



## **CLEARING PERMIT**

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 10817/1
Permit Holder:	Pilbara Iron Company (Services) Pty Ltd
<b>Duration of Permit:</b>	From 22 May 2025 to 22 May 2035

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 geotechnical investigation and associated activities.

## 2. Land on which clearing is to be done

Lot 150 on Deposited Plan 242287, Maitland Lot 1502 on Deposited Plan 75876, Maitland

## 3. Clearing authorised

The permit holder must not clear more than 14 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

## 4. Period during which clearing is authorised

The permit holder must not clear any native vegetation after 22 May 2030.

## PART II – MANAGEMENT CONDITIONS

## 5. 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.

#### 6. 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.

#### 7. Directional clearing

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

## 8. Fauna management – backfilling

The permit holder must:

- (a) fence all test pits on the day of drilling/excavating with fine mesh to prevent fauna access; or
- (b) cover all test pits on the day of drilling/excavating with a cover which prevents entry to the pits by fauna species and backfill upon completion
- (c) cover all bore holes at the end of each day and backfill upon completion; and
- (d) restrict clearing activities to day-light hours to avoid the possibility of injury to fauna.

#### 9. **Revegetation and rehabilitation (temporary works)**

The permit holder must:

- (a) retain the vegetative material and topsoil removed by clearing authorised under this permit and stockpile the vegetative material and topsoil in an area that has already been cleared;
- (b) at an *optimal time* within 12 months following clearing authorised under this permit, *revegetate* and *rehabilitate* the area(s) that are no longer required for the purpose for which they were cleared under this permit (*temporary works*) by:
  - i. ripping the ground on the contour to remove soil compaction; and
  - ii. laying the vegetative material and topsoil retained under condition 9(a) on the cleared area(s).
- (c) within 24 months of laying the vegetative material and topsoil on the cleared area in accordance with condition 9(b) of this permit:
  - i. engage an *environmental specialist* to determine the species composition, structure and density of the area *revegetated* and *rehabilitated*; and
  - ii. where, in the opinion of an *environmental specialist*, the composition structure and density determined under condition 9(c)(i) of this Permit will not result in similar species composition, structure and density to that of pre-referral clearing vegetation types in that area, *revegetate* the area by

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deliberately *planting* and/or *direct seeding native vegetation* that will result in a similar species composition, structure and density of native vegetation to pre-clearing vegetation types in that area and ensuring only local provenance seeds and propagating material are used.

### PART III - RECORD KEEPING AND REPORTING

#### 10. 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.

No.	Relevant matter	Speci	ifications		
1.	In relation to the authorised clearing	the (a) the species composition, structure, and the cleared area;			
activities generally		(b)	the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), 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)	the date that the geotechnical activities were commenced		
		(f)	actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 5		
		(g)	actions taken to minimise the risk of the introduction and spread of <i>weeds</i> in accordance with condition 6; and		
		(h)	action taken to minimise impacts on fauna in accordance with condition 7 of this Permit.		
2.	In relation to fauna management pursuant to condition 8	(a)	evidence of backfilling / fencing / covering all excavations in accordance with condition 8.		
3.	In relation to the	(a)	The size of the area revegetated and rehabilitated		
	revegetation and rehabilitation or areas	(b)	The date(s) on which the <i>revegetation</i> and <i>rehabilitation</i> was undertaken; and		
	of the permit	(c)	The boundaries of the area <i>revegetated</i> and <i>rehabilitated</i> (recorded digitally as a shapefile).		

Table 1: Records that must be kept

#### 11. Reporting

The permit holder must provide to the *CEO* the records required under condition 10 of this permit when requested by the *CEO*.

## DEFINITIONS

In this permit, the terms in Table 2 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.
direct seeding	means a method of re-establishing vegetation through the establishment of a seed bed and the introduction of seeds of the desired plant species.
environmental specialist	means a person who holds a tertiary qualification in environmental science or equivalent and has a minimum of 2 years work experience relevant to the type of environmental advice that an environmental specialist is required to provide under this permit, or who is approved by the <i>CEO</i> as a suitable environmental specialist
EP Act	Environmental Protection Act 1986 (WA)
fill	means material used to increase the ground level, or to fill a depression.
local provenance	means native vegetation seeds and propagating material from natural sources within 50 kilometres and the same IBRA subregion of the area cleared.
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.
optimal time	means the period from November to December for undertaking direct seeding and no planting without irrigation for undertaking planting.
planting	means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired specie
rehabilitate/ed/ion	means actively managing an area containing native vegetation in order to improve the ecological function of that area.
revegetate/ed/ion	means the re-establishment of a cover of local provenance native vegetation in an area using methods such as natural regeneration, direct seeding and/or planting, so that the species composition, structure and density is similar to pre- clearing vegetation types in that area.
temporary works	means access tracks, spoil areas, side tracks, site offices, storage areas, laydown areas, extraction sites, camps, project surveys, pre-construction activities, and similar works associated with a project activity that are temporary in nature
	means any plant –
	(a) that is a declared pest under section 22 of the <i>Biosecurity and</i>
	Agriculture Management Act 2007; or
weeds	(b) published in a Department of Biodiversity, Conservation and
	Attractions species-led ecological impact and invasiveness
	ranking summary, regardless of ranking; or
	(c) not mulgenous to the area concerned.

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### **END OF CONDITIONS**

B.Walker.

Belinda Walker EXECUTIVE DIRECTOR GREEN ENERGY

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

29 April 2025





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



# **Clearing Permit Decision Report**

1 Application details a	and outcome
1.1. Permit applicat	tion details
Permit number:	CPS 10817/1
Permit type:	Purpose permit
Applicant name:	Pilbara Iron Company (Services) Pty Ltd
Application received:	24 October 2024
Application area:	14 hectares (ha) of native vegetation in a 140 ha footprint
Purpose of clearing:	Undertaking geotechnical investigations
Method of clearing:	Mechanical clearing
Property:	Lot 1502 on Deposited Plan 75876 Lot 150 on Deposited Plan 242287
Location (LGA area/s):	City of Karratha
Localities (suburb/s):	Maitland

## 1.2. Description of clearing activities

The application is to clear 14 ha of native vegetation within a 140-ha clearing footprint (see Figure 1, Section 1.5) for the purpose of geotechnical investigation. The investigation is required to assess the soil and ground conditions to facilitate the future development of the Karratha Solar Farm. The investigation will include site testing and sampling to obtain a representation of the sub-surface conditions of the site.

