Prepared for
Mount Gibson Mining on behalf of Koolan Iron Ore Pty Ltd
ABN: 87 008 670 817

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Koolan Island Flora and Vegetation Assessment

17-Aug-2021
Koolan Island

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Client: Mount Gibson Mining on behalf of Koolan Iron Ore Pty Ltd

ABN: 87 008 670 817

Prepared by

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Quality Information

Document Koolan Island Flora and Vegetation Assessment

Date 17-Aug-2021

Prepared by Floora de Wit, Caitlyn Sepkus

Reviewed by Linda Kirchner

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	19-Jul-2021	Draft for Internal Review	Linda Kirchner Technical Director - Impact Assessment and Permitting	
B	21-Jul-2021	Draft client submission	Linda Kirchner Technical Director - Impact Assessment and Permitting	
0	17-Aug-2021	Final submission	Linda Kirchner Technical Director - Impact Assessment and Permitting	

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Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Mount Gibson Iron Limited (MGI) on behalf of Koolan Iron Ore Propriety Limited to undertake a detailed flora and vegetation assessment for the Coral Trout and Mangrove deposits (the survey area) at their Koolan Island Operations (KIO). The objective of the assessment was to identify and map environmental values within the survey area through systematic targeted searches and collecting floristic data using quadrats and relevés.

The assessment included a detailed desktop assessment and field survey, and a reporting component. The desktop assessment considered government database searches and previous surveys undertaken for the Koolan Iron Ore Project (KIOP). A total of 81 Priority flora species were identified in the desktop assessment. Of these, four species are known to occur within the survey area. This was reduced to two species following a review of species occurrence, habitat, and known distribution. Five Priority species were considered likely to occur and 22 species may occur. The desktop assessment identified the target flora species that were subject to field searches.

The field survey was led by Principal Botanist Floora de Wit assisted by Caitlyn Sepkus (AECOM) and Cody Sibasado (KIO). The survey was undertaken between 5 and 11 May 2021.

The flora and vegetation assessment included collecting floristic data from seven 50 x 50 m quadrats and three relevés, and walking meandering traverses by three people approximately 20-50 m apart across the survey area. A summary of the results is presented below:

- Known locations of four Priority flora were visited on the first day to enable confident identification of species in the field. None of the Priority flora species were confirmed at known locations, including;
    - *Triodia* sp. Hidden Island (T. Handasyde TH 61009) – historical records in close proximity to the survey area potentially represent a miss-identification as it was identified from sterile material (Eleanor Hoy pers. comm.)
    - *Pterocaulon globuliflorum* – this species has not been recorded on Koolan Island since 2005. It is not known from this IBRA region and is unlikely to occur
    - *Ipomoea tolmerana* subsp. *occidentalis*) – although this species was not found it remains likely that it occurs at the known location. The sample from previous surveys was confirmed at the WA Herbarium. Lack of material found during this survey could reflect lack of distinguishable material (flowering/fruiting)
    - *Jacquemontia* sp. Keep River (J.L. Egan 5015) – this species was not recorded at its known location, however its presence was noted at nine locations in the survey area. It was considered locally common
- Seven native vegetation communities were mapped, none of which represent a Threatened or Priority ecological community. All vegetation communities aligned with previous mapping.

Vegetation mapping completed previously was updated to reflect the conditions observed during this survey. This was enabled by the significant survey effort that extended across the survey area.

No significant limitations were defined that may influence the outcome of the survey.

1.0 Introduction

1.1 Background

The Koolan Island Operations (KIO) is owned and operated by Koolan Iron Ore Propriety Limited, a wholly-owned subsidiary of Mount Gibson Iron Limited (MGI). Construction associated with KIO began in June 2006, with mining commencing in 2007. Koolan Island was also previously mined by BHP Billiton between 1965 and 1993.

Several ecological surveys have been undertaken on Koolan Island. These surveys include detailed flora and vegetation assessments and pre-clearance surveys targeting flora species defined within the Ministerial Statement. Previous surveys have been undertaken by Keighery *et al.* (1995), Ecologia (2005a; 2005b, 2006a; 2006b; 2008a, 2008b), MBS (2008; 2010; 2011, 2012), and AMP (2014; 2018; 2019; 2021). APM's 2018 Level 2 Flora and Vegetation Survey overlaps with the current assessment and provides important background information for this assessment.

1.2 Location and Survey Areas

The flora and vegetation assessment was conducted on Koolan Island, one of the many islands that form the Buccaneer Archipelago. The island is separated from the mainland by a 1 km wide channel and is located in the Shire of Derby-West Kimberly, approximately 130 km northeast of Derby and 1,928 km northeast of Perth.

The survey area included two deposits, Mangrove, and Coral Trout, both located directly adjacent to current operations (Figure 1).

1.3 Scope and Objective

The objective of the survey was to identify and map conservation significant flora species through a systematic targeted survey and assess the environmental values of flora and vegetation within areas previously not assessed. Specifically, the scope included:

- undertaking a detailed flora and vegetation assessment within a specific area
- conducting targeted flora searches for conservation significant flora and significant weeds within the survey area
- producing a concise technical report, documenting methods, results and discussion of surveys, suitable for supporting compliance and approvals documentation.

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Survey area

Survey Area

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KOOLAN ISLAND FLORA AND VEGETATION ASSESSMENT

Figure
1

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2.0 Legislative Framework

2.1 Overview

Table 1 summarises the key legislation governing the protection and management of Western Australia's conservation significant species and communities, which are further discussed below.

Table 1 Relevant legislation, regulations and guidance

Legislation	Purpose
Commonwealth of Australia	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity.
Western Australia	
Biodiversity Conservation Act 2016 (BC Act)	Provides for the conservation and protection of Western Australia's biodiversity and biodiversity components.
Environmental Protection Act 1986 (EP Act)	Preventing, controlling and abating environmental harm and conserving, preserving, protecting, enhancing and managing the environment.
Biosecurity and Agriculture Management Act 2007 (BAM Act)	Provides for the management, control and prevention of certain plants and animals, and for the protection of agriculture and related resources generally.
EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment, 2016	Provides guidance to ensure adequate flora and vegetation data of an appropriate standard are obtained and used in EIA.

2.2 Commonwealth

The EPBC Act is the main piece of Commonwealth legislation protecting biodiversity in Australia. Flora species at risk of extinction are recognised at a Commonwealth level and are categorised in one of six categories as outlined in Table 2.

Table 2 Categories of species listed under Schedule 179 of the EPBC Act

Code	Conservation Category
Ex	Extinct Taxa
ExW	Extinct in the Wild
CE	Critically Endangered
E	Endangered
V	Vulnerable
CD	Conservation Dependent

Communities can be classified as Threatened Ecological Communities (TECs) under the EPBC Act. The EPBC Act protects Australia's ecological communities by providing for:

- identification and listing of ecological communities as threatened
- development of conservation advice and recovery plans for listed ecological communities
- recognition of key threatening processes
- reduction of the impact of these processes through threat abatement plans.

Categories of federally listed TECs are described in Table 3.

Table 3 Categories of TECs that are listed under the EPBC Act

Code	Conservation Category
CE	Critically Endangered If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	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.
V	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.

2.3 Western Australia

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of Western Australia's biodiversity and biodiversity components.

Threatened flora are plants which have been assessed as being at risk of extinction (DPaW, 2019). Plants that are considered Threatened and need to be specially protected because they are under identifiable threat of extinction are listed under Part 2 of the BC Act. These categories are defined in Table 4.

