



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: 7298/1
File Number: 2016/001891-1
Duration of Permit: From 6 January 2018 to 6 January 2023

PERMIT HOLDER

Pastoral Management Pty Ltd

LAND ON WHICH CLEARING IS TO BE DONE

Lot 1501 on Deposited Plan 74341, Mardie.

AUTHORISED ACTIVITY

The Permit Holder shall not clear more than 150 hectares of native vegetation within the areas cross hatched yellow on attached Plan 7298/1.

CONDITIONS

1. Period in which clearing is authorised

- (a) between 1 January and 30 March of any given year; and
- (b) unless undertaking construction of the algae ponds within three months of the authorised clearing being undertaken.

2. Avoid, minimise etc clearing

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in 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.

3. Records to be kept

The Permit Holder must maintain the following records for activities done pursuant to this Permit:

- (a) in relation to the clearing of native vegetation authorised under this Permit,
 - (i) 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 or decimal degrees;
 - (ii) the date that the area was cleared; and
 - (iii) the size of the area cleared (in hectares).

4. Reporting

- (a) The Permit Holder must provide to the CEO on or before 30 June of each year, a written report demonstrating adherence to all conditions of this permit, and setting out the records required under condition 3 of this permit in relation to clearing and other activities carried out between 1 January and 31 December of the previous calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the CEO on or before 30 June of each year.
- (c) Prior to 3 October 2022, the Permit Holder must provide to the CEO a written report of records required under condition 3 of this Permit where these records have not already been provided under condition 4(a) of this Permit.

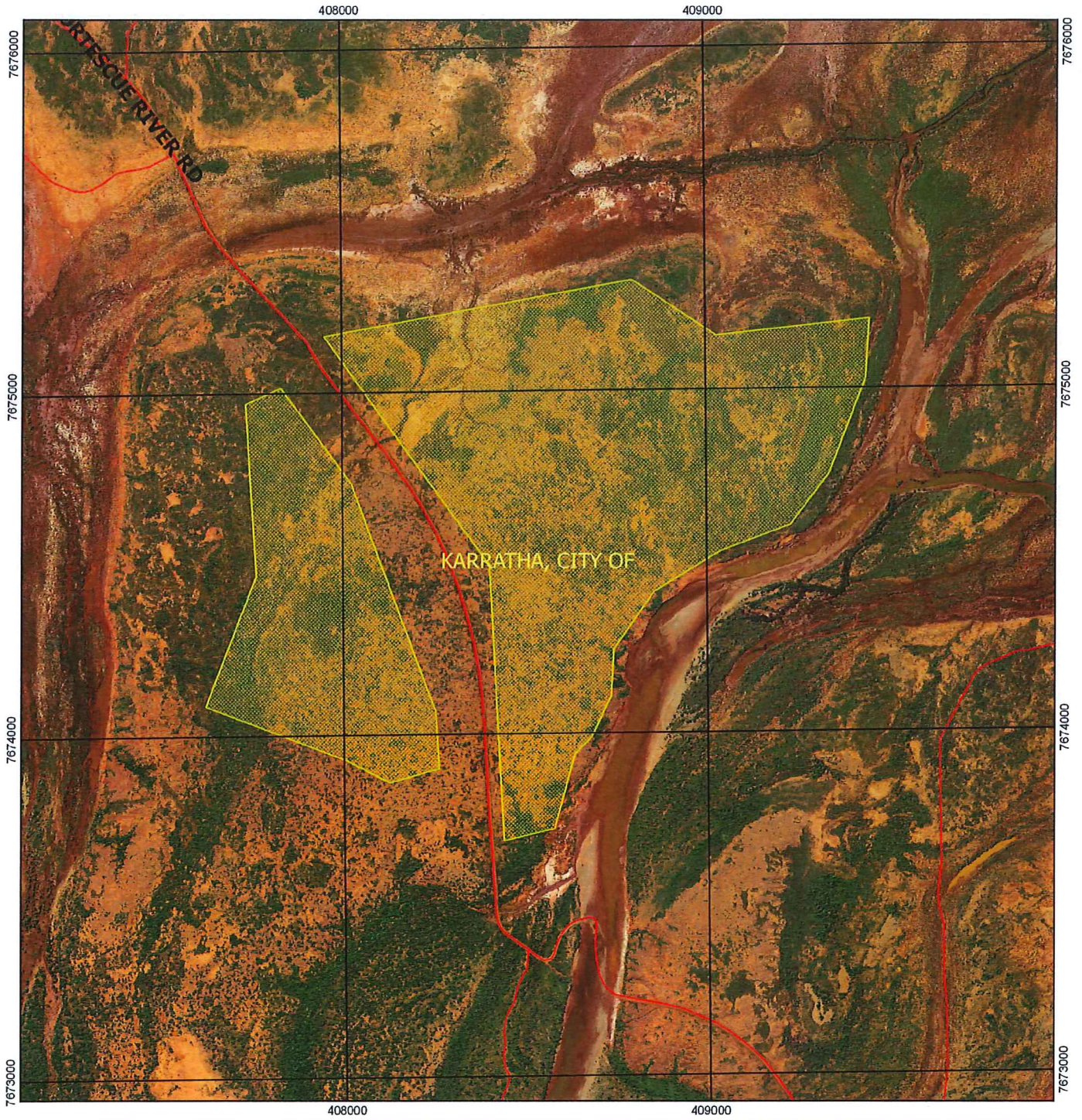


Mathew Gannaway
MANAGER
CLEARING REGULATION

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

7 December 2017

Plan 7298/1



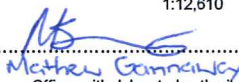
Legend

-  Roads
-  LGA
- Virtual Mosaic (LGATE-V001)
-  Areas approved to clear



MGA 94
Geocentric Datum of Australia 1994

1:12,810

 Date 7/12/17

Officer with delegated authority under Section 20
of the Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA



1. Application details

1.1. Permit application details

Permit application No.: 7298/1
Permit type: Area Permit

1.2. Applicant details

Applicant's name: Pastoral Management Pty Ltd

1.3. Property details

Property: Lot 1501 on Deposited Plan 74341
Local Government Authority: City of Karratha
Localities: Mardie

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
150		Mechanical Removal	Pastoral diversification

1.5. Decision on application

Decision on Permit Application: Granted

Decision Date: 7 December 2017

Reasons for Decision: The application for a clearing permit was received on 23 September 2016, and has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986*. It has been concluded that the proposed clearing is at variance to Principle (f), may be at variance to Principles (g), (i) and (j), is not at variance to principle (e) and is not likely to be at variance to the remaining clearing principles.

