
**ASSESSMENT OF FLORA, VEGETATION and FAUNA
ON THE
INFINITE GREEN ENERGY AREA NEAR NORTHAM**

Prepared for

Infinite Green Energy

Prepared by

Mattiske Consulting Pty Ltd

January 2023



Mattiske Consulting Pty Ltd



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LIST OF ABBREVIATIONS

- BAM Act:** *Biosecurity and Agriculture Management Act 2007 (WA)*
BC Act: *Biodiversity Conservation Act 2016 (WA)*
BOM: Bureau of Meteorology
DCCEEW: Department of Climate Change, Energy, the Environment and Water
DBCA: Department of Biodiversity, Conservation and Attractions
EP Act: *Environmental Protection Act 1986 (WA)*
EPA: Environmental Protection Authority
EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
IBRA: Interim Biogeographical Regionalisation for Australia
PEC: Priority ecological community
TEC: Threatened ecological community
TPFL: Threatened and Priority Flora (WA Herbarium)
WAH: Western Australian Herbarium (PERTH)

1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned by Infinite Green Energy in the spring months of 2022 to complete an assessment of flora, vegetation and fauna values on the localised remnant vegetation along the Mortlock River on a historical operating sheep and grain farm near the township of Northam in the Western Australian Wheatbelt, Figure 1.

The proposed energy facility is located on an operating farm that includes grazing paddocks for sheep areas historically and currently cleared and used for various crops. The remnant area of vegetation is restricted to the fringes of the Mortlock River and as such is dominated by introduced grasses and a few patches of trees that are mostly in decline.

A field assessment was undertaken by Dr Libby Mattiske (Mattiske Consulting) who has over 40 years of experience in undertaking biological surveys in Western Australia in the spring months of 2022.

On the basis of a desktop assessment of state and federal databases, a total of 348 taxa from 63 families and 197 genera had the potential to occur in the survey area. Of these there was the potential for 11 threatened taxa listed under the Biodiversity Conservation Act (2016) and the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) and 6 Priority 3 flora and 1 Priority 4 flora have the potential to occur in the survey area. Of the 18 threatened and priority flora species based on distribution patterns using FloraBase (DPAW 1998-) or suitable soils, three species had a medium potential to occur near the survey area. Following the field assessment, a total of 23 taxa from 13 families and 22 genera were recorded. The range of flora on the site is very limited due to the previous of historical activities. In general only an occasional tree persists over introduced grasses and herbs. No threatened or priority flora species were recorded in the survey area. Of the 23 flora taxa recorded 15 of these were introduced species. Two of the introduced species (**Opuntia stricta* was recorded at site 6 and **Echium plantagineum* was recorded at sites 1 and 2 – see Figure 5) are listed as Weeds of National Significance (DCCEEW 2022a); although only present in limited numbers. The latter reflects the degree of disturbance of the vegetation in the survey area.

The range of flora on the site is very limited due to the previous clearing activities associated with the grazing and cropping activities. There are solar panels already east of the creekline that are operating on previously cleared, grazed and cropped paddocks. The proposed energy facilities will be established on the western side of the creekline in the cleared and grazed paddock. The current and proposed facilities occur on completely degraded paddocks and the only proposed disturbance of the degraded remnant vegetation along the fringes of the Mortlock River is an overhead facility to link the established solar panel with the proposed hydrogen energy facility. As there are major gaps in the tree canopies, that such a facility will be easily installed with the potential for possible only one or two trees to be pruned or removed. The understorey on the fringes of the creekline is dominated by mainly introduced grasses (e.g. **Avena fatua*, **Bromus diandrus*, **Lolium rigidum* and **Eragrostis curvula*). This dominance of introduced grasses is reflected in the high cover of these introduced grasses which at times even made walking difficult in the areas.

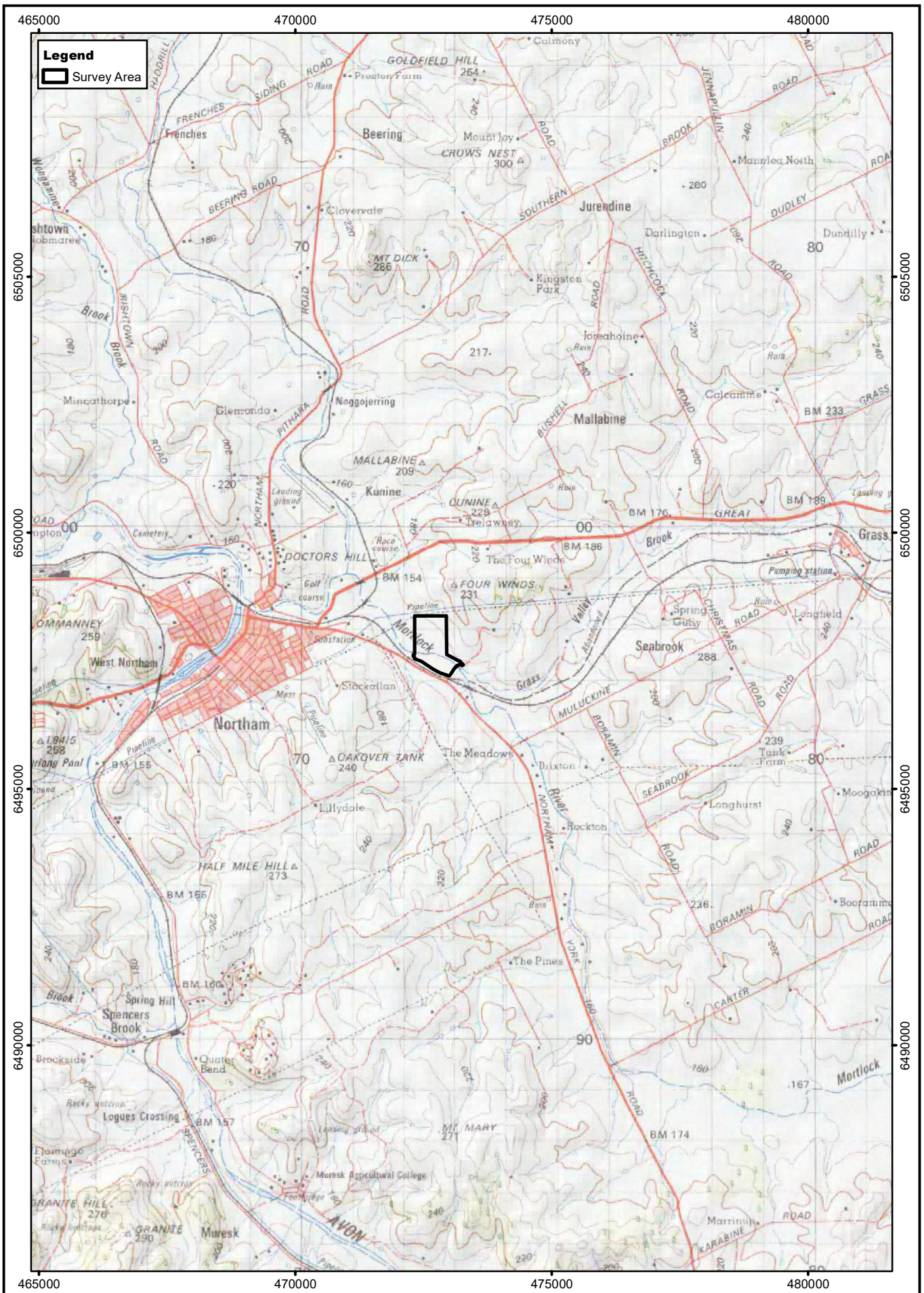
Although the woodlands in the Western Australian Wheatbelt are listed as Endangered Threatened Ecological Communities under the *Environment Protection Biodiversity and Conservation Act 1999*. In recognising that intensive agricultural clearing has impacted the extent of the remnants of vegetation loss any impacts require referral to the Federal Department of Climate Change, Energy, the Environment and Water. The extent of these impacts have been documented by a range of specialists including (Prober and Smith 2009). As the areas within the Northam survey area are degraded there remain two options to minimize impacts, firstly to cross the river at the established creek crossing and the other is to select the most open area along the survey area that does not lead to any tree loss or at the minimum one or two trees on the immediate slopes near the river. Either option should be considered insignificant on the values as temporary access would only be needed to install pole to carry power connections.

On the basis of the desktop assessment of Nature Map and the national databases (PMST) a total of 237 taxa had the potential to occur in the survey area. Of these there was the potential for 6 amphibians, 180 birds, 6 fish, 9 mammals, 35 reptiles and 1 spider. A total of 20 conservation significant species listed under the Biodiversity Conservation Act (2016) and the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) had the potential to occur in the area. This included 1 critically endangered bird, 3 endangered birds, 3 vulnerable birds, 1 other specially protected bird species, 7 migratory birds, 1 Priority 3 bird species, 1 Priority 4 species, and 3 vulnerable mammal species. The field assessment did not record

During the survey, discussions with the landowner highlighted the lack of presence of the listed black cockatoo species. The survey did not record any suitable hollows for larger birds such as the Black Cockatoo and only birds present were several smaller birds and duck species on the localised seasonal ponds. As indicated in previous sections the degree of clearing on the paddock where the Northam Hydrogen plant is to be established had been heavily grazed by the sheep and only the occasional grass species was present in this area. Fauna utilisation of the area is very restricted to the occasional water birds that may use seasonal water flows and smaller areas of ponding. If trees are avoided then any impacts would be negligible to bird species. The density of the introduced grasses would limit access to other fauna species. No listed Black Cockatoos were observed and according to the landowner have not been observed. The latter in part reflects the degree of disturbance and lack of suitable hollows and the poor state of many trees. Whilst there are some Eucalypts in fruit and flower and *Casuarina obesa* in fruit due to the degraded condition of most of the trees any usage for foraging would be minimal.

A comparison of the desktop findings and the field assessment findings highlights the lack of significant biological values and further as there are options for following already degraded and completely degraded areas adjacent to the current access vehicle route across the river any direct or indirect impacts should be able to be avoided.

In summary, in terms of the ten native vegetation clearing principles, Principles (b), (d), (e) and (f) are relevant to the consideration of this work; however in view of the potential options to avoid any disturbance by installing overhead power cables near the current open track and access route across the Mortlock n River these principles can be avoided. Furthermore, any such installation is a short-term consideration and as such should not trigger any issues on flora, vegetation or fauna where the facilities cross the Mortlock River.



Legend
 Survey Area

N
 0 0.6 1.2 km
 Scale: 1:100,000
 MGA94 (Zone 50)
 CAD Ref: a2893_F004_01
 Date: December 2022 Rev: A A4

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Northam Hydrogen Plant Locality

Figure:
1

2. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned by Infinite Green Energy in the spring months of 2022 to complete an assessment of flora, vegetation and fauna values on the localised remnant vegetation along the Mortlock River on a historical operating sheep and grain farm near the township of Northam in the Western Australian Wheatbelt, Figure 1.

