



Review of Values of flora, vegetation and vertebrate fauna present within the proposed clearing area on the Karragullen Fruit Company property

1. INTRODUCTION

Mattice Consulting Pty Ltd was engaged by the Karragullen Fruit Company to assess the flora, vegetation and vertebrate fauna values on the small triangular area as designated on Figure 1 in the spring months of 2021.

2. BACKGROUND

The area is designated as General Rural (City of Armadale - Town Planning Scheme 4, Gazetted 4th November 2005). This scheme categorisation "means that the use is permitted by the Scheme providing the use complies with the relevant development standards and the requirements of the Scheme" including Agriculture Intensive (p11. Of City of Armadale Planning Scheme 4).

The property has been operated by the Karragullen Fruit Company for many years as an orchard. This block occurs on the fringes of the small settlement of Karragullen in a valley dominated by fruit orchards.

The recent clearing activities on the edges of the remnant vegetation near Canning Road were undertaken in response to a letter from the City of Armadale for fire protection purposes which is permitted under the Local government legislation. A copy of the letter can be supplied if required.

The proposal is to expand the current orchard by clearing the 1.77ha of remnant vegetation (bounded by red line on Figure 1) within the triangular area near Canning Road.

The following information has been collated to assist in the application for a clearing permit as required under the EPA Native Vegetation Clearing Regulations (EPA 2004).

3. METHODOLOGIES AND APPROACH

The objective of the assessment was to identify any environmental issues that might arise in relation to the need to clear the native vegetation. The site inspections were undertaken on three separate occasions in the spring months, twice by the Mattiske Consulting team and once by Tony Kirkby in view of the potential usage by the Black Cockatoos.

A search of state and federal databases was undertaken (NatureMap, Department of Parks and Wildlife 2007), although it is recognised that the data was extracted in 2021 as this dataset is no longer on line; Department of Agriculture, Water and the Environment 2021). These searches highlighted a significant range of species that might be present as it covered the Darling Ranges and also the Darling Scarp.



0 10 20m

Scale: 1:1,500
MGA94 (Zone 50)

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Karagullen Orchid

Figure:

1

The inclusion of the Darling Scarp increased the coverage due to the diversity of soils and landforms that support a greater diversity of flora.

A review of the regional databases was also undertaken with particular reliance on the landform and soil mapping by Churchward and McArthur 1980 and the vegetation complex studies by Heddle *et al.* (1980) and Mattiske and Havel (1998) for the northern Jarrah forest. Whilst some of this data from these studies may not be accepted by agencies as it older than 10 years; it is critical to the regional assessment as it places the values on the 1.77ha into a wider context. Whilst there has been some pressure in recent times to rely on current or more recent publications this is not feasible for the regional interpretations due to the lack of large scale projects currently being supported by government agencies.

The flora and vegetation values were assessed using the Havel (1975a and 1975b) site-vegetation types for the northern Jarrah forest through foot traverses and also the establishment of 8 sampling sites (Figure 2). This work is widely recognized as providing greater insight into not only the flora values but also the inter-relationships between the flora, vegetation and site conditions. The assessment work included both targeted work on the property searching for threatened and priority species and also the establishment of 8 sites which included undertaking detailed recording on site parameters and also flora species (including height, percentage cover alive and dead, and numbers where species less common or required identification following field studies).

The tree values were assessed as a means of assessing potential values for listed bird species such as the Black Cockatoos. In addition, Tony Kirkby undertook an assessment of any trees with potential hollows that might be suitable for nesting by the Black Cockatoos.

Additional opportunistic observations were also undertaken on other fauna usage of the assessment area.

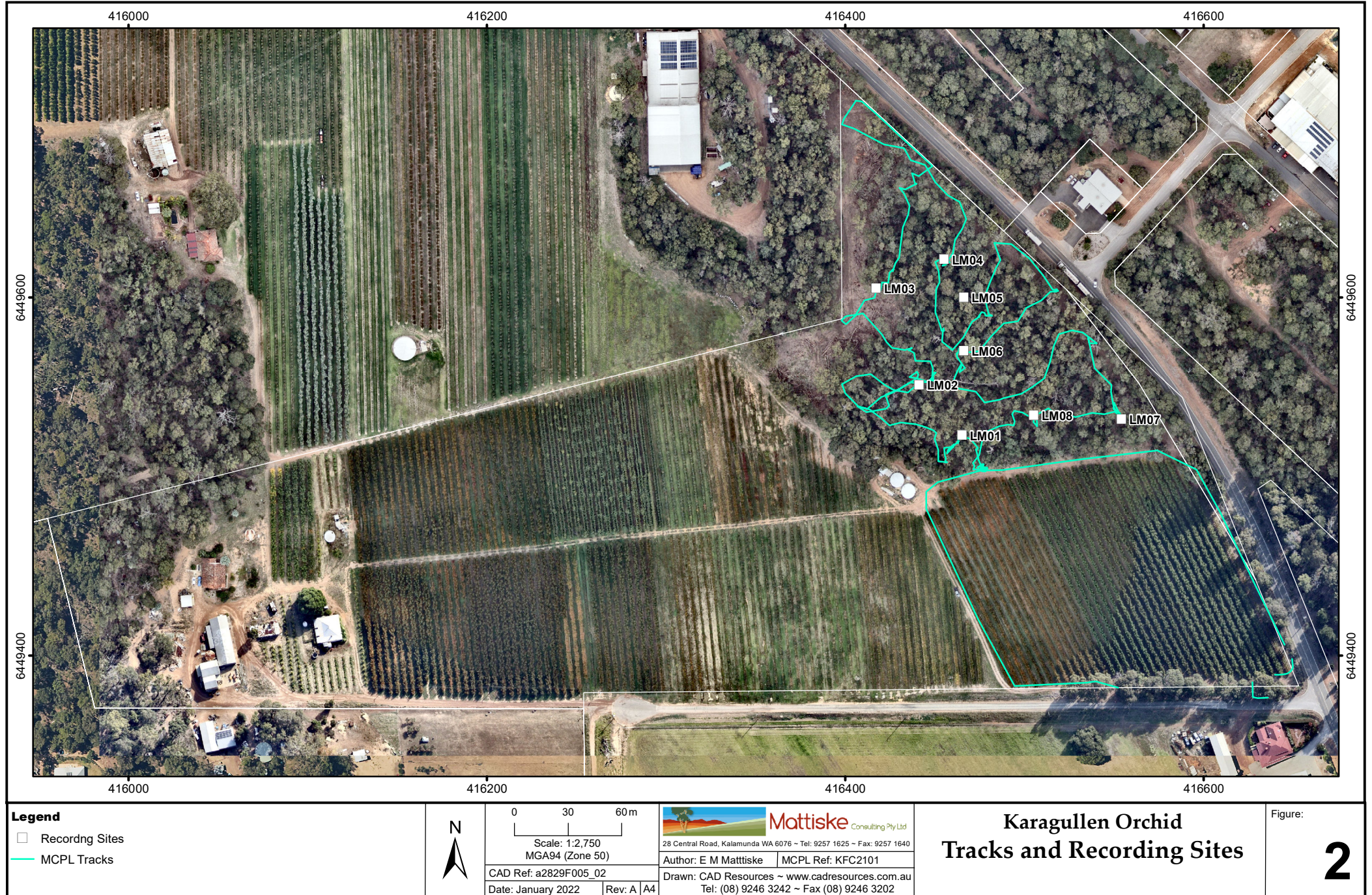
4. RESULTS

4.1 Flora

Based on a 10km radius search of NatureMap (Department of Parks and Wildlife 2007-), a total of 1009 vascular plant species from 91 families and 345 genera had a potential to occur within the Karagullen assessment area. Whilst this number is particular high, it largely reflects the diversity of soils and landforms associated with the nearby Darling Scarp to the west. This interpretation is reinforced by the review of potential threatened and priority flora for the area where the majority of the species occur on the later higher diverse landforms and soils near granites on the Darling Scarp. The results for the conservation species from the NatureMap search were combined with the results from the national database search (Department of Agriculture, Water and the Environment 2021a). Consequently, the NatureMap search is in some ways less relevant when the area is restricted to 1.77ha and is dominated by sandy gravels and sandy-loam gravels that dominate the mid and upper slopes of the lateritic soils as defined by Churchward and McArthur (1980) which supports the Dwellingup 2 (D2) vegetation complex as defined by Heddle *et al.* (1980) and Mattiske and Havel (1998) on the northern Darling Ranges.