## 1.3. Decision on application

Decision:	Granted
Decision date:	29 April 2025
Decision area:	14 ha of native vegetation in a 140 ha footprint, 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). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days. No submissions were received.

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

- site characteristics (see Appendix A)
- relevant datasets (see Appendix E.1)
- findings of the fauna (Stantec, 2023), and flora and vegetation (AECOM, 2023) surveys undertaken across a larger 1824-ha survey area which encompasses the application area. The surveys did not identify any evidence of conservation significant flora and/or fauna within the application area (see Appendix D)
- clearing principles set out in Schedule 5 of the EP Act (see Appendix B)
- findings of the DWER's environmental impact assessment of the proposed activities (see Section 3.2)

- advice from DWER's North West Region branch that the proposed clearing is unlikely to impact the water quality and water resources; and
- relevant planning instruments and any other matters considered relevant to the assessment (see Section 3).

The Delegated Officer also took into consideration that the objective of the proposal is to facilitate preliminary works for the Karratha Solar Farm. If approved, this project will support an increase in the supply of renewable energy in Western Australia and is aligned with the State's objective to develop a cleaner, more diverse, and affordable electricity network.

The assessment identified that the proposed clearing may result in the following:

- the potential introduction and spread of weeds into adjacent vegetation, which could impact the quality of the adjacent vegetation and its habitat values
- The loss of habitat for conservation significant fauna species which is not considered significant at the local or regional scale
- The proposed clearing may expose the soils in the area to wind erosion. However, considering the limited extent of clearing and its temporary nature, the impacts are unlikely to be appreciable.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing is unlikely to lead to appreciable or long-term adverse impacts on environmental values including fauna, vegetation and soils. The potential impacts can be managed to avoid an unacceptable risk to the environment.

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

- avoid, minimise to reduce the impacts and extent of clearing
- take hygiene steps to minimise the risk of the introduction and spread of weeds
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity
- revegetate and rehabilitate areas cleared for temporary works by laying stockpiled vegetative material and topsoil on the cleared area; and
- backfilling, fencing or covering all test pits and bore holes to prevent fauna access and potential injuries.



#### 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 510 of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

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

Other legislation of relevance for this assessment include:

- Biodiversity Conservation Act 2016 (WA) (BC Act)
- Conservation and Land Management Act 1984 (WA) (CALM Act)
- Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)
- Rights in Water and Irrigation Act 1914 (RIWI Act)
- Land Administration Act 1997
- Planning and Development Act 2005.

The key guidance documents which inform this assessment are:

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

#### **3** Detailed assessment of application

#### 3.1. Avoidance and mitigation measures

The applicant stated that the application area has been carefully planned to avoid and minimise unnecessary disturbance and will be carried out in accordance with the environmental management plan which includes the following mitigation measures (Drilling Environmental Plant, 2024):

- Access to the application area will be via both bitumen road and existing track, where possible to reduce impact of activities within an area
- No widening or maintenance of existing track will be undertaken
- No clearing will occur within 50 meters of national park boundary
- avoiding and minimising impacts to environmentally sensitive areas
- avoiding non-approved boundary and exclusion and restricted areas; and
- mitigating impacts as stated in the environmental management plan.

The Delegated Officer was satisfied that 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

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

The assessment against the clearing principles (see Appendix B) identified the impacts of the proposed clearing present a risk to biological values. 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 (Biodiversity and Fauna) - Clearing Principles (a and b)

#### **Vegetation**

The vegetation within the clearing footprint is mapped as Vegetation Association (VA) Abydos Plain-Roebourne - 589 (Beard, 1975). This VA is well represented across all scales (i.e. State, IBRA Bioregion, IBRA Sub-region and Local Government Area (LGA)), with over 99% of the pre-European extent remaining.

A detailed flora, vegetation and fauna survey was conducted by AECOM (2023) to describe key vegetation and fauna values within the application area and to determine the potential impact to areas of sensitivity. These vegetation units were observed to be consistent with the broadscale vegetation association mentioned above. AECOM considered the vegetation in the application area to be ranging from degraded to excellent condition with the majority being in excellent condition (Trudgen, 1991).

Ten weed species were recorded, with *Cenchrus ciliaris* the most common weed species. No Declared Weed of National Significance were recorded and most of the weeds were restricted to disturbed areas near infrastructure and minor drainage (AECOM, 2023).

#### Ecological communities

AECOM (2023) identified that the native vegetation in the application area does not represent threatened ecological communities (TECs) listed under the BC Act or EPBC Act. However, areas of the application were considered to represent the following two priority ecological communities (PECs) listed by the Department of Biodiversity, Conservation and Attractions (DBCA):

- the Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (Priority 1) (the Roebourne Plains PEC) this PEC is represented by the T2 SsSk vegetation type, covering approximately 1.3 ha (0.9%) of the application area. The extent of this PEC in the application area represents approximately 0.4% of the mapped extent within a larger survey area (AECOM, 2023). In addition, approximately 630 ha of this PEC are mapped directly adjacent to the survey area.
- the Horseflat Land System of the Roebourne Plains (Priority 3) (the Horseflat PEC) vegetation type H5 (TsSk) identified by AECOM (2023) was considered analogous to this PEC due to shared soil and floristic characteristics. A total of 2.7 ha (2.0%) of vegetation type H5 is mapped within the application area. This represents approximately 1.8% of the Horseflat PEC extent mapped by AECOM (2023) within the survey area. Occurrences of the Horseflat PEC (P3) are also mapped to the east, northeast, and west of the survey area.

Given the relatively small extent of the Roebourne Plains PEC and Horseflat PEC within the application area (1.3 ha and 2.7 ha respectively) compared to the extent of these communities mapped within the larger survey area, as well as, mapped occurrences of these PECs outside the survey area, the proposed clearing is unlikely to have significant impacts on these PECs at the local or regional level.