The proposed energy facility is located on an operating farm that includes grazing paddocks for sheep areas historically and currently cleared and used for various crops. The location also is bounded on the west by an operating railway line, associated support tracks and the main road from Northam to York.

2.1 Climate

Beard (1990) describes the climate of the Avon Botanical District as dry warm Mediterranean with 7-8 dry months per year. Figure 2 shows the average climate data of the Northam weather station (rainfall, minimum and maximum temperature), (BOM 2022). The seasonal wetter and cooler months in winter and the drier and hotter months in summer typify the regional conditions.

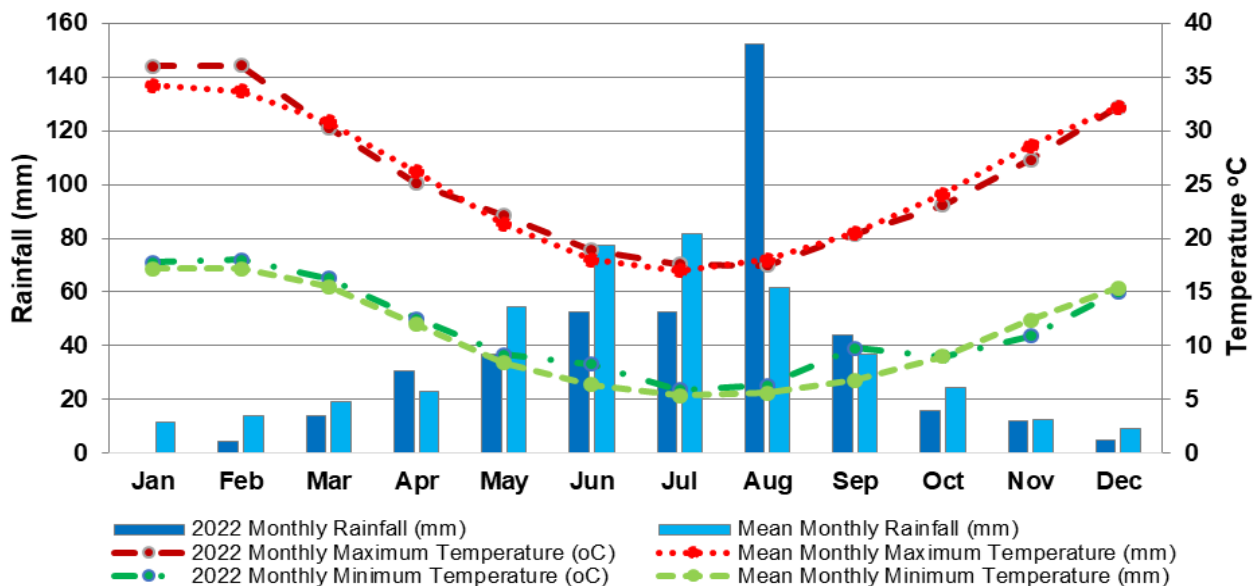


Figure 2: Summary of Climatic data from Bureau of Meteorology (BOM 2022) for the Northam Station - 010111 (Rainfall, Minimum and Maximum Temperatures °C)

2.2 Western Australia's Flora – A Legislative Perspective

At the State level, the *Biodiversity Conservation Act 2016* provides for taxa of native flora (and fauna) to be specially protected because they are subject to identifiable threats. Protection of these taxa has been identified as being warranted because they may become extinct, are threatened, or are otherwise in need of special protection. Ecological communities that are deemed to be threatened are afforded protection under the *Environmental Protection Act 1986*. Listings of threatened species and communities are reviewed annually by the Western Australian Threatened Species Scientific Committee (TSSC), which is a body appointed by the Minister for the Environment and supported by the DBCA. The TSSC reviews threatened and specially protected flora (and fauna) listings on an annual basis. Recommendation for additions or deletions to the listings of specially protected flora (and fauna) is made to the Minister for the Environment by the TSSC, via the Director General of the DBCA, and the WA Conservation Commission. Under Schedule 1 of the *Biodiversity Conservation Act 2006*, the Minister for

the Environment may declare that a class or description of flora to be threatened flora throughout the State, by notice published in the *Government Gazette* (DBCA 2022a).

At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, a nomination process exists, to list a threatened species or ecological community. Additions or deletions to the lists of Threatened species and communities are made by the Minister for Agriculture, Water and the Environment, on advice from the Federal Threatened Species Scientific Committee. *Environment Protection and Biodiversity Conservation Act 1999* lists of Threatened flora and ecological communities are published on the Department of Climate Change, Energy, the Environment and Water (2022b, 2022c).

2.3 Threatened and Priority Flora

Flora within Western Australia that is considered to be under threat may be classed as either threatened flora or priority flora. Where flora has been gazetted as threatened flora under the *Biodiversity Conservation Act 2006*, it is an offence "to take" such flora without the written consent of the Minister. The *Biodiversity Conservation Act 2006* states that "to take" flora includes to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.

Priority flora constitute species which are considered to be under threat, but for which there is insufficient information available concerning their distribution and/or populations to make a proper evaluation of their conservation status. Such species are considered to potentially be under threat, but do not have legislative protection afforded under the *Biodiversity Conservation Act 2016*. The DBCA categorises priority flora according to their conservation priority, using five categories, P1 to P5, to denote the conservation priority status of such species, with P1 listed species being the most threatened, and P5 the least. Priority flora species are regularly reviewed, and may have their priority status changed when more information on the species becomes available. Appendix A1 sets out definitions of both threatened and priority flora (DBCA 2022a).

At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened species can be listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent, by the Commonwealth Minister for Agriculture, Water and the Environment. Refer to Appendix A2 for a description of each of these categories of threatened species. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed threatened species without approval from the Commonwealth Minister for Climate Change, Energy, the Environment and Water, unless those actions are not prohibited under the Act.

2.4 Threatened and Priority Ecological Communities

An ecological community is defined as a naturally occurring biological assemblage that occurs in a particular type of habitat composed of specific abiotic and biotic factors. At the State level, ecological communities may be considered as threatened once they have been identified as such by the Western Australian Threatened Ecological Communities Scientific Advisory Committee. A threatened ecological community is defined, under the *Environmental Protection Act 1986*, as an ecological community listed, designated or declared under a written law or a law of the Commonwealth as threatened, endangered or vulnerable. There are four State categories of threatened ecological communities, or TECs: presumed totally destroyed (PD); critically endangered (CR); endangered (EN); and vulnerable (VU) (DBCA 2019). A description of each of these categories of TECs is presented in Appendix A3. Threatened ecological communities are gazetted as such (DBCA 2022b).

At the Commonwealth level, some Western Australian TECs are listed as threatened, under the *Environment Protection and Biodiversity Conservation Act 1999*. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed threatened ecological community without approval from the Commonwealth Minister for the Agriculture, Water and the Environment, unless those actions are not prohibited under the Act. A description of each of these categories of TECs is presented in Appendix A4. The current *Environment*

Protection and Biodiversity Conservation Act 1999 list of threatened ecological communities can be located on the DCCEE (2022c) website.

Ecological communities identified as threatened, but not listed as threatened ecological communities, can be classified as priority ecological communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. The DBCA categorises priority ecological communities according to their conservation priority, using five categories, P1 to P5, to denote the conservation priority status of such ecological communities, with P1 communities being the most threatened and P5 the least. Appendix A5 sets out definitions of priority ecological communities (DEC 2013). A list of current priority ecological communities can be viewed at the DBCA (2022c) website.

2.5 Clearing of Native Vegetation

Under the *Environmental Protection Act 1986*, the clearing of native vegetation requires a permit to do so, from the Department, Water and Environmental Regulations (DWER) or the Department of Mines, Industry Regulation and Safety (DMIRS), unless that clearing is exempted under specific provisions listed in Schedule 6 of the Act, or are prescribed in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Under the *Environmental Protection Act (1986)*, "native vegetation" means indigenous aquatic or terrestrial vegetation, and includes dead vegetation unless that dead vegetation is of a class declared by regulation to be excluded from this definition but does not include vegetation in a plantation. Under the *Environmental Protection Act 1986*, Section 51A, "clearing" means the killing or destruction of, the removal of, the severing or ringbarking of trunks or stems of, or the doing of any other substantial damage to, some or all of the native vegetation in an area, and includes the draining or flooding of land, the burning of vegetation, the grazing of stock, or any other act or activity, that causes any of the aforementioned consequences or results.

Under the *Environmental Protection Act 1986*, ten principles are set out, under which native vegetation should not be cleared. These principles state that native vegetation should not be cleared, if:

- a. it comprises a high level of biological diversity;
- b. it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia;
- c. it includes, or is necessary for the continued existence of, threatened flora;
- d. it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community;
- e. it is significant as a remnant of native vegetation in an area that has been extensively cleared;
- f. it is growing in, or in association with, an environment associated with a watercourse or wetland;
- g. the clearing of the vegetation is likely to cause appreciable land degradation;
- h. the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area;
- i. the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water; or
- j. the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, under Regulation 5, sets out prescribed clearing actions that do not require a clearing permit, as defined in Section 51C of the *Environmental Protection Act 1986*.

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, under Regulation 6 –"Environmentally sensitive areas" are defined as "the area covered by vegetation within 50 m of

threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the threatened flora is located”.

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* - Regulation 6 (Environmentally sensitive areas), the area covered by a threatened ecological community, is similarly considered an Environmental sensitive area and therefore non-permitted, unless Ministerial approval is granted.

2.6 Declared Plant (Pest) Species

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2022).

2.7 Local and Regional Significance

Flora or vegetation may be locally or regionally significant in addition to statutory listings by the State or Federal Government.

In regards to flora; species, subspecies, varieties, hybrids and ecotypes may be significant other than as threatened flora or priority flora, for a variety of reasons, including:

- a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and
- being poorly reserved (EPA 2004).

Vegetation may be significant because the extent is below a threshold level and a range of other reasons, including:

- scarcity;
- unusual species;
- novel combinations of species;
- a role as a refuge;
- a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly, a good local and/or regional example of a unit in “prime” habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);

- a restricted distribution (EPA 2004).

Vegetation communities are locally significant if they contain Priority Flora species or contain a range extension of a particular taxon outside of the normal distribution. They may also be locally significant if they are very restricted to one or two locations or occur as small isolated communities. In addition, vegetation communities that exhibit unusually high structural and species diversity are also locally significant.

Vegetation communities are regionally significant where they are limited to specific landform types, are uncommon or restricted plant community types within the regional context, or support populations of threatened Flora.

Determining the significance of flora and vegetation may be applied at various scales, for example, a vegetation community may be nationally significant and governed by statutory protection as well as being locally and regionally significant.

3. OBJECTIVES

Mattiske Consulting Pty Ltd was commissioned by the Infinite Green energy in the spring months of 2022 to complete an assessment of flora, vegetation and fauna values on the proposed power operational areas in the property near Northam, Figure 1.