A review of the potential threatened and priority flora species highlighted reflected the diversity of nearby landforms and soils that support these species. The potential threatened and priority species are summarized in Appendices B and C and include the following that might be potentially present (see Table 1). Of the species listed in Table 1, the majority are associated with soil and landform types that are not present in the 1.77ha of proposed clearing activities at Karagullen, Appendix C.

Source:



A total of 46 plant species from 27 families and 40 genera were recorded in the area. The proportion of introduced species was relatively low and these occurred mainly on the recently cleared fire breaks on the fringes of the property and on the south-western corner of the 1.77ha area.

4.2 Vegetation

The survey area is situated within Beard's (1990) Northern Jarrah Forest subregion of the Southwest Province. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys. Dell and Havel (1989) broadly classified the Jarrah Forest as an open forest in its northern extent and as a tall forest in its southern extent. In lower rainfall areas towards the east trees decrease in size, forming woodlands or low forests. This dry sclerophyllous forest typically comprises a dominant *Eucalyptus marginata* and *Corymbia calophylla* overstorey, a mid-storey of *Allocasuarina fraseriana* (Sheoak), *Banksia grandis* (Bull Banksia), *Persoonia longifolia* (Snottygobble), *Persoonia elliptica* (Spreading Snottygobble), and a groundcover of woody shrubs with grass trees *Xanthorrhoea preissii*, *Kingia australis* and the cycad *Macrozamia riedlei* (Dell and Havel 1989).

Heddlé *et al.* (1980) defined and described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes as part of the System 6 studies. Mattiske and Havel (1998) updated this initial more restricted mapping coverage to the wider south-west forest region as (Regional Forest Agreement vegetation complexes). Havel, J.J. (2000) summarized in greater detail the relationships between the landforms, soils and climatic conditions. The vegetation complex within the Karragullen assessment area was defined as Dwellingup 2 (D2) by Mattiske and Havel (1998):

Dwellingup 2 - Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones.

This vegetation complex is well represented in the protected lands (IUCN I-IV) for Conservation being 19.31% on the basis of the March 2019 dataset as managed by the Department of Biodiversity, Conservation and Attractions (DBCA, 2019). This vegetation complex is well represented in conservation lands and state forest areas where the representation increases to 68.47% (DBCA 2019).

4.3 Site-Vegetation Type Mapping

The site-vegetation type mapping, based on the early studies by Havel (1975a, 1975b) enable a more detailed classification of the vegetation in relation to the relationships between the flora, vegetation and site-conditions. The site-vegetation types is dominated by the ST site-vegetation type with several areas tending towards to site-vegetation type T depending on the species present and the local soil types which are dominated by sandy-gravels to sandy-loam gravels.

The different site-vegetation types recorded are summarized below:

ST - Open Forest of *Eucalyptus marginata* - *Corymbia calophylla* with scattered understorey, including *Leucopogon capitellatus*, *Leucopogon verticillatus*, *Lasiopetalum floribundum* and *Styphelia tenuiflora* on sandy-gravelly soils.

T- Open Forest of *Eucalyptus marginata* - *Corymbia calophylla* with scattered understorey, including *Leucopogon verticillatus*, *Pteridium esculentum*, *Clematis pubescens* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravelly soils.



Photo 1: Looking through Jarrah-Marri forest with low mixed understorey (ST site-vegetation type)



Photo 2: Looking through Jarrah-Marri forest with low mixed understorey (T site-vegetation type)

4.4 Vegetation Condition

The vegetation on the 1.77ha of forests within the survey area the vegetation is largely very good to excellent, although the southwestern fringes and northern fringes have been disturbed to some degree in the past.

4.5 Fauna

The assessment area is relatively restricted in area (1.77ha), however the area is still used by the Black Cockatoos for foraging. Whilst any trees with hollows were assessed for potential tree nesting sites, none were recorded by the botanists or Tony Kirkby (Cockatoo specialist) (see summary by Kirkby in Appendix D). This local area around Karagullen is regularly used by Black Cockatoos and therefore any clearing activities need assessment in the more regional context for these Cockatoo species. The series of pine trees in adjacent properties also provide regular foraging activities during some seasons.

There was some ground disturbance by Bandicoots, however these are becoming much more common in the northern Jarrah forest and near local settlements. In view of the size of the area proposed to be cleared and the dominance of orchard activities in the valley system adjacent to the assessment areas, it is unlikely that any proposed clearing would have impacts on other listed fauna species.

5. REVIEW OF MNES VALUES

In terms of the MNES values as summarized in Appendix A from a Protected Matters search of the national databases (Department of Agriculture, Water and the Environment 2021a) a range of potential values arise for both flora and fauna species and community values the following summary is provided in Appendices A and D.

5.1 Wetlands of International Importance

Two wetlands of international importance were listed via the PMST search (DAWE 2021xx). Both of these wetlands occur west on fringes of search area and on the Swan Coastal Plain well away from the Karragullen survey areas that occurs on the Darling Ranges and inland from the Darling Scarp. Further the survey area is limited to 1.77 ha of proposed clearing on the upper sandy-loam gravels of the Dwellingup landform and soil types of the Darling Ranges and no wetlands occur anywhere near the proposed clearing activities. The survey area occurs in a valley that has been historically been used for agriculture and horticultural purposes.

This value is therefore not applicable.

5.2 Listed Threatened Ecological Communities

Two listed threatened ecological communities (Banksia Woodlands of the Swan Coastal Plain ecological community and the Tuart (*Eucalyptus gomphocephala*) Woodlands and Forest of the Swan Coastal Plain ecological community) were listed via the PMST search (DAWE 2021a). These communities occur primarily on the Spearwood and Bassendean dunes systems on the western and central areas of the Swan Coastal Plain located well away from the Karragullen survey areas that occurs on the Darling Ranges and inland from the Darling Scarp. Further the survey area is limited to 1.77 ha of proposed clearing on the upper sandy-loam gravels of the Dwellingup landform and soil types of the Darling Ranges and no wetlands occur anywhere near the proposed clearing activities. The survey area occurs in a valley that has been historically been used for agriculture and horticultural purposes.

This value is therefore not applicable.

5.3 Listed Threatened Fauna Species and Migratory Birds

Eight threatened bird species, four mammal species, one fresh-water mussel and seven migratory bird species were listed on the PMST search (DAWE 2021 xx), see Appendix XX. In view of the absence of suitable habitats the majority of the bird, mammal and migratory birds do not visit or use the area.

In assessing the potential of these species it should be recognised that the survey area under consideration is only 1.77ha and that the trees have been assessed for hollows and nesting sites by Tony Kirkby, a cockatoo specialist. The assessment area is relatively restricted in area (1.77ha), however the area is still used by the Black Cockatoos for foraging. Whilst any trees with hollows were assessed for potential tree nesting sites, none were recorded by the botanists or Tony Kirkby (Cockatoo specialist) (see summary by Kirkby in Appendix D). This local area around Karragullen is regularly used by Black Cockatoos and therefore any clearing activities need assessment in the more regional context for these Cockatoo species. The series of pine trees in adjacent properties also provide regular foraging activities during some seasons.