Table 4 Conservation codes for flora and fauna listed under the *Biodiversity Conservation Act 2016* (Jan 2019)

Code	Conservation Category
CR	**Critically Endangered Species** Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
EN	**Endangered Species** Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
VU	**Vulnerable Species** Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
EX	**Extinct Species** Species where there is no reasonable doubt that the last member of species has died.

Species that have not yet been adequately surveyed to warrant being listed under the BC Act, or are otherwise data deficient, are added to a Priority List under Priorities 1, 2 or 3 by the State Minister for Environment. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. Categories and definitions of Priority flora species are summarised in Table 5.

Table 5 Conservation codes for WA flora and fauna listed by DBCA and endorsed by the Minister for Environment

Code	Conservation Category
P1	**Priority One – Poorly Known Species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation.
P2	**Priority Two – Poorly Known Species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation.
P3	**Priority Three – Poorly Known Species** Species that are known from several locations, and the species does not appear to be under imminent threat.
P4	**Priority Four – Rare, Near Threatened and other species in need of monitoring** Includes rare species and near threatened species.

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat and that may be subject to processes that threaten to destroy or significantly modify the assemblage across its range. TECs are listed by both state and commonwealth legislation.

Vegetation communities in Western Australia are described as TECs if they have been endorsed by the Western Australian Minister for Environment following recommendations made by the Threatened Species Scientific Committee. A TEC is one which is found to fit into one of four categories, summarised in Table 6 (DEC, 2013).

Table 6 Conservation codes for State listed ecological communities

Conservation Code	Category
PD	**Presumed Totally Destroyed** Adequately searched for but no representative occurrence has been located.
CR	**Critically Endangered** Adequately surveyed, subject to major contraction, in danger of significant modification in the immediate future.
EN	**Endangered** Adequately surveyed, subject to major contraction, in danger of significant modification in the near future.
VU	**Vulnerable** Adequately surveyed, declining in distribution and/or condition, security not yet assured and may move into a category of higher threat in near future.

Possible TECs that do not meet survey criteria or are not adequately defined are listed as Priority Ecological Communities (PECs) and listed in one of five categories, summarised in Table 7.

Table 7 Conservation categories for Priority Ecological Communities

Code	Conservation Category
P1	Priority One: poorly-known ecological communities
P2	Priority Two: poorly-known ecological communities
P3	Priority Three: poorly known ecological communities
P4	Priority Four: 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.
P5	Priority Five: conservation dependent ecological communities

3.0 Existing Environment

3.1 Climate

The survey area has a tropical, sub-humid climate, with a mean annual rainfall of 1094.1 mm (BoM, 2021). Rainfall data was obtained from the nearest Bureau of Meteorology (BoM) weather station Kimbolton weather station (No. 003073) located 63.6 km from Koolan Island. Rainfall for the year preceding the survey (2020) was higher than average, with an annual rainfall of 1176.4 compared to the mean 1094.1 mm. In the 12 months preceding the survey, March, October, November and December received higher than average rainfall, with all other months receiving less than average (Figure 2).

Temperature data was obtained from the BoM Yampi Sound (Defence) weather station (No. 003108), located 76 km from Koolan Island. Mean temperatures for the 12 months prior to the survey included some of the highest, and lowest temperatures recorded between 2019-2021 (Figure 2). During the survey, weather conditions were warm and humid with a light breeze.

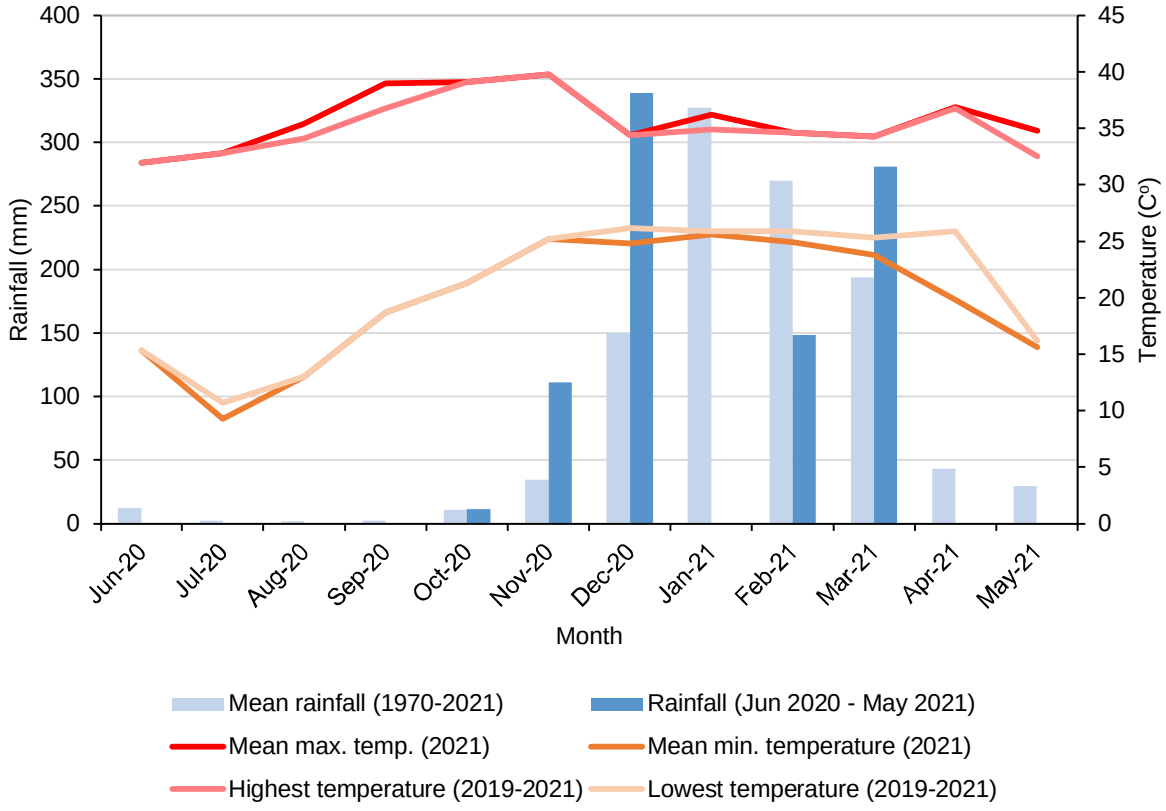


Figure 2 Rainfall data from Kimbolton Weather Station (No. 003073) and temperature data from Yampi Sound (No. 003108)

3.2 IBRA Regions

The largest regional vegetation classification scheme recognised by EPA is the Interim Biogeographical Region of Australia (IBRA). The IBRA regions provide the planning framework for the systematic development of a comprehensive, adequate and representative (CAR) national reserve system. There are 89 recognised IBRA regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (IBRA 7, 2012).

The survey area is situated in the North Kimberly bioregion and the Mitchell subregion (NK1). The North Kimberley bioregion, described in CALM (2002), is located on the northern tip of WA. The region is a dissected plateau of the Kimberley Basin featuring savannah woodland of woollybutt and Darwin stringy bark over high sorghum grasses and *Triodia schinzii* hummock grasses on shallow sandy soils across outcropping Proterozoic siliceous sandstone strata. The red and yellow earths mantling basic Proterozoic volcanics support savannah woodlands of *Eucalyptus tectifica* and *Eucalyptus grandifolia* alliance over high sorghum grasses. The drainage lines support riparian closed forests of paperbark trees and *Pandanus* as well as extensive mangals in the estuaries and sheltered bays as well as small patches of monsoon rainforest scattered throughout the district.