The reconnaissance survey was undertaken in accordance with the EPA (2016a and 2016b) and Commonwealth (2013) survey guidance statements. A detailed survey was not undertaken due to the extensive clearing in the past from historical grazing activities and crop production over the majority of the area.

- Record the flora, vegetation and fauna values in the area through sampling;
- Undertake searches for flora species using foot traverses;
- Collect and identify the vascular plant species present in the survey area;
- Collate and identify weeds within the survey area;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the DBCA (2022a) and plant collections held at the Western Australian State Herbarium (WAH 1998-), and listed by the DCCEEW (2022a) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Identify any threatened or priority ecological communities recorded by reference to current literature and current listings by the DBCA (2022b, 2022c) and as listed by the DCCEEW (2022c) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Undertake targeted work on the fauna habitat values and any potential usage of the area;
- Provide recommendations on the local and regional significance of the values; and
- Prepare a report summarising the findings.

4. METHODS

This report provides a summary that incorporates key points from recent site inspections Dr Mattiske in the spring months of 2022. Survey recorded sites summarized on Vegetation Map (Figure 5). This image also reflects the degree of previous clearing on the majority of the areas.

An assessment of the impact of weed invasion or vegetation condition was undertaken on the basis of the vegetation condition scale from Keighery (1994) (Appendix A7).

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the Western Australian Herbarium. The plant species were identified through

comparisons with pressed specimens housed at the Western Australian Herbarium. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

The descriptions of plant communities within the survey area are based on the structural forms of Australian vegetation developed by Beard (1990).

The trees on the survey area were re-assessed for the presence of suitable hollows for bird species and evidence of any usage of the areas by other fauna was noted.

4.1 Survey Limitations and Constraints

An assessment of the survey against a range of factors which may have had an impact on the outcomes of the present survey was made (Table 1). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

Table 1: Potential Flora, Vegetation and Fauna Survey Limitations

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	Not a constraint: The study has been undertaken in an area that has been well studied and documented with regional literature and data available (Beard 1990; Beecham, 2001).
Scope (i.e. what life forms, etc., were sampled).	Not a constraint: Due to sufficient rainfall, all life forms were sampled adequately during the time of the survey. All site characteristics were adequately sampled during the time of the survey.
Proportion of flora collected and identified (based on sampling, timing and intensity).	Not a constraint: As the native flora was largely absent the survey effort was more than adequate in terms of coverage as the areas ranged from degraded to completely degraded (cleared and grazed paddocks).
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	Not a constraint: The information collected during the survey was sufficient to assess the vegetation that was present during the time of the survey.
Mapping reliability.	Not a constraint: Aerial photography of a suitable scale was used. The information collected during the survey was sufficient to assess the vegetation and fauna habitats that were present during the time of the survey.
Timing, weather, season, cycle.	Not a constraint: It is generally accepted that flora and vegetation surveys are conducted in late spring (after late rains in the southwest in 2021) in the Wheatbelt (EPA 2004). Rainfall prior to the survey was deemed to be sufficient (Figure 2).
Disturbances (fire flood, accidental human intervention, etc.).	Potential constraint: Previous agricultural activities have led to degraded and completely degraded condition of the survey area.

Table 1: Potential Flora, Vegetation and Fauna Survey Limitations (continued)

Potential Survey Limitation	Impact on Survey
Intensity (in retrospect, was the intensity adequate).	Not a constraint: Sites were established in the degraded remnant vegetation on the fringes of the Mortlock River. In view of the heavy grazing activities and crop production and already established solar panels in the eastern sections, the intensity was influenced by the historical and recent activities.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	Not a constraint: The available resources were adequate to complete the survey.
Access problems (i.e. ability to access survey area).	Not a constraint: Existing tracks enabled adequate access to survey the vegetation within the survey area.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	Not a constraint: Dr Mattiske had the appropriate training in sampling and identifying the biological values in the region.

5. DESKTOP RESULTS

The survey area occurs in the Avon botanical district and the Wheatbelt botanical region as defined by Beard (1990). The Avon botanical district has largely been disturbed for agricultural activities and as such only 7% remains uncleared in the botanical district.

The Wheatbelt botanical region occurs on archaean granites with infolded metamorphics of the Yilgarn Bock (Beard 1990).

5.1 Landform and Soils

The underlying land system as illustrated on Figure 3 is summarized in Table 2.

Table 2: Summary of Land Systems for the Survey Area

<i>Systems</i>	<i>Name</i>	<i>Description</i>	<i>Area (Ha) % Total Mapped</i>	<i>Total Mapped (Ha)</i>
256Jc	Jelcobine System	Isolated steep low hills with undulating low granite hills and isolated lateritic remnants in the Zone of Rejuvenated Drainage. Gravels, and grey shallow to deep sandy duplexes. Wandoo, york gum, Jam and Casuarina woodland predominate.	198.31 0.09%	212529.54
256Af	Avon Flats System	Alluvial flats, in the northern Zone of Rejuvenated Drainage, with brown loamy earth, grey non-cracking clay and brown deep sand. York gum-salmon gum-flooded gum-sheoak woodland.	109.02 0.54%	20122.59

Both systems within the survey area are less than 1.00% of the total extents of the respective land systems.

5.2 Pre-European Vegetation

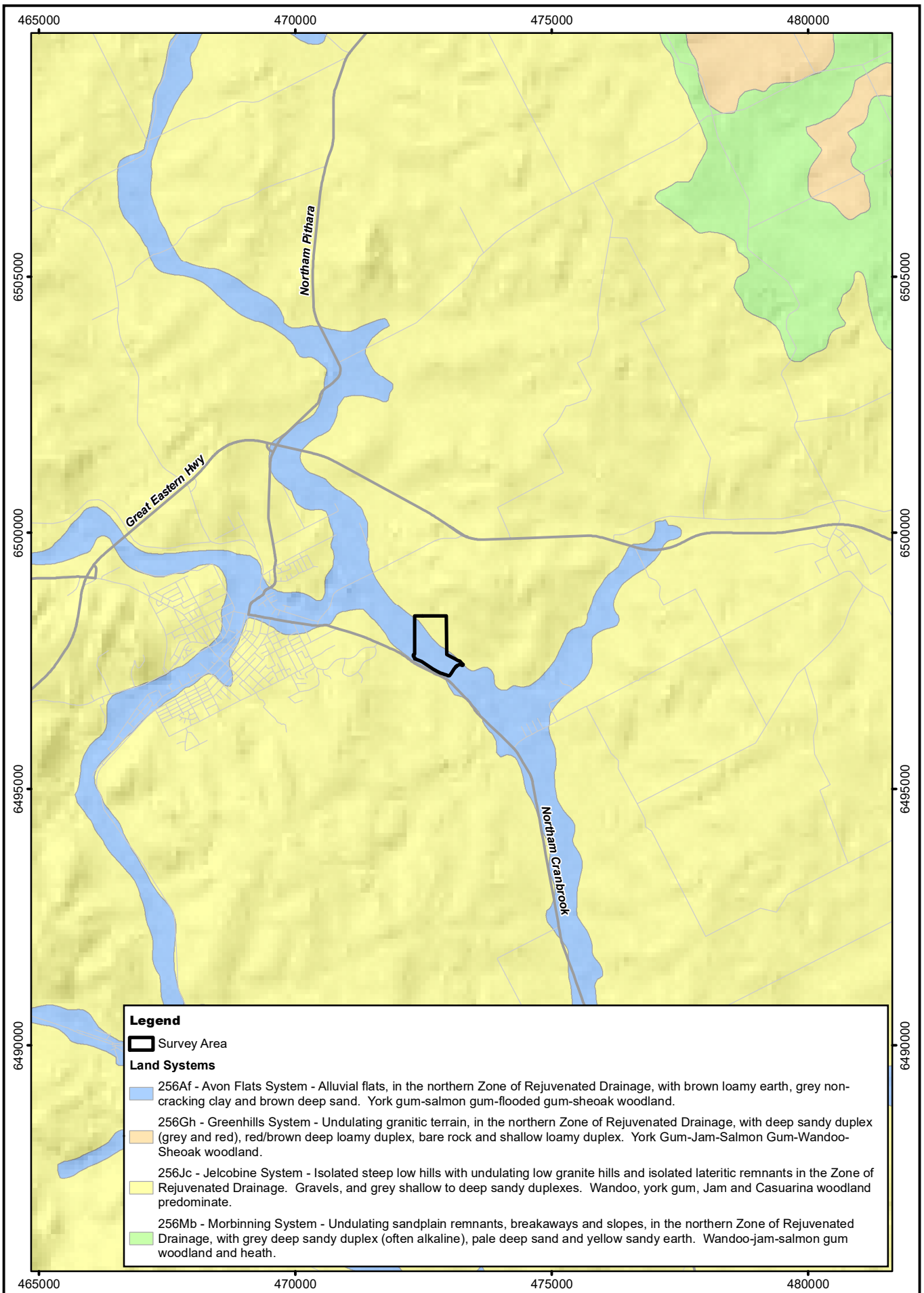
The survey area lies in the Avon Botanical Sub-districts within the Wheatbelt botanical region (Beard 1990).

The underlying Pre-European vegetation as illustrated on Figure 4 in the survey area is summarized in Table 3.

The survey area occurs as 0.13% of this Pre-European vegetation mapping unit.

Table 3: Summary of Pre-European Vegetation unit for the Survey Area

<i>Systems</i>	<i>Name</i>	<i>Description</i>	<i>Area (Ha) % Total Mapped</i>	<i>Total Mapped (Ha)</i>
352.6	York	Wheatbelt; York gum, salmon gum etc. <i>Eucalyptus loxophleba</i> , <i>E. salmonophloia</i> . Goldfields; gimlet, redwood etc. <i>E. salubris</i> , <i>E. oleosa</i> . Riverine; rivergum <i>E. camaldulensis</i> . Tropical; messmate, woollybutt	307.33 0.13%	237739.86