This value may be applicable through the occurrence of foraging activities of the listed Black Cockatoos (although no roosting or nesting activity was recorded).

5.4 Listed Threatened Flora Species

Only one species had a medium-high potential to occur in the area, namely *Pimelea rara* (P4)(Potential). Although *Pimelea* plants were recorded, plants of *Pimelea rara* were not present in the assessment area. Three other species had the potential to occur (*Thysanotus anceps* (P3), *Acacia anomala* (T) and *Acacia aphylla* (T)) as they have been recorded north of the survey area. Despite searching for all of the potential threatened and priority flora species in the spring months of 2021 none of these species were recorded on the 1.77ha area. The latter may reflect the small size of the area and the distance from other populations. The survey timing was not an issue for all species.

This value is therefore not applicable.

Table 1: Potential Threatened and Flora Species from Database Searches 2021
(see Appendix C)

Conservation Status State	Conservation Federal Status	Numbers of Taxa in Different Likelihood Categories (based on site preferences and location)		
		Very Unlikely	Unlikely	Potential
Presumed Extinct		1		
Threatened	Critically Endangered	1		
Threatened	Endangered	3	1	
Threatened	Vulnerable	2	1	2
Priority 1		1	1	
Priority 2			3	
Priority 3		11	1	1
Priority 4		7	1	1

6. REVIEW OF 10 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.

This area is not considered to contain levels of high biodiversity due to the restricted size of the proposed clearing area and the representation of the site-vegetation types in extensive areas of native forest in the northern Jarrah forest.

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.

The assessment area is relatively restricted in area (1.77ha), however the area is still used by the Black Cockatoos for foraging. Whilst any trees with hollows were assessed for potential tree nesting sites, none were recorded by the botanists or Tony Kirkby (Cockatoo specialist). This local area around Karagullen is regularly used by Black Cockatoos and therefore any clearing activities need assessment in the more regional context for these species.

There was some ground disturbance by Bandicoots, however these are becoming much more common in the northern Jarrah forest and near local settlements.

Clearing of the vegetation may be at variance with this Principle.

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

No naturally occurring rare 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.

No threatened ecological communities were present in the assessment area. Those highlighted occur on the Swan Coastal Plain and not on the Darling Ranges where the assessment area occurs.

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

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 areas zoned as General Rural by the City of Armadale under Town Planning Scheme 4 and as the area abuts well established orchards and highly modified vegetation. The area is near extensive area of native forest and this small section should not have a significant impact on the local and regional vegetation values.

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 assessment area is not associated with a watercourse or wetland.

Clearing of the vegetation is not at variance with this 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 occurs near state forest and conservation areas (e.g. Korung National Park and State Forest areas, Figure 3). The proposed clearing activities are associated with an orchard expansion on a well-established orchard property and opposite a local store and the small settlement of Karragullen.

Clearing of the vegetation is not at variance with this Principle as the proposed activities will not have an impact on the environmental values of the nearby conservation areas.

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 adjacent orchards.

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 would not influence current surface water flows.

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 clearing and the location on mid and upper slopes, clearing activities are not likely to cause, or exacerbate, the incidence of flooding.

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

6. Overview of Values

In summary, the clearing proposed is associated with a localised and small area (1.77ha) of remnant vegetation. The area assessed does not support threatened flora species or ecological communities, however the area is used for foraging by Black Cockatoos which are regularly recorded at Karragullen.

As indicated below if the 10 clearing principles were applied the work is unlikely to be at variance with most of 10 clearing principles, with the exception of the foraging activities of the Black Cockatoos (which are listed under the EPBC Act 1999). No other matters of national environmental significance (MNES) occur in the 1.77ha area as proposed for clearing on land zoned locally for General rural.

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APPENDIX A1: STATE DEFINITION OF THREATENED AND PRIORITY FLORA SPECIES

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2021c).

Category	Definition
T – Threatened	<p>Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedules 1 to 4 of the <i>Wildlife Conservation (Rare Flora) Notice</i> under the WC Act).</p> <p>Threatened flora are further ranked by the DPaW to align with IUCN Red List categories and criteria:</p> <ul style="list-style-type: none"> • CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild (Schedule 1); • EN: Endangered – considered to be facing a very high risk of extinction in the wild (Schedule 2); or • VU: Vulnerable – considered to be facing a high risk of extinction in the wild (Schedule 3). • EX: Presumed Extinct – taxa that have been adequately searched for and there is no reasonable doubt that the last individual has died (Schedule 4)
P1 – Priority 1 (Poorly known taxa)	<p>Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation.</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.</p>
P2 – Priority 2 (Poorly known taxa)	<p>Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc.</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.</p>
P3 – Priority 3 (Poorly known taxa)	<p>Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.</p> <p>Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>
P4 – Priority 4 (Rare, Near Threatened and other taxa in need of monitoring)	<p>1. Rare - Taxa 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>2. Near Threatened - Taxa 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>3. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

APPENDIX A2: DEFINITION OF THREATENED FLORA SPECIES (*Environment Protection and Biodiversity Conservation Act 1999*)

Category Code	Category
Ex	Extinct Taxa 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 Taxa 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 Taxa 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 Taxa 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 Taxa 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 Taxa 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.

APPENDIX A3: DEFINITION OF THREATENED ECOLOGICAL COMMUNITIES (Department of Biodiversity, Conservation and Attractions 2021d)

Category Code	Category
PTD	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:</p> <ul style="list-style-type: none"> (i) records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; (ii) all occurrences recorded within the last 50 years have since been destroyed.
CE	<p>Critically Endangered</p> <p>An ecological community will be listed as Critically Endangered 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 of the following criteria:</p> <ul style="list-style-type: none"> (i) 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; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:</p> <ul style="list-style-type: none"> (i) 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; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the short term future.
V	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable 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 of the following criteria:</p> <ul style="list-style-type: none"> (i) The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; (ii) The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; (iii) The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

APPENDIX A4: DEFINITION OF THREATENED ECOLOGICAL COMMUNITIES (Commonwealth Environment Protection and Biodiversity Conservation Act 1999)

Three categories exist for listing threatened ecological communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Listing Category	Explanation of Category
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.

APPENDIX A5: DEFINITION OF PRIORITY ECOLOGICAL COMMUNITIES (Department of Biodiversity, Conservation and Attractions 2021d)

Category Code	Category
P1	<p>Poorly-known ecological communities</p> <p>Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.</p>
P2	<p>Poorly-known ecological communities</p> <p>Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.</p>
P3	<p>Poorly known ecological communities</p> <ul style="list-style-type: none"> (i) 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 or: (ii) 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; (iii) 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	<p>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.</p>
P5	<p>Conservation Dependent ecological communities</p> <p>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.</p>

APPENDIX A6: CATEGORIES AND CONTROL OF DECLARED (PLANT) PESTS IN WESTERN AUSTRALIA *(Department of Primary Industries and Regional Development 2021)*
(Biosecurity and Agriculture Management Regulations 2013)

Control Category	Control Measures
<p 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 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 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 (ii) reduce the number or distribution of the declared pest in the area; or (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 (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.</p>

APPENDIX A7: DEFINITION OF STRUCTURAL FORMS OF AUSTRALIAN VEGETATION (Beard 1990)

Structural Forms of Australian Vegetation			
Growth Form of Tallest Stratum	Foliage Cover of Tallest Stratum		
	30 – 70%	10 – 30%	less than 10%
Tall Trees [greater than 30 m]	Tall Forest	Tall Woodland	Open Tall Forest
Medium Trees [10 – 30 m]	Forest	Woodland	Open Woodland
Low Trees [less than 10 m]	Low Forest	Low Woodland	Open Low Woodland
Tall Shrubs [greater than 2 m]	Thicket	Scrub	Open Scrub
Low Shrubs [less than 2 m]	Heath	Low Shrubland	Open Low Shrubland
Grassland [less than 1 m]	Closed Bunch Grassland	Open Bunch Grassland	Hummock Grassland

APPENDIX A8: DEFINITION OF VEGETATION CONDITION SCALE (Trudgen 1988)

Condition Rating	Description
Pristine (1)	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent (2)	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Very Good (3)	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Good (4)	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded (5)	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded (6)	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX A9: STATE DEFINITION OF THREATENED FAUNA SPECIES

Note: Categories listed under the *Wildlife Conservation Act 1950*; adapted from Department of Biodiversity, Conservation and Attractions (2021c).