#### Flora

No Commonwealth or State listed Threatened flora species were recorded in the application area (AECOM, 2023). Three Priority flora species listed by DBCA were recorded within the wider survey area (AECOM, 2023):

- *Dolichocarpa* sp. Hamersley Station (P3) recorded at eight locations. The closest population was recorded approximately 120 metres from the application area
- *Euphorbia inappendiculata* var. *inappendiculata* (P2) recorded at five locations. The closest population was recorded approximately 53.6 metres from the application area.
- *Themeda* sp. Hamersley Station (P3) was recorded at five locations. The closest population was recorded approximately 573.7 metres from the application area.

No other conservation significant flora were considered likely to occur within the application area or the wider survey area (AECOM, 2023). Given this, and the separation distance between the application area and recorded priority flora species, the proposed clearing is unlikely to impact conservation significant flora.

#### <u>Fauna</u>

The majority of the fauna records identified during the desktop assessment are associated with marine and coastal habitats which are not represented within the application area. Most terrestrial fauna species recorded are migratory birds, small mammals and reptiles which may utilise or inhabit the vegetation within the application area.

The local area retains approximately 99 percent of its original vegetated extent. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.

AECOM (2023) identified five fauna habitat types within the application area, with the Tussock Grassland Plains habitat type being the most widespread.

A total of eight fauna species of conservation significance were considered likely to occur within the application area (AECOM, 2023):

- Barn Swallow, *Hirundo rustica* (MI, MI).
- Fork-tailed Swift, Apus pacificus (MI, MI).
- Ghost Bat, Macroderma gigas (EN, EN).
- Grey Falcon, Falco hypoleucos (VU, not listed under the EPBC Act).
- Lined Soil-crevice Skink, Notoscincus butleri (P4, not listed under EPBC Act).
- Northern Quoll, *Dasyurus hallucatus* (EN, EN).
- Northern Short-tailed Mouse, Leggadina lakedownensis (P4, not listed under EPBC Act).
- Oriental Plover, Charadrius veredus (MI, MI).

Neither AECOM (2023), nor Stantec (2023) identified evidence of conservation significant fauna within the application area. However, Peregrine Falcon (*Falco peregrinus*), was recorded during a targeted fauna survey (Stantec, 2023) outside the application area.

A targeted Northern Quoll survey did not detect any signs of this species within the survey area. The minor drainage line habitat within the application area is sparsely vegetated and does not provide suitable denning habitat (Stantec, 2023).

No shorebird or waterbird species were recorded during the bird survey (Stantec, 2023). However, the clay plain habitat may become seasonally inundated, providing temporary foraging conditions for shorebirds.

Considering the above, the native vegetation within the application area may provide suitable habitat for conservation significant fauna. However, given a fauna survey (Stantec, 2023) targeting species likely to occur within the application area did not find any evidence of these species, and the extent of native vegetation remaining within the region, this habitat is unlikely to be critical or significant. Any potential impact on fauna individuals present during clearing can be mitigated through management conditions added to the clearing permit.

#### **Conclusion**

Based on the above assessment, the size of the application area and extent of native vegetation remaining within the local area (99 per cent), the proposed clearing is unlikely to have significant impacts on conservation significant flora, fauna or ecological communities at the local, regional or conservation scale. It is considered that any potential impacts on biodiversity values can be can be managed to be environmentally acceptable through permit conditioning as detailed below.

The Delegated Officer concluded that the proposed clearing does not constitute a significant residual impact to biodiversity values.

#### **Conditions**

To address the above impacts, the following management measures will be required on the clearing permit:

- implement weed management strategies
- backfilling or covering all the test pits and bore holes to prevent fauna access
- progressively rehabilitate and revegetate temporary cleared areas; and
- conduct clearing in a slow, one-directional manner to allow any fauna individuals present to move into adjacent vegetation ahead of the clearing activity.

#### 3.2.2. Environmental values (Land and water resources) - Clearing Principles (f) and (g)

The application area is located in a semi-arid region, where the soils consist of sands and clay, and the climate is dry. A desktop assessment indicated that there are no significant water resources features in the vicinity of the proposal. As a result, the risk of erosion or sedimentation of the waterways is low, and the risk of subsequent water quality impacts downstream is reduced.

A minor, non-perennial watercourse transects the northeastern portion of the application. However, the proposed geotechnical investigation is unlikely to be conducted within the vicinity of this watercourses. On this basis, and given the clearing is scattered across a 140-ha clearing footprint, it is unlikely to result in any significant or long-term impacts to surface or groundwater quality or to the ecological values of the vegetation communities associated with the non-perennial watercourses. This is consistent with advice from DWER's North West Region branch (2025) that the proposed clearing is unlikely to impact the water quality and water resources.

The region's landform and geology comprise of Quaternary alluvial and older alluvial coastal and subcoastal plains. The vegetation consists of a grass savannah with mixed bunch and hummock grasses, along with a dwarf shrub steppe dominated by *Acacia stellaticeps*, or *A. pyrifolia* and *A. inaequilatera* (Kendrik and Stanley (2001) in AECOM (2023). The soils in the application area, typical of semi-arid regions, are prone to wind erosion in the absence of ground cover. However, given the proposed clearing is small, temporary, and spread across multiple sites within a larger footprint, it will unlikely result in any appreciable land degradation impacts.

#### **Conclusion**

Based on the above assessment, the proposed clearing is considered unlikely to result in appreciable land degradation or any significant or long-term impacts to the quality of surface or groundwater, or the ecological values of the riparian communities associated with watercourses.

The impacts of the proposed clearing can be managed to be environmentally acceptable by taking steps to minimise the risk of the introduction and spread of weeds and revegetating all areas cleared for temporary works.

#### **Conditions**

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- revegetation and rehabilitation to ensure areas cleared for temporary works are revegetated and rehabilitated within six months of the area no longer being required for the purpose for which it was cleared; and
- weed control to ensure that protocols are put in place to limit the introduction and transportation of weedaffected materials.