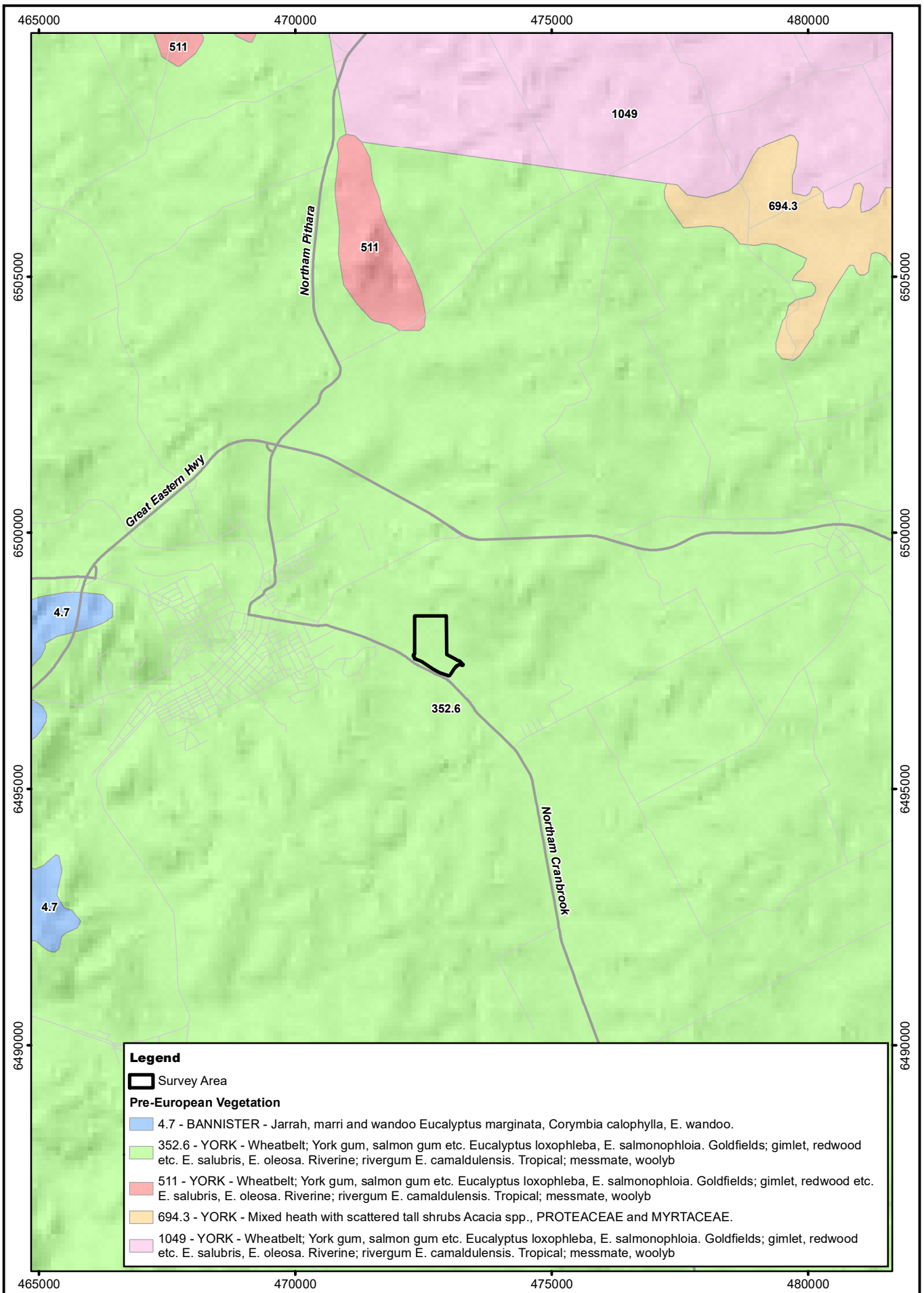
N
0 0.6 1.2 km
Scale: 1:100,000
MGA94 (Zone 50)


CAD Ref: a2893_F004_03
Date: December 2022 Rev: A A4

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Northam Hydrogen Plant Land Systems

Figure:
3





 0 0.6 1.2 km

 Scale: 1:100,000

 MGA94 (Zone 50)

 CAD Ref: a2893_F004_02

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Northam Hydrogen Plant Pre-European Vegetation

Figure: **4**

5.3 Potential Flora Values

The desktop assessment of Nature Map and the national flora databases (PMST) were then reassessed for potential flora species by concentrating on species that occur on the creeklines, rivers and lower clay loam flats. Many of the conservation species are restricted to heath communities associated with granite outcrops and shallow lateritic soils. As the latter are not present in the survey area it was feasible to reduce the number of likelihood threatened and priority flora from the main databases and concentrate on the conservation species that might occur in the local landform and soil types.

As a result a total of 348 taxa from 63 families and 197 genera had the potential to occur in the survey area (see Appendix C). Of these there was the potential for 11 threatened taxa listed under the Biodiversity Conservation Act (2016) and the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) and 6 Priority 3 flora and 1 Priority 4 flora have the potential to occur in the survey area, Appendix C. Of the 18 threatened and priority flora species based on distribution patterns using FloraBase (DPAW 1998-) or suitable soils, three species had a medium potential to occur near the survey area.

5.4 Potential Vegetation and Ecological Community Values

The survey area for the Northam Hydrogen Plant is located within the Avon botanical district as defined by Beard (1990).

Although the woodlands in the Western Australian Wheatbelt are listed as Endangered Threatened Ecological Communities under the *Environment Protection Biodiversity and Conservation Act 1999*. In recognising that intensive agricultural clearing has impacted the extent of the remnants of vegetation loss any impacts require referral to the Federal Department of Climate Change, Energy, the Environment and Water. The extent of these impacts have been documented by a range of specialists including (Prober and Smith 2009).

5.5 Potential Fauna Values

The desktop assessment of Nature Map and the national databases (PMST) were then reassessed for potential fauna species by concentrating on species that occur on the creeklines, rivers and lower clay loam flats.

As a result a total of 237 taxa had the potential to occur in the survey area (see Appendix E). Of these there was the potential for 6 amphibians, 180 birds, 6 fish, 9 mammals, 35 reptiles and 1 spider. A total of 20 conservation significant species listed under the Biodiversity Conservation Act (2016) and the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) had the potential to occur in the area, see Appendix E. This included 1 critically endangered bird, 3 endangered birds, 3 vulnerable birds, 1 other specially protected bird species, 7 migratory birds, 1 Priority 3 bird species, 1 Priority 4 species, and 3 vulnerable mammal species, Appendix E.

6. SITE INSPECTION RESULTS

6.1 Flora

The range of flora on the site is very limited due to the previous clearing activities associated with the grazing and cropping activities. There are solar panels already east of the creekline that are operating on previously cleared, grazed and cropped paddocks. The proposed energy facilities will be established on the western side of the creekline in the cleared and grazed paddock. The current and proposed facilities occur on completely degraded paddocks and the only proposed disturbance of the degraded remnant vegetation along the fringes of the Mortlock River is an overhead facility to link the established solar panel with the proposed hydrogen energy facility. As there are major gaps in the tree canopies, that such a facility will be easily installed with the potential for possible only one or two trees to be pruned or removed. The understorey on the fringes of the creekline is dominated by mainly introduced grasses (e.g. **Avena fatua*, **Bromus diandrus*, **Lolium rigidum* and **Eragrostis curvula*). This dominance of introduced grasses is reflected in the high cover of these introduced grasses which at times even made walking difficult in the areas.

The field assessment of the survey area included 23 taxa from 13 families and 22 genera, Appendix C. The range of flora on the site is very limited due to the previous of historical activities. In general only an occasional tree persists over introduced grasses and herbs.

No threatened or priority flora species were recorded in the survey area (Appendix C).

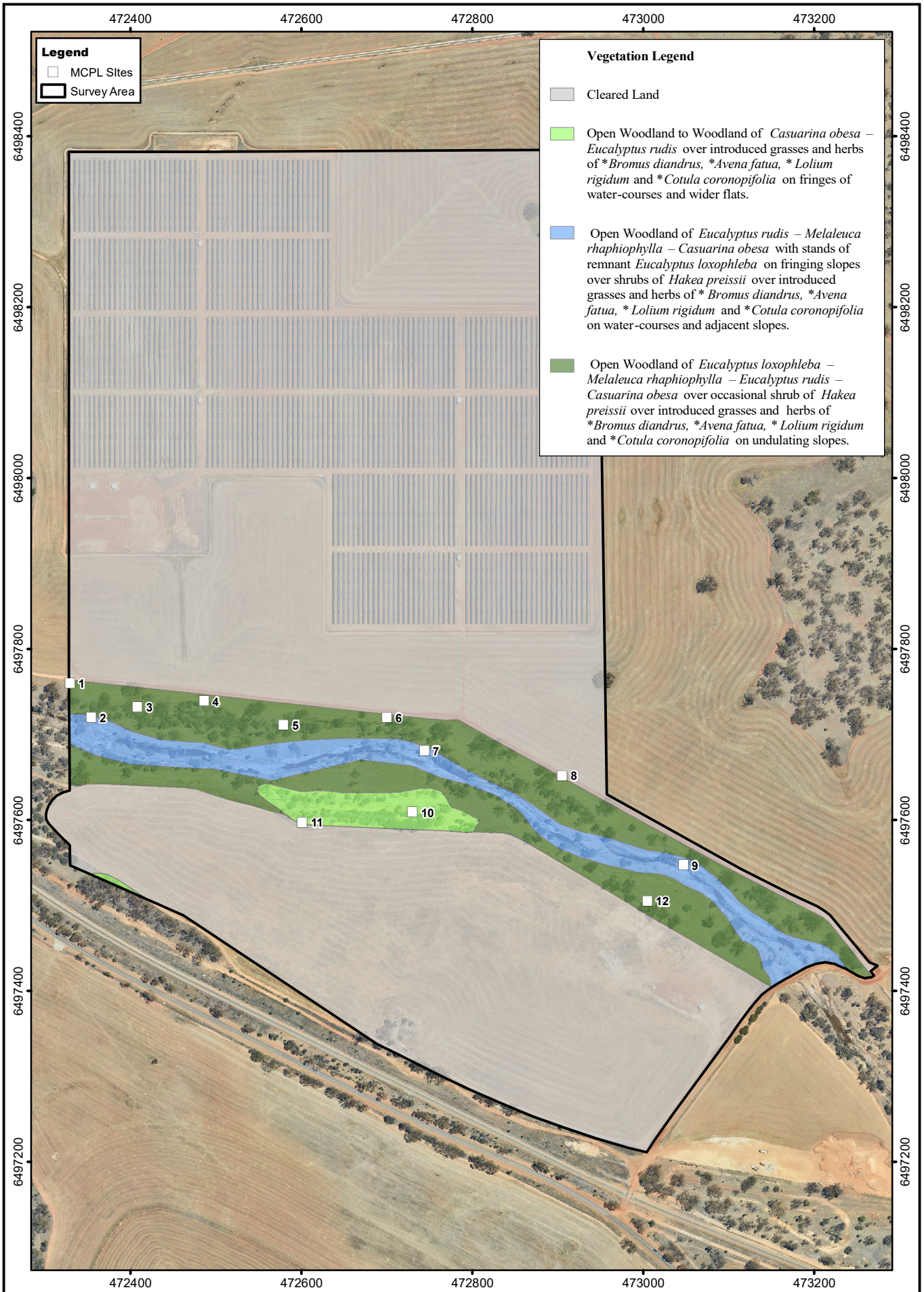
Of the 23 flora taxa recorded 15 of these were introduced species. Two of the introduced species (**Opuntia stricta* was recorded at site 6 and **Echium plantagineum* was recorded at sites 1 and 2 – see Figure 5) are listed as Weeds of National Significance (DCCEEW 2022a); although only present in limited numbers. The latter reflects the degree of disturbance of the vegetation in the survey area.

6.2 Vegetation

Three woodland types were recorded on the survey area in 2022 (see Figure 5 and Table 4. The differences relate to the subtle variations in the dominance of the trees and the proximity to the river bed and therefore higher clay content of the soils and slightly moister soils.