CATEGORY	DEFINITION
T – Threatened fauna	<p>Taxa that have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such. Threatened fauna are published as “Specially Protected Fauna”, declared to be ‘likely to become extinct’ pursuant to section 14(4) of the <i>Wildlife Conservation Act 1950</i> and are listed under Schedules 1 to 4 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna</i>.</p> <p>Assessments of the conservation status of threatened fauna are based on national extent of the taxa and ranked according to their level of threat using the IUCN Red List criteria:</p> <ul style="list-style-type: none"> • CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild (Schedule 1); • EN: Endangered – considered to be facing a very high risk of extinction in the wild (Schedule 2); • VU: Vulnerable – considered to be facing a high risk of extinction in the wild (Schedule 3);
EX – Presumed extinct fauna	Taxa that have been adequately searched for and there is no reasonable doubt that the last individual has died (Schedule 4).
IA – Migratory birds protected under an international agreement	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA), The Republic of Korea (ROKAMBA) and the Bonn Convention, relating to the protection of migratory birds (Schedule 5).
CD – Conservation dependent fauna	Fauna of special conservation need, being dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6).
OS – Other specially protected fauna	Fauna otherwise in need of special protection to ensure conservation (Schedule 7)

APPENDIX A10: FEDERAL DEFINITION OF THREATENED FAUNA SPECIES

Note: Threatened fauna may be listed in six categories as defined in section 179 of the *Environment Protection and Biodiversity Conservation Act 1999*.

CATEGORY	DEFINITION
Ex - Extinct	Taxa 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	Taxa 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	Taxa 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	Taxa 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	Taxa 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	Taxa 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.

APPENDIX A11: STATE DEFINITION OF PRIORITY FAUNA SPECIES

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2021c); note that categories are not listed under any state or federal legislation. Priority species are defined as 'possibly threatened taxa 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 or other specially protected fauna lists for other than taxonomic reasons.'

CATEGORY	DEFINITION
P1 – Priority 1 (Poorly known taxa)	<p>Taxa that are known from one or a few locations (generally five or less) which are potentially at risk. Occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves, and active mineral leases; or under threat of habitat destruction or degradation</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. These taxa are in urgent need of further survey.</p>
P2 – Priority 2 (Poorly known taxa)	<p>Taxa that are known from one or a few locations (generally five or less), some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc.</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. These taxa are in urgent need of further survey.</p>
P3 – Priority 3 (Poorly known taxa)	<p>Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.</p> <p>Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>
P4 – Priority 4 (Rare, Near Threatened and other taxa in need of monitoring)	<p>1. Rare - Taxa 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>2. Near Threatened - Taxa 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>3. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>



APPENDIX B: EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 23-Dec-2021

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	38
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	9
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	5
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	14
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Forrestdale and thomsons lakes	Within 10km of Ramsar site	In buffer area only

Listed Threatened Ecological Communities	[Resource Information]
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For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area	In buffer area only

Listed Threatened Species	[Resource Information]
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Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Zanda baudinii listed as Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
MAMMAL			
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area	In feature area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area	In feature area
OTHER			
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
PLANT			
Acacia anomala Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat may occur within area	In buffer area only
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Diplolaena andrewsii [6601]	Endangered	Species or species habitat may occur within area	In feature area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area	In feature area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area	In feature area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area	In buffer area only
Goodenia arthrotricha [12448]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat may occur within area	In buffer area only
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat may occur within area	In buffer area only
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat may occur within area	In buffer area only
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Verticordia fimbrilepis subsp. fimbrilepis Shy Featherflower [24631]	Endangered	Species or species habitat may occur within area	In buffer area only
Listed Migratory Species [Resource Information]			
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [50949]	WA	In buffer area only
Commonwealth Land - [51387]	WA	In buffer area only
Commonwealth Land - [50953]	WA	In buffer area only
Commonwealth Land - [51528]	WA	In buffer area only
Commonwealth Land - [51928]	WA	In buffer area only
Commonwealth Land - [51526]	WA	In buffer area only
Commonwealth Land - [51986]	WA	In buffer area only
Commonwealth Land - [51927]	WA	In buffer area only
Commonwealth Land - [51525]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Thinornis cucullatus as Thinornis rubricollis Hooded Dotterel, Hooded Plover [87735]		Species or species habitat may occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Canning River	Management Area	WA	In buffer area only
Korung	National Park	WA	In feature area
Midgegooroo	National Park	WA	In buffer area only
Stinton Cascades	Nature Reserve	WA	In buffer area only
Unnamed WA21569	5(1)(g) Reserve	WA	In buffer area only

Regional Forest Agreements			[Resource Information]
Note that all areas with completed RFAs have been included.			
RFA Name		State	Buffer Status
South West WA RFA		Western Australia	In feature area

EPBC Act Referrals					[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Controlled action					
Clearing for orchard expansion, Lot 400 Canning Road, Carmel, WA	2016/7647	Controlled Action	Completed		In buffer area only
Development of an Integrated Aged Care Facility, Kalumunda, WA	2013/6990	Controlled Action	Completed		In buffer area only
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval		In buffer area only
Nava-1 Cable System	2001/510	Controlled Action	Completed		In buffer area only
Not controlled action					
Canning Mills Road Improvement Project, Martin, WA	2015/7426	Not Controlled Action	Completed		In buffer area only
Clearing of Lot 400 Canning Road, Carmel, WA	2017/7979	Not Controlled Action	Completed		In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Construction of international rowing course and commercial/residential areas	2003/1034	Not Controlled Action	Completed	In buffer area only
Eradication of the European House Borer, Perth metropolitan area, WA	2009/5027	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Tonkin Highway Extension	2001/470	Not Controlled Action	Completed	In buffer area only
Wungong Transfer Mains Project	2007/3532	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
Residential subdivision of Lot 126 Lawnbrook Road, Walliston	2021/9105	Referral Decision	Referral Publication	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN A 10KM VICINITY OF THE KARAGULLEN SURVEY AREA

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AW – Avon Wheatbelt, JF –Jarrah Forrest, PER – Perth, SWP – Swan Coastal Plain, EP – Esperance Plains, M – Mallee, GS – Geraldton Sandplains, W- Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference
<i>Scholtzia</i> sp. <i>Bickley</i> (W.H. <i>Loaring</i> s.n. PERTH 06165184)	Myrtaceae	X	x	Habit: Flower colour: Flowering period (indicated in green): Soils: IBRA Distribution: Florabase records: J F M A M J J A S O N D N/A JF 1	VERY UNLIKELY Presumed extinct (X) recorded north of survey area only to date	
<i>Acacia anomala</i>	Fabaceae	T	V	Habit: Slender, rush-like shrub, 0.2-0.5 m high. Flower colour: Yellow Flowering period (indicated in green): Soils: Lateritic soils and slopes. IBRA Distribution: JF, SCP Florabase records: 25 J F M A M J J A S O N D	POTENTIAL Recorded north of survey area	 <i>Acacia anomala</i> Photos: B.R. Maslin, D. Coates & S.D. Hopper
<i>Acacia aphylla</i>	Fabaceae	T	V	Habit: Divaricately branched, spinescent, glaucous shrub, 0.9-2.5 m high. Flower colour: Yellow Flowering period (indicated in green): Soils: Sand, loam, clay loam. Granite outcrops, hills. IBRA Distribution: AW,JF,SCP Florabase records: 47 J F M A M J J A S O N D	POTENTIAL Recorded north of survey area	 <i>Acacia aphylla</i> Photos: S.D. Hopper & B.R. Maslin