#### **3.3.** Relevant planning instruments and other matters

The City of Karratha (the City) advised that the proposed geotechnical investigation does not require local government approvals and that the proposed clearing is consistent with the City's Local Planning Scheme. The City did not have any objections to the proposed clearing.

The application area lies within the proclaimed surface and groundwater areas under the RIWI Act and is therefore subject to licencing. However, the proposed geotechnical investigation does not require water supplies. Therefore, no licence under the RIWI Act is required. It is the permit holder's responsibility to comply with the legal requirements of the RIWI Act.

DWER's North West Region branch (2025) advised that the proposed activities are unlikely to impact the water quality and water resources, provided the clearing is undertaken in accordance with the following best practice management of riparian vegetation and erosion:

- Disturbance to natural drainage or adversely affect the quality or quantity of water in any watercourse, dam, waterhole, spring, or subterranean source of supply should be avoided where possible
- Disturbance to riparian vegetation should be avoided where possible to maintain foreshore stability and protect important riparian habitats. Where possible, existing tracks are to be utilised; and
- Providing suitable buffers along watercourse and constructing any creek crossings on straighter sections of watercourse rather than bends or meanders.

The permit holder has been notified of the above management practices in writing.

Part of the application area lies within a mapped Aboriginal Heritage Site (Cajuput Well Scatter 2). It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) (AH Act) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process. The permit holder has been notified of their responsibilities under the AH Act.

Immediately prior to the grant of Clearing Permit CPS 10817/1, Department of Planning, Lands and Heritage (2025) advised that a section 91 licence required to access the land parcels within which clearing of native vegetation is proposed to take place was close to being granted. Given this, and that the proposed clearing does not pose a high risk to the environment, DWER granted the permit prior to s.91 licence being granted. It is the permit holder's responsibility to comply with the requirements of the *Land Administration Act 1997* and to ensure that all relevant approvals, including land access, have been obtained prior to the native vegetation clearing activities being conducted.

#### End

## Appendix A. Site characteristics

## A.1. Site characteristics

Characteristic	Details
Local context	The application is for the proposed clearing of 14 ha of native vegetation within an application area of approximately 140 ha located approximately 11 km southwest of the Town of Karratha in the Pilbara region of Western Australia for the purpose of geotechnical investigation (Figure 1).
	It is mapped within the Pilbara IBRA bioregion and the Roebourne (PIL04) sub-region, described as 'Mosaic: Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex (Kendrick and Stanley 2001).
	Spatial data indicates the local area (50-kilometre radius from the centre of the area proposed to be cleared) retains approximately 95 per cent of the original native vegetation cover.
Ecological linkage	The vegetation proposed to be cleared does not represent a significant ecological linkage
Conservation areas	There are unmanaged reserves conservation areas within the local area, none of which occur within the application area. The nearest conservation area is unmanaged reserves, 27646 which is 0.9km from the application area and one conservation Reserve, Murujuga National Park, approximately 11.5 km northeast from the survey area.
Vegetation description	Biological surveys over the application area identified 13 vegetation units. The vegetation units mostly comprise of grasslands on flats and woodlands.
	The full survey descriptions and maps are available in Appendix D.
	<ul> <li>Vegetation types mapped over the application area, as follows:</li> <li>Tussock grasslands on flats</li> </ul>
	<ul> <li>ExPe – tussock on deep clay loam soils representative of Horseflat PEC</li> <li>SsSk – tussocks on gilgai clays, representative of Roebourne Plains PEC</li> <li>SaXI – very bare open grasslands on hard clay</li> <li>ItTw – mix of tussock and hummock grasslands, analogous to Horseflat PEC</li> </ul>
	Hummock grasslands on flat to undulating terrain
	<ul> <li>AbTwBp – Triodia on pebbly clay loams</li> <li>TwSk – Triodia with tussock grasses on variable soil from soft clays to hard clay</li> <li>loam, analogous to Horseflat PEC</li> </ul>
	<ul> <li>AiTwBe – Triodia with common mid to tall shrubs on hard red clay loam soils</li> <li>CpTw – Triodia and some tussock grasses on hard clay soils</li> <li>TsTw – Triodia on rocky outcrops with skeletal rocky soils.</li> </ul>
	- ApTwBp – Acacia shrubland over Triodia on lower slopes associated with adjacent ranges (outside survey area).
	<ul> <li>Minor channels</li> <li>ChAcTw – open woodland in shallow drainage near power station</li> <li>AcCf – tussock grassland representing slight variation to adjacent grasslands on plains, represents Horseflat PEC</li> </ul>
	Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework (DotEE 2018). The Roebourne Plains PEC (P1) is represented by T2 – SsSk vegetation, mapped for 277.45 ha (15% of survey area). This community comprises tussock grasslands on deep gilgai clay soils. A large