Based on the assessment against the clearing principles, the Delegated Officer determined that:

- the proposed clearing may cause appreciable land degradation in the form of water erosion;
- the proposed clearing may impact on the water quality of the nearby DuBoulay Creek; and
- the proposed clearing may exacerbate flooding

The Delegated Officer has granted the clearing permit subject to conditions to address the abovementioned potential impacts.

To minimise the potential for land degradation, surface water quality deterioration and flooding, the clearing permit contains conditions requiring:

- the algae ponds to be constructed within three months of the authorised clearing being undertaken; and
- no clearing to be undertaken during the regions wettest months (between 1 January and 30 March) of any given year.

The Delegated Officer took into account the Development Approval issued by the City of Karratha, which contains conditions that will assist in mitigating environmental impacts associated with the end land use.

In determining to grant a clearing permit subject to conditions, the Delegated Officer found that the proposed clearing is unlikely to lead to an unacceptable risk to the environment.

2. Site Information

Vegetation Description: Two mapped Beard vegetation associations occur within the application area:
- Beard vegetation association 676 is described as succulent steppe; samphire; and
- Beard vegetation association 600 is described as sedgeland; sedges with open low tree savanna; *Eucalyptus* sp. aff *aspera* over various sedges (Shepherd et al., 2001).

A site inspection undertaken by the former Department of Environment Regulation (DER) identified that the vegetation within the application area largely comprises (where * denotes a weed species) **Prosopis* sp. (mesquite) low open woodland over **Cenchrus ciliaris* and **Cenchrus setiger* tussock grassland with *Triodia* sp. open hummock grassland. Other areas comprised of **Prosopis* sp. low open woodland over scattered low shrubs of *Atriplex* sp. over **Cenchrus ciliaris* open tussock grassland and *Triodia* sp. hummock grassland (DER, 2017).

Clearing Description: The applicant proposes to clear 150 hectares of native vegetation within Lot 1501 on Deposited Plan 74341, Mardie, for the purpose of constructing algae ponds.

The applicant proposes to fill the algae ponds with mine dewater via a pipeline from the nearby Sino Iron Mine managed by CITIC Pacific Mining.

Vegetation Condition: Good; Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).

To

Degraded: Structure severely disturbed; regeneration to Good condition requires intensive management (Keighery, 1994).

The majority of the vegetation within the application area is considered to be in a degraded (Keighery, 1994) condition (DER, 2017).

Comment: The condition of the vegetation within the application area was determined via a site inspection undertaken by officers of the former DER (DER, 2017).

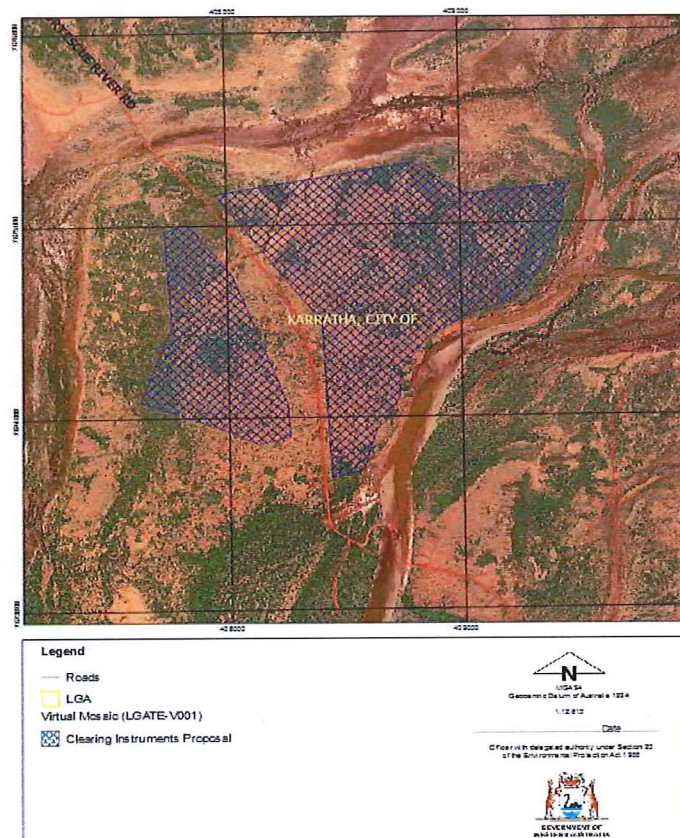


Figure 1. Application Area

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments **Proposed clearing is not likely to be at variance to this Principle**

The applicant proposes to clear 150 hectares of native vegetation within Lot 1501 on Deposited Plan 74341, Mardie, for the purpose of constructing algae ponds (see Figure 1).

The vegetation within the application area is considered to be in a good to degraded (Keighery, 1994) condition, with the majority of the vegetation in a degraded (Keighery, 1994) condition (DER, 2017). The application area is on a Pastoral Lease and signs of cattle grazing were observed throughout. A high density of weed species was observed throughout the majority of the area inspected, with weeds significantly altering native vegetation structure (DER, 2017).

