GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9705/1
Permit Holder:	Regional Power Corporation trading as Horizon Power
Duration of Permit:	From 15 September 2023 to 15 September 2032

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 constructing a solar farm.

2. Land on which clearing is to be done

Lot 1504 on Deposited Plan 404497, Boodarie

Lot 1499 on Deposited Plan 404497, Boodarie

Lot 273 on Deposited Plan 219540 (Crown Reserve 33016) (PIN 11015917), Boodarie

Great Northern Highway Road reserve (PIN 11734365), Boodarie

3. Clearing authorised

The permit holder must not clear more than 106 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 15 September 2028.

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. Fauna management

The permit holder must:

(a) restrict clearing activities to day-light hours to avoid the possibility of injury to fauna; and

(b) conduct clearing activities in a slow, progressive manner in a single direction towards adjacent *native vegetation* to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

8. Fauna management – pre-clearance survey

(a) Within seven (7) days prior to undertaking any clearing authorised under this permit, the permit holder shall engage a *fauna specialist* to undertake clearance surveys within the area cross-hatched yellow on Figure 1 of Schedule 1 for the Greater Bilby (*Macrotis lagotis*) and Brush-tailed Mulgara (*Dasycercus blythi*), including the identification and inspection of burrows, and determination of whether burrows are being utilised.

(b) Where evidence of recent burrow use is identified under condition 8(a) of this permit, the Permit Holder shall;

  (i) engage a *fauna specialist* to flag the location of the burrow/s showing signs of recent use;

  (ii) not clear within five metres of the flagged burrow/s;

  (iii) engage a *fauna specialist* to monitor with cameras, the flagged burrow/s for a maximum of five days, or until such time that Greater Bilby or Brush-tailed Mulgara have been observed to independently move on from the burrow/s; and

  (iv) prior to clearing, engage a *fauna specialist* to re-inspect any flagged burrow/s for the presence of Greater Bilby or Brush-tailed Mulgara.

(c) If Greater Bilby or Brush-tailed Mulgara are identified utilising any flagged burrow/s under condition 8(b)(iv) of this permit and cannot be avoided in accordance with condition 5 of this permit, the permit holder shall engage a *fauna specialist* to remove and relocate the identified Greater Bilby or Brush-tailed Mulgara to an area of suitable habitat, in accordance with a section 40 authorisation under the *Biodiversity Conservation Act 2016*.

(d) Where active Greater Bilby or Brush-tailed Mulgara burrows are identified under condition 8(a) of this permit, and/or Greater Bilby or Brush-tailed Mulgara are relocated under condition 8(c) of this permit, the permit holder shall include the following in a report submitted to the *CEO* within two months of undertaking any clearing authorised under this permit:

(i) the location of any active Greater Bilby or Brush-tailed Mulgara burrows identified, using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(ii) a description of the camera monitoring measures undertaken under condition 8(b)(iii) of this Permit;

(iii) the date and time of Greater Bilbies or Brush-tailed Mulgara are recorded as independently moving from a flagged burrow;

(iv) the gender of each Greater Bilby captured under condition 8(c) of this Permit;

(v) the location of any Greater Bilbies or Brush-tailed Mulgara, as referred to under condition 8(a) of this Permit, captured using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(vi) the date, time, vegetation type and weather conditions at each location where Greater Bilbies or Brush-tailed Mulgara are captured under condition 8(d)(v) of this permit;

(vii) the location of any Greater Bilbies or Brush-tailed Mulgara, identified in accordance with condition 8(a) of this permit, relocated using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(viii) the date, time, vegetation type and weather conditions at each location where Greater Bilbies or Brush-tailed Mulgara are relocated under condition 8(c) of this permit;

(ix) the name of the *fauna specialist* that relocated fauna under condition 8(c) of this permit; and

(x) a copy of the fauna licence authorising the relocation of fauna under condition 8(c) of this permit.

9. Construction period

The permit holder must commence construction of the solar farm no later than three (3) months after undertaking the clearing authorised under this permit.

10. 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) as soon as is practicable, and no later than 12 months following clearing authorised under this permit, *revegetate* and *rehabilitate* the areas that are no longer required for the construction (*temporary works*) activities by:

(i) re-shaping the surface of the land so that it is consistent with the surrounding five metres land;

(ii) ripping the ground on the contour to remove soil compaction;

(iii) laying the vegetative material and topsoil retained under condition 10(a) on the cleared areas; and

(iv) undertake *weed* control activities on an 'as needed' basis to reduce *weed* cover within the cleared areas to no greater than the weed cover within the adjacent *native vegetation*.

(c) within 24 months of laying the vegetative material and topsoil on the cleared area in accordance with condition 10(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 10(c)(i) of this Permit will not result in similar species composition, structure and density to that of pre-clearing vegetation types in that area, *revegetate* the area by 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

11. Records that must be kept

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

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA20), 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 direction of the area cleared; (f) actions taken to avoid, minimise, and reduce the impacts and extent of *clearing* in accordance with condition 5; and (g) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 6. (h) action taken in accordance with condition 9.
2.	In relation to fauna management pursuant to condition 8.	(a) results of the pre-clearance surveys undertaken in accordance with condition 8 of this permit; and (b) a copy of the *fauna specialist's* report.

No.	Relevant matter	Specifications
3.	In relation to *revegetation* and *rehabilitation* of areas pursuant to condition 10 of this permit:	(a) the location of any areas *revegetated* and *rehabilitated*, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings or decimal degrees; (b) a description of the *revegetation* and *rehabilitation* activities undertaken; (c) the date that the area was *revegetated* and *rehabilitated*; (d) the size of the area *revegetated* and *rehabilitated* (in hectares); and (e) any *weed* control activities undertaken within the area *revegetated* and *rehabilitated*.

12. Reporting

The permit holder must provide to the *CEO* the records required under condition 11 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 *Environmental Protection Act 1986*.
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.
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 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 CEO as a suitable environmental specialist.
fauna specialist	means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of 2 years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the *CEO* as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.
fill	means material used to increase the ground level, or to fill a depression.
department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the

Term	Definition
	administration of the EP Act, which includes Part V Division 3.
EP Act	*Environmental Protection Act 1986* (WA)
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.
suitable habitat	means habitat known to support the Greater Bilby (*Macrotis lagotis*) and Brush tailed Mulgara *(Dasycercus blythi*) within the known current distribution of the species.
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.
weeds	means any plant – (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS

J Burton

Jessica Burton
A/MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

22 August 2023

Schedule 1

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

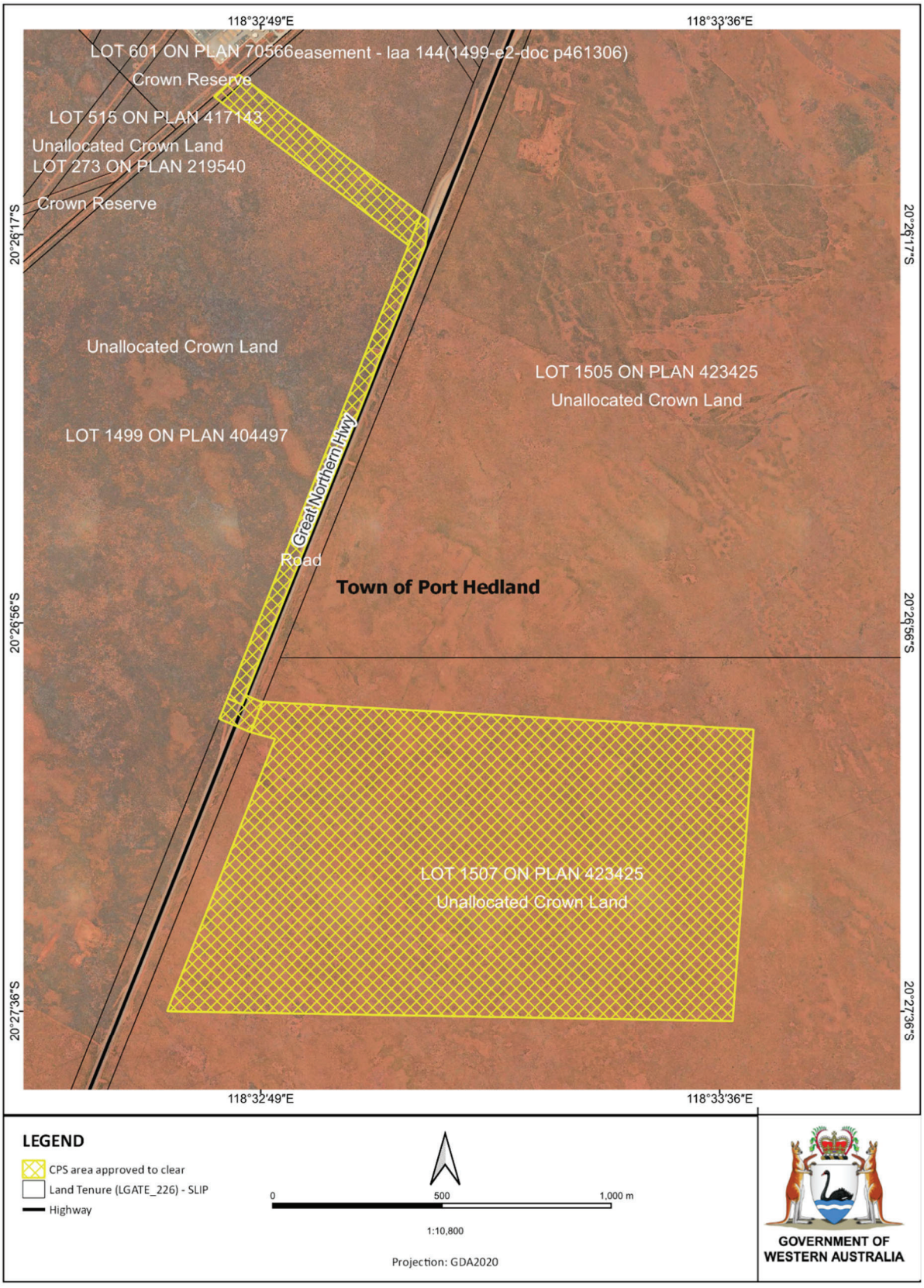

Figure 1: Map of the boundary of the area within which clearing may occur and that is subject to conditions.