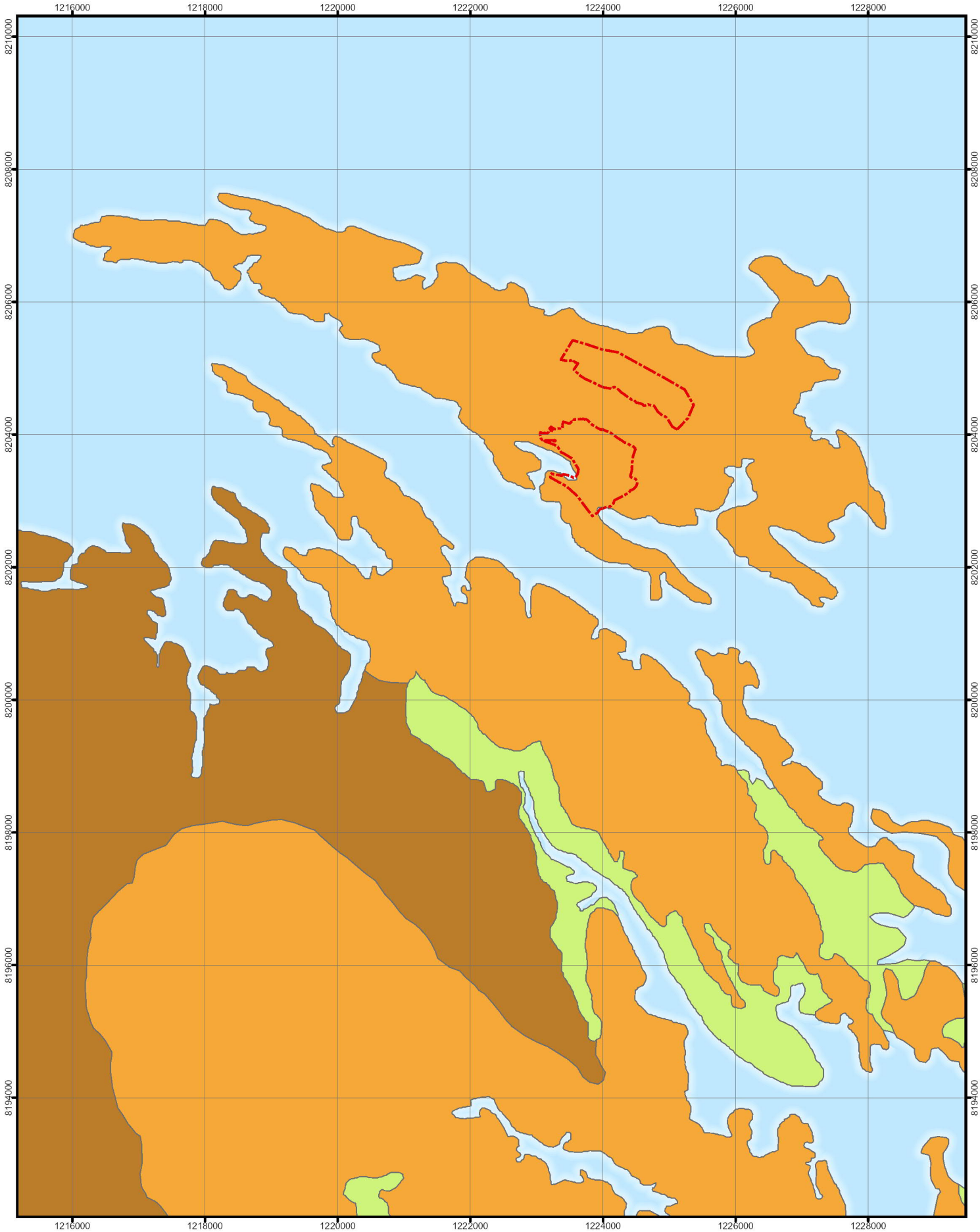
Values of the bioregion include a sunken coastline with extensive coastal archipelagos, island groups, and tropical laterite flora with a palm-dominated landscape unique to WA. The North Kimberley consists of the Mitchell and the Berkeley subregions.

The Mitchell subregion, described by Graham (2001), is the dissected plateau of the Kimberley Basin supporting Savannah woodland over high *Sorghum* grasses on red and yellow earths mantling basic Proterozoic volcanics. Drainage lines are fringed by riparian closed forests of *Melaleuca* and *Pandanus* while the rugged coastline has extensive Mangal in estuaries and deep, sheltered embayments. Rare features include the sunken coastline with Mangals, mound springs and swamp rainforests, tropical laterite flora, Cape Bougainville rainforest, Airfield Swamp, Prince Regent Lineament, fauna species and flora and fauna of the north-western margin which is considered in pristine condition.

3.3 Geology and Soils

Koolan Island is located on the Kimberly soil-landscapes, on the Lubbock System, comprised of rocky quartzite and sandstone cuestas, ridges and plateaux supporting snappy gum and bloodwood low woodlands with curly spinifex (DPRID, 2019) (Figure 3). The island is on the Yampi Peninsula soils landscape zone, defined by hills, ranges and plateaux (with some lowlands and coastal mudflats) on sandstone and volcanic rocks of the King Leopold Orogen (Yampi Fold Belt) with Stony soils, Red/brown non-cracking clays, Yellow deep sands and Tidal soils (DPRID, 2018).

Koolan Island has a steep coast with frequent embayments, narrow gullies and few beaches (McKenzie *et al*., 1995). The island is a series of parallel flat-topped ridges formed from steeply dipping beds of the resistant Warton and Pentecost Sandstones and a series of deeply incised creeks through softer Elgee Siltstone (Keighery *et al*., 1995). The island's geology is defined by proximal littoral pink brown arkose and feldspathic sandstone, minor siltstone, haematitic quartz sandstone, glauconitic sandstone and quartz pebble conglomerate (Figure 4).



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- Targeted survey area
- Carpentaria System - Bare coastal mudflats, minor sandy margins and seaward margins, little vegetation except for mangrove fringing thickets.
- Lubbock System - Rocky quartzite and sandstone cuestas, ridges and plateaux supporting snappy gum and bloodwood low woodlands with curly spinifex.
- Precipice System - Rocky quartzite plateaux and mountain ranges supporting snappy gum and bloodwood low very open woodlands with curly spinifex; also narrow basalt valleys supporting grassy grey box woodlands.