Table 4: Summary of Vegetation unit for the Survey Area

Name	Description	Area (Ha) % Total Mapped	Vegetation Condition
1	Open Woodland to Woodland of <i>Casuarina obesa</i> , <i>Eucalyptus rudis</i> over introduced grasses and herbs of <i>*Bromus diandrus</i> , <i>*Avena fatua</i> , <i>*Lolium rigidum</i> and <i>*Cotula coronopifolia</i> on fringes of water-courses and wider flats.	0.981	Degraded
2	Open Woodland of <i>Eucalyptus rudis</i> , <i>Melaleuca raphiophylla</i> , <i>Casuarina obesa</i> with stands of remnant <i>Eucalyptus loxophleba</i> on fringing slopes over shrubs of <i>Hakea preissii</i> over introduced grasses and herbs of <i>*Bromus diandrus</i> , <i>*Avena fatua</i> , <i>*Lolium rigidum</i> and <i>*Cotula coronopifolia</i> on water-courses and adjacent slopes	2.904	Degraded
3	Open Woodland of <i>Eucalyptus loxophleba</i> , <i>Melaleuca raphiophylla</i> , <i>Eucalyptus rudis</i> , <i>Casuarina obesa</i> over occasional shrub of <i>Hakea preissii</i> over introduced grasses and herbs of <i>*Bromus diandrus</i> , <i>*Avena fatua</i> , <i>*Lolium rigidum</i> and <i>*Cotula coronopifolia</i> on undulating slopes	6.415	Degraded
CL	Cleared	59.075	Completely Degraded



N
0 40 80 m
Scale: 1:6,000
MGA94 (Zone 50)

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**Northam Hydrogen Plant
Vegetation**

Figure:
5



Photograph 1: **Site 11 – Community 1 (Figure 5)** - Open Woodland to Woodland of *Casuarina obesa*, *Eucalyptus rudis* over introduced grasses and herbs of **Bromus diandrus*, **Avena fatua*, **Lolium rigidum* and **Cotula coronopifolia* on fringes of water-courses and wider flats.



Photograph 2: **Site 7 – Community 2 (Figure 5)** - Open Woodland of *Eucalyptus rudis*, *Melaleuca raphiophylla*, *Casuarina obesa* with stands of remnant *Eucalyptus loxophleba* on fringing slopes over shrubs of *Hakea preissii* over introduced grasses and herbs of **Bromus diandrus*, **Avena fatua*, **Lolium rigidum* and **Cotula coronopifolia* on water-courses and adjacent slopes.



Photograph 3: Site 4 – Community 3 (Figure 5) - Open Woodland of *Eucalyptus loxophleba*, *Melaleuca raphiophylla*, *Eucalyptus rudis*, *Casuarina obesa* over occasional shrub of *Hakea preissii* over introduced grasses and herbs of *Bromus diandrus*, *Avena fatua*, *Lolium rigidum* and *Cotula coronopifolia* on undulating slopes.



Photograph 4: Site 6 – Community 3 (Figure 5) - Open Woodland of *Eucalyptus loxophleba*, *Melaleuca raphiophylla*, *Eucalyptus rudis*, *Casuarina obesa* over occasional shrub of *Hakea preissii* over introduced grasses and herbs of *Bromus diandrus*, *Avena fatua*, *Lolium rigidum* and *Cotula coronopifolia* on undulating slopes. *Opuntia stricta* in foreground near dead falling tree.

6.3 Fauna

During the survey, discussions with the landowner highlighted the lack of presence of the listed black cockatoo species. The survey did not record any suitable hollows for larger birds such as the Black Cockatoo and only birds present were several smaller birds and duck species on the localised seasonal ponds. As indicated in previous sections the degree of clearing on the paddock where the Northam Hydrogen plant is to be established had been heavily grazed by the sheep and only the occasional grass species was present in this area.

The remnant vegetation and the creekline was very densely covered by introduced grass species, so it was not possible over the majority of the degraded area near the river to even see any diggings in the soils. The temporary ponds on Mortlock River are seasonal and would only support fauna species for a short period.

As indicated for the flora and vegetation values if the power connection across Mortlock River is installed next to the current established river crossing this would avoid any direct or indirect impacts on the fauna species.

7. REVIEW OF 10 NATIVE VEGETATION CLEARING PRINCIPLES

The observations were reviewed against the 10 clearing principles as defined under the EPA Regulations (2004) on the Native Vegetation Clearing.

Principle (a): Native vegetation should not be cleared if it comprises a high level of biodiversity.

As indicated by the lack of understorey plant species and the high ratio of introduced plant species to native plant species. This area is not considered to contain levels of high biodiversity due to the restricted size of the proposed clearing area and also the historical raw material extraction activities and past agricultural activities.

Clearing of the vegetation is not at variance with this Principle.

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 indigenous to Western Australia.

Although there remains some remnant vegetation on the fringes of the Mortlock River, the vast majority of the Northam Hydrogen Plant area is a totally cleared paddock that is regularly grazed by sheep and is considered completely degraded based on Keighery (1994) condition ratings. The remaining remnant areas along the fringes of the Mortlock River are degraded (based on Keighery 1994) and are dominated by declining trees over dense introduced grasses and herbs in the understorey.

Clearing of the vegetation on the completely degraded areas due to the lack of native plants is not at variance with this Principle and as such do not support a significant habitat for indigenous fauna.

Clearing of the vegetation on the degraded areas along the fringes of the Mortlock River due to the lack of native understorey species is unlikely to be at variance with this Principle and as such do not support a significant habitat for indigenous fauna. If the proposed power link between the solar panels on the eastern side of the remnant and the Northam hydrogen plant to the west avoid all trees in the selection of the alignment then the impacts of any established power line connection across the river would be insignificant for indigenous fauna.

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

No naturally occurring threatened or priority flora species were present in the assessment area.

Clearing of the vegetation is not at variance with this Principle.

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

The Western Australian Wheatbelt Eucalypt woodlands within the survey area are degraded and as such support declining native trees over dense introduced grasses and herbs. Consequently the values are generally absent.

Clearing of the vegetation on the completely degraded areas due to the lack of native plants is not at variance with this Principle and as such do not support any threatened ecological communities.

Clearing of the vegetation on the degraded areas along the fringes of the Mortlock River due to the lack of native understorey species is unlikely to be at variance with this Principle if the condition of the vegetation is considered. If the proposed power link between the solar panels on the eastern side of the remnant and the Northam hydrogen plant to the west avoid all trees in the selection of the alignment then the impacts of any established power lone connection across the river would be insignificant for any stands of degraded Eucalypt woodlands.

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.

The assessment area occurs within mainly historical agricultural areas so the values from a flora and vegetation perspective are limited.

Clearing of the vegetation is not at variance with this Principle.

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

The degraded vegetation occurs on the edges of the Mortlock River.

Clearing of the vegetation on the fringes of Mortlock River may be at variance with this Principle; however if the proposed power linkage between the Solar Panels and the proposed Northam hydrogen plant does not clear any or minimal trees then the proposed power linkage over the river remnant area would not be significant and therefore unlikely to be at variance with the Principle.

Principle (g): 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.

The assessment area does not occur near any adjacent or nearby conservation areas as the area is surrounded by agricultural properties.

Clearing of the vegetation is not at variance with this Principle.

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

Clearing is unlikely to cause further degradation due to the highly modified nature of the Muchea 3 site.

Clearing of the vegetation is not at variance with this Principle.

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

Clearing is unlikely to cause deterioration in the quality of surface or underground water.

Clearing of the vegetation is not at variance with this Principle.

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

In view of the size of the proposed limited disturbance of any vegetation then the clearing activities are not likely to cause, or exacerbate, the incidence of flooding.

Clearing of the vegetation is not at variance with this Principle.

8. DISCUSSION

Mattiske Consulting Pty Ltd was commissioned by Infinite Green Energy in the spring months of 2022 to complete an assessment of flora, vegetation and fauna values on the localised remnant vegetation along the Mortlock River on a historical operating sheep and grain farm near the township of Northam in the Western Australian Wheatbelt, Figure 1.

The proposed energy facility is located on an operating farm that includes grazing paddocks for sheep areas historically and currently cleared and used for various crops. The remnant area of vegetation is restricted to the fringes of the Mortlock River and as such is dominated by introduced grasses and a few patches of trees that are mostly in decline.

A field assessment was undertaken by Dr Libby Mattiske (Mattiske Consulting) who has over 40 years of experience in undertaking biological surveys in Western Australia in the spring months of 2022.

A total of 23 flora taxa from 13 families and 22 genera were recorded. The range of flora on the site is very limited due to the previous of historical activities. In general only an occasional tree persists over introduced grasses and herbs. No threatened or priority flora species were recorded in the survey area. Of the 23 flora taxa recorded 15 of these were introduced species. Two of the introduced species (**Opuntia stricta* was recorded at site 6 and **Echium plantagineum* was recorded at sites 1 and 2) are listed as Weeds of National Significance (DCCEEW 2022a); although only present in limited numbers. The latter reflects the degree of disturbance of the vegetation in the survey area.

There are solar panels already east of the creekline that are operating on previously cleared, grazed and cropped paddocks. The proposed energy facilities will be established on the western side of the creekline in the cleared and grazed paddock. The current and proposed facilities occur on completely degraded paddocks and the only proposed disturbance of the degraded remnant vegetation along the fringes of the Mortlock River is an overhead facility to link the established solar panel with the proposed hydrogen energy facility. As there are major gaps in the tree canopies, that such a facility will be easily installed with the potential for possible only one or two trees to be pruned or removed. The understorey on the fringes of the creekline is dominated by mainly introduced grasses (e.g. **Avena fatua*, **Bromus diandrus*, **Lolium rigidum* and **Eragrostis curvula*). This dominance of introduced grasses is reflected in the high cover of these introduced grasses which at times even made walking difficult in the areas.

Although the woodlands in the Western Australian Wheatbelt are listed as Endangered Threatened Ecological Communities under the *Environment Protection Biodiversity and Conservation Act* 1999. In recognising that intensive agricultural clearing has impacted the extent of the remnants of vegetation loss any impacts require referral to the Federal Department of Climate Change, Energy, the Environment and Water. The extent of these impacts have been documented by a range of specialists including (Prober and Smith 2009). As the areas within the Northam survey area are degraded there remain two options to minimize impacts, firstly to cross the river at the established creek crossing and the other is to select the most open area along the survey area that does not lead to any tree loss or at the minimum one or two trees on the immediate slopes near the river. Either option should be considered insignificant on the values as temporary access would only be needed to install pole to carry power connections.

