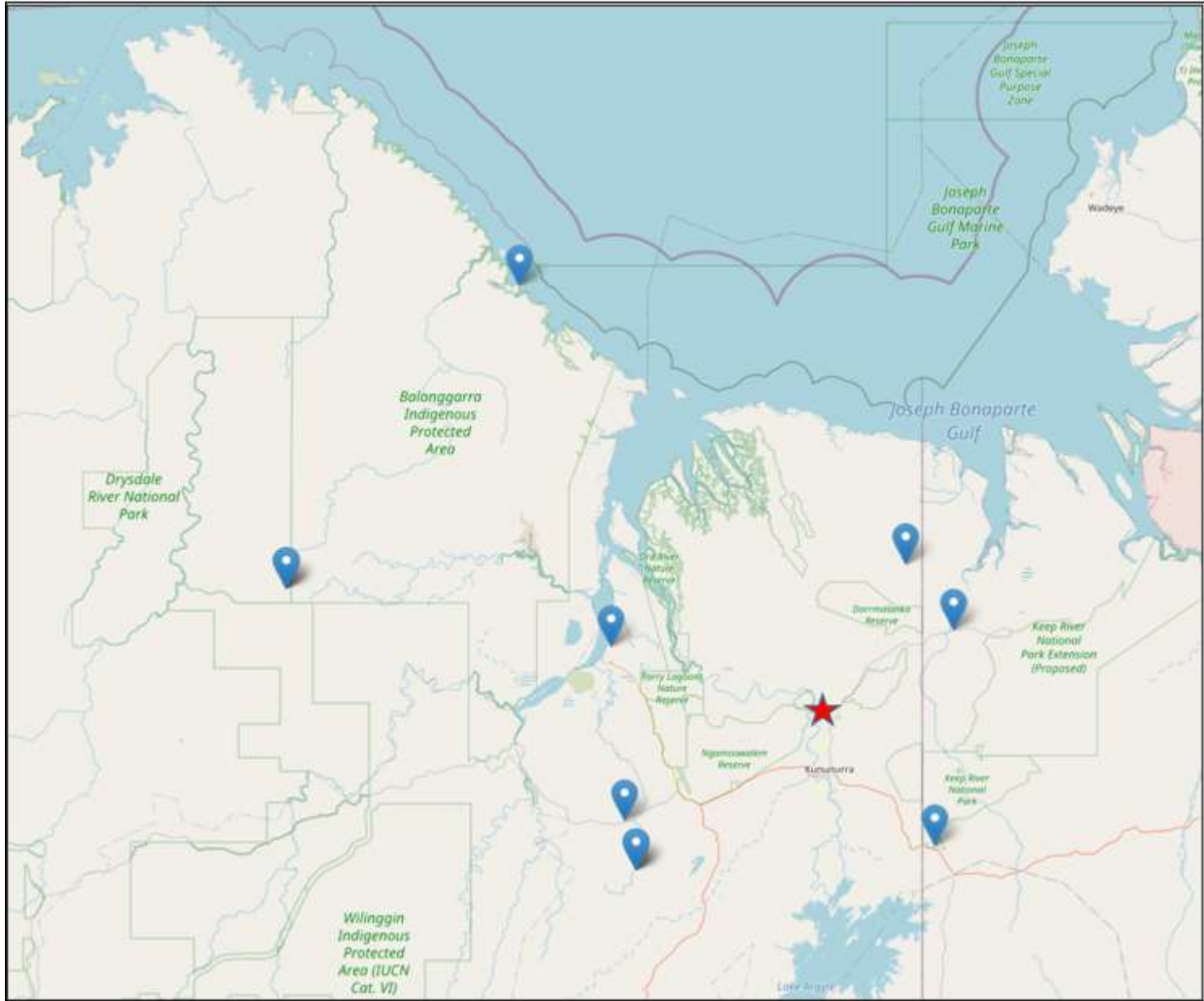


Figure 1: *Dolichandrone filiformis* records (WAH 1998-).