Soil Landscape Mapping

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KOOLAN ISLAND FLORA AND VEGETATION ASSESSMENT

Figure 3

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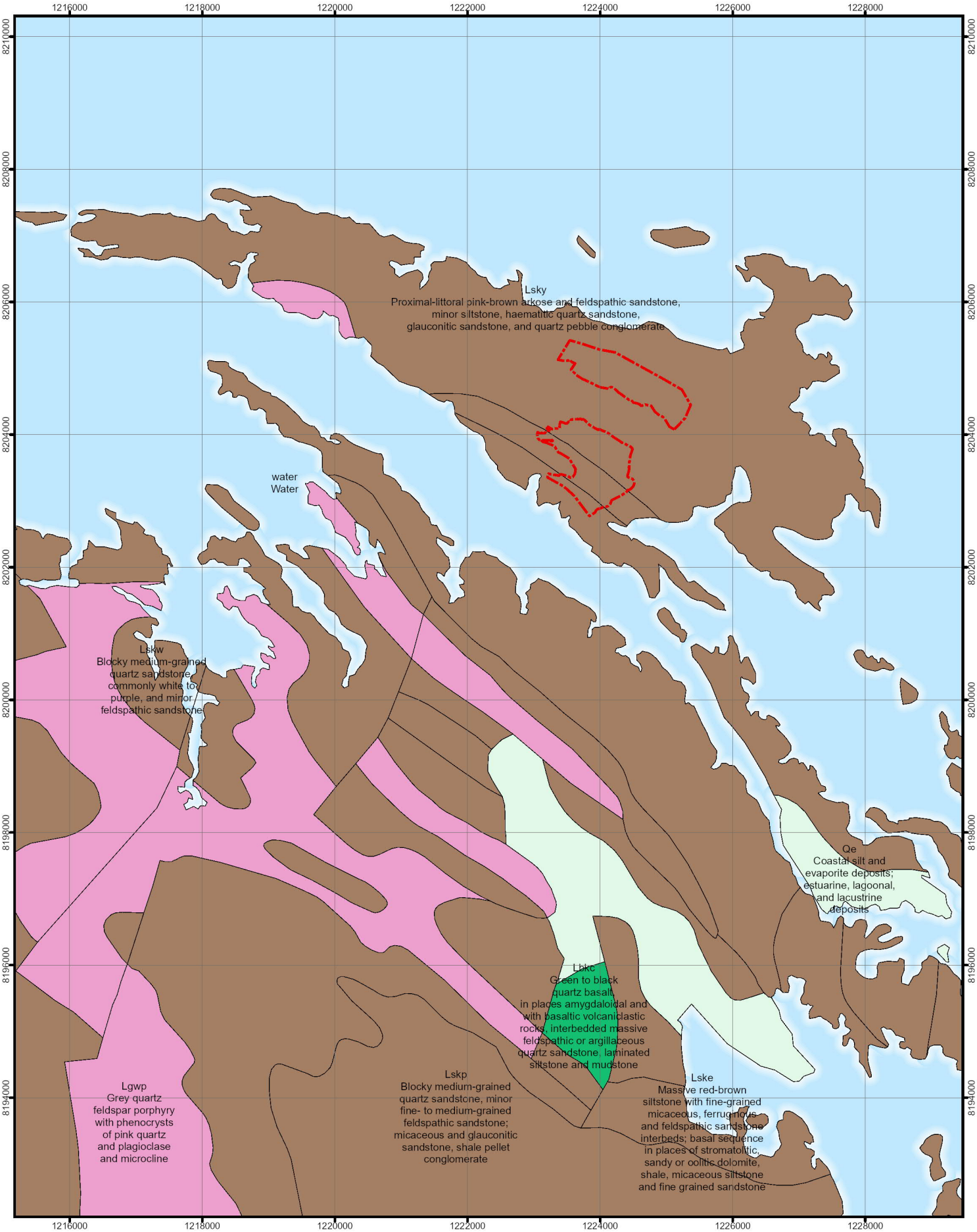

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LEGEND

- Targeted survey area
- QUATERNARY
  - Qe
- PALEOPROTEROZOIC
  - Lgwp
  - Lbkc
  - Lske
  - Lskp
  - Lsky
  - Lskw

Geology

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Figure 4

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3.4 Vegetation

Beard (1979) mapping is used to determine the current extent of remnant vegetation remaining when compared to pre-European vegetation extent. The survey area is mapped as Vegetation Association 8001: Grasslands, curly spinifex, low tree savanna; bloodwood (*Eucalyptus dichromophloia*) & woolybutt over curly spinifex on islands (Beard, 1979) (Figure 5). Vegetation Association 8001 has 85.8% remaining across Western Australia and 91.17% across the IBRA region and subregion (Table 8).

Table 8 Beard (1979) Vegetation Association

Vegetation Association	Description	Percentage remaining (%)			
		Western Australia	North Kimberly IBRA region	Mitchell IBRA subregion	Shire of Derby-West Kimberly
8001	Grasslands, curly spinifex, low tree savanna; bloodwood (*Eucalyptus dichromophloia*) & woolybutt over curly spinifex on islands	85.81	91.17	91.17	86.03

Koolan Island is located within the Lubbock Land System (Schoknecht and Payne, 2011), characterised by rugged sandstone cuestas, ridges, and plateaux; low open woodlands and curly spinifex. The system was formed by dissection of the Kimberly surface and is generally stable with low to very low susceptibility to erosion. The system is comprised of five land units including rocky surfaces mantled with boulders, lower slopes that can be dissected into narrow spurs, fans and aprons up to 800 m long, drainage floors up to 400 m wide and channels up to 30 m wide and 4.5 m deep. (Schoknecht and Payne, 2011).

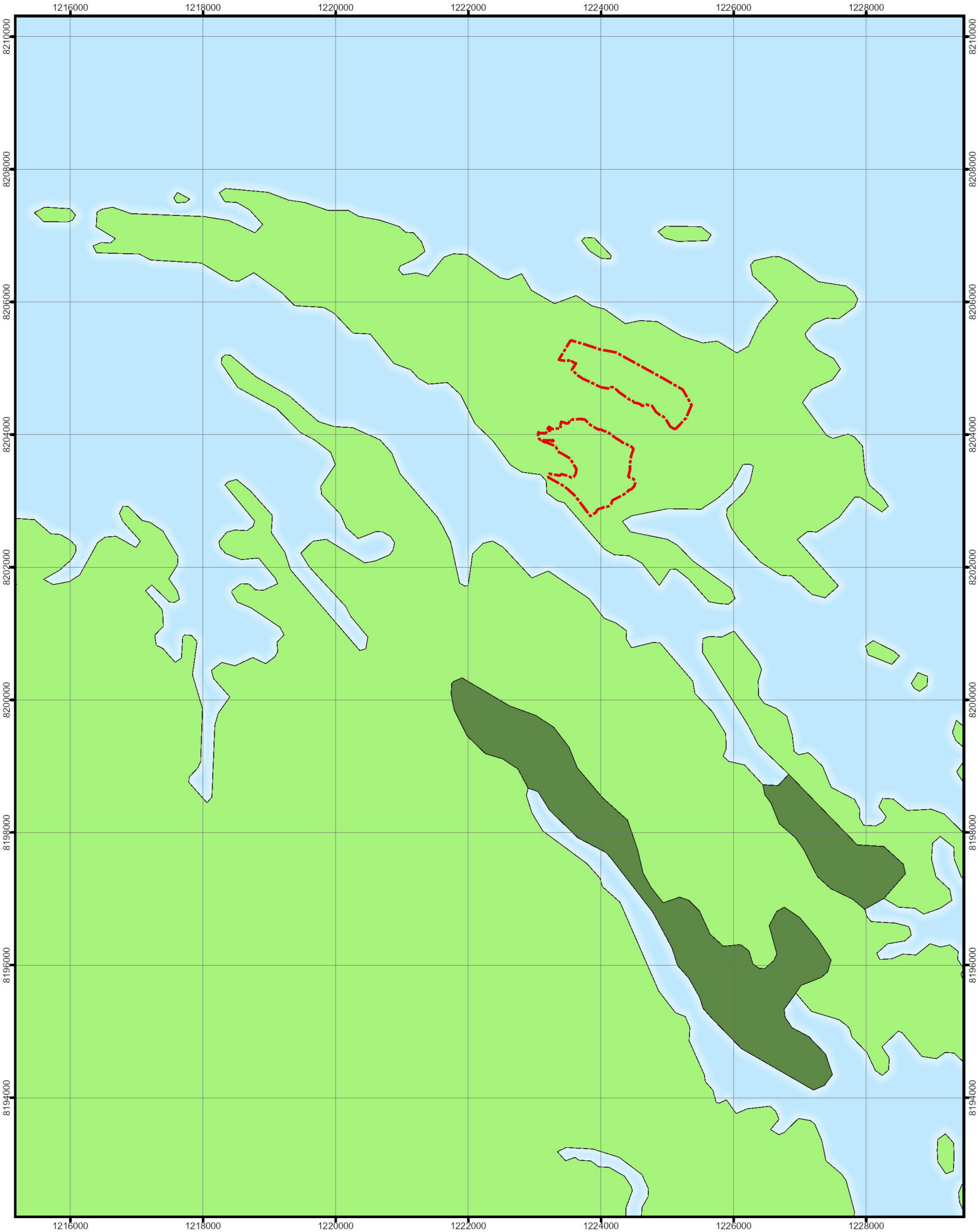
Vegetation mapping across the whole island was conducted by Ecologia (2005a), identifying six broad community types described in Table 9.