As indicated in previous sections the degree of clearing on the paddock where the Northam Hydrogen plant is to be established had been heavily grazed by the sheep and only the occasional grass species was present in this area. Fauna utilisation of the area is very restricted to the occasional water birds that may use seasonal water flows and smaller areas of ponding. If trees are avoided then any impacts would be negligible to bird species. The density of the introduced grasses would limit access to other fauna species. No listed Black Cockatoos were observed and according to the landowner have not been observed. The latter in part reflects the degree of disturbance and lack of suitable hollows and the poor state of many trees. Whilst there are some Eucalypts in fruit and flower and *Casuarina obesa* in fruit due to the degraded condition of most of the trees any usage for foraging would be minimal.

A comparison of the desktop findings and the field assessment findings highlights the lack of significant biological values and further as there are options for following already degraded and completely degraded areas adjacent to the current access vehicle route across the river any direct or indirect impacts should be able to be avoided.

In summary, in terms of the ten native vegetation clearing principles, Principles (b), (d), (e) and (f) are relevant to the consideration of this work; however in view of the potential options to avoid any disturbance by installing overhead power cables near the current open track and access route across the Mortlock n River these principles can be avoided. Furthermore, any such installation is a short-term consideration and as such should not trigger any issues on flora, vegetation or fauna where the facilities cross the Mortlock River.

9. ACKNOWLEDGEMENTS

The authors would like to thank the environmental team from Infinite Green Energy for assistance with this project.

10. LIST OF PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

Name	Position	Project Involvement	Flora Collection Permit
Dr E.M. Mattiske	Managing Director & Principal Ecologist	Planning, Field work, Management & Reporting	FB62000019-2

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), **threatened flora** are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of Threatened Flora Species

Note: Adapted from section 179 of the *EPBC Act 1999*.

CODE	CATEGORY	DEFINITION
Ex	Extinct	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016 (BC Act)* provides for (amongst other things) the protection of flora facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10, Division 2.

Threatened flora are listed in the *Biodiversity Conservation Act (Rare Flora) Notice 2018* (under Part 2 of the *BC Act*; DBCA 2022a) and are categorised under Schedules 1-3. A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the *BC Act*. Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of Threatened Flora Species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
CR	Critically endangered	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).
EN	Endangered	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).
VU	Vulnerable	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).

Priority flora species are defined as “possibly threatened species that do not meet the survey criteria, or are otherwise data deficient; or are adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list for other than taxonomic reasons” (DBCA 2022a). Priority species are not afforded any additional protection under state or federal legislation, however are considered significant under the Environmental Protection Authority’s *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of Priority Flora Species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
P1	Priority 1: Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	Priority 2: Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	Priority 3: Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	Priority 4: Rare, Near Threatened, and other species in need of monitoring	<p>a) Rare - Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>b) Near Threatened - Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>c) Other - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the *EPBC Act 1999*, **threatened ecological communities** are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of Threatened Ecological Communities

Note: Adapted from section 181 and section 182 of the *EPBC Act*.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

The *Biodiversity Conservation Act 2016 (BC Act)* provides for (amongst other things) some protection of ecological communities at risk of collapse in Western Australia under Part 3 (Division 2).

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2 of the *BC Act*; DBCA 2022b). An ecological community is defined as **threatened** if “it is facing an extremely high risk of collapse in the immediate, near or medium-term future”, pursuant to sections 28, 29 and 30 of the *BC Act*. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2). Some of these TECs are also endorsed by the Federal Minister as threatened, and some of these are listed under the *EPBC Act* and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of Threatened Ecological Communities

Note: Adapted from DBCA (2022b).

CODE	CATEGORY	DEFINITION
CR	Critically Endangered	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one or more of the following criteria: <ol style="list-style-type: none"> 1. The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	Endangered	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet any one or more of the following criteria: <ol style="list-style-type: none"> 1. The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	Vulnerable	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one or more of the following criteria: <ol style="list-style-type: none"> 1. The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; 2. The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or 3. The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2022c) in the *Priority Ecological Communities for Western Australia – Version 32 (15 July 2021)*. Similarly, to priority flora, PECs are not afforded additional legislative protection, however are considered significant under the EPA (2016b) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from DBCA (2022c).

CODE	CATEGORY	DEFINITION
P1	Priority 1 (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	Priority 2 (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	Priority 3 (Poorly known ecological communities)	<ol style="list-style-type: none"> Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation; Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Priority 4 (Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring)	<ol style="list-style-type: none"> Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. Communities that have been removed from the list of threatened communities during the past five years.
P5	Priority 5 (Conservation Dependent ecological communities)	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (Section 12), or an organism for which a declaration under Section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (DPIRD 2022).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
<p style="text-align: center;">C1 (Exclusion)</p> <p>'(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.'</p> <p>Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.</p>	<p>In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.</p>
<p style="text-align: center;">C2 (Eradication)</p> <p>'(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.'</p> <p>Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.</p>	<p>In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.</p>
<p style="text-align: center;">C3 (Management)</p> <p>'(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to:</p> <p>(i) alleviate the harmful impact of the declared pest in the area; or</p> <p>(ii) reduce the number or distribution of the declared pest in the area; or</p> <p>(iii) prevent or contain the spread of the declared pest in the area.'</p> <p>Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.</p>	<p>In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to:</p> <p>(a) alleviate the harmful impact of the declared pest in the area for which it is declared; or</p> <p>(b) reduce the number or distribution of the declared pest in the area for which it is declared; or</p> <p>(c) prevent or contain the spread of the declared pest in the area for which it is declared.</p>

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENIX A5: DEFINITION OF VEGETATION CONDITION SCALE

Vegetation condition ratings relate to vegetation structure, level of disturbance at each structural layer and the ability of the vegetation unit to regenerate (Table 5.1). Vegetation condition provides complementary information for assessing the significance of potential impacts.

Table 5.1 Definition of Vegetation Condition Categories

Note: Adapted from Keighery (1994).

CATEGORY	DEFINITION
1 (Pristine)	Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement.
2 (Excellent)	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
3 (Very Good)	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4 (Good)	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
5 (Degraded)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
6 (Completely Degraded)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR AND RECORDED IN 2022, IN THE PROPOSED NORTHAM ENERGY PLANT SURVEY AREA

Note:*denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2022a).

FCC = Federal conservation code; E = Endangered, CE= Critically Endangered, V = Vulnerable (EPBC Act);

FAMILY	CONFIRMED SPECIES	SCC	FCC	EPBC	NatureMap	MCPL 2022
Caryophyllaceae	* <i>Gypsophila vaccaria</i>				X	
	* <i>Petrorhagia dubia</i>				X	
	* <i>Sagina apetala</i>				X	
	* <i>Silene cucubalus</i>				X	
	* <i>Silene vulgaris</i>				X	
	<i>Spergularia marina</i>				X	
Casuarinaceae	<i>Allocasuarina huegeliana</i>				X	
	<i>Allocasuarina</i> sp.				X	
	<i>Casuarina obesa</i>					X
Chenopodiaceae	<i>Atriplex amnicola</i>				X	
	<i>Atriplex semibaccata</i>				X	
	<i>Atriplex suberecta</i>				X	
	* <i>Chenopodium murale</i>				X	
	<i>Maireana</i> sp.					X
	<i>Roycea pycnophylloides</i> <i>Roycea spinescens</i>	T	E	X		
Colchicaceae	<i>Wurmbea dioica</i> subsp. <i>alba</i>				X	
Crassulaceae	<i>Crassula colorata</i>				X	
	<i>Crassula colorata</i> var. <i>acuminata</i>				X	
	<i>Crassula decumbens</i>				X	
	<i>Crassula decumbens</i> var. <i>decumbens</i>				X	
	<i>Crassula extrorsa</i>				X	
Cucurbitaceae	* <i>Citrullus colocynthis</i>				X	
	* <i>Cucumis myriocarpus</i>					X
Cupressaceae	<i>Callitris pyramidalis</i>				X	
Cyperaceae	<i>Carex inversa</i>				X	
	* <i>Cyperus eragrostis</i>				X	
	<i>Cyperus gymnocaulos</i>				X	
	<i>Isolepis hookeriana</i>				X	
	<i>Isolepis marginata</i>				X	
	<i>Lepidosperma resinsum</i>				X	
Dilleniaceae	<i>Hibbertia avonensis</i>				X	
	<i>Hibbertia rupicola</i>				X	
	<i>Hibbertia striata</i>				X	

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FCC = Federal conservation code; E = Endangered, CE= Critically Endangered, V = Vulnerable (EPBC Act);

FAMILY	CONFIRMED SPECIES	SCC	FCC	EPBC	NatureMap	MCPL 2022
Fabaceae (Continued)	<i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Senna charlesiana</i> * <i>Trifolium arvense</i> var. <i>arvense</i> * <i>Trifolium campestre</i> * <i>Trifolium dubium</i> * <i>Trifolium hybridum</i> var. <i>hybridum</i> * <i>Trifolium spumosum</i> * <i>Trifolium subterraneum</i> * <i>Trifolium tomentosum</i> var. <i>tomentosum</i> * <i>Vicia villosa</i>				X	X
Frankeniaceae	<i>Frankenia conferta</i> <i>Frankenia glomerata</i> * <i>Frankenia pulverulenta</i> <i>Frankenia</i> sp.	T P4	V	X	X	X
Gentianaceae	<i>Schenkia australis</i>				X	X
Geraniaceae	* <i>Erodium botrys</i> <i>Erodium cygnorum</i> * <i>Erodium moschatum</i>				X	X
Goodeniaceae	<i>Dampiera lavandulacea</i> <i>Goodenia cynopotamica</i> <i>Lechenaultia biloba</i> <i>Lechenaultia formosa</i> subsp. <i>Wheatbelt</i> (R.J. Cranfield 4718) <i>Lechenaultia laricina</i>	T	V	X	X	X
Haemodoraceae	<i>Conostylis caricina</i> subsp. <i>caricina</i> <i>Conostylis prolifera</i> <i>Conostylis setigera</i> subsp. <i>setigera</i> <i>Tribonanthes</i> sp.				X	X
Hemerocallidaceae	<i>Agrostocrinum scabrum</i> subsp. <i>scabrum</i> <i>Stypandra glauca</i> <i>Tricoryne elatior</i>				X	X
Iridaceae	* <i>Moraea fugax</i> * <i>Moraea miniata</i> * <i>Moraea setifolia</i> * <i>Romulea rosea</i> var. <i>communis</i> * <i>Watsonia meriana</i> var. <i>bulbillifera</i>				X	X

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Note: *denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2022a).