Characteristic	Details						
	proportion of the survey area represents the Horseflat PEC or is analogous to the Horseflat PEC. This includes true representations by vegetation communities T1 – SsSk and T3 – AcCf mapped for 454.56 ha, and analogous vegetation communities T4 – ItTw and H5 – TwSk mapped for 370.81 ha. The Horseflat PEC is mapped for 45% of the total area (AECOM, 2023).						
	The mapped vegetation types retain approximately 99 per cent of the original extent (Government of Western Australia, 2019).						
	The mapped vegetation association for the area which is Abydos Plain-Roebourne 589, described as short bunch-grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex short bunch-grass savanna / grass-steppe. The vegetation units identified are consistent with the mapped vegetation association Beard (Beard, 1975)						
	The Abydos Plain-Roebourne cent of the original extent (Go	e 589 vegetation a overnment of Wes	issociation retains approximately 99 per tern Australia, 2019).				
Vegetation condition	The biological survey conducted within the application area (AECOM, 2023) indicates that the vegetation within the proposed clearing area ranges in condition between Degraded and Excellent condition (Trudgen, 1991). The majority of native vegetation (78 per cent, 1044.82 ha) was recorded as being in Excellent condition, and 30.62 ha of cleared areas vegetation, which represents tracks and infrastructure						
	Condition Rating	Extent (ha)	Percent of Total Area (%)				
	Excellent	1,404.82	78				
	Very Good	384.01	21				
	Poor	3.74	1				
	Degraded	1.60	0				
	Vegetation Total	1.794.18	100				
	Cleared	30.62					
	Survey Area Total	1 824 80 ba					
	The full Trudgen (1991) cond the survey descriptions and n	ition rating scale i napping are availa	s provided in Appendix C. Excerpts of able in Appendix D				
Climate and landform	The climate of the region is so which mostly falls in the sum Temperatures in the region has and highest 36.2° C.	emi-arid climate. T ner months betwe ave been recorde	The annual average rainfall is 297.5mm een December and March. d as ranging between the lowest 13.9°C				
	The landform and geology of the region comprises quaternary alluvial and older alluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of <i>Acacia stellaticeps</i> or <i>A. pyrifolia</i> and <i>A. inaequilatera</i> (Kendrik and Stanley (2001) in AECOM (2023).						
	The land systems of the appli	cation area are m	apped as:				
	<ul> <li>Boolgeeda system described as 'stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands' (covers small area in southern section of survey area).</li> <li>Calcrete system described as 'low calcrete platforms and plains supporting shrubby hard spinifex grasslands' (northeastern most section of survey area).</li> <li>Horseflat system described as 'Gilgai clay plains supporting Roebourne Plains grass grasslands and minor grassy snakewood shrublands' (majority of survey area).</li> <li>Ruth system described as 'Hills and ridges of volcanic and other rocks supporting shrubby hard spinifex and occasionally soft spinifex grasslands'</li> </ul>						

Characteristic	Details
Soil description	The soil is mapped as Horseflat systems (281Hf) which is described as Gilgaied clay plains supporting Roebourne Plains grass grasslands and minor grassy snakewood shrublands.
	Soils are stony with red loamy earths and red shallow loams (and some red/brown non- cracking clays, red deep sandy duplexes and red deep sands (Tille, 2006).
Land degradation risk	Comprising of mostly sands, clay and shallow loamy soils, the application area is prone to wind erosion and while water erosion risk is low due to low rainfall and high evaporation.
Waterbodies	The desktop assessment and aerial imagery indicated that there are no significant water resources features however, non-perennial watercourses transect the application area.
Hydrogeography	The application area is mapped within the proclaimed Pilbara groundwater and surface water areas and are subject to licensing requirements under the <i>RIWI Act</i> .
	The application area does not occur within a Public Drinking Water Source Areas (DWER-034) or an area subject to the <i>Country Areas Water Supply Act 1947</i> .
	Groundwater salinity level (Total Dissolved Solids) is mapped as 1,000-3,000 milligrams per litre (fresh to brackish) (DWER-026).
Flora	No threatened flora was identified in the desktop assessment. Several priority flora species have been recorded in the local area, some of which were found in areas with similar soil and vegetation to that of the application area.
	The flora and vegetation survey conducted within the application area did not identify any flora species of conservation significance, however, 41 priority flora were identified as potentially occurring including (AECOM, 2023):
	<ul> <li>two species with a high likelihood of occurring,</li> <li>twenty-two species with a moderate likelihood of occurring, and</li> <li>fifteen species with a low likelihood of occurring.</li> </ul>
Ecological communities	The application area is outside of any mapped ecological communities of conservation values. The nearest ecological community to the application area is the Roebourne Plains gilgai grasslands Priority Ecological Community (PEC Priority 1).
Fauna	Five fauna habitats were recorded, with hummock and tussock grasslands the most dominant habitat types covering over 90% of the survey area. Many of the records are associated with marine and coastal habitats which are not represented within the application area. Most terrestrial fauna species recorded are migratory birds, small mammals and reptiles which may utilise or inhabit the vegetation within the application area. The fauna survey for the project did not identify any conservation significant fauna species present within the application area.

A.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*									
Pilbara	17,808,657.04	17,731,764.88	99.57	1,801,714.98	10.12				
Vegetation complex									
Beard vegetation association Abydos Plain-Roebourne 589	728,768.20	724,695.82	99.44	15,304.39	2.10				

\*Government of Western Australia (2019a)

\*\*Government of Western Australia (2019b)

## A.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix E.1), and biological survey information, impacts to the following conservation significant flora required further consideration.

Species name	Conservatio n status	Suitable vegetatio n type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to applicatio n area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Euphorbia inappendiculata var. inappendiculata	P3	Y	Y	34.4	5	Y
Gymnanthera cunninghamii	P3	Y	Y	23	1	Y
Neptunia longipila	P2	Y	Y	11	5	Y
Stackhousia clementii	P3	Y	Y	4.15	9	Y
Terminalia supranitifolia	P3	Y	Y	3.30	29	Y

## A.4. Fauna analysis table

Species name	Conservatio n status	Suitable habitat features ? [Y/N]	Suitable vegetatio n 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]
Actitis hypoleucos (common sandpiper)	MI	Υ	Y	1.56	111	Υ
Apus pacificus (fork-tailed swift)	MI	Υ	Y	10.59	8	Y
Arenaria interpres (ruddy turnstone)	MI	Υ	Y	1.56	188	Y
Calidris acuminata (sharp-tailed sandpiper)	MI	Υ	Y	1.56	43	Y
Calidris alba (sanderling)	MI	Y	Y	4.72	23	Y
Calidris canutus (red knot)	EN	Y	Y	1.48	14	Y
Calidris falcinellus (broad-billed sandpiper)	MI	Y	Y	4.72	5	Y