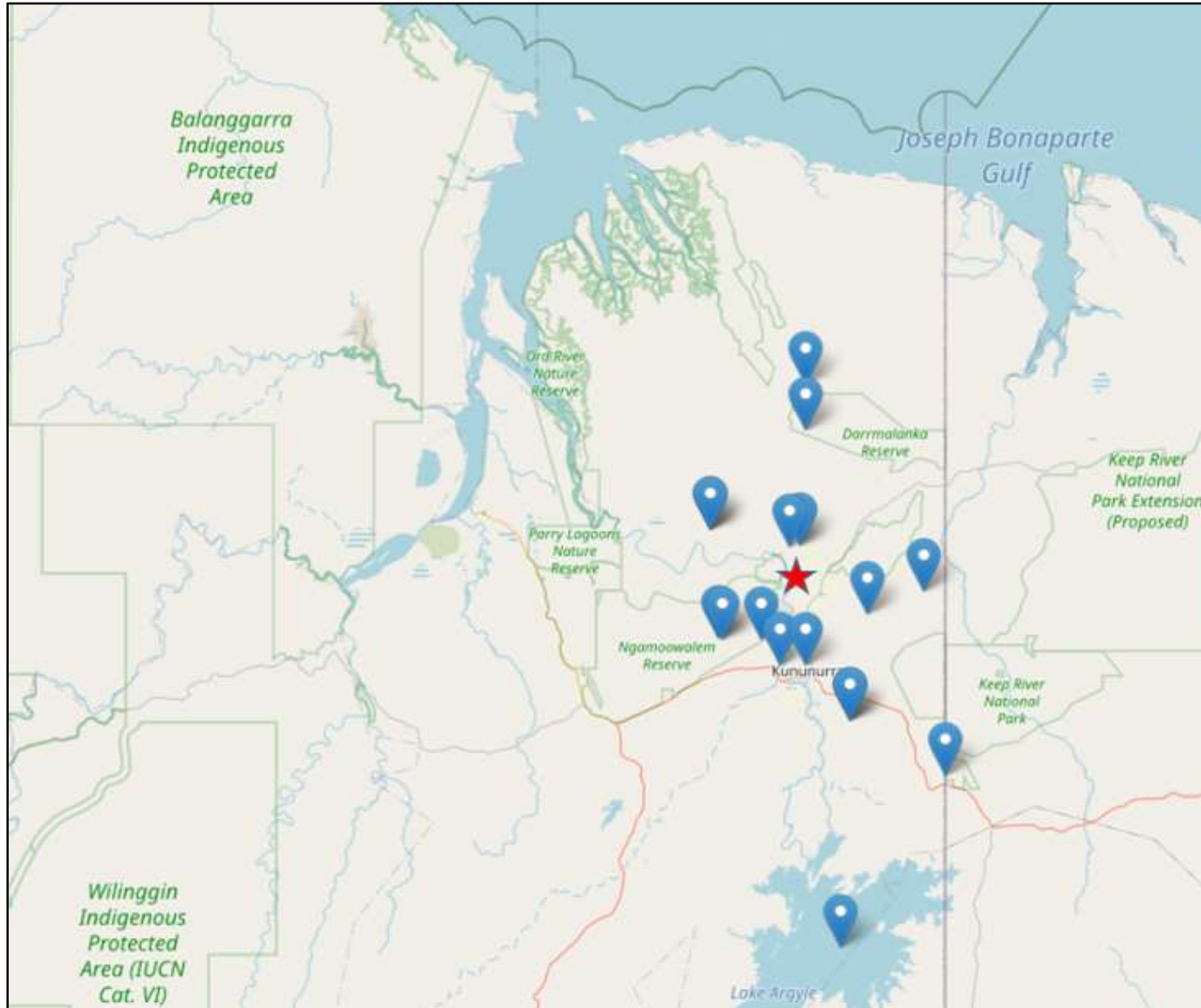


Figure J: *Brachychiton tuberculatus* records (WAH 1998-)