FCC = Federal conservation code; E = Endangered, CE= Critically Endangered, V = Vulnerable (EPBC Act);

FAMILY	CONFIRMED SPECIES	SCC	FCC	EPBC	NatureMap	MCPL 2022
Myrtaceae (Continued)	<i>Leptospermum erubescens</i>				X	
	<i>Melaleuca hamata</i>				X	
	<i>Melaleuca leptospermoides</i>				X	
	<i>Melaleuca raphiophylla</i>				X	X
	<i>Melaleuca viminea</i>				X	
	<i>Melaleuca viminea</i> subsp. <i>viminea</i>				X	
	<i>Scholtzia halophila</i> subsp. <i>mortlockensis</i>	P3			X	
	<i>Scholtzia involucreta</i>				X	
	<i>Taxandria linearifolia</i>				X	
	<i>Thryptomene racemulosa</i>				X	
	<i>Verticordia acerosa</i> var. <i>preissii</i>				X	
	<i>Verticordia brachypoda</i>				X	
	<i>Verticordia densiflora</i> var. <i>densiflora</i>				X	
	<i>Verticordia eriocephala</i>				X	
	<i>Verticordia huegelii</i> var. <i>stylosa</i>				X	
	<i>Verticordia pennigera</i>				X	
	<i>Verticordia picta</i>				X	
	<i>Verticordia staminosa</i> subsp. <i>staminosa</i>	T	E	X		
Nyctaginaceae	<i>Boerhavia schomburgkiana</i>				X	
	<i>Boerhavia</i> sp.				X	
Onagraceae	* <i>Oenothera speciosa</i>				X	
Orchidaceae	<i>Caladenia barbarossa</i>				X	
	<i>Caladenia denticulata</i>				X	
	<i>Caladenia douthiae</i>				X	
	<i>Caladenia huegelii</i>	T	E	X		
	<i>Caladenia longicauda</i> subsp. <i>eminens</i>				X	
	<i>Diuris porrifolia</i>				X	
	<i>Diuris</i> sp.				X	
	<i>Thelymitra stellata</i>	T	E	X		
Orobanchaceae	* <i>Parentucellia latifolia</i>				X	
Oxalidaceae	* <i>Oxalis flava</i>				X	
	* <i>Oxalis purpurea</i>				X	
Papaveraceae	* <i>Fumaria capreolata</i>				X	
	* <i>Fumaria muralis</i> subsp. <i>muralis</i>				X	
	* <i>Papaver rhoeas</i>				X	

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR AND RECORDED IN 2022, IN THE PROPOSED NORTHAM ENERGY PLANT SURVEY AREA

Note:*denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2022a).

FCC = Federal conservation code; E = Endangered, CE= Critically Endangered, V = Vulnerable (EPBC Act);

FAMILY	CONFIRMED SPECIES	SCC	FCC	EPBC	NatureMap	MCPL 2022
Phyllanthaceae	<i>Lysiandra calycina</i>				X	
Pittosporaceae	<i>Marianthus bicolor</i>				X	
Plantaginaceae	* <i>Linaria maroccana</i>				X	
	* <i>Plantago coronopus</i> subsp. <i>commutata</i>				X	
Poaceae	* <i>Aira cupaniana</i>				X	
	<i>Amphibromus nervosus</i>				X	
	<i>Aristida holathera</i>				X	
	<i>Aristida holathera</i> var. <i>holathera</i>				X	
	<i>Austrostipa anaiwaniorum</i>				X	
	<i>Austrostipa nitida</i>				X	
	<i>Austrostipa trichophylla</i>				X	
	<i>Austrostipa variabilis</i>				X	
	* <i>Avellinia festucoides</i>				X	
	* <i>Avena barbata</i>				X	
	* <i>Avena fatua</i>					X
	* <i>Brachypodium distachyon</i>				X	
	* <i>Briza minor</i>				X	
	* <i>Bromus diandrus</i>				X	X
	* <i>Bromus rubens</i>				X	
	* <i>Cenchrus echinatus</i>				X	
	<i>Chloris truncata</i>				X	
	<i>Diplachne fusca</i>				X	
	* <i>Ehrharta calycina</i>					X
	* <i>Ehrharta longiflora</i>				X	
	<i>Enneapogon nigricans</i>				X	
	* <i>Eragrostis cilianensis</i>				X	
	* <i>Eragrostis curvula</i>					X
	<i>Eragrostis dielsii</i>				X	
	* <i>Eragrostis mexicana</i>				X	
	* <i>Hyparrhenia hirta</i>				X	
<i>Lachnagrostis filiformis</i>				X		
* <i>Lolium rigidum</i>					X	
<i>Neurachne alopecuroidea</i>				X		
* <i>Panicum hillmanii</i>				X		
<i>Paspalidium constrictum</i>				X		
<i>Paspalum vaginatum</i>				X		
* <i>Pentameris airoides</i>				X		
* <i>Pentameris airoides</i> subsp. <i>airoides</i>				X		

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Note:*denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2022a).

FCC = Federal conservation code; E = Endangered, CE= Critically Endangered, V = Vulnerable (EPBC Act);

FAMILY	CONFIRMED SPECIES	SCC	FCC	EPBC	NatureMap	MCPL 2022
Proteaceae (Continued)	<i>Petrophile seminuda</i> <i>Petrophile serruriae</i> <i>Petrophile squamata</i> subsp. northern (J. Monks 40) <i>Stirlingia abrotanoides</i>				X X X X	
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>				X	
Restionaceae	<i>Hypolaena exsulca</i>				X	
Rhamnaceae	<i>Cryptandra intermedia</i> <i>Trymalium ledifolium</i> var. <i>lineare</i>				X X	
Rosaceae	<i>Acaena echinata</i>				X	
Sapindaceae	<i>Dodonaea larreoides</i>				X	
Scrophulariaceae	<i>Eremophila decipiens</i> subsp. <i>decipiens</i> * <i>Phyllopodium cordatum</i> * <i>Verbascum creticum</i>				X X X	
Solanaceae	<i>Anthocercis ilicifolia</i> subsp. <i>ilicifolia</i> * <i>Datura inoxia</i> * <i>Datura wrightii</i> * <i>Nicotiana glauca</i> <i>Nicotiana rotundifolia</i> <i>Solanum hoplopetalum</i> <i>Solanum lasiophyllum</i> * <i>Solanum nigrum</i> * <i>Solanum triflorum</i>				X X X X X X X X X	X
Stylidiaceae	<i>Levenhookia pulcherrima</i> <i>Stylidium eriopodum</i> <i>Stylidium leptophyllum</i>	P3			X X X	
Thymelaeaceae	<i>Pimelea argentea</i> <i>Pimelea brevifolia</i> subsp. <i>modesta</i>				X X	
Verbenaceae	* <i>Phyla canescens</i>				X	

APPENDIX C: POTENTIAL CONSERVATION SIGNIFICANT FLORA NEAR THE PROPOSED NORTHAM ENERGY PLANT SURVEY AREA

Note: *denotes introduced species; T denotes threatened flora and

P1-P4 denote priority flora species (DBCA 2022a).

FCC = Federal conservation code; E = Endangered, CE= Critically Endangered,

V = Vulnerable (EPBC Act); (DCCEEW 2022a)

SPECIES	FAMILY	SCC	FCC	EPBC	LIKELIHOOD	REASONING
<i>Gastrolobium hamulosum</i>	Fabaceae	T	E	X	Medium	Local recordings, soil preference present
<i>Grevillea christineae</i>	Proteaceae	T	E	X	Medium	Soil preference present, no local recordings
<i>Roycea pycnophylloides</i>	Chenopodiaceae	T	E	X	Low	Clay soils present, recordings located further inland
<i>Acacia aphylla</i>	Fabaceae	T	V	X	Medium	Soil preference present, local recordings
<i>Frankenia conferta</i>	Frankeniaceae	T	V	X	Low	Few nearby recordings, soil preference present
<i>Grevillea flexuosa</i>	Proteaceae	T	V	X	Low	No local recordings, prefers gravel/ sand
<i>Lechenaultia laricina</i>	Goodeniaceae	T	V	X	Low	Local recordings, prefers gravelly loam/ sand
<i>Acacia campylophylla</i>	Fabaceae	P3			Low	Local recordings, prefers lateritic soils
<i>Acacia lirellata</i> subsp. <i>lirellata</i>	Fabaceae	P3			Low	recordings, prefers sand and loam soils
<i>Daviesia nudiflora</i> subsp. <i>drummondii</i>	Fabaceae	P3			Low	Local recordings, prefers loamy sand
<i>Dicrastylis reticulata</i>	Lamiaceae	P3			Very Low	Local recordings, prefers granite outcrop
<i>Frankenia glomerata</i>	Frankeniaceae	P4			Very Low	Local recordings, prefers salt lakes and sand
<i>Levenhookia pulcherrima</i>	Stylidiaceae	P3			Very Low	Local recordings, prefers sand
<i>Scholtzia halophila</i> subsp. <i>mortlockensis</i>	Myrtaceae	P3			Low	nearby, prefers sand or loamy sand

APPENDIX D: POTENTIAL FAUNA SPECIES WITHIN THE NORTHAM ENERGY PLANT SURVEY AREA

CE = Critically Endangered; EN = Endangered; VU = Vulnerable; MI = Migratory;
 OS = Other specially protected species; E = Endangered; V= Vulnerable. WA Status (DBCA, 2022b)
 PMST (DCCEEW, 2022b), NatureMap (DBCA,2007-),

Class	Taxon	SCC	FCC	Naturemap	PMST
Amphibia	<i>Crinia pseudinsignifera</i>			X	
	<i>Heleioporus albopunctatus</i>			X	
	<i>Heleioporus eyrei</i>			X	
	<i>Limnodynastes dorsalis</i>			X	
	<i>Litoria moorei</i>			X	
	<i>Pseudophryne guentheri</i>			X	
Birds	<i>Acanthagenys rufogularis</i>			X	
	<i>Acanthiza apicalis</i>			X	
	<i>Acanthiza chrysorrhoa</i>			X	
	<i>Acanthiza inornata</i>			X	
	<i>Acanthiza uropygialis</i>			X	
	<i>Accipiter cirrocephalus</i>			X	
	<i>Accipiter fasciatus</i>			X	
	<i>Acrocephalus australis</i>			X	
	<i>Actitis hypoleucos</i>	MI	MI	X	
	<i>Aegotheles cristatus</i>			X	
	<i>Anas castanea</i>			X	
	<i>Anas gracilis</i>			X	
	<i>Anas platyrhynchos</i>			X	
	<i>Anas platyrhynchos subsp. domesticus</i>			X	
	<i>Anas rhynchotis</i>			X	
	<i>Anas superciliosa</i>			X	
	<i>Anhinga novaehollandiae</i>			X	
	<i>Anthochaera carunculata</i>			X	
	<i>Anthochaera lunulata</i>			X	
	<i>Apus pacificus</i>	MI	MI	X	
	<i>Aquila audax</i>			X	
	<i>Aquila morphnoides subsp. morphnoides</i>			X	
	<i>Ardea intermedia</i>			X	
	<i>Ardea modesta</i>			X	
	<i>Ardea pacifica</i>			X	
	<i>Artamus cinereus</i>			X	
	<i>Artamus cinereus subsp. melanops</i>			X	
	<i>Artamus personatus</i>			X	
	<i>Aythya australis</i>			X	
	<i>Barnardius zonarius</i>			X	
	<i>Biziura lobata</i>			X	
	<i>Burhinus grallarius</i>			X	
	<i>Cacatua pastinator</i>			X	
	<i>Cacatua sanguinea</i>			X	
<i>Cacomantis flabelliformis</i>			X		
<i>Cacomantis pallidus</i>			X		
<i>Calidris acuminata</i>	MI	MI			
<i>Calidris ferruginea</i>	CE	CE/MI	X	X	
<i>Calidris melanotos</i>	MI	MI			
<i>Calidris ruficollis</i>	MI	MI	X		
<i>Calyptorhynchus banksii</i>			X		
<i>Calyptorhynchus banksii naso</i>	VU	VU		X	
<i>Calyptorhynchus baudinii</i>	EN	EN	X		