The application area is located on a gently undulating floodplain, located approximately 2.25 kilometres from the coastal watermark and adjacent to a section of DuBoulay Creek, which borders the application area to the south and east. The application area includes a natural drainage area (mapped as a minor non-perennial watercourse) within the north west portion of the larger application area, which appears to be an outlet for when DuBoulay Creek floods (DER, 2017). The Fortescue River is located approximately 700 metres west of the application area.

The vegetation within the application area largely comprises (where * denotes a weed species) **Prosopis* sp.

(mesquite) low open woodland (forms dense thickets in certain areas) over *Cenchrus ciliaris* and *Cenchrus setiger* tussock grassland with *Triodia* sp. open hummock grassland (DER, 2017). The site inspection also identified areas of *Prosopis* sp. low open woodland over scattered low shrubs of *Atriplex* sp. over *Cenchrus ciliaris* open tussock grassland and *Triodia* sp. hummock grassland within the application area. The natural drainage area within the north west portion of the application area comprises low open heath of mixed chenopod species including *Tecticornia* sp. and *Neobassia astrocarpa*. Occasional *Acacia* sp. were encountered (DER, 2017).

As discussed under Principle (g), the application area has been mapped by the former Department of Agriculture and Food Western Australia (DAFWA) as the Yamerina Land System and the Littoral Land System. A site inspection identified that the soils within the application area range from red deep loamy duplex soils and red loamy earths to red/brown clays (DER, 2017).

The local area considered in the assessment of this application is defined as a 50 kilometre radius measured from the perimeter of the application area. According to available datasets, no threatened ecological communities (TECs) or rare flora have been recorded within the local area.

According to available datasets, the closest Priority Ecological Community (PEC) to the application area is the Horseflat Land System of the Roebourne Plains (Priority 3), recorded approximately 12.5 kilometres east of the application area. This PEC is described as extensive, weakly gilgaied clay plains dominated by tussock grasslands on mostly alluvial non-gilgaied, red clay loams or heavy clay loams. Given the dominance of weed species such as *Prosopis* sp., *Cenchrus ciliaris* and *Cenchrus setiger* (DER, 2017), the application area is not considered to be representative of this PEC.

According to available datasets there are nine priority flora species recorded within the local area. A Level 1 Flora and Fauna Survey undertaken for a proposed pipeline between Sino Iron Mine (at Cape Preston) and the Fortescue River, which runs between the two application areas (borders the westernmost application area at its closest point) did not identify any threatened or priority listed flora (Astron Environmental Services, 2013) (see Figure 2 below depicting the location of the survey area in yellow). The site inspection determined that the vegetation within the adjacent survey area for the proposed pipeline is contiguous with the application areas (DER, 2017).

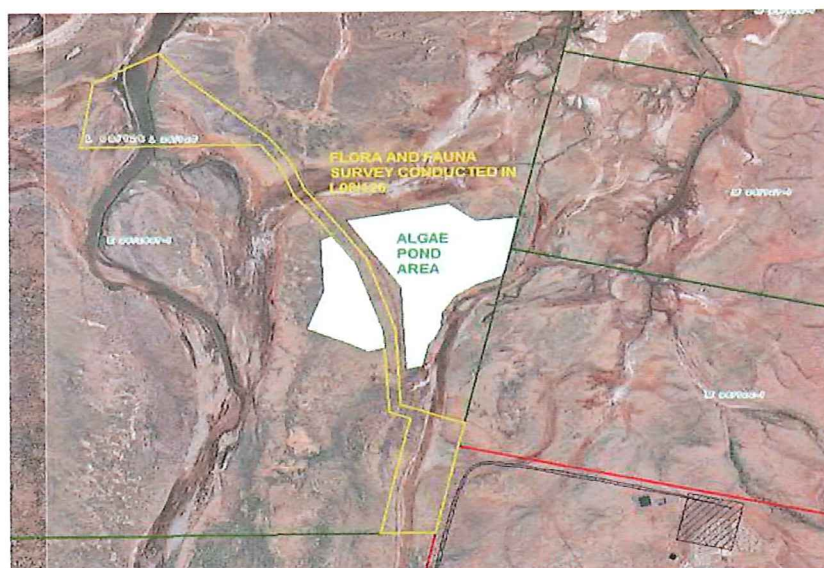


Figure 2. Survey Area relative to the Application Area

With regard to potential impacts to rare or priority flora species, the former Department of Parks and Wildlife (Parks and Wildlife) advised (Parks and Wildlife, 2017b):

It is noted that the Level 1 flora survey provided is for the proposed pipeline route that runs between the two areas proposed to be cleared under CPS 7298/1, but that this survey did not identify any threatened or priority ecological communities or species in that vicinity, despite searching for priority species that were deemed to have the potential to occur.

The Department of Parks and Wildlife considers it unlikely that these priority flora species or any priority fauna would be significantly impacted by the proposed clearing. Impacts may be minimised by limiting vegetation clearing and disturbance as far as practicable and by undertaking progressive rehabilitation to prevent further degradation of adjacent habitats.

Noting that the application area is dominated by weed species and is largely in a degraded (Keighery, 1994) condition (DER, 2017), and given Parks and Wildlife's advice and the findings of the Level 1 Flora and Fauna Survey, the application area is not likely to contain threatened or priority flora species.

As assessed under Principle (b), given the largely degraded (Keighery, 1994) condition of the vegetation within the application area and presence of higher quality vegetation within the local area, the application area is not

likely to comprise significant fauna habitat.

Noting the condition of the vegetation within the application area, high density of weed species, and the unlikely presence of threatened or priority flora, fauna or ecological communities, the application area is not likely to comprise a high level of biological diversity.