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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Anthocercis gracilis</i>	Solanaceae	T	V	Habit: Erect, spindly shrub, to 0.6(-1) m high. Flower colour: Yellow-green Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AW, JF Florabase records: 29	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY No granite outcrops in survey area, occurs mainly north and near Darling Scarp to north west	 <i>Anthocercis gracilis</i> Photos: S.D. Draper & J.L. Robson
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Conospermum undulatum</i>	Proteaceae	T	V	Habit: Erect, compact shrub, 0.6-2 m high. Flower colour: White-other Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Grey or yellow-orange clayey sand. IBRA Distribution: JF,SCP Florabase records: 90	J	F	M	A	M	J	J	A	S	O	N	D	UNLIKELY Soils not recorded on survey area, recorded nearby in National Park, however mostly on Swan Coastal Plain	 <i>Conospermum undulatum</i> Photos: A.D. Crawford & K.R. Thiele
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Darwinia apiculata</i>	Myrtaceae	T	E	Habit: Densely branched shrub, 0.4-0.5 m high. Flower colour: Green & yellow/red Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Lateritic soils, near granite boulders. IBRA Distribution: JF,SCP Florabase records: 10	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Recorded mainly to west and north; soils do not occur on survey area	 <i>Darwinia apiculata</i> Photos: J.L. Robson
J	F	M	A	M	J	J	A	S	O	N	D							



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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference
<i>Diuris drummondii</i>	Orchidaceae	T	V	Habit: Tuberous, perennial, herb, 0.5-1.05 m high. Flower colour: Yellow Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Low-lying depressions, swamps. IBRA Distribution: AW,JF,SCP,W Florabase records: 53	VERY UNLIKELY As survey area on clay-loam gravel soils on slopes, mainly Swan Coastal Plain	 <i>Diuris drummondii</i> Photos: A. P. Brown and I. & M. Greeve
<i>Diuris purdiei</i>	Orchidaceae	T	E	Habit: Tuberous, perennial, herb, 0.15-0.35 m high. Flower colour: Yellow Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Grey-black sand, moist. Winter-wet swamps. IBRA Distribution: JF, SCP Florabase records: 26	VERY UNLIKELY As survey area occurs on clay-loam gravel slopes well away from swamps and valley floors, mainly on Swan Coastal Plain	 <i>Diuris purdiei</i> Photos: I. & M. Greeve & S.D. Hopper
<i>Goodenia arthrotricha</i>	Goodeniaceae	T	E	Habit: Erect perennial, herb, to 0.4 m high. Flower colour: Blue Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Gravel. Granite rocks, slopes. IBRA Distribution: AW,JF,SCP Florabase records: 20	UNLIKELY As soils not on survey area, although recorded nearby to west	 <i>Goodenia arthrotricha</i> Photo: H. Bowler


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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Grevillea thelemanniana</i>	Proteaceae	T	CE	Habit: Spreading, lignotuberosus shrub, 0.3-1.5 m high. Flower colour: Pink-red Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sand, sandy clay. Winter-wet low-lying flats. IBRA Distribution: JF, SCP Florabase records: 37	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not on survey area, mainly on Swan Coastal Plain	 <i>Grevillea thelemanniana</i> Photo: L. Anderson
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Thelymitra stellata</i>	Orchidaceae	T	E	Habit: Tuberosus, perennial, herb, 0.15-0.25 m high. Flower colour: Yellow & Brown Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sand, gravel, lateritic loam. Stony hills and slopes. Grey sand over laterite. Watercourse, lateritic boulders. IBRA Distribution: GS, JF, SCP Florabase records: 20	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Known from area west of survey area and also north and south, particularly on northern sandplains	 <i>Thelymitra stellata</i> Photos: A.P. Brown & L. & M. Green
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Drosera oreopodion</i>	Droseraceae	P1	x	Habit: Fibrous-rooted, rosetted perennial, herb, to 0.035 m high, to 0.015 m wide. Flower colour: White Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Clayey sand sometimes mixed with lateritic pebbles. IBRA Distribution: JF, SCP Florabase records: 6	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY South of survey area and soils not present in survey area	
J	F	M	A	M	J	J	A	S	O	N	D							

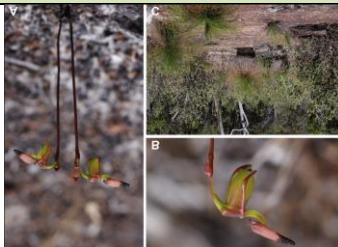

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference
<i>Eriochilus sp. Roleystone (G. Brockman 1140)</i>	Orchidaceae	P1	x	Habit: NA Flower colour: NA Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Lateritic gravels, black sandy gravels IBRA Distribution: JF Florabase records: 3	UNLIKELY Known from area west of survey area	
<i>Andersonia sp. Blepharifolia (F. & J. Hort 1919)</i>	Ericaceae	P2	x	Habit: NA Flower colour: NA Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Loam sandy gravels on slopes over laterite, sandy-loam soils associated with granite IBRA Distribution: JF, SCP Florabase records: 9	UNLIKELY Recorded nearby but on sandier soils near granites	
<i>Bossiaea modesta</i>	Fabaceae	P2	x	Habit: Slender, trailing & twining shrub. Flower colour: Yellow & red Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Soils derived from granite. Damp areas close to stream. IBRA Distribution: JF,SCP Florabase records: 22	UNLIKELY Soils not on site, although recorded nearby	 <p><i>Bossiaea modesta</i> Photo: A.D. Crawford</p>


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Species	Family	SCC	FCC	Description and Habitat		Likelihood of Occurrence	Picture Reference												
<i>Paracaleana ferricola</i>	Orchidaceae	P2		Habit: Flower colour: Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: IBRA Distribution: Florabase records:	J	F	M	A	M	J	J	A	S	O	N	D	Perennial herb Green brown Soils gravelly with sandy patches JF 3	UNLIKELY Occurs north on sandy gravel soils	
J	F	M	A	M	J	J	A	S	O	N	D								
<i>Acacia horridula</i>	Fabaceae	P3	x	Habit: Flower colour: Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: IBRA Distribution: Florabase records:	J	F	M	A	M	J	J	A	S	O	N	D	Harsh, slender, single-stemmed shrub, 0.3-0.6(-1) m high. Yellow Gravelly soils over granite, sand. Rocky hillsides. JF,SCP 33	VERY UNLIKELY No granite in survey area, although recorded nearby	
J	F	M	A	M	J	J	A	S	O	N	D								
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>	Fabaceae	P3	x	Habit: Flower colour: Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: IBRA Distribution: Florabase records:	J	F	M	A	M	J	J	A	S	O	N	D	Shrub, 0.9-2.5 m high, 'minni-ritchi' bark, phyllodes mostly 8-13 cm long, 1-2 mm wide. Yellow Granitic soils. AW,JF,SCP 42	VERY UNLIKELY Not recorded locally, mainly north of survey area and no granite in survey area	
J	F	M	A	M	J	J	A	S	O	N	D								