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Class	Taxon	SCC	FCC	Naturemap	PMST
Birds (Continued)	<i>Calyptorhynchus latirostris</i>	EN	EN	X	
	<i>Charadrius ruficapillus</i>			X	
	<i>Chenonetta jubata</i>			X	
	<i>Cheramoeca leucosterna</i>			X	
	<i>Chroicocephalus novaehollandiae</i>			X	
	<i>Cincloramphus cruralis</i>			X	
	<i>Cincloramphus mathewsi</i>			X	
	<i>Circus assimilis</i>			X	
	<i>Cladorhynchus leucocephalus</i>			X	
	<i>Climacteris rufa</i>			X	
	<i>Colluricincla harmonica</i>			X	
	<i>Columba livia</i>			X	
	<i>Coracina novaehollandiae</i>			X	
	<i>Corvus coronoides</i>			X	
	<i>Coturnix pectoralis</i>			X	
	<i>Cracticus nigrogularis</i>			X	
	<i>Cracticus tibicen</i>			X	
	<i>Cracticus tibicen subsp. dorsalis</i>			X	
	<i>Cracticus torquatus</i>			X	
	<i>Cygnus atratus</i>			X	
	<i>Cygnus olor</i>			X	
	<i>Dacelo novaeguineae</i>			X	
	<i>Daphoenositta chrysoptera</i>			X	
	<i>Dendrocygna arcuata</i>			X	
	<i>Dicaeum hirundinaceum</i>			X	
	<i>Egretta garzetta</i>			X	
	<i>Egretta novaehollandiae</i>			X	
	<i>Elanus axillaris</i>			X	
	<i>Elanus caeruleus subsp. axillaris</i>			X	
	<i>Elseynornis melanops</i>			X	
	<i>Eolophus roseicapillus</i>			X	
	<i>Epthianura albifrons</i>			X	
	<i>Erythronyx cinctus</i>			X	
	<i>Eurostopodus argus</i>			X	
	<i>Falco berigora</i>			X	
	<i>Falco cenchroides</i>			X	
	<i>Falco hypoleucos</i>	VU		X	X
	<i>Falco longipennis</i>			X	
	<i>Falco peregrinus</i>	OS		X	
	<i>Fulica atra</i>			X	
	<i>Gallinula tenebrosa</i>			X	
	<i>Gallus gallus</i>			X	
	<i>Gavialis virescens</i>			X	
<i>Geopelia cuneata</i>			X		
<i>Gerygone fusca</i>			X		
<i>Glossopsitta porphyrocephala</i>			X		
<i>Grallina cyanoleuca</i>			X		
<i>Haliastur sphenurus</i>			X		
<i>Hamirostra isura</i>			X		
<i>Hieraaetus morphnoides</i>			X		

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Class	Taxon	SCC	FCC	Naturemap	PMST
Birds (Continued)	<i>Himantopus himantopus</i>			X	
	<i>Hirundo neoxena</i>			X	
	<i>Ixobrychus flavicollis subsp. australis (southwest subpop.)</i>			X	
	<i>Lalage tricolor</i>			X	
	<i>Leipoa ocellata</i>	VU	VU		X
	<i>Lichenostomus leucotis</i>			X	
	<i>Lichenostomus ornatus</i>			X	
	<i>Lichenostomus virescens</i>			X	
	<i>Lichmera indistincta</i>			X	
	<i>Malacorhynchus membranaceus</i>			X	
	<i>Malurus splendens</i>			X	
	<i>Manorina flavigula</i>			X	
	<i>Megalurus gramineus</i>			X	
	<i>Melithreptus brevirostris</i>			X	
	<i>Melopsittacus undulatus</i>			X	
	<i>Merops ornatus</i>			X	
	<i>Microcarbo melanoleucos</i>			X	
	<i>Microeca fascinans</i>			X	
	<i>Milvus migrans</i>			X	
	<i>Motacilla cinerea</i>	MI	hypo		
	<i>Myiagra inquieta</i>			X	
	<i>Neophema elegans</i>			X	
	<i>Ninox novaeseelandiae</i>			X	
	<i>Nycticorax caledonicus</i>			X	
	<i>Nymphicus hollandicus</i>			X	
	<i>Ocyphaps lophotes</i>			X	
	<i>Oxyura australis</i>	P4		X	
	<i>Pachycephala pectoralis</i>			X	
	<i>Pachycephala rufiventris</i>			X	
	<i>Pachycephala rufiventris subsp. rufiventris</i>			X	
	<i>Pardalotus punctatus</i>			X	
	<i>Pardalotus striatus</i>			X	
	<i>Pelecanus conspicillatus</i>			X	
	<i>Petrochelidon ariel</i>			X	
	<i>Petrochelidon nigricans</i>			X	
	<i>Petroica boodang</i>			X	
	<i>Petroica goodenovii</i>			X	
	<i>Phalacrocorax carbo</i>			X	
	<i>Phalacrocorax sulcirostris</i>			X	
	<i>Phalacrocorax varius</i>			X	
	<i>Phaps chalcoptera</i>			X	
	<i>Phylidonyris niger</i>			X	
<i>Phylidonyris novaehollandiae</i>			X		
<i>Platalea flavipes</i>			X		
<i>Platalea regia</i>			X		
<i>Platycercus icterotis</i>			X		
<i>Platycercus spurius</i>			X		
<i>Platycercus zonarius</i>			X		
<i>Platycercus zonarius subsp. zonarius</i>			X		
<i>Podargus strigoides</i>			X		

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Class	Taxon	SCC	FCC	Naturemap	PMST
Birds (Continued)	<i>Poliiocephalus poliocephalus</i>			X	
	<i>Polytelis anthopeplus</i>			X	
	<i>Pomatostomus superciliosus</i>			X	
	<i>Porphyrio porphyrio</i>			X	
	<i>Porzana fluminea</i>			X	
	<i>Porzana pusilla</i>			X	
	<i>Porzana tabuensis</i>			X	
	<i>Pterodroma macroptera subsp. macroptera</i>			X	
	<i>Purnella albifrons</i>			X	
	<i>Purpureicephalus spurius</i>			X	
	<i>Recurvirostra novaehollandiae</i>			X	
	<i>Rhipidura albiscapa</i>			X	
	<i>Rhipidura leucophrys</i>			X	
	<i>Rostratula australis</i>	EN	EN	X	X
	<i>Sericornis frontalis</i>			X	
	<i>Smicromis brevirostris</i>			X	
	<i>Stictonetta naevosa</i>			X	
	<i>Strepera versicolor</i>			X	
	<i>Streptopelia chinensis</i>			X	
	<i>Streptopelia senegalensis</i>			X	
	<i>Tachybaptus novaehollandiae</i>			X	
	<i>Tadorna tadornoides</i>			X	
	<i>Taeniopygia guttata</i>			X	
	<i>Taeniopygia guttata subsp. castanotis</i>			X	
	<i>Threskiornis molucca</i>			X	
	<i>Threskiornis spinicollis</i>			X	
	<i>Todiramphus pyrrhopygius</i>			X	
	<i>Todiramphus sanctus</i>			X	
	<i>Tribonyx ventralis</i>			X	
	<i>Trichoglossus haematodus</i>			X	
	<i>Tringa glareola</i>	MI	MI	X	
	<i>Turnix varius</i>			X	
	<i>Turnix velox</i>			X	
	<i>Tyto alba subsp. delicatula</i>			X	
	<i>Tyto novaehollandiae subsp. novaehollandiae</i>	P3		X	
<i>Vanellus tricolor</i>			X		
<i>Zosterops lateralis</i>			X		
Fish	<i>Bostockia porosa</i>			X	
	<i>Carassius auratus</i>			X	
	<i>Craterocephalus sp.</i>			X	
	<i>Galaxias occidentalis</i>			X	
	<i>Gambusia sp.</i>			X	
	<i>Pseudogobius olorum</i>			X	
Mammals	<i>Cercartetus concinnus</i>			X	
	<i>Chalinolobus gouldii</i>			X	
	<i>Chalinolobus morio</i>			X	
	<i>Dasyurus geoffroyi</i>	VU	VU	X	X
	<i>Macrotis lagotis</i>	VU	VU	X	

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Class	Taxon	SCC	FCC	Naturemap	PMST
Mammals (Continued)	<i>Phascogale calura</i>	VU	CD	X	X
	<i>Sminthopsis crassicaudata</i>			X	
	<i>Tachyglossus aculeatus</i>			X	
	<i>Trichosurus vulpecula subsp. vulpecula</i>			X	
Reptiles	<i>Antaresia stimsoni subsp. stimsoni</i>			X	
	<i>Aprasia repens</i>			X	
	<i>Aspidites ramsayi</i>			X	
	<i>Christinus marmoratus</i>			X	
	<i>Crenadactylus ocellatus subsp. ocellatus</i>			X	
	<i>Cryptoblepharus buehananii</i>			X	
	<i>Ctenophorus ornatus</i>			X	
	<i>Ctenophorus reticulatus</i>			X	
	<i>Ctenotus fallens</i>			X	
	<i>Delma fraseri</i>			X	
	<i>Demansia psammophis subsp. reticulata</i>			X	
	<i>Diplodactylus polyophthalmus</i>			X	
	<i>Diplodactylus pulcher</i>			X	
	<i>Eremiascincus richardsonii</i>			X	
	<i>Gehyra variegata</i>			X	
	<i>Hesperoedura reticulata</i>			X	
	<i>Lerista distinguenda</i>			X	
	<i>Lialis burtonis</i>			X	
	<i>Menetia greyii</i>			X	
	<i>Morelia spilota subsp. imbricata</i>			X	
	<i>Neelaps bimaculatus</i>			X	
	<i>Parasuta gouldii</i>			X	
	<i>Pogona minor subsp. minor</i>			X	
	<i>Pseudechis australis</i>			X	
	<i>Pseudonaja affinis subsp. affinis</i>			X	
	<i>Pseudonaja mengdeni</i>			X	
	<i>Pseudonaja modesta</i>			X	
	<i>Ramphotyphlops australis</i>			X	
	<i>Ramphotyphlops pinguis</i>			X	
	<i>Ramphotyphlops waitii</i>			X	
	<i>Tiliqua occipitalis</i>			X	
	<i>Tiliqua rugosa subsp. rugosa</i>			X	
	<i>Underwoodisaurus millii</i>			X	
	<i>Varanus gouldii</i>			X	
	<i>Varanus tristis</i>			X	
Spider	<i>Idiosoma nigrum</i>	VU	EN		X