Vegetation communities were originally mapped by Keighery *et al.* (1995) into five broad floristic types. Additional surveys by Ecologia (2005) split the *Eucalyptus* Woodland community and included disturbed/rehabilitated areas. APM (2018) found the vegetation descriptions reported in Ecologia (2005) to still be suitable for describing the floristic assemblages at Koolan Island, however, added two further categories: Vegetation communities of Koolan Island are described in Table 9.

Table 9 Vegetation Communities mapped on Koolan Island in Keighery et al (1995), Ecologia (2005) and APM (2018)

Vegetation Community	Description
Open Woodland	*Eucalyptus miniata* occurs as a taller canopy, with the lower bloodwoods *Corymbia confertiflora* and *C. cadophora* subsp. *cadophora* occurring at variable densities below, and a missed herb/soft grass/*Triodia* sp. ground cover. Within this vegetation community, three subunits were delineated: ***Eucalyptus miniata* Woodland/Open Woodland along stony ridge crests and slopes** Characterised by a dense stony ground cover, sometimes with boulders, and is restricted to the crests and upper slopes of haematite ridges. ***Eucalyptus miniata/Corymbia cadophora* subsp. *cadophora* Woodland along moderate depth gullies** Characterised by a higher density of canopy cover and greater diversity of overstorey taxa, although compositional differences appear insignificant. **Very Open Woodland** Very open woodland surveyed in the current survey is primarily distinguished by the scarcity of the overstorey, with very scattered *Corymbia confertiflora*, *Calytrix exstipulata*, *Ficus platypoda*, *Acacia tumida* var. *tumida*, *A. hippuroides* and *Grevillea agrifolia* present, over varied low shrubs, herbs, soft grasses and *Triodia bitextura.*

Vegetation Community	Description
Rainforest/Vine Thickets	The overstorey includes the trees/shrubs *Diospyros maritima*, *Grewia breviflora* and *Mimusops elengi*, and the vines *Adenia heterophylla* and *Jacquemontia pannosa* var. *pannosa.* Less widespread but common at a subset of locations were the trees/shrubs; *Ficus virens* var. *sublanceolata, Nauclea orientalis, Canarium australianum, Celtis philippense* and *Flueggea virosa* subsp. *melanthesoides* and the vines *Operculina aequisepala, Jasminum didymum* var. *didymum* and *Phyllanthus reticulatus.*
Woodland *Callitris intratropica* Forest with deep gullies	The moderately dense to dense canopy of *Callitris intratropica* is frequently interspersed with *Corymbia confertiflora*, *Eucalyptus obconica*, *Grevillea heliosperma* and/or *Brachychiton viscidulus.* The shrub stratum is primarily below one metre and of variable density, comprising *Gossypium costulatum, Grewia retusifolia, Buchnera linearis, Petalostigma pubescens, Tephrosia ?savannicola, Callicarpa candicans* and *Galactia tenuiflora.* Soft grasses such as *Chrysopogon latifolius, Cymbopogon procerus, Eriachne ciliata* and *Panicum seminudum* and the spinifex *Triodia microstachya* and a variety of herbs are present at ground level. The climbers, **Passiflora foetida* var. *hispida* and *Galactia tenuiflora* are relatively common.
Mangroves	The vegetation consists of a single dense stratum of tall shrubs/low trees, predominantly below five metres, consisting of mixtures of *Osbornia octodonta*, *Avicennia marina*, *Rhizophora stylosa* and *Camptostemon schultzii*, with *Excoecaria ovalis* also present sometimes at the edges of the community.
Beaches	Keighery *et al.* (1995) recorded 12 small beaches across the island, predominately adjacent to mangrove communities with some mobile sands. Ecologia (2005) recorded a scattered shrub overstorey comprised of **Leucaena leucocephala* subsp. *leucocephala* and *Melochia umbellata* with *Buchnera linearis* and *Templetonia hookeri* forming a sparse lower shrub stratum. The most common species are the grasses **Melinis repens, *Panicum coloratum* and *Spinifex* *longifolius* and the creepers **Passiflora foetida* var. *hispida, Cajanus viscidus* and *Ipomoea pes-caprae* subsp. *brasiliensis.* Keighery *et al.* (1995) also recorded the creeper/climber *Abrus precatorius* and the prostrate annual *Commelina ensifolia.*
Previously disturbed/rehabilitated vegetation	Extensive across the central area of the island and includes pits, tracks and the old township. Rehabilitated areas were characterised by open to moderately dense *Acacia* dominated shrublands, and non-rehabilitated areas were comprised of variable overstorey with predominately introduced shrubs, herbs and grasses.
Roads and Cleared Areas	Areas not currently purposed to vegetation cover.
Melaleuca Woodland	Dominant canopy species *Melaleuca viridiflora* restricted to a small area on Pindan Creek.



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Targeted survey area

43: Mangroves: Low forest (Kimberley) or thicket (Pilbara) mangroves *Avicennia marina, Rhizophora stylosa, Bruguiera exaristata.*

8001: Grasslands, curly spinifex savanna woodland or low trees: Curly spinifex with woodland *Triodia bitextura* with *Eucalyptus phoenicea, E. brevifolia, Corymbia ferruginea, C. dichromophloia.*

Pre-European Vegetation

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KOOLAN ISLAND FLORA AND VEGETATION ASSESSMENT

Figure

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3.5 Previous Surveys

Several ecological surveys have been undertaken on Koolan Island. A brief description of each, including significant findings, are presented in Table 10.