Given the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

References:

Astron Environmental Services (2013)
DER (2017)
Keighery (1994)
Parks and Wildlife (2017b)

GIS Databases:

SAC Bio Datasets (Accessed December 2017)
Hydrography, Hierarchy
Hydrography, Linear
Landsystem Rangelands

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposed clearing is not likely to be at variance to this Principle

There are records of 40 conservation significant fauna species within the local area (Parks and Wildlife, 2007-). Of these, 24 are migratory avian species with large home ranges, and two of these species, being the great egret (*Ardea modesta*) and lesser sand plover (*Charadrius mongolus*), were identified during a Level 1 Flora and Fauna Survey which encompassed an adjacent area of native vegetation between the two application areas (Astron Environmental Services, 2013).

Noting the highly mobile nature of migratory avian species, extent of proposed clearing relative to the vegetation remaining within the local area (which retains approximately 99 per cent pre-European vegetation), and that the application area is largely in a degraded (Keighery, 1994) condition (DER, 2017), the application area is not likely to comprise significant habitat for the great egret, lesser sand plover or any other migratory avian fauna.

Nine of the species recorded in the local area are marine species, and given that a vegetative buffer is maintained (largely 40 to 50 metres) to the nearby DuBoulay Creek, direct impacts to marine habitats are unlikely. As discussed under Principle (i), the proposed clearing may result in secondary impacts to marine habitats, via surface water run-off and sedimentation into DuBoulay Creek and the Fortescue River, particularly during periods of heavy rainfall. To mitigate this potential impact, the applicant is required to clear outside of the regions wettest months (being January to March), and construct the algae ponds within three months of clearing to limit the exposure of bare soils and minimise risks associated with water erosion and sedimentation.

The remaining fauna species recorded in the local area are the northern quoll (*Dasyurus hallucatus*) (classified as 'rare or likely to become extinct' under the *Wildlife Conservation Act 1950* [WC Act]), orange leaf-nosed bat (*Rhinioncteris aurantia*) (classified as 'rare or likely to become extinct' under the WC Act), black-footed rock-wallaby (*Petrogale lateralis subsp. lateralis*) (classified as 'rare or likely to become extinct' under the WC Act), little north-western mastiff bat (*Mormopterus loriae subsp. cobourgiana*) (recognised as Priority 1 by the Department of Biodiversity, Conservation and Attractions (DBCA)), spectacled hare-wallaby (*Lagorchestes conspicillatus subsp. leichardti*) (Priority 3), western pebble-mound mouse (*Pseudomys chapmani*) (Priority 4) and short-tailed mouse (*Leggadina lakedownensis*) (Priority 4) (Parks and Wildlife, 2007-).

A site inspection of the application area did not identify any discrete fauna habitats such as caves, breakaways, other rocky habitats, large trees or hollow logs, which are recognised as suitable habitat for the northern quoll, little north-western mastiff bat, western pebble-mound mouse, black-footed rock-wallaby, and orange leaf-nosed bat (DER, 2017). Noting this, the application area is not likely to provide significant habitat for these species.

The spectacled hare-wallaby and short-tailed mouse may opportunistically forage within the application area, however given the largely degraded (Keighery, 1994) condition of the application area, and noting the presence of extensive areas of surrounding vegetation, these mobile species are likely to be transient visitors, and are not likely to be reliant on the habitat within application area.

With regards to impacts to conservation significant fauna the former Parks and Wildlife advised (Parks and Wildlife, 2017b):

It is unlikely that...any priority fauna would be significantly impacted by the proposed clearing.

Given the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

References:

Astron Environmental Services (2013)
DER (2017)
Keighery (1994)
Parks and Wildlife (2007-)
Parks and Wildlife (2017b)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments Proposed clearing is not likely to be at variance to this Principle

According to available datasets there are no rare (Threatened) flora records within the local area. The closest rare flora record is located approximately 280 kilometres south east of the application area. This species is described as a shrub that grows on rocky crevices, near the edge of creek beds, on the base of cliffs, or near the crest of a ridge (Western Australian Herbarium, 1998-).

A site inspection of the application area did not identify suitable habitat for this species (DER, 2017), and the proposed clearing is not likely to contain or be necessary for the continued existence of rare flora.

Given the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

References:
DER (2017)
Western Australian Herbarium (1998-)

GIS Databases:
SAC Bio Datasets (Accessed December 2017)

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments Proposed clearing is not likely to be at variance to this Principle

According to available databases, there are no records of TECs within the local area. The closest TEC to the application area is the 'Roebourne Plains gilgai grasslands with gilgai microrelief on deep cracking clays', recorded approximately 74 kilometres north east of the application area.

A site inspection of the application area did not identify the presence of deep cracking clays. Noting this, and dominance of weed species (DER, 2017), the application area is not considered to be representative of this TEC.

Given the above, the application area is not likely to comprise the whole or a part of, or be necessary for the maintenance of any TECs, and the proposed clearing is not likely to be at variance to this Principle.

Methodology

References:
DER (2017)

GIS Databases:
SAC Bio Datasets (Accessed December 2017)

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

Comments Proposed clearing is not at variance to this Principle

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

As indicated in Table 1, the remaining extents of native vegetation within the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, local government area and mapped vegetation associations are all greater than the 30 per cent threshold.

The local area is extensively vegetated and retains approximately 99 per cent (536,727 hectares) of its pre-European vegetation extent (taking into account the coastal watermark). The application area represents approximately 0.028 per cent of the remaining native vegetation within the local area, and the proposed clearing would reduce the extent of native vegetation within the local area to 536,577 hectares.

Noting the high level of disturbance, dominance of weed species and absence of significant habitat for flora and fauna species of conservation significance (DER, 2017), the application area is not considered to be significant as a remnant. Noting that the Shire, the IBRA bioregion and the local area retain more than 30 per cent of their vegetation extents, it is considered that the application area is not within an area that has been extensively cleared.

Given the above, the proposed clearing is not at variance to this Principle.