Appendix K: Sources of information

K.2. References

- Aldrick, J.M., Clarke, A.J., Moody, P.W., van Cuylenberg, M.H. and Wren, B.A. (1990). Soils of the Ivanhoe Plain, East Kimberley, Western Australia. Technical Bulletin No.82. Department of Agriculture, South Perth.
- Australian Bureau of Meteorology (BOM) website: <http://www.bom.gov.au/climate/data/> (accessed October 2021).
- Australian Museum (2021) Peregrine Falcon. Government of New South Wales. Available at: <https://australianmuseum.net.au/learn/animals/birds/peregrine-falcon/>.
- Australian Museum (2020) Freshwater Crocodile. <https://australian.museum/learn/animals/reptiles/freshwater-crocodile/>
- Avibase: The World Bird Database (2021) Bird species profiles. <https://avibase.bsc-eoc.org>
- Birdlife Australia (2021) Bird species profiles. BirdLife Australia <https://www.birdlife.org.au/bird-profile/>
- Birdlife Australia: Birds in Backyards (2021) <https://www.birdsinbackyards.net/species/>
- BirdLife International (2021). *Cuculus saturates*. IUCN Red List of Threatened Species. e.T61450351A86133024. doi:10.2305/IUCN.UK.2016-3.RLTS.T61450351A86133024.en.
- Commonwealth of Australia (2001) *National Objectives and Targets for Biodiversity Conservation 2001-2005*, Canberra.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2021a) Officer-level advice provided in relation to clearing permit application CPS 9420/1. Email dated 18 November 2021 (DWER ref. A2065389).
- Department of Biodiversity, Conservation and Attractions (DBCA) (2021b) *Priority Ecological Communities for Western Australia Version 32*. Species and Communities Program, 15 July 20 <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities>
- Department of Conservation and Land Management (CALM) (2005) Camaenid Land Snails of the East Kimberley - Interim Recovery Plan 2005-2010. Interim Recovery Plan 194, February 2005. https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/recovery_plans/Approved_interim_recovery_plans/_camaenid_snails_irp194.pdf
- Department of Environment and Conservation (DEC) (2019) Consultation Document on Listing Eligibility and Conservation Actions - *Falco hypoleucos* Grey Falcon. <https://www.awe.gov.au/sites/default/files/env/consultations/ad34afee-a901-4c94-8e71-654e9f15f29c/files/consultation-document-falco-hypoleucos.pdf>
- Department of Environment and Conservation (DEC) (2008) Site Inspection Report by the DEC (now the Department of Water and Environmental Regulation) over Lot 510 on Deposited Plan 421305. Clearing Permit application CPS 2370/1 (DWER Ref: DOC52440).
- Department of Environment and Conservation (DEC) (2009) Clearing Permit, Plan and Decision Report for clearing permit application CPS 2370/1. Department of Environment (now Department of Water and Environmental Regulation) URL: <https://ftp.dwer.wa.gov.au/permit/2370/Permit/>.
- Department of Environment and Conservation (DEC) (2012) Fauna profiles - Lakeland Downs Short-tailed Mouse - *Leggadina lakedownensis*. Department of Environment and Conservation, Western Australia. <https://library.dbca.wa.gov.au/static/FullTextFiles/071381.pdf>
- Department of Primary Industries and Regional Development (DPIRD) (2021a). Letter to Kimberley Cotton Company regarding lease arrangements. Dated 12 August 2021 (DWER ref. DWERDT500020).
- Department of Primary Industries and Regional Development (DPIRD) (2021b) Broad-scale mapping of *Typhonium* sp. Kununurra habitat and advice from DPIRD received by the Department of Water and Environmental Regulation received on 20 October 2021 (DWER ref. A2065753)
- Department of Primary Industries and Regional Development (DPIRD) (2021c). *NRInfo Digital Mapping. Department of Primary Industries and Regional Development*. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (accessed October 2021).
- Department of Primary Industries and Regional Development (DPIRD 2022a). Advice and a land assessment report for an application to clear native vegetation on Lot 510 on Deposited Plan 421305 – Kimberley Cotton Company (DWERDT569417).
- Department of Primary Industries and Regional Development (DPIRD 2022b). Communication received by the Department of Water and Environmental Regulation (DWER) from the Department of Primary Industries and Regional Development (DPIRD 2022b) on 23 September 2022 (DWERDT663564)