Species name	Conservatio n status	Suitable habitat features ? [Y/N]	Suitable vegetatio n 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]
Calidris ferruginea (curlew sandpiper)	CR	Y	Y	1.48	35	Y
Calidris ruficollis (red-necked stint)	MI	Y	Y	1.48	52	Y
Calidris subminuta (long-toed stint)	MI	Y	Y	2.41	11	Y
Calidris tenuirostris (great knot)	CR	Υ	Y	1.48	40	Y
<i>Charadrius leschenaultia (</i> greater sand plover, large sand plover)	VU	Y	Y	3.04	102	Y
Charadrius mongolus (lesser sand plover)	EN	Y	Y	4.72	37	Y
Charadrius veredus (oriental plover)	МІ	Y	Y	3.71	7	Y
<i>Chlidonias leucopterus</i> (white-winged black tern)	MI	Y	Y	1.58	16	Y
<i>Ctenotus angusticeps</i> (Airlie Island Ctenotus, Northwestern coastal Ctenotus)	P3	Y	Y	17.68	5	Y
Dasyurus hallucatus (northern quoll)	EN	Υ	Y	0.12	540	Y
Falco hypoleucos (grey falcon)	VU	Y	Y	26.21	2	Y
Falco peregrinus (peregrine falcon)	OS	Υ	Y	5.48	13	Y
Fregata ariel (lesser frigatebird)	MI	Υ	Y	18.15	59	Y
Gelochelidon nilotica (gull-billed tern)	MI	Υ	Y	5.48	29	Y
Glareola maldivarum (oriental pratincole)	MI	Υ	Y	3.79	16	Y
<i>Hirundo rustica</i> (barn swallow)	MI	Υ	Y	3.47	4	Y
Hydroprogne caspia (Caspian tern)	MI	Υ	Y	1.56	334	Y
<i>Leggadina lakedownensis</i> (northern short- tailed mouse, Lakeland Downs mouse, kerakenga)	P4	Y	Y	0.91	15	Y
Lerista nevinae (Nevin's slider)	EN	Y	Y	33	112	Y
<i>Lerista quadrivincula</i> (four-lined slider (Karratha))	P1	Y	Y	27	2	Y
<i>Liasis olivaceus barroni</i> (Pilbara olive python)	VU	Y	Y	11.10	65	Y
Limosa lapponica (bar-tailed godwit)	MI	Υ	Y	1.56	151	Y
Limosa limosa (black-tailed godwit)	MI	Y	Y	16.25	5	Y
Macroderma gigas (ghost bat)	VU	Υ	Y	15	8	Y
<i>Notoscincus butleri</i> (lined soil-crevice skink (Dampier))	P4	Y	Y	10.41	42	Y
<i>Numenius madagascariensis</i> (eastern curlew)	CR	Y	Y	1.56	99	Y
Numenius minutus (little curlew)	MI	Y	Y	1.56	18	Y
Numenius phaeopus (whimbrel)	МІ	Y	Y	1.56	169	Y
Oceanites oceanicus (Wilson's storm- petrel)	MI	Y	Y	13.76	14	Y
Onychoprion anaethetus (bridled tern)	MI	Y	Y	16	94	Y
<i>Ozimops cobourgianus</i> (northern coastal free-tailed bat)	P1	Y	Y	11	21	Y
Plegadis falcinellus (glossy ibis)	MI	Y	Y	5.62	8	Y
Pluvialis fulva (Pacific golden plover)	MI	Y	Y	3.74	16	Y
Pluvialis squatarola (grey plover)	MI	Y	Y	4.72	41	Y
Pseudomys chapmani (western pebble- mound mouse, ngadji)	P4	Y	Y	13.71	24	Y

Species name	Conservatio n status	Suitable habitat features ? [Y/N]	Suitable vegetatio n 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]
Sterna dougallii (roseate tern)	MI	Υ	Y	20	56	Y
Sterna hirundo (common tern)	МІ	Y	Y	17	24	Y
Sternula albifrons (little tern)	MI	Υ	Y	5.62	14	Y
Sula leucogaster (brown booby)	МІ	Y	Y	18	20	Y
Thalasseus bergii (crested tern)	MI	Υ	Y	3.05	130	Y
Tringa brevipes (grey-tailed tattler)	MI & P4	Y	Y	3.05	206	Y
<i>Tringa glareola</i> (wood sandpiper)	MI	Y	Y	2.5	37	Y
Tringa nebularia (common greenshank)	MI	Y	Y	1.56	150	Y
Tringa stagnatilis (marsh sandpiper)	MI	Y	Y	2.41	51	Y
Xenus cinereus (Terek sandpiper)	MI	Υ	Y	5.5	27	Y

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

## A.5. Ecological community analysis table

Community name	Conservatio n status	Suitable habitat features ? [Y/N]	Suitable vegetatio n type? [Y/N]	Distance of closest record to applicatio n area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Burrup Peninsula rock pile communities	P1	Ν	Ν	14.57	64	Y
Chenopod vegetation associations of the Roebourne Plains	P1	Ν	Ν	42.53	2	Y
Four plant assemblages of the Wona Land System (previously 'Cracking clays of the Chichester and Mungaroona Range')	P1	Ν	Ν	42.11	2	Y
Horseflat Land System of the Roebourne Plains	P3	Y	Y	4.18	51	Υ
Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (Roebourne Plains gilgai grasslands)	P1	Y	Y	0	20	Y

# Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<u>Principle (a):</u> "Native vegetation should not be cleared if it comprises a high level of biodiversity."	Not likely to be at	Yes Refer to Section
Assessment:	variance	3.2.1, above.
None of the vegetation types mapped in the application area represent Threatened Ecological Communities (TECs) listed under the EPBC Act or the BC Act. Approximately 1.3 and 2.7 ha of the application represents the Roebourne Plains PEC and Horseflat PEC, respectively. No conservation significant flora or fauna were identified during the biological surveys. The application area is therefore not considered to comprise a high level of biodiversity.		
<u>Principle (b):</u> "Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."	Not likely to be at variance	Yes Refer to Section 3.2.1, above.
Assessment:		
The application area provides suitable habitat for conservation significant fauna. However, no evidence of the native vegetation within the application area being used by conservation significant fauna was identified during a fauna survey targeting species likely to occupy the application area (AECOM, 2023. No hollows were observed in the trees.		
Vegetation occurring in the region and surrounding the application area contains similar fauna habitat and it is unlikely that the vegetation within the application area represents significant habitat for conservation significant fauna. Due to the small size of the application area, the proposed clearing is unlikely to have negative impacts on conservation significant fauna at the local, regional or conservation level.		
<u>Principle (c):</u> "Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."	Not likely to be at	No
Assessment:	variance	
The flora survey did not identify any threatened flora listed under the EPBC Act or BC Act within the application area. The survey timing was undertaken following significant rainfall when adequate material was available to accurately identify grasses and herbs.		
<u>Principle (d):</u> "Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."	Not likely to be at variance	No
Assessment:		
The area proposed to be cleared does not contain TECs. The flora and vegetation survey did not identify vegetation dominated by species indicative of a TEC.		
Environmental value: significant remnant vegetation and conservation are	eas	