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9705/1
Permit type:	Purpose permit
Applicant name:	Regional Corporation Trading as Horizon Power
Application received:	14 April 2022
Application area:	106 hectares of native vegetation
Purpose of clearing:	Solar farm construction
Method of clearing:	Mechanical clearing
Property:	Lot 1504 on Deposited Plan 404497 Lot 1499 on Deposited Plan 404497 Great Northern Highway Road reserve (PIN 11734365) Lot 273 on Deposited Plan 219540 (Crown reserve 33016) (PIN 11015917)
Location (LGA area/s):	Town of Port Hedland
Localities (suburb/s):	Boodarie

1.2. Description of clearing activities

The vegetation proposed to be cleared is contained within a single contiguous area (see Figure 1, Section 1.5). The purpose of clearing is for the construction of a solar farm in Boodarie. The area proposed for clearing is 106 hectares within an approximately 166.5-hectare footprint.

The initial area applied to clear was 100 hectares. During the assessment of the application, Horizon Power modified the application to include an additional linear strip of native vegetation to the original application area to connect to the power station via a 33 kV overhead line. As a result of this amendment, the proposed clearing area increased from 100 hectares to 106 hectares. The application was readvertised on 19 May 2023 for seven days to reflect the amendment to the clearing footprint.

1.3. Decision on application

Decision:	Granted
Decision date:	22 August 2023
Decision area:	106 hectares of native vegetation, as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The department advertised the application for 21 days and no submissions were received. In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix B), relevant datasets (see Appendix F.1), the findings of a biological survey (see Appendix E), the clearing principles set out in Schedule 5 of the EP Act (see Appendix C), relevant planning

instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration that the purpose of the clearing is for a solar farm supporting the economic development of the region and that this project is to replace existing power stations that are almost attend of life with no ability to extend their current life span.

The assessment identified that the proposed clearing will result in:

- the loss of native vegetation that is suitable habitat for Greater Bilby (*Macrotis lagotis*) and Brush-tailed Mulgara (*Dasycercus blythi*);
- potential mortality of conservation significant fauna utilising the application area;
- the potential introduction and spread of weeds into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat value; and
- potential land degradation in the form of wind and water erosion.

The Delegated Officer determined that whilst suitable habitat for conservation significant fauna will be cleared, it is not considered to be significant habitat in the context of the native vegetation remaining within the local area. The greatest potential impact may be to individuals that may be present at the time of clearing.

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 land degradation or have long-term adverse impacts on habitat for conservation significant fauna and adjacent vegetation. Impacts from the proposed clearing can be minimised and managed to unlikely lead to an unacceptable risk to the above-mentioned environmental value with appropriate conditions imposed on the clearing permit.

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;
- conducting a pre-clearance survey for the Bilbies and the Brush tailed mulgara;
- restricting the clearing activities to daylight hours;
- rehabilitation/revegetation of any temporary clearing areas; and
- undertake the construction of the solar farm no later than three months after undertaking the authorised clearing.

1.5. Site map

Figure 1 Map of the application area

The area cross-hatched yellow indicates the area authorised to be cleared under the granted clearing permit.

2 Legislative context

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

In addition to the matters considered in accordance with section 51O of the EP Act (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 polluter pays principle
- 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)
- *Soil and Land Conservation Act 1945* (WA)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- 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 department requested reasons as to how the proposed clearing area was determined. Horizon Power advised that the following measures were taken into consideration when selecting the site for the final land use (GHD, 2022).

- Land ownership / tenure
- Native title rights and interests
- Heritage considerations
- Council zoning
- Proximity to existing electricity infrastructure (grid connection)
- Accessibility
- Terrain
- Environmental considerations

Further avoidance measures proposed by Horizon Power (GHD, 2022).

- Existing cleared areas (particularly along the Great Northern Highway) will be used where possible, to minimise the amount clearing of native vegetation required.
- Where existing tracks cannot be used, navigation paths will avoid vegetation where practicable.
- Access routes will be optimised to avoid requirements for earthworks or grading where practicable.
- Trees and tall shrubs will be avoided in the selection of access routes.
- Vegetation within access tracks will be driven over in preference to clearing where this does not pose an unacceptable fire risk or damage to vehicles.

Horizon Power has further advised the department that Horizon Power will only clear the area of land required for the construction and operation of the solar farm. Any areas of temporary clearing not required during operations will be rehabilitated. Topsoil and some vegetative material will be stockpiled for reuse onsite where required. Licensed fauna handlers will be present during ground clearing activities to support relocation of fauna. All contractors will be required to operate under a construction management plan which will cover as a minimum, environmental risks such as waste, clearing minimization, fauna, flora and erosion management. It is noted that erosion management from wind and water will be incorporated in design and operational requirement of the facility (e.g. hardstand) (Horizon Power, 2022).

The Delegated Officer was satisfied that the applicant has undertaken reasonable measures 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 B) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix C) identified that the impacts of the proposed clearing present a risk to biological values (fauna and adjacent flora and vegetation) and impact to land degradation in the form of increased wind and water erosion. 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 (flora) - Clearing Principles (a)

Assessment

The application area is located within the Pilbara bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). At a broad scale, the vegetation within the application area is described as mosaic: short bunch grassland, savanna or grass plain (Shepherd et al, 2001). A biological survey was undertaken between 25 June and 28 June 2021 by 360 Environmental, which is the optimal survey period for the region (2021). The survey area did not include the additional area that was incorporated into the proposed clearing area during the assessment, also discussed under section 3.2. However, given the additional area is narrow and linear and is located within the same broad scale vegetation mapping as the area surveyed, the habitat values would be comparable, and an additional survey was not considered necessary based on the results of the flora survey over the broader clearing footprint.

During the survey, the application area was assessed using releves to gather information. Additional flora taxa observed opportunistically around flora sites or while transferring on foot within the application area were also recorded. The survey team also searched for conservation significant flora species within the application area, specifically in known locations or preferred habitat encountered in the survey area for these species (360 Environmental, 2021). The timing of the survey is appropriate to identify majority of the species that were identified from the 50-kilometre radius local area (EPA, 2016). Identification of the flora collected was not considered as a limitation as Western Australian Herbarium specialists were consulted for specimens which were difficult to identify.

The biological survey has identified the vegetation within the application area as *Acacia stellaticeps* (*Acacia tumida* var*. pilbarensis, Senna notabilis* and *Indigofera monophylla*) low open shrubland over *Triodia epactia* (and *Triodia lanigera*) low open hummock grassland over *Aristida holathera* var*. holathera* (and *Chrysopogon fallax*) low sparse tussock grassland. The vegetation within the application area was assessed to be in a very good to excellent condition (Trudgen, 1991). No riparian vegetation was identified within the application area. Evidence of disturbance in the application included weeds, vehicle tracks and litter (360 Environmental, 2021).

Flora

According to available databases, 16 priority flora listed by the Department of Biodiversity, Conservation and Attractions (DBCA) and no threatened flora listed under the EPBC Act or BC Act were identified within the 50-kilometre radius of the application area. The previously listed threatened flora species, *Seringia exastia* was recorded from the local area. However, this species has now been delisted (WA Herb, 1998-). Based on the similarities shared between the soil and vegetation types in habitats for these 15 flora taxa and within the application area, it was determined that four flora species have the potential to occur within the application area. These species are considered below:

Abutilon sp*. pritzelianum* (Priority 3): The Florabase website (Western Australian Herbarium, 1998-) indicates that this species is known from 48 recorded populations between Murchison to Port Hedland. The Florabase website describes this species as a shrub approximately two metres high, with yellow flowers in April to July. The species is known to be growing in red to brown sandy soils, associated with Acacia shrubland including *Acacia ancistrocarpa, Acacia inaeqilatera, Acacia tumida* var*. pilbarensis, Acacia sericophylla,* and *Acacia stellaticeps*, sometimes under open woodland of *Corymbia zygophylla*, often over hummock grassland of *Triodia* spp.; has been observed in roadside vegetation (WA Herb, 1998). The nearest record is 3.70 kilometres from the application area. The survey did not identify this species within the application area (360 Environmental, 2021). The flora would have been flowering during the time the survey was undertaken therefore, unlikely to have been missed.