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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Allocasuarina grevilleoides</i>	Casuarinaceae	P3	x	Habit: Dioecious, lignotuberosus shrub, 0.15-0.4 m high. Flower colour: NA Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sand over laterite, gravel. IBRA Distribution: AW,GS,JF,SCP Florabase records: 34	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not present in survey area and species occurs mainly north of Perth	
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Asteridea gracilis</i>	Asteraceae	P3	x	Habit: Annual, herb, 0.15-0.35 m high. Flower colour: White-pink Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sand, clay, gravelly soils. IBRA Distribution: EP,JF,SCP Florabase records: 11	J	F	M	A	M	J	J	A	S	O	N	D	UNLIKELY Variable soils and recorded nearby	 <i>Asteridea gracilis</i> Photo: H. Bowler
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Banksia kippistiana</i> var. <i>paenepeccata</i>	Proteaceae	P3	x	Habit: Erect, prickly, lignotuberosus shrub, 0.3-1.2 m high. Flower colour: Yellow-cream Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Lateritic gravelly soils. IBRA Distribution: GS, JF, SCP Florabase records: 28	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Known from area west of survey area and also on northern sandplains	
J	F	M	A	M	J	J	A	S	O	N	D							


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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Beaufortia purpurea</i>	Myrtaceae	P3	x	Habit: Erect or spreading shrub, 0.3-1.5 m high. Flower colour: Red-purple Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Lateritic or granitic soils. Rocky slopes. IBRA Distribution: JF, SCP Florabase records: 43	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not in survey area, mainly recorded to west	 <i>Beaufortia purpurea</i> Photos: L. Anderson & K.R. Thiele
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Gonocarpus pycnostachyus</i>	Haloragaceae	P3	x	Habit: Erect annual, herb, 0.1-0.15 m high. Flower colour: Green-red Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sand or clay soils. Wet depressions, granite rocks. IBRA Distribution: EP, JF, M Florabase records: 10	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not on survey area, mainly although recorded nearby to east, mainly recorded on south coast of WA	
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Halgania corymbosa</i>	Boraginaceae	P3	x	Habit: Erect shrub, 0.35-1 m high. Flower colour: Blue-purple Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Gravelly soils, soils over granite. IBRA Distribution: JF,SCP Florabase records: 18	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY No granite outcrops in area	 <i>Halgania corymbosa</i> Photo: H. Bowler
J	F	M	A	M	J	J	A	S	O	N	D							



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Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AW – Avon Wheatbelt, JF –Jarrah Forrest, PER – Perth, SWP – Swan Coastal Plain, EP – Esperance Plains, M – Mallee, GS – Geraldton Sandplains, W- Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>	Malvaceae	P3	x	Habit: NA Flower colour: NA Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: exposed granites and dark sandy loam soils, sandy loams over granite, clayey sands over granite IBRA Distribution: AW, JF, SCP Florabase records: 48	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not in survey area, mainly recorded to west	
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Meionectes tenuifolia</i>	Haloragaceae	P3	x	Habit: NA Flower colour: NA Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Edge of swamp, Grey sands, seasonally wet poorly drained flats, granite flats. Moist clays. IBRA Distribution: JF, SCP Florabase records: 25	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not on survey area, snot recorded near survey area, mainly north and on Swan Coastal Plain	
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Pithocarpa corymbulosa</i>	Asteraceae	P3	x	Habit: Erect to scrambling perennial, herb, 0.5-1 m high. Flower colour: White Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Gravelly or sandy loam. Amongst granite outcrops. IBRA Distribution: GS,JF,SCP Florabase records: 22	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY No granite outcrops in area	
J	F	M	A	M	J	J	A	S	O	N	D							



APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN A 10KM VICINITY OF THE KARAGULLEN SURVEY AREA

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AW – Avon Wheatbelt, JF –Jarrah Forrest, PER – Perth, SWP – Swan Coastal Plain, EP – Esperance Plains, M – Mallee, GS – Geraldton Sandplains, W- Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference
<i>Stackhousia</i> <i>sp. Red- blotched corolla (A. Markey 911)</i>	Celastraceae	P3	x	Habit: NA Flower colour: NA Flowering period (indicated in green): J F M A M J J A S O N D Soils: Stony, sandy clay, edges of granite rock on sandy clays over granite, clayey sands over laterite. IBRA Distribution: AW, GS, JF Florabase records: 9	VERY UNLIKELY Soil types not present in survey area	
<i>Thysanotus anceps</i>	Asparagaceae	P3	x	Habit: Rhizomatous, leafless perennial, herb, to 0.4 m high. Flower colour: Purple Flowering period (indicated in green): J F M A M J J A S O N D Soils: White or grey sand, lateritic gravel, laterite. IBRA Distribution: GS, JF, SCP Florabase records: 17	POTENTIAL Recorded nearby and similar to some soils	 <i>Thysanotus anceps</i> Photo: A. Ireland
<i>Acacia oncinophylla</i> <i>subsp. patulifolia</i>	Fabaceae	P4	x	Habit: Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Flower colour: Yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Granitic soils, occasionally on laterite. IBRA Distribution: JF, SCP Florabase records: 31	VERY UNLIKELY Recorded locally to west on escarpment, mainly north of survey area and no granite in survey area	 <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> Photos: S.J. Patrick




APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN A 10KM VICINITY OF THE KARAGULLEN SURVEY AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference
<i>Calothamnus accedens</i>	Myrtaceae	P4	x	Habit: Erect & slender shrub, to 1.8 m high. Flower colour: Pink - red Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Sandy soils over laterite. Road verge. IBRA Distribution: AW, GS, JF, SCP. Florabase records: 39	VERY UNLIKELY Mainly to west and north on sandier soils which do not occur on survey area	
<i>Calothamnus graniticus subsp. leptophyllus</i>	Myrtaceae	P4	x	Habit: Erect, multi-stemmed shrub, 1-2 m high. Flower colour: Red Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Clay over granite, lateritic soils. Hillsides. IBRA Distribution: JF, SCP Florabase records: 32	VERY UNLIKELY Mainly to south; soils do not occur on survey area	 <p><i>Calothamnus graniticus subsp. leptophyllus</i> Photos: A. D. Crawford, M. Hancock & W. McGrath</p>
<i>Cyanicula ixioides subsp. ixioides</i>	Orchidaceae	P4	x	Habit: Tuberous, perennial, herb, 0.05-0.15 m high. Flower colour: Yellow Flowering period (indicated in green): <div>J F M A M J J A S O N D</div> Soils: Laterite, gravel. IBRA Distribution: AW,JF,SCP Florabase records: 28	VERY UNLIKELY Occurs north of the survey area, mainly near Mundaring and northwards	 <p><i>Cyanicula ixioides subsp. ixioides</i> Photos: I. & M. Greene & G. Brunsbauer</p>



APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN A 10KM VICINITY OF THE KARAGULLEN SURVEY AREA

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AW – Avon Wheatbelt, JF –Jarrah Forrest, PER – Perth, SWP – Swan Coastal Plain, EP – Esperance Plains, M – Mallee, GS – Geraldton Sandplains, W- Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence	Picture Reference												
<i>Grevillea pimeleoides</i>	Proteaceae	P4	x	Habit: Non-lignotuberous shrub, 0.4-2.4 m high. Flower colour: Yellow-orange Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Gravelly soils over granite. Rocky hillsides. IBRA Distribution: JF,SCP Florabase records: 36	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY No granite outcrops in survey area, recorded south and north	 <i>Grevillea pimeleoides</i> Photos: A. Ireland & K.R. Thiele
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Lasiopetalum bracteatum</i>	Malvaceae	P4	x	Habit: Erect, open shrub, 0.4-1.5 m high. Flower colour: Pink-purple Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops. IBRA Distribution: JF, SCP Florabase records: 44	J	F	M	A	M	J	J	A	S	O	N	D	VERY UNLIKELY Soils not recorded on survey area	 <i>Lasiopetalum bracteatum</i> Photos: B.A. Fisher and A. Ireland
J	F	M	A	M	J	J	A	S	O	N	D							
<i>Pimelea rara</i>	Thymelaeaceae	P4	x	Habit: Shrub, 0.2-0.35 m high. Flower colour: White Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Lateritic soils. IBRA Distribution: JF Florabase records: 52	J	F	M	A	M	J	J	A	S	O	N	D	POTENTIAL Survey area contains suitable habitat. Close in range.	 <i>Pimelea rara</i> Photos: H. Bowler, S.J. Patrick & J.L. Robson
J	F	M	A	M	J	J	A	S	O	N	D							