Table 10 Surveys undertaken on Koolan Island

Survey Title and Short Description	Significant findings
Biological inventory of Koolan Island flora and vegetation managed by WA Department of Environment and Conservation (now DBCA) (Keighery *et al.,* 1995). Includes current survey area in their entirety.	**Flora**: 282 plant taxa, 12 new weed species. One undescribed native species (*Corymbia* aff. *cadophora*), three Priority flora including *Dendrophthoe odontocalyx, Jacquemontia* sp. Keep River (J.L. Egan 5051), *Hibiscus marenitensis*. **Vegetation**: five broad units, no TECs or PECs.
Ecologia (2005a; 2005b) Level 2 flora and vegetation assessment of Koolan Island. Survey incorporated the entire island and included 65 quadrats and targeted flora searches using 'linked traverses'.	**Flora**: 382 plant taxa, 35 weed species, six Priority flora *Brachychiton xanthophyllus, Fimbristylis* sp. E Kimberley Flora (C.R. Dunlop 5403), *Gymnanthera cunninghamii, Phyllanthus aridus* (now delisted), *Pterocaulon globuliflorum,* and *Stackhousia clementii*. **Vegetation**: six broad units and three sub-units consistent with Keighery *et al.* (1995)
Ecologia (2006a; 2006b; 2008a, 2008b) pre-clearance surveys targeting specific species defined in Ministerial Statement within defined areas on Koolan Island. No overlap with current survey area.	**Flora**: Priority *Phyllanthus aridus* recorded extensively (now delisted). *Hibiscus marenitensis and Brachychiton* sp. ?novel Koolan Island recorded by Ecologia (2008a; 2008b).
MBS (2008; 2010; 2011, 2012) pre-clearance surveys targeting specific species defined in Ministerial Statement within defined areas on Koolan Island. No overlap with current survey area.	**Flora:** Priority *Phyllanthus aridus* (now delisted)
APM (2014; 2019) pre-clearance surveys targeting specific species defined in Ministerial Statement within defined areas on Koolan Island. No overlap with current survey area.	**Flora:** three Priority flora *Phyllanthus aridus* (now delisted), *Ipomoea tolmerana* subsp. o*ccidentalis, Triodia* sp. Hidden Island (T. Handasyde TH6109)
APM (2018) Level 2 Flora and Vegetation Survey of Koolan Island. Survey extended approximately 60% of the Island and included 14 quadrats and targeted flora searched in selected areas using traverses.	**Flora**: 215 plant taxa, two Priority flora *Triodia* sp. Hidden Island (T. Handasyde TH6109), *Eragrostis spartinoides, Brachychiton xanthophyllus* **Vegetation**: consistent with Ecologia (2005a) and Keighery *et al.* (1995).
APM (2021) Detailed flora and vegetation assessment of Area F on Koolan Island. No overlap with the current survey area. Included three quadrats and targeted flora searches using linear traverses.	**Flora**: *Triodia* sp. Hidden Island (T. Handasyde TH6109) **Vegetation**: consistent with Ecologia (2005a) and Keighery *et al*. (1995).

4.0 Methods

4.1 Desktop Assessment

A comprehensive desktop assessment was conducted and involved gathering background information for the local area from public and private (paid) databases and available literature. The desktop assessment utilised the following resources:

- Threatened and Priority flora database (Department of Biodiversity, Conservation and Attractions [DBCA, 2021a]) with a 100 km buffer from the survey area.
- Threatened and Priority Ecological Community boundaries (DBCA, 2021b) with a 50 km buffer from the survey area
- Atlas of Living Australia (AoLA)
- NatureMap (DBCA, 2021d)
- Index of Biodiversity Assessments (IBSA) website (no records/reports within 20 km);
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) (DAWE, 2021)
- Detailed flora and vegetation assessments (APM, 2018; Ecologia, 2005a) of Koolan Island
- Pre-clearance flora surveys undertaken in compliance with Ministerial Statement 715 (Ecologia 2005b, 2006a, 2006b, MBS, 2008, 2011, 2012; APM, 2014, 2019).

All flora and communities of conservation significance identified in the desktop assessment were assessed for their likelihood of occurrence within the survey area based on previous surveys, habitat presence, and age of records (Table 11).

A field booklet with descriptions and photographs of all plants considered likely to occur was produced to aid with identification in the field.

Table 11 Categories of likelihood of occurrence for species and communities

Likelihood	Flora	Communities
Likely to occur	Habitat is present in the Survey area and the species has been recorded in close proximity to the survey area.	Known occurrences of the community in close proximity to the survey area. Vegetation looks the same within the known occurrence and Survey area based on aerial imagery. Geographic location is similar to the survey area.
May occur	Habitat may be present and/or the species has been recorded in close proximity to the survey area.	Known occurrence of the community in the local area, and/or vegetation looks the same within known occurrence and Survey area based on aerial imagery. Geographic location is similar to the survey area.
Unlikely to occur	No suitable habitat is present and the species has not been recorded in close proximity to the survey area.	Known occurrence of the community in close proximity to the survey area however geographic location does not occur in survey area.

4.2 Field Survey

4.2.1 Flora and Vegetation

A detailed flora and vegetation survey was undertaken by Floora de Wit (collection permit FB62000137) from 05 May 2021 to 11 May 2021. Floora de Wit has 15 years' experience undertaking flora and vegetation assessments across WA including the Kimberley district. Floora completed a Bachelor of Science in Environmental Biology (Environmental Restoration) and completed a Postgraduate Diploma in Environmental Management and Impact Assessment. Floora was supported by Caitlyn Sepkus and Cody Sibosado.

Caitlyn Sepkus has just commenced her career in environmental science with AECOM (<1 year experience) with a Bachelor of Science degree in Conservation and Wildlife Biology and Environmental Management. Cody Sibosado is a Traditional Owner originally from the Bard Tribe from the Dampier Peninsula. Cody has been taught anthropology since a young child and knew many of the traditional names and uses of plants on the island. He also spent 12 months as a ranger working with the Environmental Department on Koolan Island collecting seeds from the native plants for rehabilitation purposes. Other duties included identifying introduced species of plants to the island and working to eradicate targeted weeds.

A detailed flora and vegetation survey was undertaken in areas that had not been previously assessed in detail by APM (shown onFigure 6). Some sites were also completed in areas considered under-surveyed to support updating the historical vegetation mapping.

Floristic data was collected from seven quadrats (50 x 50 m) and three relevés, supported by observation points. Quadrats were demarcated using a measuring tape. Quadrats were used in native vegetation in 'Good' or better condition while degraded patches were recorded as relevés.

Data collected from quadrats included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence/absence of disturbance. Each site was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- sample site type (quadrat/relevé and size)
- photograph (northwest corner)
- soil details (type, colour, moisture)
- landform
- vegetation condition
- fire history
- comprehensive species list
- estimated height
- estimated percentage cover (for trees both percentage within quadrat and within community was recorded to enable better description of vegetation community).

4.2.2 Targeted Flora Searches

The desktop assessment results were used to determine the conservation significant flora species that would be targeted during the field survey. These species were compiled into a field booklet including details of relevant morphological features used to identify species in the field. Photographs and scans of Western Australian Herbarium (WAH) vouchered specimens, previous Koolan Island flora reports, journal publications, and government databases such as FloraBase were utilised to produce the field booklet.

Known locations (DBCA records or previous survey records) were visited on the first day of the survey to verify their identification. None of these Proirity species were found, which is discussed in the Limitations table in Table 13.

Targeted flora species included:

- *Triodia* sp. Hidden Island (T. Handasyde TH 6109)
- *Ipomoea tolmerana* subsp. *occidentalis*
- *Gymnanthera cunninghamii*
- *Pterocaulon globuliflorum*
- *Jacquemontia* sp. Keep River (J.L. Egan 5051)

- *Brachychiton xanthophyllus*
- *Hibiscus marenitensis*
- *Eucalyptus kenneallyi*
- *Eragrostis spartinoides*

Meandering transects were used to conduct targeted searches. Traverses occurred across the entirety of the survey area to provide greater understanding of the conservation flora values (Figure 6). The traverses took into account suitable habitat, landforms, and accessibility. The survey area is characterised by hills dissected by deep valleys. Numerous very steep slopes, cliffs and large rocky outcrops were encountered and had to be avoided.

Suitable habitat was defined as:

- steep rocky slopes, particularly south-facing with numerous rocky outcrops
- waterways and valley floors.

All species that were considered to potentially resemble a threatened or Priority flora species were photographed, captured on a hand-held GPS, and a sample taken for confirmation by WAH.