Table 1: Vegetation Extents

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Extent in Parks and Wildlife Managed Lands (%)
IBRA Bioregion*				
Pilbara	17,808,657	17,733,584	99.6	10.2
Local Government Area*				
City of Karratha	1,529,968	1,500,854	98.1	2.5
Beard Vegetation Association in Bioregion*				
600	67,036	66,955	99.9	0
676	92,364	92,303	99.9	0

Methodology References:
Commonwealth of Australia (2001)
DER (2017)
*Government of Western Australia (2016)

GIS Databases:
Kimberley Remnant Vegetation
Pre-European Vegetation

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposed clearing is at variance to this Principle

The application area is located on a gently undulating floodplain (mapped as an area subject to inundation), located approximately 2.25 kilometres from the coastal watermark and approximately 40 to 50 metres from a perennial watercourse commonly known as DuBoulay Creek, which borders the application area to the south and east. The application area includes a mapped minor non-perennial watercourse which runs from the north west portion of the application area to the south west portion. The minor watercourse was identified during the site inspection (DER, 2017). Fortescue River is located approximately 700 metres west of the application area.

The former Department of Water (DoW) was notified of the proposed clearing and advised the following with regard to impacts to riparian vegetation (DoW, 2016):

The following management practices are advised...:

- Disturbance to riparian vegetation should be avoided to maintain foreshore stability and protect important riparian habitats...[and]
- There should be no significant alteration of the natural hydrological regime and geomorphology of the waterway and its catchment.

While the application area largely maintains a 40 to 50 metre buffer to DuBoulay Creek, the vegetation growing within the minor watercourse and within areas closest to DuBoulay Creek, comprise of low open heath of mixed chenopod species including *Tecticornia* sp. and *Neobassia astrocarpa* in a degraded to good (Keighery, 1994) condition (DER, 2017). These species are commonly associated with watercourses and floodplains within the region, therefore the application area does contain vegetation growing in association with an environment associated with a watercourse or wetland.

Noting the above, the proposed clearing is at variance to this Principle.

Given the largely degraded (Keighery, 1994) condition of the vegetation within the application area (DER, 2017), that a buffer to DuBoulay Creek is maintained, and that riparian habitat in better condition appears to occur within and around DuBoulay Creek and the Fortescue River (such as on other floodplains of the Fortescue River), the proposed clearing is not likely to have a significant impact on riparian habitat within the local area.

To mitigate impacts to DuBoulay Creek and the Fortescue River, the applicant is required to clear outside of the regions wettest months (being January to March) and construct the algae ponds within three months of clearing to limit the exposure of bare soils and reduce the risk of sedimentation.

Methodology References:
DER (2017)
DoW (2016)
Keighery (1994)

GIS Databases:
Hydrography, Hierarchy
Hydrography, Linear

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments

Proposed clearing may be at variance to this Principle

The application area has been mapped by the former DAFWA to be a mixture of the Yamerina and Littoral Land Systems. The Yamerina Land System is described as deltaic deposits supporting tussock grassland, woodland and minor halophytic shrubs. The Littoral Land System is described as bare coastal mudflat, mangroves and sandy flats with samphire. A site inspection identified that the soils within the application area range from red deep loamy duplex soils and red loamy earths to red/brown clays (DER, 2017).

The soils identified within the application area are considered to have a moderate to low risk of wind erosion, and given that the application area has previously been heavily grazed and contains bare areas, the proposed clearing is not likely to result in appreciable land degradation through wind erosion.

The Commissioner of Soil and Land Conservation (CSLC) was notified of the proposed clearing and advised the following with regard to the potential for land degradation (CSLC, 2016):

The application area has been interpreted to be located on the flood plains land unit of the Yamerina Land System. The soils are likely to be red, deep loamy duplex and loamy earths with some sandy duplex soils.

The application area being on the flood plain is likely to be subject to regular flooding from over bank flow and run on during cyclonic and monsoonal rainfall as well as the flooding of the Fortescue River. Tidal and storm surge may be other risk factors...

...I conclude that the proposed land clearing and algal pond construction may cause appreciable land degradation...

Noting the above, there is the potential for appreciable land degradation to occur via water erosion and flooding, and the proposed clearing may be at variance to this Principle.

This risk of water erosion will be heightened during wetter months or cyclonic events. To mitigate the potential for water erosion, the applicant will be required to clear outside of the regions wettest months (being January to March) and construct the algae ponds within three months of clearing, to limit the exposure of bare soils and reduce the risk of water erosion.

Methodology

References:
CSLC (2016)
DER (2017)

GIS Databases:
Landsystem Rangelands
Hydrography, Hierarchy
Hydrography, Linear

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments

Proposed clearing is not likely to be at variance to this Principle

The closest conservation area managed by the Department of Biodiversity Conservation and Attractions (DBCA) is the Great Sandy Island Nature Reserve, located approximately 8.2 kilometres north east of the application area. The proposed clearing of 150 hectares of mainland vegetation largely in a degraded (Keighery, 1994) condition is not likely to impact on the environmental values of this reserve. There are no mainland conservation areas managed by the DBCA within the local area.

Given the above, the proposed clearing is not likely to impact on the environmental values of any conservation areas, and the proposed clearing is not likely to be at variance to this Principle.

Methodology

References:
Keighery (1994)

GIS Databases:
SAC Bio Datasets (Accessed December 2017)
DBCA Tenure

(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.

Comments

Proposed clearing may be at variance to this Principle

As discussed under Principle (f), the application area is within close proximity to a section of DuBoulay Creek, which borders the application area to the south and east. The application area includes a minor non-perennial watercourse which runs from the north west portion of the application area to the south west portion. The Fortescue River is located approximately 700 metres west of the application area.

As discussed under Principle (g), the proposed clearing may result in water erosion via flooding. This has the potential to transport sediment from the application area into the nearby DuBoulay Creek and potentially into the Fortescue River, resulting in the deterioration of water quality within these watercourses.

With regard to impacts to riparian habitats, the former Parks and Wildlife advised (Parks and Wildlife, 2017b):

The proposed clearing could impact on the adjacent floodplain, mangroves and salt flats by altering surface water flows.