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN A 10KM VICINITY OF THE KARAGULLEN SURVEY AREA

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AW – Avon Wheatbelt, JF –Jarrah Forrest, PER – Perth, SWP – Swan Coastal Plain, EP – Esperance Plains, M – Mallee, GS – Geraldton Sandplains, W- Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat		Likelihood of Occurrence	Picture Reference												
<i>Stylidium striatum</i>	Stylidiaceae	P4	x	Habit: Flower colour: Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: IBRA Distribution: Florabase records:	J	F	M	A	M	J	J	A	S	O	N	D	Rosetted perennial, herb, 0.15-0.55 m high Yellow Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland. JF 28	UNLIKELY Recorded north and east of survey area	 <i>Stylidium striatum</i> Photos: J. Weger
J	F	M	A	M	J	J	A	S	O	N	D								
<i>Thysanotus glaucus</i>	Asparagaceae	P4	x	Habit: Flower colour: Flowering period (indicated in green): <table><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: IBRA Distribution: Florabase records:	J	F	M	A	M	J	J	A	S	O	N	D	Caespitose, glaucous perennial, herb, 0.1-0.2 m high. Purple White, grey or yellow sand, sandy gravel. EP,GS,JF,M,SCP 26	VERY UNLIKELY Sandy soils are not present in survey area	 <i>Thysanotus glaucus</i> Photos: N.H. Bateman
J	F	M	A	M	J	J	A	S	O	N	D								

APPENDIX D: DISTRIBUTION AND HABITAT OF PROTECTED FAUNA SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE KARRAGULLEN SURVEY AREA
(Department of Agriculture, Water and the Environment 2021a; Department of Biodiversity, Conservation and Attractions 2021) Conservation Status - EPBC Act (in brackets),
State listing -no brackets; Migratory International Agreement

Species	Common Name	Conservation Status	Distribution	Habitat	Likelihood of occurrence
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	The Australian Painted Snipe is a snipe-like shorebird.	Occurs in different habitats associated with wetlands and patchy vegetation near wetlands.	Very unlikely
<i>Bettongia penicillata</i> subsp. <i>ogilbyi</i>	Woylie, Brush-tailed Bettong	Critically Endangered (Endangered)	Scattered populations throughout the jarrah forest in the south-west corner of WA. Isolated populations at Francois Peron NP, Kalbarri NP, Nambung NP, Julimar Forest, Avon Valley NP, Dryandra Woodland, Boyagin NR, Tutanning NR and North Karlgarin NR.	Forest to grasslands, coastal and inland. <i>Gastrolobium</i> thickets provide refuges for Woylies against introduced predators.	Very unlikely
<i>Botaurus poeciloptilus</i>	Australian Bittern	Endangered (Endangered)	Found in coastal and sub-coastal areas of south-eastern and south-western mainland Australia and the eastern marshes of Tasmania.	Found in reed beds associated with shallow and vegetated fresh to brackish swamps.	Very unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered (Critically Endangered and Migratory International)	Curlew sandpipers occur around the coasts and also widespread inland. In Western Australia, they are widespread around coastal and sub-coastal plains from Cape Arid to south-west Kimberley.	Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	Very unlikely
<i>Calyptorhynchus banksii</i> subsp. <i>naso</i>	Forest Red-tailed Black-Cockatoo	Vulnerable (Vulnerable)	Endemic to south-west WA in an area bounded by Gingin, Mt Helena, Christmas Tree Well, West Dale (rarely to Brookton), North Bannister (rarely to Wandering), Mt Saddleback, Kojonup, Rocky Gully, upper King River and Green Range (east of Albany). most common in the northern Darling Range from about Collie north to Mundaring and is very local throughout the lower south-west.	Inhabits the dense <i>E. marginata</i> , <i>E. diversicolor</i> and <i>C. calophylla</i> forests receiving more than 600 mm average rainfall annually, mainly in the hilly interior. Has been observed in a range of other forest and woodland types, including <i>E. patens</i> , <i>E. wandoo</i> , <i>E. gomphocephala</i> , <i>E. staeri</i> , <i>E. cornuta</i> and <i>E. rudis</i> .	Observed foraging, although no nesting hollows or roosting sites within survey area.
<i>Calyptorhynchus baudinii</i>	Baudin's Black-Cockatoo, Long-billed Black-Cockatoo	Endangered (Endangered)	South west of WA, extending from Albany northward to Gidgegannup and Mundaring, and inland to the Stirling Ranges and near Kojonup.	Mainly occurs in eucalypt forests, especially <i>E. marginata</i> , <i>C. calophylla</i> , also <i>E. diversicolor</i> forest, less frequently in woodlands of <i>E. wandoo</i> , <i>E. patens</i> , <i>E. rudis</i> , <i>E. cornuta</i> , partly cleared farmlands and urban areas including roadside trees and house garden.	Potential foraging, although no nesting hollows or roosting sites in survey area.
<i>Calyptorhynchus latirostris</i>	Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered (Endangered)	Endemic to south-western Australia.	Nests in tall living or dead eucalypts, particularly <i>E. wandoo</i> and <i>E. salmonophloia</i> .	Observed foraging, although no nesting hollows or roosting sites in survey area.

APPENDIX D: DISTRIBUTION AND HABITAT OF PROTECTED FAUNA SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE KARRAGULLEN SURVEY AREA
(Department of Agriculture, Water and the Environment 2021a; Department of Biodiversity, Conservation and Attractions 2021) Conservation Status - EPBC Act (in brackets),
State listing -no brackets; Migratory International Agreement

Species	Common Name	Conservation Status	Distribution	Habitat	Likelihood of occurrence
<i>Setonix brachyurus</i>	Quokka	Vulnerable	The Quokkas occur on a narrow strip of range in south-western Western Australia and on islands such as Bald Island and Rottnest. Historically this species was more widespread and abundant. It has been recorded in the southwest forests, but generally in denser understorey areas.	The Quokkas are herbivorous and prefer denser understorey areas associated with swamps, riparian areas and dense coastal heaths.	Very Unlikely
<i>Dasyurus geoffroi</i>	Chuditch, Western Quoll	Vulnerable (Vulnerable)	Restricted to the south-west of WA. Present in varying densities throughout Jarrah forest, Kalbarri NP and is sparsely populated in the wheatbelt and goldfields areas.	Eucalypt forest (especially <i>E. marginata</i>), dry woodland and mallee shrublands. Moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest. Densest populations in riparian forest.	Potential, but unlikely in project impact areas located in cleared areas. Active orchards and dogs in area.
<i>Isoodon obesulus</i> subsp. <i>fusciventer</i> , <i>Isoodon fusciventer</i>	Quenda, Southern Brown Bandicoot	Priority 4	Widely distributed near the south west coast from Guilderton to east of Esperance. Patchy distribution through Jarrah and Karri forest, Swan Coastal Plain, and inland as far as Hyden. Translocated to Julimar State Forest, Hills Forest near Mundaring, Tutanning NR, Boyagin NR, Dongolocking NR, Leschenault Conservation Park, Karakamia Sanctuary, Paruna Sanctuary, Yalgorup NP, Creery Wetlands, Avon Valley NP, Nambung NP, Francois Peron NP and Thomson's Lake NR.	Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting <i>E. marginata</i> and <i>E. wandoo</i> forests are usually associated with watercourses.	Potential, Unlikely in project impact areas as near active orchards.
<i>Leipoa ocellata</i>	Malleefowl	Vulnerable (Vulnerable)	Semi-arid regions of southern Australia. Located to the south and west of a line extending from Cape Farquhar, which lies north of Carnarvon, to the Eyre Bird Observatory in the south-east of WA. Not recorded near active horticultural areas and Karragullen settlement.	Shrublands and low woodlands dominated by mallee vegetation. Eucalypt or <i>Callitris</i> woodlands, acacia shrublands, <i>Melaleuca uncinata</i> vegetation or coastal heathlands.	Very Unlikely
<i>Notamacropus irma</i>	Western Brush Wallaby	Priority 4	South-west of WA, from Cape Arid to Kalbarri.	Preferred habitat of opens forest and woodland of mallee, heathland, open low grasses and scrubby thickets.	Very unlikely, may occur in larger reserves, but not likely in highly modified areas