Euploca mutica previously known as *Heliotropium muticum* (Priority 3): The Florabase website (Western Australian Herbarium, 1998-) indicates that this species is known from 75 recorded populations between east Pilbara to Port Hedland. This flora is known to be growing in red to brown sandy loam soils and is associated with Acacia shrubland over hummock grassland including *Triodia* spp. The flora is known to flower in August and has a special feature

where its corolla tube is straight (WA Herb, 1998-). The nearest record is 7.84 kilometres from the application area. The survey refers to this species by its previous name, *Heliotropium muticum* and the survey did not identify this species within the application area. Post-survey, with the knowledge gained from the survey effort during ground truthing, the species likelihood of occurrence within the application area was also rated as low by the principal botanist (360 Environmental, 2021). This species was also described as a disturbance opportunist in a flora and vegetation survey undertaken by Ecoscape in 2014.

Rothia indica subsp*. australis* (Priority 3): The Florabase website (Western Australian Herbarium, 1998-) indicates that this species is known from 21 recorded populations between Port Hedland to West Kimberly. The Florabase website describes this species as a prostrate annual herb growing up to 0.3 metres high, densely covered in spreading hairs and flowers in April to August. This flora is known to be growing in red to brown sandy soils, associated with tall Acacia shrubland, over low shrub including *Trianthema* spp., *Dissocarpus paradoxus*, *Nicotiana* spp*., Eriachne aristidea, Frankenia* spp., over hummock grassland including *Triodia* spp. (WA Herb, 1998-). The nearest record is 12.93 kilometres from the application area. The survey did not identify this species within the application area (360 Environmental, 2021). The flora would have been flowering during the time the survey was undertaken therefore, unlikely to have been missed.

Tephrosia rosea var. Port Hedland (A.S. George 1114) (Priority 1): The Florabase website (Western Australian Herbarium, 1998-) indicates that this species is known from 44 recorded populations between Karratha and Port Hedland. This species is described as an erect, spreading shrub with pink flowers in July to September. This flora is known to be growing in red to yellow coastal dune sands, associated with open shrubland of *Acacia* spp. and *Grevillea* spp., over hummock grassland including *Triodia* spp., *Whitechloa airoides, Eriachne aristidea* and *Cenchrus ciliaris* WA Herb, 1998-). The nearest record is 6.49 kilometres from the application area. The survey did not identify this species within the application area. Post-survey, with the knowledge gained from the survey effort during ground truthing, the species likelihood of occurrence within the application area was also rated as low by the principal botanist (360 Environmental, 2021).

The flora and vegetation survey recorded a total of 82 taxa from 53 genera across 27 families. The dominant families were Poaceae (17 taxa), Malvaceae (15 taxa) and Fabaceae (10 taxa). The most dominant genera were *Acacia* (six taxa) and *Ptilotus* (five taxa). None of the above listed priority taxa or any other priority taxa identified from the local area have been previously mapped over the application area and none were identified during the biological survey (360 Environmental, 2021).

Two introduced species were recorded within the application area, representing 2.4 per cent of the total taxa recorded. None are listed as Declared Pests under the *Biosecurity or Agriculture Management Act 2007* or listed as a Weed of National Significance (360 Environmental, 2021). It is noted that weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

No Threatened Ecological Communities (TECs) or Priority Ecological communities (PECs) are known to occur within the application area. No TECs or PECs were identified during the biological survey (360 Environmental, 2021).

Conclusion

The native vegetation proposed to be cleared comprises of a vegetation type and flora taxa typical to the region. Based on the above assessment, the proposed clearing is unlikely to significantly impact on priority flora. However, the proposed clearing may introduce and spread weeds into the surrounding vegetation which may impact on habitat quality. Weed management practices will help reduce this risk.

Conditions

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

- weed management measures to be implemented to mitigate impacts to adjacent vegetation.
- revegetation and rehabilitation of any areas cleared for temporary works by returning vegetative material and topsoil removed by clearing.

3.2.2. Biological values (fauna) - Clearing Principles (b)

Assessment:

The fauna survey identified one fauna habitat type within the application area, which is sandy plains, described as a habitat represented by low open shrubland over low open hummock grassland and low sparse tussock grassland. Hummocks and tussocks provide habitat for birds, reptiles, and mammals (360 Environmental, 2021).

According to available databases, 60 species of conservation significant fauna have been recorded within the 50-kilometre radius local area. The species recorded include 46 bird species, nine mammal species and five reptile species. The majority of the birds (36) identified from the local area are avian migratory birds protected under an international agreement, which are associated with aquatic habitats and breed in northern latitudes. Noting the absence of wetlands or a watercourse within the application area, the proposed clearing is not likely to have a significant impact on the identified migratory birds or any other aquatic species identified from the local area. No conservation significant fauna species were mapped as having been recorded within the application area.

A likelihood of occurrence assessment identified that four conservation significant fauna species identified from the local area had the potential to occur within the application area and required further consideration. The 360 Environmental (2021) fauna survey and the department's fauna analysis have identified that the proposed clearing will involve clearing of native vegetation that is potential habitat for the following species.

- *Dasycercus blythi* (Brush-tailed mulgara) – Priority 4
- *Dasyurus hallucatus* (Northern quoll) - Endangered
- *Falco hypoleucos* (Grey falcon) – Vulnerable
- *Macrotis lagotis* (Bilby, dalgyte) – Vulnerable
- *Falco peregrinus* (Peregrine falco) – Other Specially protected
- *Pseudomys chapmani* (Western pebble-mound mouse, ngadji) – Priority 4

Class: Bird

Falco peregrinus (Peregrine falcon) may regularly overfly the application area. According to the Australian Museum website, the Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites and prefers coastal and inland cliffs or open woodlands near water and may even be found nesting on high city buildings. This species is widespread and highly mobile and is found in various habitats (Australian Museum, 2019). The biological survey did not identify any evidence of the Peregrine falcon (360 Environmental, 2021). It is likely that the Peregrine falcon may overfly the application area but based on the habitat preference and the large home range of this bird, the proposed clearing will not have a significant impact on the Peregrine falcon.

Falco hypoleucos (Grey falcon) is identified from eight locations within the 50-kilometre radius local buffer. The Grey falcon is associated with lowland plains, particularly acacia shrublands crossed by watercourses in arid to semi-arid Australia and preys on other bird species including doves, pigeons, parrots and cockatoos. This species breeds from June to November in nests within tall trees along watercourse (DCCEEW, n.d). Given no watercourses or tall trees are present within the application area, it is unlikely the vegetation proposed for clearing will provide core habitat for this species. The Grey falcon may utilise the application area as a hunting ground but due to the mobile nature, no impact to this species will occur from the proposed clearing.

Class: Mammal

The *Macrotis lagotis* (Bilby) is known from 38 records within the local area and largely occupies three major vegetation types: open tussock grassland on uplands and hills, mulga woodland or shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. The distribution of the greater Bilby is highly fragmented in Western Australia (Commonwealth of Australia, 2019). Bilbies are found in a range of habitats from arid rocky soils with little ground cover to semi-arid shrublands and woodlands (DCCEEW, n.d). The closest record was identified 2.33 kilometres from the application area. Bilbies are known to emerge after dark to forage for food. The biological survey did not identify evidence of bilby activity (footprint, scats and digging) within the survey area (360 Environmental, 2021). While this species was not identified within the survey area, it may transiently occur on site given the high mobility of the species and the habitat suitability of the application area. No sightings or secondary signs (burrows, tracks and scats) of the Bilby were recorded during the survey (360 Environmental, 2021). However, given the numerous recordings of the Bilby within a very close proximity to the application area in 2018, this species may use habitat over the application area for foraging and shelter. The survey report states that the soils within the application

area are thin and shallow, and not well suited to the deep, complex burrows the species uses for daytime shelter. However, it is also noted by the department that the biological survey has described the fauna habitat within the application area as sandy plains, described as low open shrubland over low open hummock grassland and low sparse tussock grassland. Hummocks and tussocks provide habitat for birds, reptiles, and mammals and the soil is suitable for burrowing (360 Environmental, 2021). Therefore, the possibility Bilbies utilise the application area for burrowing cannot be eliminated and it is highly likely that Bilbies may use the sandy plains habitat for foraging.

As part of the clearing permit CPS 9706/1, which occurs within the application area for the purpose of geotechnical investigations, an additional targeted survey for bilby was undertaken, involving searching a 25-metre diameter area around all borehole locations. No active bilby borrows were detected within the disturbance footprint. The additional survey did not cover the entire area proposed for clearing to construct the solar farm. Therefore, the Delegated officer considered the need for another pre-clearance survey for bilby as part of this clearing permit application CPS 9705/1. To mitigate the possibility of mortality to bilby individuals and to ensure the bilby borrows are not impacted, appropriate fauna management conditions have been imposed on the clearing permit.