The former Parks and Wildlife recommended that surface water management measures are employed to maintain a normal surface water regime that allows for the protection of environmental values (Parks and Wildlife, 2017b).

Mapped groundwater salinity within the application area is moderately saline to brackish (less than 1000 to 3000 milligrams per litre total dissolved solids). While brackish groundwater may occur, the application area contains vegetation in largely a degraded (Keighery, 1994) condition, with existing bare areas as a result of cattle grazing (DER, 2017). Therefore, noting that the local area is highly vegetated, it is unlikely that the proposed clearing will lead to a significant rise in groundwater levels, and the deterioration in the quality of surface and/or underground water via increased salinity is considered unlikely.

Noting that the proposed clearing may result in sedimentation of DuBoulay Creek and the Fortescue River, it may be at variance to this Principle.

As discussed under Principle (g), the applicant is required to clear outside of the regions wettest months and construct the algae ponds within three months of clearing. These measures will assist to limit the exposure of bare soils and reduce the risk of water erosion, which will minimise run-off and sedimentation into nearby watercourses.

Methodology

References:

CSLC (2016)
DER (2017)
Keighery (1994)
Parks and Wildlife (2017b)

GIS Databases:

Groundwater Salinity, Statewide
Hydrography, Hierarchy
Hydrography, Linear

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

Comments

Proposed clearing may be at variance to this Principle

The application area lies between the Onslow and Karratha town sites, which experience an arid to tropical climate with regular cyclonic events that usually occur between January and March and contribute to a mean annual rainfall of approximately 328 millimetres. On average, these towns experience highest levels of rainfall between January and March (BoM, 2017a; BoM, 2017b).

As discussed under Principle (g), in relation to flooding, the CSLC advised (CSLC, 2016):

The application area being on the flood plain is likely to be subject to regular flooding from over bank flow and run on during cyclonic and monsoonal rainfall as well as the flooding of the Fortescue River. Tidal and storm surge may be other risk factors...

Noting that the application area is located on a floodplain, the close proximity of DuBoulay Creek and the Fortescue River and advice from the CSLC, it is considered that the proposed clearing may increase the risk of localised short term flooding following periods of heavy rainfall, which is commonly experienced by the region. Therefore, the proposed clearing may be at variance to this Principle.

As discussed within Principles (g) and (i), the applicant would be required to clear outside of the regions wettest months, which will assist to reduce the risk of flooding immediately post clearing.

Methodology

References:

BoM (2017a)
BoM (2017b)
CSLC (2016)

GIS Databases:

Hydrography, Hierarchy
Hydrography, Linear

Planning instruments and other relevant matters.

Comments

The clearing permit application was advertised in *The West Australian* newspaper on 24 October 2016 for a 21 day public submission period. No public submissions have been received for this application.

The intent of the proposed clearing is for the disposal of excess dewatering effluent from the nearby Sino Iron Mine site into holding ponds for the farming of algae. The Sino Iron Mine site is run by CITIC Pacific Mining who is working with the applicant, Pastoral Management Pty Ltd, to initiate the project.

The applicant has advised that the algae pond operations are a predominantly passive operation. Water is proposed to be held in the ponds where optimal algae conditions of abundant sunlight and carbon dioxide prevail (Aurecon, 2017). The type of algae harvested will be *Dunaliella salina*, which is a genus of one-celled green microalgae commonly used in beta carotene production. The applicant advised that this species is known for its low nuisance and invasiveness value (Aurecon, 2017). The algae product produced by the operation is an algae concentrate and/or biomass which will be used as supplemental feed stock for pastoral operations and very small quantities will be diverted to trial alternative later tertiary processing usages such as biofuel or dietary supplements. The initial production rates are expected to be in the order of 150,000 kg per annum of algae concentrate per year (Aurecon, 2017).

CITIC Pacific Mining hold an operational licence (L8308/2008/2) issued by the former DER's Industry Regulation, associated with the operations of the Sino Iron Mine site, which includes the prescribed premises category of mine dewatering discharge. The applicant has applied for an amendment to L8308/2008/2, to allow for an additional mine dewater discharge point to be included to service the algae ponds. The amendment is currently under assessment by DWER's Industry Regulation.

The applicant has also applied for a separate works approval to allow for the mine dewater to be discharged into the algae ponds, and the subsequent maintenance of the algae ponds. The works approval is currently under assessment by DWER's Industry Regulation.

Native Title Notification

On 21 October 2016, a DER Delegated Officer wrote to the Yaburara and Mardudhunera native title claimants and Yamatji Marlpa Aboriginal Corporation (which acts on behalf of the claimants), providing notice as required by section 24GB s9 of the *Native Title Act 1993*, and providing an opportunity to comment on the application. A response has not yet been received.

Department of Lands Advice

The application area is on a Pastoral Lease, and on 15 September 2015 the applicant applied for a Pastoral Diversification Permit from the former Department of Lands (DoL) to allow for the deviation in land use and construction of the algae ponds, as provided for under section 122 of the *Land Administration Act 1997*.

On 14 October 2016 the former DoL provided a copy of a draft pastoral diversification permit to the former DER. The former DoL advised that the Pastoral Diversification Permit has been approved in principle, pending a clearing permit being issued (Department of Lands, 2017).

Commissioner of Soil and Land Conservation (CSLC) Advice

The CSLC provided the following advice with regard to the potential environmental impact associated with the proposed end land use (CSLC, 2016):

The application area being on the flood plain is likely to be subject to regular flooding from over bank flow and run on during cyclonic and monsoonal rainfall as well as the flooding of the Fortescue River. Tidal and storm surge may be other risk factors...

Therefore, the design and construction of the proposed ponds will need to consider these risks and possibly saline and erodible soils that could contribute to structural failure.

Fencing of the ponds is also recommended to avoid damage caused by livestock.