Assessment against the clearing principles	Variance level	Is further consideration required?
<u>Principle (e):</u> "Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."	Not likely to be at	No
Assessment:	variance	
The extent of the mapped vegetation type and native vegetation in the region is approximately 99% which is consistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.		
<u>Principle (h):</u> "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."	Not at variance	No
Assessment:		
The closest conservation area Murujuga National Park, approximately 11 km to the northeast of the application area. Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.		
Environmental value: land and water resources		
<u>Principle (f):</u> "Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."	May be at variance	Yes Refer to Section
Assessment:		3.2.2, above
The application area intersects one minor non-perennial water course that flows after significant rainfall event recorded. The vegetation in the application area may therefore be considered to be growing in association with an environment associated with a watercourse. However, the nature of the proposed geotechnical investigation scattered across an 140-ha footprint, the proposed clearing is unlikely to result in any significant or long-term impacts to surface or groundwater quality or to the ecological values of the vegetation communities associated with the non-perennial watercourse.		
<u>Principle (g):</u> "Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."	Not likely to be at	Yes Refer to Section
Assessment:	variance	3.2.2, above.
The mapped soils are moderately susceptible to wind erosion if vegetation is depleted. Noting the condition of the vegetation and extent of the proposed clearing spread across a 140-ha footprint, the proposed clearing is not likely to have an appreciable impact on land degradation.		
<u>Principle (i):</u> "Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."	Not likely to be at variance	No
Assessment:		
The activities associated with the proposed clearing will not intercept groundwater or impact surface water resources or Public Drinking Water Sources Areas. The proposed clearing is unlikely to impact surface or ground water quality.		
<u>Principle (j):</u> "Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."	Not likely to be at variance	No
Assessment:		

Assessment against the clearing principles	Variance level	Is further consideration required?
The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding. The small scale of clearing proposed is not expected to increase the intensity of flooding.		

## Appendix C. 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, 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.

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.

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

# Appendix D. Biological survey information excerpts

### Table 1. Vegetation Community Descriptions and Photographs (AECOM, 2023)

		•
Description	Additional Detail	Photograph
Elate with Gilgai Clay		
Flats with Gilgai Clay         T2         SsSk         Low Tussock Grassland Eragrostis and Sorghum         Sorghum stipoideum, Eragrostis xerophila and Iseilema vaginiflorum low tussock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus gomphrenoides low herbland.         Recorded on flat terrain with red deep clay gilgai loams. Includes Panicum decompositum var. decompositum, Astrebla pectinata and Chrysopogon fallax as indicator species for the Roebourne Plains PEC and another 11 native grass species. Considered a good representation of the Roebourne Plains PEC.         Flats with Non-Gilgai Clay         T1         ExPe	Survey effort: Q15, Q17, Q22, Q36, Q45, Q47, Q50, Q53, Q55 Extent: 277.46 ha Species richness: 87 native and 5 weed species	
Low Tussock Grassland Eragrostis and Sorghum Eragrostis xerophila, Sorghum stipoideum and Bothriochloa ewartiana low tussock grassland with <i>Ptilotus axillaris, Goodenia pascua</i> and <i>Sida fibulifera</i> low open shrub and herbland. Recorded on flat terrain with predominantly soft clay loams with occasional patches of harder non-gilgai clays. Represents Horseflat PEC.	Extent: 376.19 ha Species richness: 44 native species	
Description		Die stermente
H1 AbTwBp Low Hummock Grassland Triodia Acacia bivenosa, Scaevola spinescens and Senna glutinosa subsp. pruinosa mid open shrubland over Triodia wiseana, Eulalia aurea and Sorghum stipoideum low mixed hummock and tussock grassland with Bonamia pilbarensis, Afrohybanthus aurantiacus and Goodenia microptera low open herbland. Recorded on flat soils with hard clay loam with crusting and/or pebbles on surface. Included quartz and granite rocks.	Additional Detail Survey effort: Q10, Q13, Q46, Q48, Q49 Extent: 90.80 ha Species richness: 104 native and 4 weed species	Photograph
T5 SaXI Low Tussock Grassland Xerochloa Salsola australis, Abutilon lepidum and Streptoglossa bubakii low mixed shrub and herbland with Xerochloa laniflora, Eragrostis xerophila and Bothriochloa ewartiana low tussock grassland. Soils are hard flat non-gilgai red clay with pebbles on the surface.	Survey effort: Q32 Extent: 51.46 ha Species richness: 9 native species	