The *Dasyurus hallucatus* (Northern quoll) was identified from 1032 locations within the local area with the closest record being six kilometres from the application area. The Northern quoll is associated with rocky areas and eucalyptus forests and require den resources such as hollow logs, rock crevices, caves and hollow trees (Oakwood et at, 2016). Based on the above description, it is unlikely the application area will provide core habitat for the Northern quoll. They are opportunistic foragers that feed on a broad range of items including invertebrates (beetles, grasshoppers etc), vertebrates (birds, small mammals, reptiles), vegetative materials (fruit, nectar) and carrion and human refuse (Department of Environment, 2022; Hill and Ward, 2010). This species has a large home range. Therefore, it is considered likely that this species will utilise the application area for foraging and dispersal. The biological survey did not locate individuals of Northern quoll or identify evidence of use by this species within the application area (360 Environmental, 2021). To mitigate any indirect impact to individuals of Northern quoll, a directional clearing condition and a condition restricting clearing to daytime have been included in the clearing permit.

The *Leggadina lakedownensis* (Northern short-tailed mouse, Lakeland downs mouse, kerakenga) is a Priority 4 mammal and is associated with habitats from the monsoon tropical coast to semiarid climates, including spinifex and tussock grasslands, samphire and sedgelands, Acacia shrublands, tropical Eucalyptus and Melaleuca woodlands and stony ranges. Most habitats, however, are seasonally inundated on red or white sandy-clay soils. The Northern short-tailed mouse are nocturnal, largely solitary individuals that spend the day in simple, single-chambered burrows (Aplin et al, 2016). It was determined by the biological survey that the application area provides suitable habitat for the Northern short-tailed mouse. However, no evidence of the species or any individuals were identified during the biological survey (360 Environmental, 2021). A directional clearing condition will be imposed on the permit to avoid potential death of individuals during clearing or driving over of the application area.

Dasycercus blythi (Brush-tailed mulgara), occur in a range of habitat types, but primarily occur in mature hummock grasslands of spinifex, especially associated with *Triodia basedowii* and *Triodia pungens* with overlapping home ranges of 1.0 to 14.4 hectares. The species occurrence may be influenced by the presence of better watered areas such as in paleo-drainage systems or drainage lines in sandplain/dune habitats. Brush-tailed mulgara is a nocturnal species, sheltering in burrows during the day (Woolley, 2016). This species was recorded 275 times within the local area. Although the survey did not record this species and the application area is unlikely to provide core habitat for this species (360 Environmental, 2021), it is likely that the sandy plain habitat within the application area will be utilised by the Brush-tailed mulgara.

As part of the clearing permit CPS 9706/1, an additional targeted survey for mulgara was undertaken, involving searching a 25-metre diameter area around all borehole locations. No active mulgara borrows were detected within the disturbance footprint. The additional survey did not cover the entire area proposed for clearing to construct the solar farm. Therefore, the Delegated officer considered the need for another search for mulgara as part of this clearing permit application CPS 9705/1.

The biological survey by 360 Environmental (2021), recorded a total of five fauna taxa from five families. One bird species of interest, Nankeen Kestrel (*Falco cenchroides*) was recorded within the application area. This species is a raptor and is recorded in 95 per cent of the survey sites located across the whole Australia with a large home range (Australian Museum, 2022). To mitigate fatality of any fauna species, present during clearing activities, the Delegated Officer has implemented conditions on the clearing permit to undertake directional clearing and to restrict clearing to daylight hours.

Conclusion:

It is determined that the fauna habitat type identified within the application area is well connected and forms part of a largely contiguous landscape. The fauna habitat of the application area is part of a much larger area of similar habitats within the local area and the surrounding region.

Based on the above assessment, the proposed clearing may result in injury or mortality of fauna individuals if present during the clearing activities. According to the above assessment, the proposed clearing may impact on suitable habitat for brush-tailed mulgara and bilby. The habitat is not deemed significant for the survival of the species, however, individuals may be present at the time of clearing. The condition to undertake a pre-clearing survey will mitigate any potential impacts to individuals that may be present at the time of clearing. A section 40 authorisation under the BC Act will be required for the take of bilbies, should burrows be located.

Conditions:

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

- slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity will minimise impact to individuals.
- undertake a targeted pre-clearance survey for Bilby and the Brush-tailed mulgara prior to any vegetation clearing.
- restrict any clearing to daylight hours.

3.2.3. Land and water resources (land degradation) - Clearing Principles (g)

The application area is situated within the Uaroo soil landscape system which is described as broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs (DPIRD, 2019).

Based on the size of the application area. the proposed clearing has the potential to cause land degradation in the form of wind erosion and may increase the surface water flow within the application area into the surrounding vegetation, if the area remains bare for an extended period of time. Management practices will help mitigate this risk. The applicant has advised that during construction, management measures will be put in place to prevent soil erosion from wind and water. As an operational and maintenance requirement (prevention of dust deposition on the solar panels), the final solar farm footprint will not include areas of bare earth. Soil coverings may include a combination of reinstated native vegetation, gravels and/or hardstand (bitumen). Furthermore, the design of the site will include stormwater management (GHD, 2022). The following are number of land degradation management measures provided by the applicant (GHD, 2022):

Erosion

- Standard construction measures regarding erosion and sediment control (include topsoil management) will be implemented during construction works.
- Designated access tracks will be utilised to prevent unauthorised disturbance.

Dust

- Standard construction dust control and mitigation measures will be implemented during clearing. This may include the use of a water trucks and undertaking clearing before or after rainfall.
- Ground disturbance, topsoil stripping and stockpiling and clearing of vegetation will be restricted during high winds if dust cannot be adequately controlled.
- Use of defined routes for machinery/ vehicles travelling on unsealed roads.
- Reduced vehicle speed limits in areas of unconsolidated soil.

The desktop assessment and aerial imagery indicate that no wetlands or watercourses are present within the application area. Therefore, the current surface water hydrology regime will be maintained. No increase incidence of flooding or sever increase in surface water flow is expected. Any sheet flow will be over a short time-scale and there is adequate surrounding native vegetation to allow water to infiltrate.

According to the available databases, there is no known risks from Acid Sulfate Soils (ASS) within the application area.

Conclusion

Based on the above assessment, the proposed clearing may result in land degradation in the form of wind erosion and is likely to result in increased surface water flow if soils are left bare for an extended period of time.

Conditions

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

- The permit holder must commence the construction of the solar farm no later than three months after undertaking the authorised clearing activities.

3.3. Relevant planning instruments and other matters

The Town of Port Hedland (the Town) has advised that the proposed clearing is consistent with the Shire's Local Planning Scheme and the construction of the Solar farm require a Development Approval (DA) under the *planning and development Act 2005* (Town of Port Hedland, 2023).

The Town stated that the proposed clearing is to be setback a minimum of 100 metres from the Great Northern Highway Road (GNH) reserve and is to be outside the Town's Visual Protection Corridor outlined in the Local Planning strategy. Based on the Town's advice, Horizon Power has moved the boundary of the proposed clearing area to be 100 metres from the GNH. However, Horizon Power has advised that some clearing is still required within the 100 metres of GNH for the purpose of connecting the solar powers to the power station via a 33 kV overhead line.

Horizon Power has informed the department that obtaining the DA from the Town of Port Hedland prior to the issuing of the clearing permit is likely to cause significant delays in delivering the decarbonisation strategy for rural Western Australia and there are tight timeframes related to this project because the existing power stations are almost to end of life with no ability to extend their current life span. Horizon Power also advised that environmental and heritage constraints and approvals are typically addressed early in the project development process while the DA is considered much later in the process, once the design is complete. To manage this risk, a standard condition on the clearing permit will be imposed where the Permit Holder must not commence clearing until the construction of the solar farm is to commence no later than three months after the clearing activities have started. The condition will ensure that clearing will not occur until the DA for the construction of the Solar Farm has been obtained and construction is guaranteed.

The proposed clearing occurs within the proclaimed Pilbara groundwater and surface water areas and are subject to licensing requirements under RiWI Act 1914. Advice was sought from the Northwest Planning team who advised that if the applicant needs to use groundwater or surface water for construction or any other purposes, the proponent will need to apply for a 5C licence to take water and a 26D licence to construct any new water supply bores. Disturbance to the bed or banks of a watercourse in association with the taking or diverting of water may require a section 17 permit (DWER, 2022). Horizon Power has advised the department that no ground or surface water will be required for the solar farm construction (GHD, 2022). The Northwest region concluded that the proposal is unlikely to impact on the water quality of water resources (DWER, 2022).

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

End

Appendix A. Additional information provided by applicant

Information	Description
Biological survey (360 Environmental, 2021).	Horizon Power commissioned 360 Environmental to undertake a reconnaissance flora and vegetation survey and a basic vertebrate fauna habitat assessment. The Boodarie survey area covered approximately 175 hectares (360 Environmental, 2021).
Response letter to the request for further information (GHD, 2022)	The response outlined further avoidance and mitigation measures for CPS 9507/1 (GHD, 2022).