It is not known whether nutrients will be required to drive the algae production in the ponds and whether this may pose a risk of land degradation in the form of eutrophication. Also it is not known whether the type of algae is benign or poses a biosecurity threat should it escape into the local environment.

The former Department of Parks and Wildlife (Parks and Wildlife) Advice

The dominant overstorey species on site, **Prosopis* sp. (mesquite), is a Weed of National Significance and a declared plant under the *Biosecurity and Agricultural Management Act 2007*. With regard to managing the spread of this species, the former Parks and Wildlife advised (Parks and Wildlife, 2017a):

Whilst Parks and Wildlife is supportive of the continual removal of this species [mesquite] the pastoralist needs to ensure that the mechanical removal is undertaken in alignment with current best practice and that the cleared material is not spread off site. In addition to this, the pastoralist should ensure that appropriate weed hygiene is implemented to minimise the risk of spreading this species to areas which are known to be mesquite free (i.e. coastal floodplain and mangroves, other areas of the station).

The main public access road to the Fortescue River mouth runs through the centre of the proposed algae ponds. Parks and Wildlife recommends that the pastoralist continues to ensure appropriate management of

weed species within a minimum of 50 metres of the road to prevent further spread. The Pilbara Mesquite Management Committee (PMMC) can be contacted directly for detailed information on best practice mesquite removal and management...

The former Parks and Wildlife provided further advice on the management of mesquite, based on the findings of the site inspection and advised (Parks and Wildlife, 2017b):

Both the flora survey [as previously referred to] and the Department of Environment Regulation's site inspection report identified the presence of the declared weed species, mesquite...and other weed species. It is recommended that weed management for the application area be conducted in accordance with the Sino Iron Project Operational Management Plan (OEMP) [developed for the aforementioned Sino Iron mine]...

With regard to the impact of mesquite and its potential spread, the applicant has advised that it has historically worked with the Pilbara Mesquite Management Committee to ensure best practice environmental management of Mardie Station. Specifically the applicant provided a transcript from the Pilbara Mesquite Management Committee website which notes that:

Mardie Station houses the single largest infestation of mesquite in Australia, covering two thirds of the 225,000 pastoral grazing lease. The population is comprised of a hybrid mix of species, which has given it extra robustness in surviving in the semi-arid conditions of the Pilbara. In partnership with Citic Pacific Mining and Pastoral Management, we have developed a strategic plan for containing and controlling mesquite on Mardie Station. It incorporates elements of strategic fencing and stock management, spatial mapping, chemical control, mechanical control and monitoring to limit the risk of spread of mesquite and gradually reduce its distribution and density across the station.

Significant work has been undertaken since this plan was put into action in 2011, using both herbicides and machinery to control mesquite... Additionally, 835 hectares of moderate to dense mesquite has been treated during this time. With the secured 10 year commitment put in place by CITIC Pacific Mining, we now have the best opportunity to make a real difference in controlling mesquite at Mardie Station.

It is considered that the applicant's continual involvement with the Pilbara Mesquite Management Committee in accordance with the strategic plan for containing and controlling mesquite on Mardie Station, will assist in managing the potential spread of Mesquite associated with the proposed clearing.

Based on the findings of the site inspection report, the former Parks and Wildlife provided further comment on the potential impact of the proposed clearing and end land use and advised (Parks and Wildlife, 2017b):

The proposed clearing could impact on the adjacent floodplain, mangroves and salt flats by altering surface water flows. It is noted that the objective of surface water management in the Sino Iron Project OEMP [associated with the development of a nearby pipeline route] is to "maintain a normal surface water regime (e.g. catchment, flow paths, volumes) that allows for protection of environmental values". It is recommended that a similar objective be implemented for the application area if the proposed clearing is approved. There may also be the potential for the algae ponds to overflow during high rainfall events, which could impact on the quality of water flowing into Fortescue River and DuBoulay Creek, both through sediment and nutrient loads in this runoff. It is recommended that the irrigation schedule be adapted to ensure enough capacity is maintained within the ponds to avoid significant overflow when rainfall is forecast.

The former Department of Water (DoW) Advice

The former DoW provided the following advice relating to the proposed clearing and end land use (DoW, 2016):

The proposal location does not occur within a public drinking water source area...however all activities associated with the clearing should be managed using current best practices, to ensure water resources are not impacted.

The following management practices are advised:

- Disturbance to riparian vegetation should be avoided to maintain foreshore stability and protect important riparian habitats.
- There should be no significant alteration of the natural hydrological regime and geomorphology of the waterway and its catchment.
- No activity shall be undertaken which results in the loss of riverbank or fringing vegetation, in particular construction of vehicular access tracks. Where possible, existing tracks are to be used.
- No activity shall be undertaken that will unduly disrupt natural drainage or adversely affect the quality or quantity of water in any watercourse, dam, waterhole, spring or subterranean source of supply.

The proposed clearing is located within the Pilbara Groundwater and Pilbara Surface Water Area, both proclaimed under the *Rights in Water and Irrigation (RiWI) Act 1914*. With regard to the potential requirement of additional approvals under the RiWI Act, the former DoW advised (DoW, 2016):

In these [Pilbara Groundwater and Pilbara Surface Water] areas a 5C Licence to take groundwater and a 26D Licence to Construct or Alter a well would be required for any groundwater supply bores. Furthermore, a permit under section 21A of the RiWI Act may be required to enable interference with the bed and banks of a watercourse.

The department can confirm that the proponent does not have any current licenses or permits relevant to this proposal area, and has not received any applications to date. If the proponent intends to take ground or surface water for the clearing purposes then a 5C and 26D application will need to be submitted for assessment – however the department understands dewater from mining operations will be used to supply the ponds.

In summary the department does not consider the application to clear native vegetation will have an adverse effect on water resources in the area...