4.3 Reporting

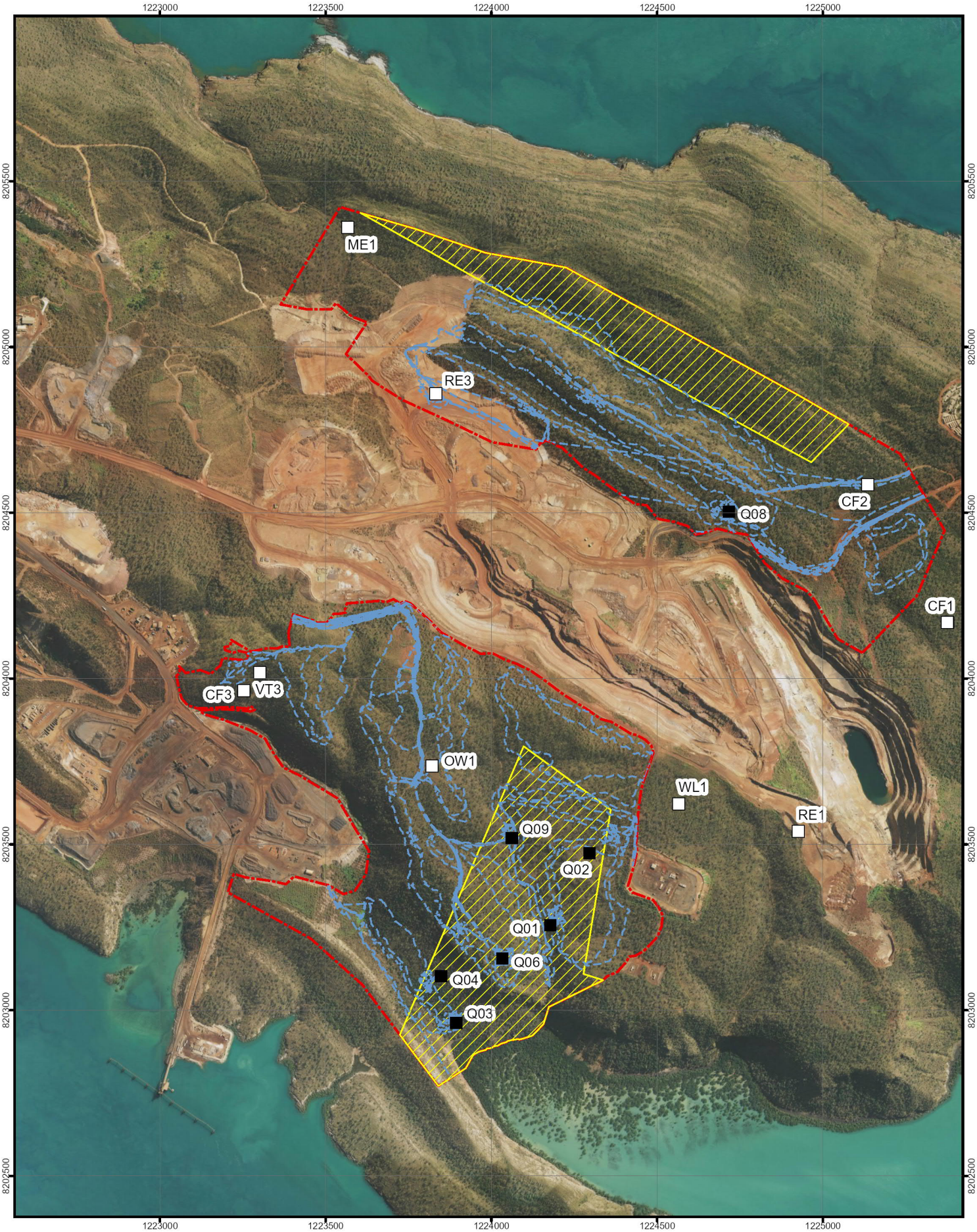
Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens, taxonomic references and keys at the WAH. Naming of species followed the convention of the WAH.

Vegetation communities were described and mapped based on changes in dominant species composition and landform. Quadrat data was analysed using cluster analysis to determine their floristic similarity and support vegetation community delineation. Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework (DEE, 2017). The APM (2018) and Ecologia (2005a) vegetation mapping was used to guide the vegetation mapping. Some areas that were mapped by APM (2018) were updated to reflect conditions on the ground. The current survey included traversing the entire survey area on foot and additional observations were made that enabled previous mapping to be refined.

Vegetation condition was determined using the Trudgen (1988) condition scale (Table 12). The vegetation condition ratings described below relate to vegetation structure, the level of disturbance at each structural layer and the ability of the vegetation unit to regenerate.

Table 12 Bushland Condition Ratings (Trudgen, 1988)

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



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Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010) Geoscience Australia, Streetpro

LEGEND

- Detailed survey area
- Targeted survey area
- Track log
- AECOM Quadrats
- 2018 APM Quadrats

Survey Effort

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KOOLAN ISLAND FLORA AND VEGETATION ASSESSMENT

Figure 7

Project: P:\606X\60657418\900_CAD_GIS\920_GIS\02_MXDs\KoolanIsland\60657418_KI Flora and Vegetation Survey.aprx (FlettN), Layout: 60657418_Fig6_SurveyEffort_A4P_v2, Last exported: 1/07/2021 3:57 PM

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4.4 Limitations

Limitations of the detailed flora and vegetation assessment and targeted searches are discussed in Table 13.

Table 13 Limitations of the ecological surveys

Limitation	Response
Availability of contextual information on the region	**Nil** Contextual information for Koolan Island was derived from the publicly available databases (SLIP portal), and previous surveys undertaken. Numerous ecological surveys have been conducted to support historical environmental approvals and compliance for the ongoing mining operations. The entire island has been surveyed in 1995 (Keighery *et al.,*1995) and again in 2005 (Ecologia, 2005a). Subsequently small parcels were subject to pre-clearance surveys to adhere to Ministerial Statement 715) and additional detailed flora and vegetation assessments. A comprehensive list of previous surveys is presented in Section 3.5. These surveys provided comprehensive contextual information to inform this survey.
Competency/experience of consultant conducting survey	**Nil** Floora de Wit led the botanical surveys. Her experience in the Kimberley has been restricted to the mainland, including Yampi Sound, Great Northern Highway (Kununurra to Warmun) and James Price Point. Her limited knowledge of Koolan Island flora was addressed by collecting samples of all flora species encountered during the field survey for formal identification. Floora was assisted by Cody Sibosado, a traditional owner who is from a local tribe and has spent considerable time on Koolan Island and the Dampier Peninsula. Udani Sirisena was the taxonomist for the Project. She has 10 years' experience as a taxonomist and works closely with WAH staff to confirm plant identification.