Appendix B. Site characteristics

B.1. Site characteristics

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

Characteristic	Details
Local context	The area proposed to be cleared is a part of an expansive tract of native vegetation in the extensive land use zone of Western Australia. It is adjacent to a power station to the northwest and remnant vegetation in the surrounding. Aerial imagery and 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 application area is not within any mapped formal ecological linkages and is unlikely to be part of any local ecological linkage.
Conservation areas	The application area is not within a conservation area. In addition, there are no conversation areas adjacent to the application area and no conservation areas within the local area.
Vegetation description	The biological survey (360 Environmental, 2021) indicates the vegetation within the proposed clearing area consists of *Acacia stellaticeps* (*Acacia tumida* var. *pilbarensis*, *Senna notabilis* and *Indigofera monophylla*) low open shrubland over *Triodia epactia* (and *Triodia lanigera*) low open hummock grassland over *Aristida holathera* var. *holathera* (and *Chrysopogon fallax*) low sparse tussock grassland. Representative photos and the full survey descriptions and maps are available in Appendix E. The broad scale mapped vegetation type within the application area is: • Beard vegetation association 589, which is described as mosaic: short bunch grassland, savanna / grass plain (Shepherd et al, 2001). The mapped vegetation type retains approximately 99 per cent of the original extent (Government of Western Australia, 2019).
Vegetation condition	The biological survey (360 Environmental, 2021) indicates the vegetation within the proposed clearing area is in very good to excellent condition (Trudgen, 1991). The full Trudgen (1991) condition rating scale is provided in Appendix D.

Characteristic	Details
	Representative photos and the full survey descriptions and mapping are available in Appendix E.
Climate and landform	The application area is within a flat landscape with Australian Hight Datum mapped at 10 metres (DPIRD, 2019). The annual average rainfall is 317.7 millimetres (taken from Port Hedland Airport) (BOM, 2022). The application area is within the Pilbara soil-landscape, Uaroo system described as broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs (DPIRD, 2019).
Soil description	The survey described the sand within the application area as plains of orange loamy sand (360 Environmental, 2021).
Land degradation risk	The mapped soil type has a low risk of the various forms of land degradation risks. This soil land system is generally not susceptible to erosion or significant vegetation degradation because of the very sandy nature absorbing much of the water (Van Vreeswyk et al., 2004). However, given the size of the clearing, the clearing is likely to result in an increased wind erosion and surface water flow.
Waterbodies	The desktop assessment and aerial imagery indicated that no perennial watercourses, drainage lines or wetlands transect the area proposed to be cleared.
Hydrogeography	The application area is within the Pilbara Groundwater area (DWER-034) and the Pilbara Surface Water area (DWER-037) as proclaimed under the *Rights in Water and Irrigation Act 1914* (RiWI Act). The mapped groundwater salinity is 1000-3000 milligrams per litre total dissolved solids which is described as brackish to saline (DWER-026).
Flora	According to the available databases, there are 16 conservation significant flora species identified within the local area. The most frequently recorded species is *Euploca mutica* which is a Priority 3 species. The closest recorded species is the *Goodenia nuda*, recorded 2.37 kilometres from the application area. None of the species identified from the local area are mapped as having been previously recorded within the application area.
Ecological communities	The application area is not within any mapped conservation significant ecological communities. There are no mapped conservation significant ecological communities within the local area.
Fauna	According to available databases, 60 species of conservation significant fauna have been recorded within the local area. The species recorded include 46 bird species, of which 36 are listed as migratory, nine mammal species and five reptile species. No conservation significant fauna species identified from the local area are mapped as having been previously recorded within the application area.

B.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	1,801,714.98	10.12
Vegetation complex					
Beard vegetation association 589 *	728,768.20	724,695.82	99	15,304.39	2.10

*Government of Western Australia (2019a)

B.3. Flora analysis table

The flora species which required further consideration are listed in the following Table.

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Did survey identify? [Y, N, N/A]
Abutilon sp. *Pritzelianum* (S. van Leeuwen 5095)	3	Y	3.70	35	N
Euploca mutica (previously known as *Heliotropium muticum*)	3	Y	7.84	38	N
Rothia indica subsp. *australis*	3	Y	12.93	5	N
Tephrosia rosea var. Port Hedland (A.S. George 1114)	1	Y	6.49	20	N

B.4. Fauna analysis table

Migratory birds, marine species have not been included within the following table given the distance from the coast and the absence of a watercourses within the application area. Fauna species likely to occur within the application area listed in the following Table.

Species scientific name	Species Common name	Conservation status	Year of the most recent record	Distance of closest record to application area (km)	Number of known records (total)	Did survey identify? [Y, N, N/A]
BIRD						
Falco hypoleucos	Grey falcon	VU	2018	9.47	8	N
Falco peregrinus	Peregrine falcon	OS	2012	3.97	3	N
MAMMAL						
Dasycercus blythi	Brush-tailed mulgara	P4	2019	0.24	275	N
Dasyurus hallucatus	Northern quoll	EN	2018	6.00	1032	N
Macrotis lagotis	Bilby, dalgyte, ninu	VU	2019	2.33	38	N
Pseudomys chapmani	Western pebble-mound mouse, ngadji	P4	2015	26.99	12	N

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

Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared does not contain locally or regionally significant flora, fauna, habitats or assemblages of plants.	Not likely to be at variance	Yes *Refer to Section 3.2.1, above.*
Principle (b): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."* Assessment: The area proposed to be cleared does contain habitat for conservation significant fauna species and based on the habitat present, it is likely to be utilised by conservation significant fauna species identified from the local area.	May be at variance	Yes *Refer to Section 3.2.2, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The area proposed to be cleared is unlikely to contain habitat for flora species listed as threatened under the BC Act. A biological survey conducted by 360 Environmental (2021) between 25 June and 28 June 2021 did not identify any threatened flora species.	Not likely to be at variance	Yes *Refer to Section 3.2.1, above.*
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: The area proposed to be cleared does not contains species that can indicate a threatened ecological community.	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment: The extent of the mapped vegetation type and the native vegetation in the local area 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.	Not likely to be at variance	No
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of conservation areas.	Not at variance	No
Environmental value: land and water resources		

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: Given no watercourses or wetlands are recorded within the application area, the proposed clearing is unlikely to impact on- or off-site hydrology and water quality. The proposed clearing will not involve clearing of riparian vegetation.	Not likely to be at variance	No
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped soils are not highly susceptible to forms of land degradation. Noting the size of the proposed clearing and the condition of the vegetation, the proposed clearing is likely to cause land degradation in the form of wind erosion and is likely to increase surface waterflow if the application area is left bare.	May be at variance	Yes *Refer to Section 3.2.3, above*
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: Given no watercourses, wetlands or Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing is unlikely to impact upon surface or ground water quality. Groundwater salinity is mapped as 1000-3000 milligrams per litre total dissolved solids and the local area is highly vegetated with 90 per cent vegetation remaining within the local area. The proposed clearing is not likely to impact upon groundwater quality.	Not likely to be at variance	No
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: 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. Given no watercourses or wetlands are recorded within the application area, the proposed clearing is unlikely to contribute to waterlogging or exacerbate the incidence or intensity of flooding.	Not likely to be at variance	No

Appendix D. 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.

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

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

Appendix E. Biological survey information excerpts and photographs of the vegetation (360 Environmental, 2021)

Vegetation Unit and Description*	Total Area, Proportion of the Survey Area	Sites	Vegetation Condition	Photograph
Boodarie Survey Area				
P1: *Acacia stellaticeps* (*Acacia tumida* var. *pilbarensis*, *Senna notabilis* and *Indigofera monophylla*) low open shrubland over *Triodia epactia* (and *Triodia lanigera*) low open hummock grassland over *Aristida holathera* var. *holathera* (and *Chrysopogon fallax*) low sparse tussock grassland	175.1 ha 100%	BOR01 BOR02 BOR03 BOR04	Very Good to Excellent	

*Brackets indicate species that may or may not be present, but were observed as dominant at some of the sites that make up the vegetation type

Figure 2: The mapped vegetation type within the survey area.

Fauna Habitat	Total Area, Proportion of the Survey Area	Sites	Habitat Description	Representative Photo
Boodarie Survey Area				
Sandy Plains	175.1 ha 100.0%	HA_BOR01 HA_BOR02 HA_BOR03 HA_BOR04	The habitat is represented by low open shrubland over low open hummock grassland and low sparse tussock grassland. Hummocks and tussocks provide habitat for birds, reptiles, and mammals. The soil is suitable for burrowing.	

Figure 4: The mapped fauna habitat type within the survey area

4.3.5.2 Boodarie Sightings and Tracks

The terrestrial vertebrate fauna survey recorded a total of five fauna taxa from five families. One taxon, *Osphranter* sp., could not be identified to species level as only tracks were observed within the Survey Area.

One species listed as Marine under the EPBC Act was sighted within the Boodarie Survey area, this was the Nankeen Kestrel (*Falco cenchroides*).

The inventory of fauna recorded is summarised in Table 14.

Table 14: Overview of Vertebrate Fauna Species Recorded (Boodarie)

Family	Scientific Name	Common Name	Recording Method	Conservation Status
Agamidae	*Ctenophorus isolepis*	Central Military Dragon	Observed	-
Estrildidae	*Taeniopygia guttata*	Zebra Finch	Observed	-
Falconidae	*Falco cenchroides*	Nankeen Kestrel	Observed	MA (EPBC)
Macropodidae	*Osphranter* sp.	-	Tracks	-
Psittaculidae	*Melopsittacus undulatus*	Budgerigar	Observed	-

Figure 5: Fauna species sighted within the survey area during the survey.