APPENDIX D: DISTRIBUTION AND HABITAT OF PROTECTED FAUNA SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE KARRAGULLEN SURVEY AREA
(Department of Agriculture, Water and the Environment 2021a; Department of Biodiversity, Conservation and Attractions 2021) Conservation Status - EPBC Act (in brackets),
State listing -no brackets; Migratory International Agreement

Species	Common Name	Conservation Status	Distribution	Habitat	Likelihood of occurrence
<i>Westraliunio carteri</i>	Carter's Freshwater Mussel, Freshwater Mussell	Vulnerable	Requires freshwater streams and creeklines.	Water courses and wetter areas.	Very Unlikely
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	Critically Endangered (Migratory International Agreement & Critically Endangered)	Occurs in coastal areas as a wading bird and intertidal areas. Rarely seen inland, mainly on the north-east and south part of Australia, including Tasmania.	Found in intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.	Very Unlikely
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	Critically Endangered (Critically Endangered)	South-west of WA. Patchy distribution in predominantly two areas: near Bunbury to Leeuwin-Naturalisete NP (with a small translocated subpopulation near Dawesville); and near Albany.	Stands of myrtaceous trees (usually <i>Agonis flexuosa</i>) growing near swamps, water courses or floodplains, and at topographic low points which provide cooler, often more fertile, conditions. Forests and woodlands dominated by <i>E. marginata</i> , <i>C. calophylla</i> , <i>E. wandoo</i> , <i>E. diversicolor</i> or <i>Agonis flexuosa</i> forest, coastal heath, myrtaceous heaths and shrublands, and <i>E. megacarpa</i> dominated riparian zones.	Very Unlikely
<i>Motacilla cinerea</i>	Grey Wagtail	Migratory Terrestrial Bird	Migratory bird, regular visitor to northern Australia. The Grey Wagtails have a strong association with water.	Association mainly with water bodies and as not present in survey area unlikely.	Very Unlikely

Note: Migratory Marine and Wetland Birds not listed above as area is well away from any marine or wetland areas.

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED ON SURVEY AREA FOR KARRAGULLEN FRUIT COMPANY, 2021

Note: * denotes introduced species

FAMILY	SPECIES	SITE							
		LM01	LM02	LM03	LM04	LM05	LM06	LM07	LM08
Apiaceae	<i>Pentapeltis peltigera</i>		x	x	x				
Asparagaceae	<i>Lomandra sonderi</i>	x	x		x			x	x
Asteraceae	* <i>Hypochaeris glabra</i>							x	
	* <i>Hypochaeris radicata</i>							x	
	<i>Lagenophora huegelii</i>	x							x
Colchicaceae	<i>Burchardia congesta</i>	x	x	x	x	x	x		
Cyperaceae	<i>Cyathochaeta avenacea</i>			x					
Dennstaedtiaceae	<i>Pteridium esculentum</i>	x		x	x			x	x
Dilleniaceae	<i>Hibbertia hypericoides</i>							x	
Droseraceae	<i>Drosera macrantha</i>		x	x					x
Elaeocarpaceae	<i>Tetratheca hirsuta</i>		x		x				
Ericaceae	<i>Leucopogon capitellatus</i>	x	x	x			x	x	x
	<i>Leucopogon verticillatus</i>			x					x
	<i>Styphelia propinqua</i>								x
Fabaceae	<i>Acacia pulchella</i>	x	x				x		x
	<i>Bossiaea aquifolium</i>	x		x	x	x		x	x
	<i>Bossiaea ornata</i>	x	x		x	x	x		x
	<i>Daviesia decurrens</i>								x
	<i>Hovea chorizemifolia</i>			x		x	x		x
	<i>Hovea trisperma</i>				x		x		
	<i>Kennedia coccinea</i>	x							x
Goodeniaceae	<i>Dampiera linearis</i>						x		
	<i>Lechenaultia biloba</i>	x		x				x	
	<i>Scaevola calliptera</i>	x	x	x	x	x	x		x

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED ON SURVEY AREA FOR KARRAGULLEN FRUIT COMPANY, 2021

Note: * denotes introduced species

FAMILY	SPECIES	SITE							
		LM01	LM02	LM03	LM04	LM05	LM06	LM07	LM08
Haemodoraceae	<i>Conostylis setosa</i>		x	x	x		x		
Iridaceae	<i>Patersonia umbrosa</i> var. <i>xanthina</i>	x	x	x	x	x	x	x	x
Myrtaceae	<i>Corymbia calophylla</i>	x	x	x	x	x	x	x	x
	<i>Eucalyptus marginata</i>	x	x	x	x	x	x	x	x
Phyllanthaceae	<i>Phyllanthus calycinus</i>	x	x	x	x	x		x	x
Pittosporaceae	<i>Billardiera fusiformis</i>								x
Poaceae	* <i>Briza maxima</i>							x	
	<i>Tetrarrhena laevis</i>	x	x	x				x	x
Proteaceae	<i>Adenanthos barbiger</i>	x	x	x	x		x		x
	<i>Banksia grandis</i>	x	x		x		x		x
	<i>Grevillea manglesii</i> subsp. <i>manglesii</i>					x		x	
	<i>Persoonia longifolia</i>	x							
Ranunculaceae	<i>Clematis pubescens</i>		x						
Restionaceae	<i>Desmocladus flexuosus</i>	x		x				x	x
Rubiaceae	<i>Opercularia hispidula</i>					x			
Rutaceae	<i>Philotheca spicata</i>	x	x		x				
Stylidiaceae	<i>Stylidium ciliatum</i>						x		
	<i>Stylidium schoenoides</i>	x							x
Thymelaeaceae	<i>Pimelea spectabilis</i>			x					
Xanthorrhoeaceae	<i>Xanthorrhoea gracilis</i>	x	x				x		x
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>	x	x	x		x	x	x	x
Zamiaceae	<i>Macrozamia riedlei</i>		x	x		x			

APPENDIX F: BLACK COCKATOO NEST TREE SURVEY, PROPOSED ORCHARD, CANNING ROAD, KARAGULLEN

The purpose of the survey was to assess the survey area for hollows suitable to be used by black cockatoos *Calyptorhynchus spp.*

Trees which could provide a black cockatoo breeding hollow at the survey area were Jarrah *Eucalyptus marginata* and Marri *Corymbia calophylla*. These species need to have reached a diameter at Breast Height (DBH) of 500mm to be large enough to have formed a breeding hollow. A black cockatoo breeding hollow needs to have an entrance of at least 120mm diameter and lead to a sheltered nest chamber of approximately 300mm diameter or larger.

All trees of a suitable size were inspected from ground level for signs of use such as chewing or wear at the hollow entrance. Hollows with a suitable entrance size were then checked internally using a pole camera.

Results.

A Jarrah of approximately 1000mm diameter located at 416449E 6449539N contained a hollow with a suitable entrance size but which showed no signs of use. Further inspection with a pole camera revealed that this apparent hollow had no depth and wasn't actually a hollow.



Blocked hollow in Jarrah – not an actual hollow.

Tony Kirkby

13th December 2021