Applicant (via CITIC Pacific Mining) Advice

With regard to the management of potential environmental impacts associated with the end land use, the applicant provided additional information to the former DER, former DoL and the City of Karratha. The additional information noted that:

- The type of algae proposed for harvesting (*Dunaliella salina*), is known for its low nuisance and invasiveness;
- The water from the algae ponds will be pumped from below the mine via sumps in the base of the pit and bores. Nothing is added to the water in the process;
- The water proposed for transport to the algae ponds is saline and of similar salinity to the groundwater beneath the algae pond. The creeks in the vicinity of the algae pond area are also exposed to saline water, therefore significant changes to natural water sources are considered unlikely;
- The harvesting process is mechanical and does not require any chemical additives;
- The algae pond wall height will be at a minimum of one metre, and may be raised above this height, in accordance with predicted flood modelling data to enable management of 1 in 100 year predicted flood events;
- The design and layout of the ponds and bunding walls have been informed from 1 in 100 year floodplain modelling;
- Cyclone rated sheds will be erected for storage and processing purposes. The sheds will be protected from flooding by raising them above the 1 in 100 year predicted flood heights;
- A Construction Environment Management Plan will be developed and include the following standards; earthmoving operations, ground and marine water quality and monitoring, onsite waste management and collection, weed management, noise and dust control, grey water containment and disposal, spill mitigation measures and contamination response action, noise and construction vehicles and machinery emissions;
- The water for the pond will be sourced from the nearby groundwater pumping for mine dewatering at the Sino Iron Mine... The water will be pumped from the mine pit into turkey's nests close to the mine and then distributed to the ponds through a pipe network. This will allow management of the water pumping rate;
- Irrigation water run-off from this system is minimal, as water is contained within the ponds. The amount and frequency of application required to optimise production will be determined through to current conditions by monitoring water use and pond status; and
- Permanent water cover, scheduling irrigation to account for pond levels and forecast rain and judicious use of surface water control structures will minimise the risk of loss through sediment transport and run-off.

(CITIC Pacific Mining, 2016; Aurecon, 2017):

City of Karratha Development Approval

Since the above information was provided, the applicant has obtained Development Approval from the City of Karratha for the algae ponds. The Development Approval is subject to conditions requiring:

- A Stormwater Management Plan for the construction and operational phases of the development, prior to the commencement of works. The plan is to include all relevant existing and finished levels, flow of stormwater from the development off the site and the end receiving destination along with any sediment and erosion control measures/devices to be implemented;
- A Construction Environmental Management Plan, to be submitted and endorsed by the City of Karratha prior to the commencement of works; and
- That the ongoing use of the site and approved development works shall not cause erosion or degradation to the subject or surrounding land. Should the City of Karratha deem it necessary to undertake mitigation works to address erosion or degradation, such works must be in accordance with plans to be submitted to the City of Karratha for endorsement and be undertaken to the satisfaction of the City of Karratha.

(City of Karratha, 2017).

It is considered that the management measures outlined by the applicant and those imposed via conditions of the Development Approval, will be sufficient to adequately mitigate environmental impacts associated with the end land use.

Methodology References:
Aurecon (2017)
CITIC Pacific Mining (2016)
City of Karratha (2017)
CSLC (2016)
DoW (2016)
Parks and Wildlife (2017a)
Parks and Wildlife (2017b)

4. References

Aurecon (2017) Development Application Submission – Intensive Horticulture (Algae Ponds, Storage Sheds, Greenhouse and Ancillary Works). Additional Information for Development Approval Application (DER Ref A1564740).

Astron Environmental Services (2013) Sino Iron Project Dewatering Pipeline Location. Level 1 Flora and Fauna Survey. Additional information Provided for Clearing Permit Application CPS 7298/1. DER Ref A1378430.

Bureau of Meteorology (BoM) (2017a). Climate Statistics for Australian Locations – Summary statistics Onslow. Australian Government, Canberra. [Accessed 20 May 2017].

Bureau of Meteorology (BoM) (2017b). Climate Statistics for Australian Locations – Summary statistics Karratha. Australian Government, Canberra. [Accessed 20 May 2017].

City of Karratha (2017) Decision on Application for Development Approval, received 13 November 2016. Additional information provided for Clearing Permit Application CPS 7298/1 (DER Ref A1564654).

CITIC Pacific Mining (2016) Additional information Provided for Clearing Permit Application CPS 7298/1. DER Ref A1403313 and Ref A1403298.

Commissioner of Soil and Land Conservation (CSLC) (2016). Land Degradation Advice and Assessment Report for clearing permit application CPS 7298/1 received 23 December 2016; Department of Agriculture and Food Western Australia (DER Ref A1352147).

Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.

Department of Environment Regulation (DER) (2017) Site Inspection Report for Clearing Permit Application CPS 7298/1. Site inspection undertaken 20 March 2017. Department of Environment Regulation, Western Australia (DER Ref A1403319).

Department of Lands (2017) Additional information Provided for Clearing Permit Application CPS 7298/1 (DER Ref A1451952).

Department of Parks and Wildlife (Parks and Wildlife) (2007-) NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife. URL: <http://naturemap.dpaw.wa.gov.au/>. Accessed December 2017.

Department of Parks and Wildlife (Parks and Wildlife) (2017a) Direct Interest Advice for Clearing Permit Application CPS 7298/1, received 23 January 2017. Department of Parks and Wildlife (DER Ref A1366710).

Department of Parks and Wildlife (Parks and Wildlife) (2017b) Additional Direct Interest Advice for Clearing Permit Application CPS 7298/1, received 23 May 2017. Department of Parks and Wildlife (DER Ref A1437388).

Department of Water (DoW) (2016) Direct Interest Advice for Clearing Permit Application CPS 7298/1, received 3 November 2016. Department of Parks and Wildlife (DER Ref A1186375).

Government of Western Australia (2016). 2015 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of September 2016. WA Department of Parks and Wildlife, Perth.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.

Western Australian Herbarium (1998-) FloraBase - The Western Australian Flora. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/> (Accessed December 2017).