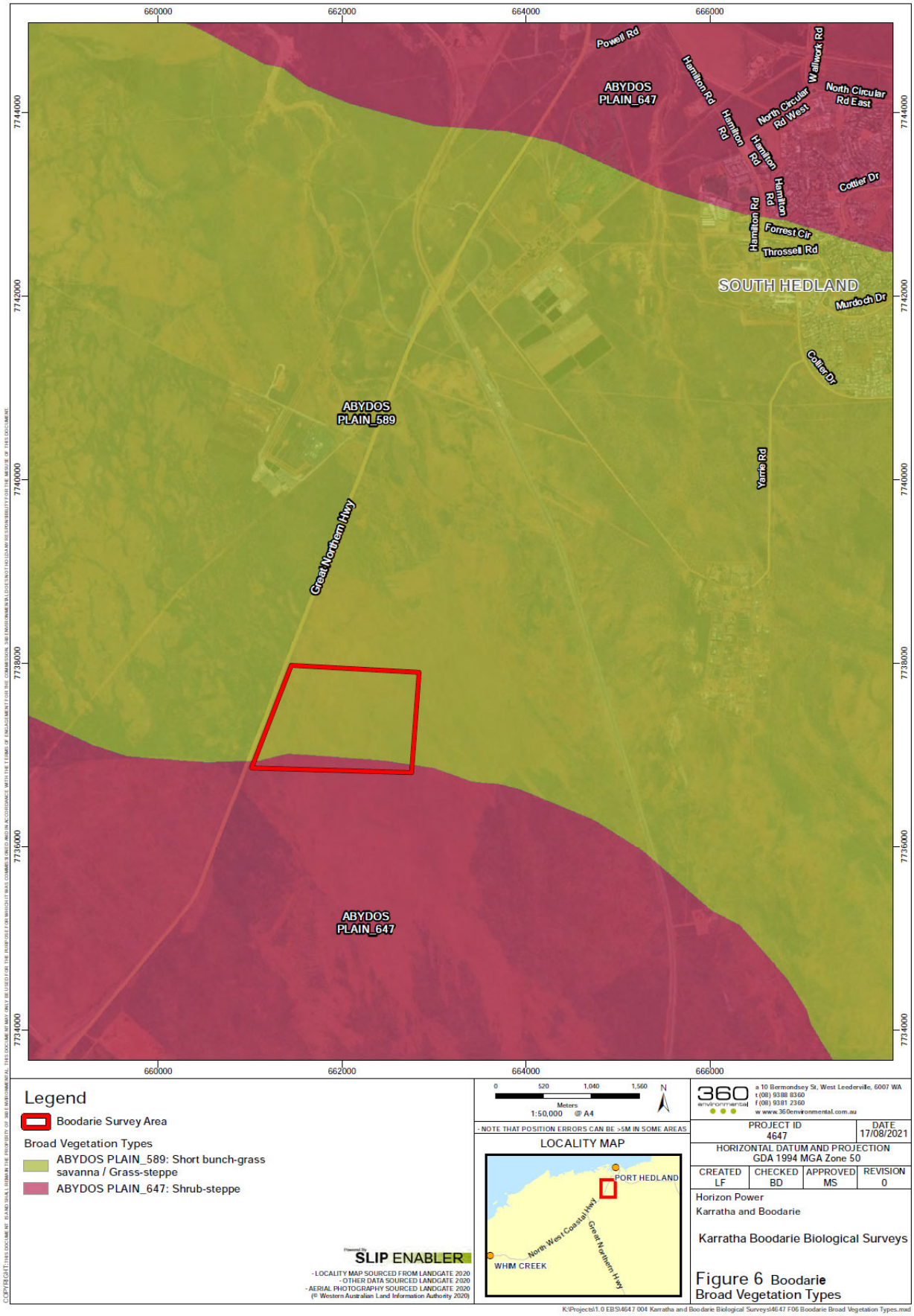

Figure 6: Broad scale vegetation type mapped within the survey area

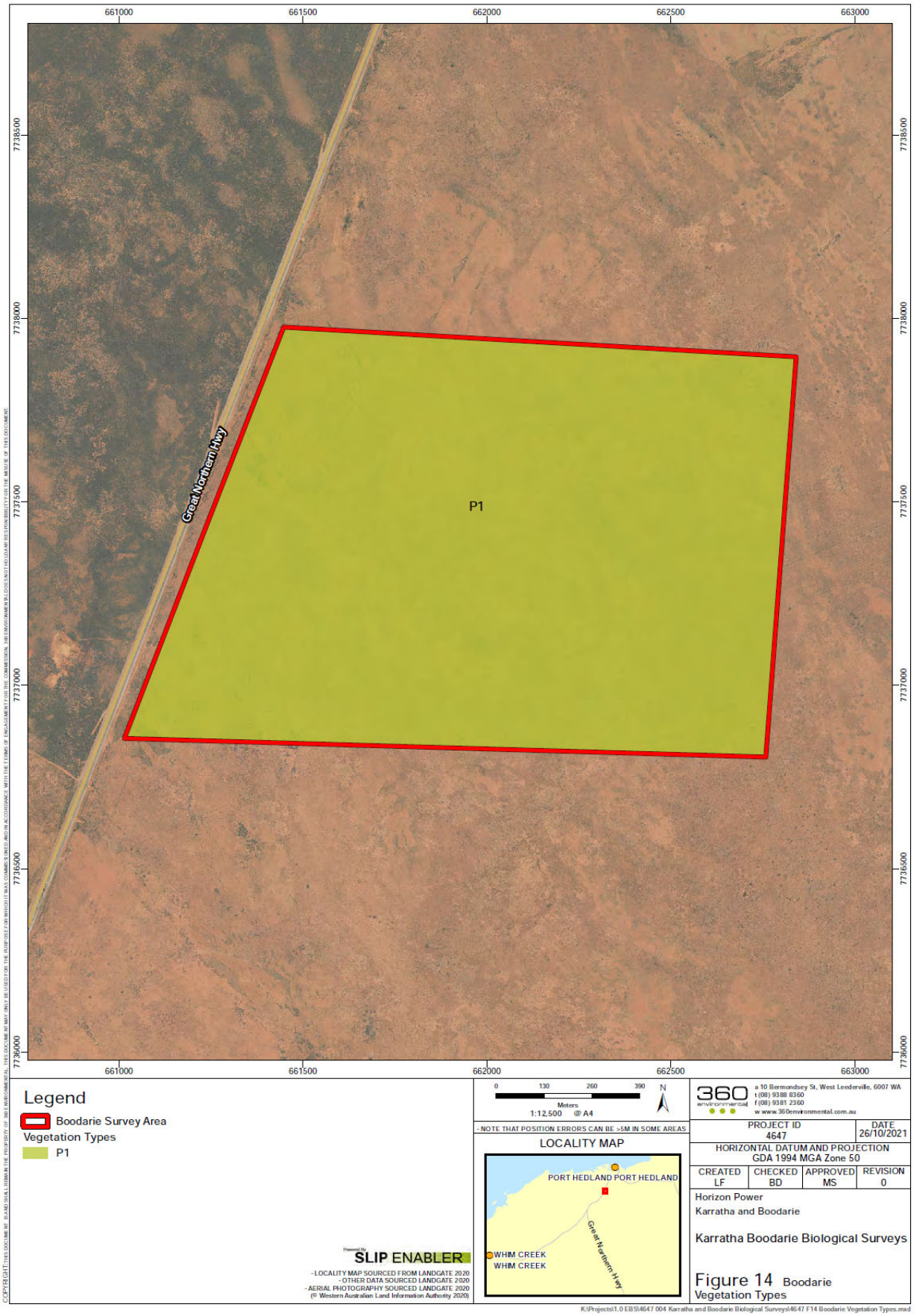

Figure 7: Vegetation type mapped within the survey area.