Description     Additional Detail     Photograph       H5     Survey effort: Q05, Q07, Q09     Extent: 153.05 ha       Triodia wiseana, Eragrostis xerophila and Sorghum stipoideum low mixed tussock and hummock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus gomphrenoides low open herbland.     Species richness: 79 native and 3 weed species
H5 TwSk Low Hummock Grassland Triodia Triodia wiseana, Eragrostis xerophila and Sorghum stipoideum low mixed tussock and hummock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus gomphrenoides low open herbland.
I WSK     Q09       Low Hummock Grassland Triodia     Extent: 153.05 ha       Triodia wiseana, Eragrostis xerophila and Sorghum stipoideum low mixed tussock and hummock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus gomphrenoides low open herbland.     Extent: 153.05 ha
Triodia wiseana, Eragrostis xerophila and Sorghum stipoideum low mixed tussock and hummock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus gomphrenoides low open herbland.       Extent: 153.05 ha
Triodia wiseana, Eragrostis xerophila and Sorghum stipoideum low mixed tussock         and hummock grassland with Stemodia kingii, Streptoglossa sp. and Ptilotus         gomphrenoides low open herbland.
and hummock grassland with <i>Stemodia kingii</i> , <i>Streptoglossa</i> sp. and <i>Ptilotus</i> gomphrenoides low open herbland. Species richness: 79 native and 3 weed species
gomphrenoldes low open nerbland.
Includes low shrub layer. Represents characteristics of both hummock grasslands
and tussocks on deeper clays. The tussock grasslands on harder clays form
bands intermittent with tussocks on deeper non-gilgai clay loams. It is therefore considered analogous to the Aurofint EC
Hard Clay with Pebbles
H2 Survey effort: Q1, Q2, Q3,
AiTwBe Q12, Q14, Q18, R20, Q58
Extent: 271.54 ha
Acacia inaequilatera, Acacia bivenosa and Acacia ancistrocarpa mid open
shrubland over Triodia wiseana, Eriachne pulchella subsp. dominii and Species richness: 111
Chrysopogon fallax low mixed hummock and tussock grassland with Bonamia native and 2 weed speles
Recorded on flat terrain with hard red clay loam soils and quartz, calcrete and
granite pebbles on the surface. Small pockets of *Cenchrus ciliaris noted near
Description Additional Detail Photograph
Description     Additional Detail     Photograph
Description     Additional Detail     Photograph       H3     Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52,     Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52,
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54
Description     Additional Detail     Photograph       H3     Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, Low Hummock Grassland Triodia     Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Corchorus parviflorus, Ptilotus aervoides and Euploca heterantha low mixed shrub and herbland with Triodia wiseana, Aristida contorta and EnneapogonExtent: 104.50 ha
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, 
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Corchorus parviflorus, Ptilotus aervoides and Euploca heterantha low mixed shrub and herbland with Triodia wiseana, Aristida contorta and Enneapogon caerulescens low mixed hummock and tussock grassland.Extent: 104.50 ha Species richness: 100 native and 5 weed species
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Corchorus parviflorus, Ptilotus aervoides and Euploca heterantha low mixed shrub and herbland with Triodia wiseana, Aristida contorta and Enneapogon caerulescens low mixed hummock and tussock grassland.Extent: 104.50 ha Species richness: 100 native and 5 weed species
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Corchorus parviflorus, Ptilotus aervoides and Euploca heterantha low mixed shrub and herbland with Triodia wiseana, Aristida contorta and Enneapogon caerulescens low mixed hummock and tussock grassland.Extent: 104.50 ha Species richness: 100 native and 5 weed speciesRecorded on flat terrain with red clay loam soils (hard) and many granite pebblesSpecies richness: 100 native and 5 weed species
DescriptionAdditional DetailPhotographH3 CpTw Low Hummock Grassland TriodiaSurvey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Survey effort: Q8, Q16, Q24, Q42, R37, R44, Q52, R54Corchorus parviflorus, Ptilotus aervoides and Euploca heterantha low mixed shrub and herbland with Triodia wiseana, Aristida contorta and Enneapogon caerulescens low mixed hummock and tussock grassland.Extent: 104.50 ha Species richness: 100 native and 5 weed speciesRecorded on flat terrain with red clay loam soils (hard) and many granite pebblesSpecies richness: 100 native and 5 weed species
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H4 TsTw Low Hummock Grassland Triodia <i>Tephrosia supina, Solanum diversifolium</i> and <i>Trichodesma zeylanicum</i> mid to low open shrubland over <i>Triodia wiseana, Paraneurachne muelleri</i> and <i>Ptilotus</i> <i>clementii</i> low mixed hummock, tussock and herbland. Recorded on rocky outcrops with skeletal soils.	Survey effort: Q34, Q38 Extent: 33.93 ha Species richness: 48 native species	riocytem
A1 ApTwBp Open Shrubland Acacia Acacia pyrifolia var. pyrifolia, Acacia bivenosa and Acacia inaequilatera mid open shrubland over <i>Triodia wiseana, Iseilema dolichotrichum</i> and Aristida contorta low mixed hummock and tussock open grassland with <i>Bonamia pilbarensis,</i> <i>Trachymene oleracea</i> subsp. <i>oleracea</i> and <i>Pterocaulon serrulatum</i> var. <i>velutinum</i> mid to low open herbland. Recorded on lower slopes and flats associated with adjacent ranges. Surface is red hard clay loam soils with rocky outcrops, quartz and granite.	Survey effort: Q27, Q29, Q31 Extent: 133.32 ha Species richness: 53 native and one weed species	

Description	Additional Detail	Photograph
Drainage Lines		-
W1 ChAcTw Open Woodland Corymbia <i>Corymbia hamersleyana</i> low open woodland over <i>Acacia coriacea</i> subsp. <i>pendens, Scaevola spinescens</i> and <i>Solanum cleistogamum</i> tall to low open shrubland over <i>Triodia wiseana, Chrysopogon fallax</i> and <i>Eulalia aurea</i> tall to low mixed hummock and tussock grassland. Associated with minor drainage near the power station. Condition mapped as Good caused by the presence of * <i>Cenchrus ciliaris</i> dominating parts of understorey.	Survey effort: R56, R57 Extent: 5.82 ha Species richness: 44 native and 1 weed species	
T3 AcCf Tall Tussock Grassland Chrysopogon and Eriachne <i>Acacia coriacea</i> subsp. <i>pendens</i> , *Vachellia farnesiana and Eremophila longifolia mid open shrubland over Chrysopogon fallax, *Cenchrus ciliaris and Eriachne flaccida tall to low grassland. Recorded in narrow drainage channels with red clay loam soils, sometimes rocks on surface. Floristics are a combination of adjacent hummock and tussock grasslands. Isolated taller shrubs present. Condition considered Very Good due to presence of weeds. Includes considerable herb layer. Represents units 7 of the Horseflat Land System (drainage depressions) – Dense tussock grasslands. Representative of the Horseflat PEC (P3).	Survey effort: R19, R21, R25, R26, Q30, Q35 Extent: 78.37 ha Species richness: 95 native and 7 weed species	
Cleared	Extent: 30.62 ha	





Map of the vegetation communities in the application area



Figure 4

Map of the significant vegetation in the application area

## Appendix E. Sources of information

#### E.1. GIS databases

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

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography Inland Waters Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality Flood Risk (DPIRD-007)
- Soil Landscape Land Quality Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping Best Available
- Soil Landscape Mapping Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

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

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