- Department of Water and Environmental Regulation (DWER) (2020) Rakali - Water rat - *Hydromys chrysogaster*. Available at: <https://rivers.dwer.wa.gov.au/species/hydromys-chrysogaster/>.
- Department of Water and Environmental Regulation (DWER) (2021a) Contaminated Sites Branch contaminated sites advice in relation to clearing permit application CPS 9420/1. Email dated 19 October 2021 (DWER ref. A2062603).
- Department of Water and Environmental Regulation (2021b) North West Region water licensing advice in relation to clearing permit application CPS 9420/1. Email dated 9 November 2021 (DWER ref. A2063558).
- Department of Water and Environmental Regulation (2022) Regulatory Services - Licensing, Process Industries advice in relation to clearing permit application CPS 9420/1. Email dated 24 October 2022 (DWERDT675261).
- Government of Western Australia (2019) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report)*. Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth.
- Ellis, R.J. (2019) A typhlopoid hotspot in the tropics: increased blindsnake diversity in the Kimberley region of Western Australia with the description of a new Anilius species (Serpentes: Typhlopidae). *Records of the Western Australian Museum* 34: 031-037 (2019). [https://museum.wa.gov.au/sites/default/files/WAMRecords_2019_34\(1\)_31to37_ELLIS.pdf](https://museum.wa.gov.au/sites/default/files/WAMRecords_2019_34(1)_31to37_ELLIS.pdf)
- Kimberley Cotton Company Ltd (Kimberley Cotton) (2021) *Clearing permit application CPS 9420/1 (including supporting information)*, received 3 September 2021 (DWER ref: DWERDT500018-20).
- Kimberley Cotton Company Ltd (Kimberley Cotton) (2022a) Response to a request for information from the Department of Water and Environmental Regulation (DWER) sent on 1 December 2021. (DWERDT611101; DWERDT611082; DWERDT611083; DWERDT612227; DWERDT656331)
- Kimberley Cotton Company Ltd (Kimberley Cotton) (2022b) Communications from the applicant regarding the need to progress clearing to enable the commencement of early works prior to the 2022 wet season (DWERDT663564; DWERDT660627; DWERDT665592).
- Marchant, S., & P.J. Higgins (eds) 1993. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings*. Oxford University Press, Melbourne. ISBN 0-19-553069-1
- Ministerial Media Statement (2021) *Kimberley cotton gin one step closer to reality*. Ministerial Media Statement published 15 September 2021. URL: <https://www.mediastatements.wa.gov.au/Pages/McGowan/2021/09/Kimberley-cotton-gin-one-step-closer-to-reality.aspx>.
- Northern Territory Government (2012) Threatened Species of the Northern Territory - Masked Owl (north Australian mainland subspecies) - *Tyto novaehollandiae kimberli*. https://nt.gov.au/__data/assets/pdf_file/0019/206362/masked-owl-mainland-top-end.pdf
- OzAnimals (2021) Oriental Cuckoo (*Cuculus optatus*). <https://www.ozanimals.com/Bird/Oriental-Cuckoo/Cuculus/optatus.html>
- Payne, A.L. and Schoknecht, N. (2011) Technical Bulletin No. 98. Land Systems of the Kimberley Region, Western Australia. Technical Bulletin No. 98. 3 Baron-Hay Court South Perth 6151. ISSN 0083-8675. September 2011.
- Shire of Wyndham-East Kimberley (2021) Direct interest comment provided in relation to clearing permit application CPS 9420/1. Email dated 19 October 2021 (DWERDT517327).
- Shire of Wyndham-East Kimberley (2022) Additional information provided by the Shire of Wyndham-East Kimberley. Emails dated 19 October 2022 and 20 October 2022 (DWERDT674284; DWERDT674413).
- Smolinski, H. (2003) Soil Survey of Frank Wise Horticulture Research Station Kununurra and Annex Block. King Loc. 318. (2003) Soil Survey of Frank Wise Horticulture Research Station Kununurra and Annex. Department of Agriculture (now the Department of Primary Industries and Regional Development - DPIRD). March 2003.
- Smolinski, H. (2021) Land and Habitat Condition Assessment of Lot 510 - Suitability as a viable habitat for *Typhonium* sp. Kununurra. Henry Smolinski, Senior Research Scientist. 21 October 2021 (DWER ref. A2065756).
- Start, A.N. (2017) Development of a *Typhonium* sp. (Araceae) from the east Kimberley, Western Australia. *Journal of the Royal Society of Western Australia*, 100(1): 9–17, 2017.
- Submission (2021) Public submission provided in relation to clearing permit application CPS 9420/1. Email dated 26 October 2021 (DWER ref. DWERDT519962).
- Threatened Species Scientific Committee (TSSC) (2005). Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*). Available from: <http://www.environment.gov.au/biodiversity/threatened/species/dasyurus-hallucatus.html>

- Threatened Species Scientific Committee (TSSC) (2015). Conservation Advice *Malurus coronatus coronatus* purple-crowned fairy-wren (western). Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/64442-conservation-advice-31102015.pdf>
- Threatened Species Scientific Committee (TSSC) (2016a). Conservation Advice *Macroderma gigas* ghost bat. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/174-conservation-advice-05052016.pdf>
- Threatened Species Scientific Committee (TSSC) (2016b). Conservation Advice *Rhinonictoris aurantia* (Pilbara form) (Pilbara Leaf-nosed Bat). Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/82790-conservation-advice-10032016.pdf>.
- Trudgen, M.E. (1991) *Vegetation condition scale* in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth.
- Western Australian Herbarium (WAH) (1998-). *FloraBase - the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions, Western Australia. <https://florabase.dpaw.wa.gov.au/> (accessed November 2021)
- Willing, T. (2022) A Botanical Survey of Lot 510 Mulligan's Lagoon Road (Proposed Cotton Gin Block) Kununurra. Report Prepared for Kimberley Cotton Company. Tim Willing and Henry Smolinski. PO Box 702. Broome, WA, 6725 (DWERDT590843)

K.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)
- 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)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography, Linear (Hierarchy) (DWER-031)
- Hydrological Zones of Western Australia (DPIRD-069)
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Mining Tenements (DMIRS-003)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation (DPIRD-006)
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- 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 – Salinity Risk (DPIRD-009)
- 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 (DPIRD-027)
- Soil Landscape Mapping – Systems (DPIRD-064)
- Vegetation Complexes – Swan Coastal Plain (DBCA-046)

Restricted GIS Databases used:

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