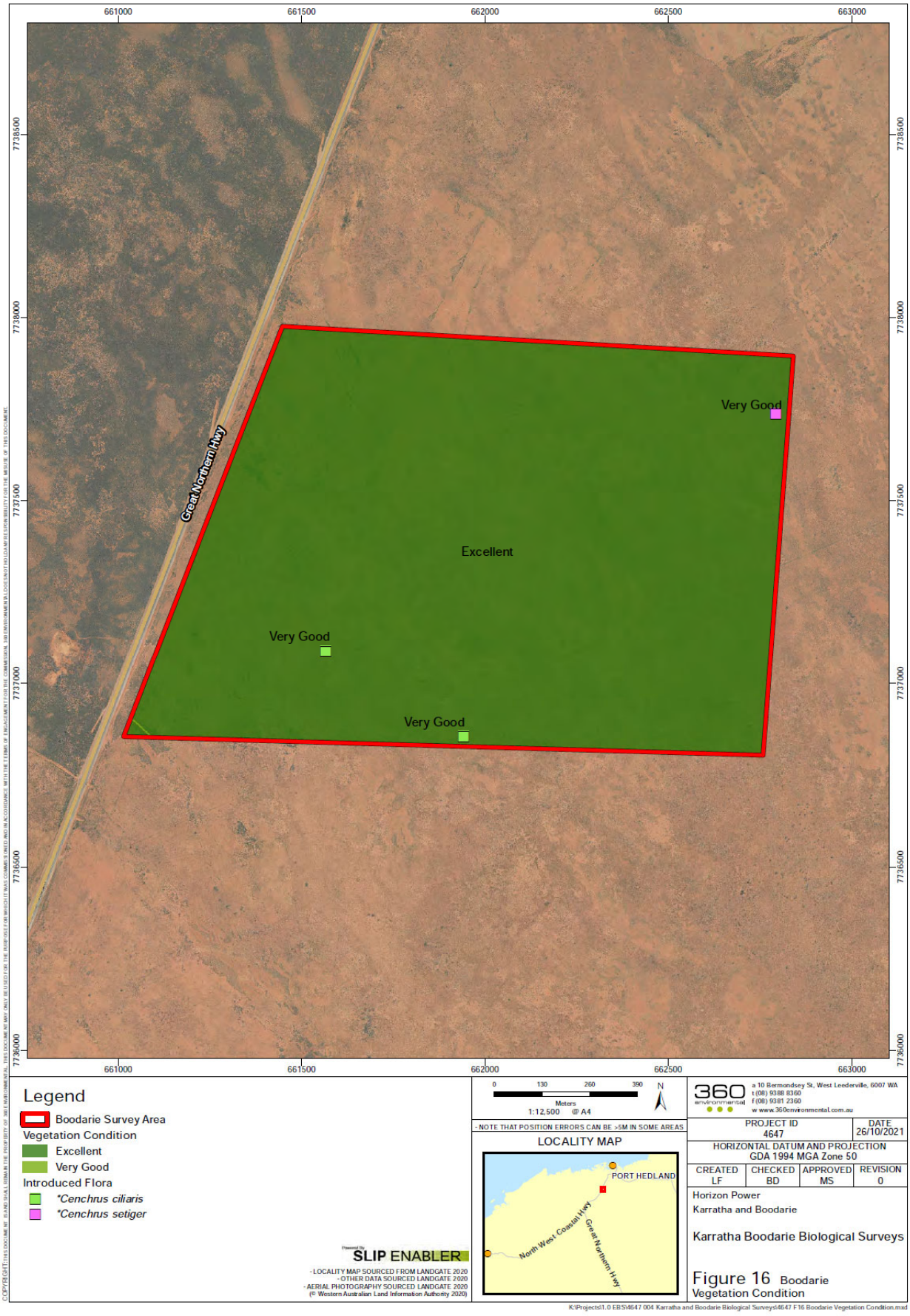

Figure 8: Vegetation condition (Trudgen, 1991) mapped within the survey area.

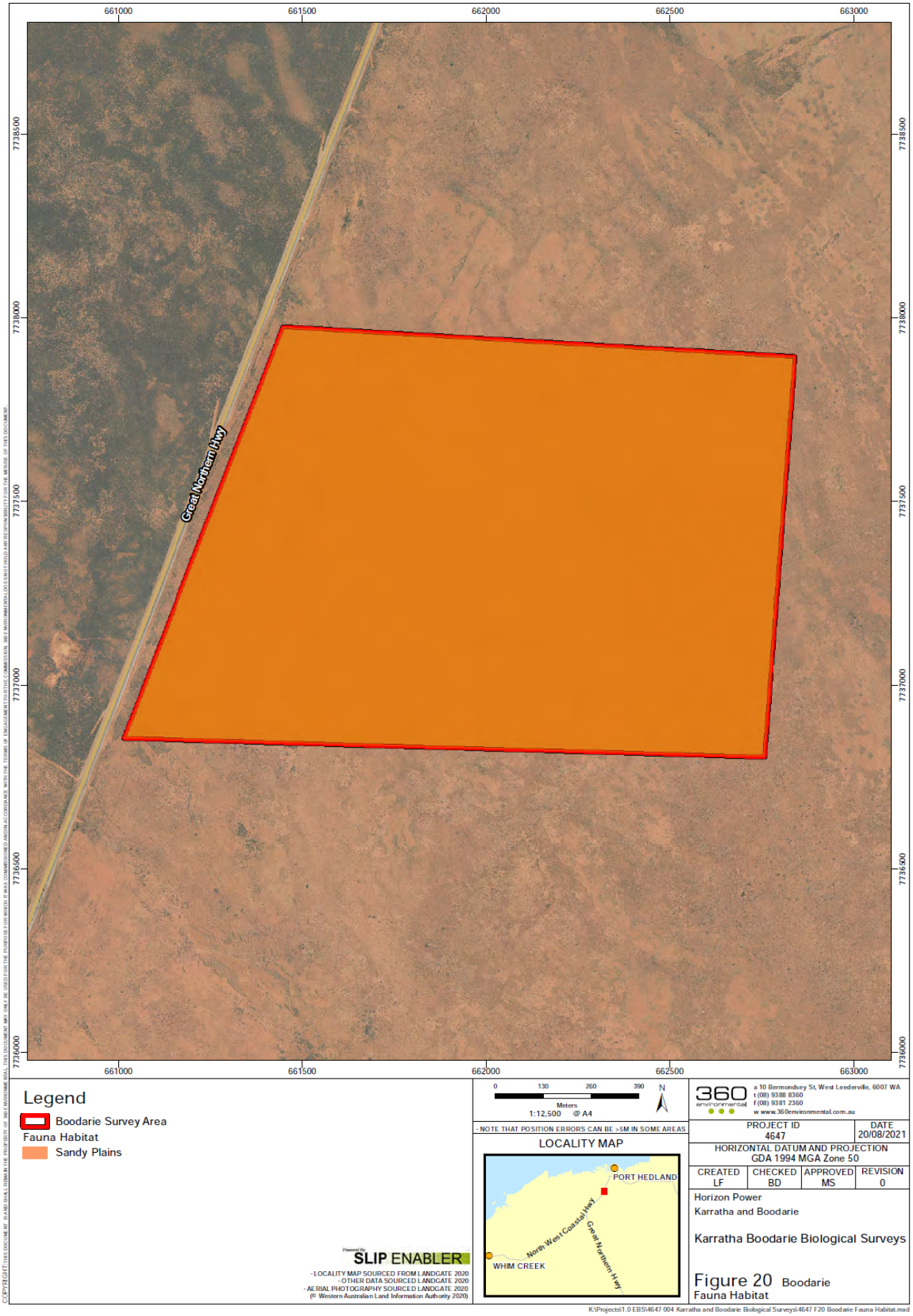

Figure 9: Fauna habitat mapped within the survey area.

Flora site sheets from the biological survey.

FLORA SITE SHEET

Project Name	4647 Karratha and Boodarie Biological Surveys		
Site:	BOR01		
Location	MGA 50	661485 **mE**	7737927 **mN**
Described by:	BE,LC		
Date:	25/06/2021		
Type:	Relevé		
Landform:	Sandy Plain		
Slope:	Flat		
Rock Type:	N/A		
Soil Type:	Loam, Sand		
Soil Colour:	Orange		

Vegetation: *Acacia stellaticeps, Senna notabilis, Corchorus sidoides subsp. vermicularis, Corchorus laniflorus and Indigofera monophylla low sparse shrubland over Triodia epactia low open hummock grassland over Aristida holathera var. holathera, Chrysopogon fallax and Bulbostylis barbata low open tussock grassland over Bonamia alatisemina, Afrohybanthus aurantiacus and Calandrinia stagnensis low sparse herbland*

Condition: Excellent **Disturbance Type:** None
Fire Age: 1-5 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)
Acacia inaequilatera	210	0.1
Chrysopogon fallax	150	2
Corchorus laniflorus	50	0.5
Acacia sericophylla	50	0.1
Acacia tumida var. pilbarensis	50	0.1
Aristida hygrometrica	50	0.1
Goodenia microptera	50	0.1
Indigofera monophylla	40	0.5
Ptilotus fusiformis	40	0.1
Waltheria indica	40	0.1
Aristida holathera var. holathera	40	20
Triodia epactia	40	14
Afrohybanthus aurantiacus	30	0.5
Bonamia pannosa	30	0.1
Cassytha capillaris	30	0.1
Crotalaria ramosissima	30	0.1
Hibiscus burtonii	30	0.1
Pluchea tetranthera	30	0.1
Ptilotus astrolasius	30	0.1
Solanum lasiophyllum	30	0.1
Trianthema pilosum	30	0.1
Senna notabilis	30	2
Corchorus sidoides subsp. vermicularis	30	1
Abildgaardia oxystachya	20	0.1
Leptosema anomalum	20	0.1
Ptilotus polystachyus	20	0.1
Sida sp. Pilbara (A.A. Mitchell PRP 1543)	20	0.1
Trigastrotheca molluginea	20	0.1
Acacia stellaticeps	20	4
Bonamia alatisemina	20	3
Stackhousia intermedia	15	0.1
Convolvulaceae sp.	10	0.1
Yakirra australiensis var. australiensis	10	0.1
Bulbostylis barbata	10	1
Calandrinia stagnensis	1	0.5

FLORA SITE SHEET

Project Name 4647 Karratha and Boodarie Biological Surveys
Site: BOR02
Location MGA 50 662737 **mE** 7737194 **mN**

Described by: BE,LC
Date: 26/06/2021
Type: Relevé

Landform: Sandy Plain
Slope: Flat
Rock Type: N/A
Soil Type: Loam, Sand
Soil Colour: Orange

Vegetation: *Acacia stellaticeps, Senna notabilis, Acacia tumida var. pilbarensis and Indigofera monophylla low open shrubland over Triodia lanigera and Triodia epactia low open hummock grassland over Aristida holathera var. holathera and Chrysopogon fallax low sparse tussock grassland over Bonamia alatisemina and Sida sp. Pilbara (A.A. Mitchell PRP 1543) low sparse herbland*

Condition: Excellent **Disturbance Type:** None
Fire Age: 1-5 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)
Acacia inaequilatera	310	0.1
Acacia sericophylla	190	0.1
Corymbia zygophylla	160	0.1
Chrysopogon fallax	80	0.5
Solanum lasiophyllum	60	0.1
Afrohybanthus aurantiacus	50	0.1
Bonamia erecta	50	0.1
Acacia tumida var. pilbarensis	50	3
Indigofera monophylla	40	0.5
Corchorus laniflorus	40	0.1
Digitaria brownii	40	0.1
Eragrostis eriopoda	40	0.1
Goodenia microptera	40	0.1
Hibiscus burtonii	40	0.1
Paraneurachne muelleri	40	0.1
Triodia lanigera	40	8
Aristida holathera var. holathera	40	2
Sida sp. Pilbara (A.A. Mitchell PRP 1543)	30	0.5
Corchorus sidoides subsp. vermicularis	30	0.1
Hibiscus leptocladus	30	0.1
Ptilotus astrolasius	30	0.1
Ptilotus fusiformis	30	0.1
Acacia stellaticeps	30	18
Senna notabilis	30	5
Triodia epactia	20	5
Bonamia alatisemina	20	3
Yakirra australiensis var. australiensis	10	0.1

FLORA SITE SHEET

Project Name 4647 Karratha and Boodarie Biological Surveys
Site: BOR03
Location MGA 50 662126 **mE** 7736846 **mN**

Described by: BE,LC
Date: 26/06/2021
Type: Relevé

Landform: Sandy Plain
Slope: Flat
Rock Type: N/A
Soil Type: Loam, Sand
Soil Colour: Orange

Vegetation: *Acacia stellaticeps, Bonamia erecta, Acacia tumida var. pilbarensis, Senna notabilis and Indigofera monophylla low open shrubland over Triodia lanigera, Triodia epactia and Triodia schinzii low open hummock grassland over Aristida holathera var. holathera and Digitaria brownii low sparse tussock grassland*

Condition: Excellent
Fire Age: 1-5 years, >10 years
Disturbance Type: None
Site Notes: Mainly burnt recently but includes a portion of longer unburnt vegetation

SPECIES LIST

Taxon	Height (cm)	Cover (%)
Chrysopogon fallax	120	0.1
Aristida inaequiglumis	90	0.1
Acacia tumida var. pilbarensis	70	2
Eragrostis eriopoda	50	0.1
Eriachne obtusa	50	0.1
Solanum phlomoides	50	0.1
Goodenia microptera	40	0.1
Hibiscus burtonii	40	0.1
Paraneurachne muelleri	40	0.1
Ptilotus astrolasius	40	0.1
Ptilotus fusiformis	40	0.1
Sida sp.	40	0.1
Sida sp. Pilbara (A.A. Mitchell PRP 1543)	40	0.1
Solanum lasiophyllum	40	0.1
Triumfetta chaetocarpa	40	0.1
Triodia lanigera	40	15
Bonamia erecta	40	4
Senna notabilis	40	2
Triodia schinzii	40	2
Digitaria brownii	40	1
Indigofera monophylla	30	0.5
Acacia ancistrocarpa	30	0.1
Acacia stellaticeps	30	12
Triodia epactia	30	3
Aristida holathera var. holathera	30	2
Bonamia alatisemina	20	0.1
Bulbostylis barbata	5	0.1

FLORA SITE SHEET

Project Name 4647 Karratha and Boodarie Biological Surveys
Site: BOR04
Location MGA 50 661061 **mE** 7736877 **mN**

Described by: BE,LC
Date: 26/06/2021
Type: Relevé

Landform: Sandy Plain
Slope: Flat
Rock Type: N/A
Soil Type: Loam, Sand
Soil Colour: Orange

Vegetation: *Acacia stellaticeps low open shrubland over Triodia epactia and Triodia lanigera low hummock grassland*

Condition: Very Good
Fire Age: > 15 years
Disturbance Type: Litter, Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)
Acacia stellaticeps	80	16
Pluchea tetranthera	60	0.1
Triodia epactia	40	35
Triodia lanigera	40	3
Cassytha capillaris	30	0.1

Fauna site sheets from the biological survey

BOR01					
Project:	4647 Karratha-Boodarie				
Date	25/06/2021		Personnel	BE, LC	
Zone	50	Easting 661485		Northing	7737927
Landform and soil			Rock		
Landform	Sandy plain		Rock type/s	None	
Soil type	Loam, Sand		Surface stone cover		
Soil colour	Orange		Surface stone size classes present		
Condition			Habitat Features		
Quality	Excellent				
Fire History	1-5 years		Water Source	Absent	
Disturbance	None observed		Microhabitats	Hummocks, Termite mounds	
Introduced fauna	None observed				
Vegetation					
Upper stratum	Absent				
Mid stratum	Mid (1-2 m)	Isolated shrubs (<0.25%)	*Chrysopogon fallax*		
Ground stratum	Low (>0.5 m)	Sparse hummock grassland (0.25-20%), Sparse herbland (0.25-20%)	*Aristida holathera var. holathera, Triodia epactia*		

Fulcrum photo ID 0028-0029

BOR02					
Project:	4647 Karratha-Boodarie				
Date	26/06/2021		Personnel	BE, LC	
Zone	50	Easting 662737		Northing	7737194
Landform and soil			Rock		
Landform	Sandy plain		Rock type/s	None	
Soil type	Loam, Sand		Surface stone cover		
Soil colour	Orange		Surface stone size classes present		
Condition			Habitat Features		
Quality	Excellent				
Fire History	1-5 years		Water Source	Absent	
Disturbance	None observed		Microhabitats	Termite mounds	
Introduced fauna	None observed				
Vegetation					
Upper stratum	Absent				
Mid stratum	Low (>1 m)	Sparse shrubland (0.25-20%)	*Acacia stellaticeps, Acacia tumida var. pilbarensis, Indigofera monophylla*		
Ground stratum	Low (>0.5 m)	Sparse hummock grassland (0.25-20%), Sparse tussock grassland (0.25-20%)	*Triodia lanigera, Triodia epactia, Aristida holathera var. holathera, Chrysopogon fallax*		

Fulcrum photo ID 0052-0053

BOR03					
Project:	4647 Karratha-Boodarie				
Date	26/06/2021		Personnel	BE, LC	
Zone	50	Easting 662126		Northing	7736846
Landform and soil			Rock		
Landform	Sandy plain		Rock type/s	None	
Soil type	Loam, Sand		Surface stone cover		
Soil colour	Orange		Surface stone size classes present		
Condition			Habitat Features		
Quality	Excellent				
Fire History	1-5 years, >10 years		Water Source	Absent	
Disturbance	None observed		Microhabitats	Hummocks, Termite mounds	
Introduced fauna	None observed				
Vegetation					
Upper stratum	Absent				
Mid stratum	Low (>1 m)	Open shrubland (20-50%)	*Acacia stellaticeps, Bonamia erecta, Acacia tumida var. pilbarensis,*		
Ground stratum	Low (>0.5 m)	Sparse hummock grassland (0.25-20%), Sparse tussock grassland (0.25-20%)	*Triodia lanigera, Triodia epactia, Aristida holathera var. holathera*		

Fulcrum photo ID 0056-0057

BOR04					
Project:	4647 Karratha-Boodarie				
Date	26/06/2021		Personnel	BE, LC	
Zone	50	Easting 661061		Northing	7736877
Landform and soil			Rock		
Landform	Sandy plain		Rock type/s	None	
Soil type	Loam, Sand		Surface stone cover		
Soil colour	Orange		Surface stone size classes present		
Condition			Habitat Features		
Quality	Very Good				
Fire History	> 15 years		Water Source	Absent	
Disturbance	Litter, Vehicle tracks		Microhabitats	Hummocks, Termite mounds	
Introduced fauna	None observed				
Vegetation					
Upper stratum	Absent				
Mid stratum	Low (>1 m)	Sparse shrubland (0.25-20%)	*Acacia stellaticeps*		
Ground stratum	Low (>0.5 m)	Open hummock grassland (20-50%)	*Triodia epactia, Triodia lanigera*		

Fulcrum photo ID 0061-0062

Appendix F. Sources of information

F.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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