Limitation	Response
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	The detailed flora and vegetation survey was represented by seven quadrats and three relevés. The density of quadrats in the survey area was considered adequate for the size of the area and homogeneity of the vegetation. The vegetation mapping was aligned with previous survey mapping including Keighery *et al.* (1995), Ecologia (2005a) and APM (2018) as described in Section Table 9. Historical vegetation mapping was refined based on the increased survey effort in 2021. Best attempts were made to align the mapping of this Project to previous mapping and maintain this scale. Vegetation descriptions were updated to reflect the vegetation within the survey area and may not be accurate for that community across the entirety of Island. None of the Priority flora species were confirmed at known locations, including *Triodia* sp. Hidden Island (T. Handasyde TH 61009, *Jacquemontia* sp. Keep River (J.L. Egan 5015), *Pterocaulon globuliflorum*, and *Ipomoea tolmerana* subsp. *occidentalis*). Potential reasons for this could be: • senescence (death) of species since previous record for a variety of reasons • improvements in taxonomy and our understanding of these species • potential miss-identification of original record • inaccurate coordinates, particularly for species recorded in 2005 or earlier. The targeted searches were undertaken by three people walking approximately 20-50 m apart. All flora species were sampled and identified back in Perth. The Koolan Island herbarium was used to tentatively identify species, most of which were confirmed back in Perth by Udani Sirisena.
Completion (is further work needed)	**Minor** The proportion of flora and vegetation, survey effort, and extent is considered adequate to meet the objective of the assessment and inform EIA as may be required. A Priority 1 flora species, *Jacquemontia* sp. Keep River (J.L. Egan 5015) was identified and recorded in quadrats only. It is likely that the distribution of this species is more common than represented in this survey. The collection did not match the description of the species (yellow flowers), therefore was not recognised as potentially representing the species. During the survey it was considered locally common, recorded in five quadrats. Additional targeted surveys would further delineate the extent and size of these populations.
Remoteness and/or access problems	**Minor** Not all terrain was able to be traversed on foot. The survey area are characterised by hilly landforms and included steep terrain and rock outcrops that drop away for up to 20 m. These areas were accessed as close as practicable and where safe to do so. All types of habitat were incorporated in targeted searches, including the edges of the drop offs, and rocky slopes and outcrops. It is possible that Priority flora species restricted to hazardous cliff edges were omitted from the survey.

Limitation	Response
Timing, weather, season, cycle	**Nil** Survey timing coincided with the flowering period of the majority of shrubs, herbs and grasses. Trees were mostly sterile. Of the 165 flora samples, five were unable to be accurately determined to species due to insufficient material. This indicates that majority of species had flowers / fruit and there is adequate knowledge available to determine these. All grasses were in seed/flower, and annual species were present.
Disturbances (e.g. fire flood, accidental human intervention) which affected results of the survey	**Nil** No disturbances were observed that may have influenced the outcome of the survey objective.

5.0 Desktop Results

5.1 Environmentally Sensitive Areas and Conservation Estates

Environmentally Sensitive Areas (ESAs) are areas that have been identified for protection due to their environmental significance, as outlined in the Western Australian *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005.

Exemptions offered for the requirement to hold a clearing permit, under Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, do not apply within ESAs. ESAs are gazetted due to supporting environmental values of State or Commonwealth importance and, in this situation, include:

- Declared World Heritage properties (EPBC Act)
- areas included on the Register of the National Estate
- defined wetlands and associated buffers
- vegetation within 50 m of rare flora
- Threatened Ecological Communities (TECs).

No ESA's were identified on Koolan Island, with the closest ESA recorded approximately 33 km south of the survey area.

5.2 Conservation Significant Vegetation

The database searches identified one Commonwealth listed TEC that may occur in the survey area, namely, *Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula,* listed as Endangered under the EPBC Act. This community is mainly confined to dunes and other Holocene coastal landforms of the Dampier Peninsula, and is heavily dependent on wet (monsoon) season rainfall (DSEWPaC, 2013). The likelihood assessment determined this TEC is unlikely to occur on the island.

No TECs or PECs have been recorded on Koolan Island during previous surveys.

5.3 Conservation Significant Flora

No Threatened flora species were identified within 100 km of the survey area. The desktop assessment identified 81 Priority flora and two species of interest. Historically, three Priority flora species have been recorded within the survey area, including *Eragrostis spartii, Ipomoea tolmerana* subsp. *occidentalis* and *Pterocaulon globuliflorum*. Following a review of habitat and known records (from DBCA and WA Herbarium), *Pterocaulon globuliflorum* was considered unlikely to occur. It has not been verified by DBCA or WA Herbarium records, and its habitat does not reflect habitat on Koolan Island.

Species known or likely to occur within the survey area are presented in Table 14.

Further to this, 22 species may occur and 50 species are unlikely to occur.

Of note are two undescribed / novel species historically recorded on Koolan Island:

- *Brachychiton* sp. (novel - Koolan Island) - the taxon is known from a limited number of earlier collections made by Ecologia on Koolan Island. It is similar to *Brachychiton viscidulus*, and it has been recorded in similar habitats (i.e. hill slopes). The taxon has finer and less dense hairs on the upper surface of the leaves when compared to the lower surface, and also less dense when compared with *Brachychiton viscidulus* (APM, 2018). This species has not been listed as a Priority species since its original collection and is therefore unlikely to represent a significant species.
- *Corymbia* aff. *cadophora* - Species recorded north of survey area, near the northern end of the Island in 2018. The WA Herbarium has only two specimens identified as *Corymbia* aff. *cadophora*, both collected on Koolan Island by Keighery and Gibson during the 1993 surveys (Keighery *et al.,* 1995). This species has not been recorded since and it is likely to have been incorporated in the broader description of *Corymbia cadophora*.

The comprehensive desktop assessment is presented in Appendix A and mapped on Figure 7.

Table 14 Priority Flora that are known, or likely to occur within the survey area

Species	Cons. Code (WA)[1]	Habitat[1]	Likelihood of Occurrence
Known			
Eragrostis spartinoides	P3	Recorded on rehabilitated waste rock landform on Koolan Island. Generally associated with red clay over basalt, loam and sandy clay along creek banks.	**Known -** Recorded by APM (2018). Habitat does not match habitat present within survey area.
Ipomoea tolmerana subsp*. occidentalis*	P1	Recorded on Koolan Island in open woodland of *Eucalyptus miniata* and *Corymbia cadophora* subsp. *cadophora* in gully (APM 2019; WAH 1998).	**Known -** Recorded by APM (2019), Vouchered at WA Herbarium.
Likely			
Dendrophthoe odontocalyx	P3	Aerial shrub, hemiparasitic on stems. On Melaleuca.	**Likely to Occur –** Recorded on Koolan Island (Keighery *et al.* 1995). Suitable habitat present.
Hibiscus marenitensis	P3	Alluvial soils, sandstone. Rises, along watercourses, coastal areas.	**Likely to Occur –** Recorded on Koolan Island by Ecologia (2008) and Keighery *et al.* (1995).
Jacquemontia sp. Keep River (J.L. Egan 5051)	P1	Two records on Koolan Island described as occurring in *Eucalyptus miniata* open woodland on red sandy loam over sandy limestone.	**Likely to Occur –** Recorded on Koolan Island by Keighery et al. (1995), suitable habitat present.
Solanum leopoldense	P3	Sandstone. Rocky gullies & creeklines. Records nearby from Eucalypt woodlands with hummock grassland understorey.	**Likely to Occur - r**ecords nearby, suitable habitat present.
Triodia sp. Hidden Island (T. Handasyde TH 6109)	P1	Found on the very Open Woodland, steep cliff faces, and into the Rainforest/Vine Thicket gully at Koolan Island (APM 2018).	**Likely to Occur –** Species recorded on Koolan Island by APM (2018; 2021). Suitable habitat present.
Known but Unlikely			
Pterocaulon globuliflorum	P2	Sand. Sandstone cliffs & scree slopes.	**Known / Unlikely -** Recorded by Ecologia (2005a). No verified locations in vicinity. Known only from Devil's Pass, Napier Range.

1. Information derived from WAH, 1998 unless otherwise referenced

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Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010) Geoscience Australia, Streetpro

LEGEND

Targeted survey area

WA Herbarium database (WAHERB)
- P1
- P2
- P3

APM (2018) Flora
- P1
- P2
- P3
- P4

APM (2021) Flora
- P1

Desktop Results - Flora

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Figure 7

Project: P:\606X\60657418\900_CAD_GIS\920_GIS\02_MXDs\KoolanIsland\60657418_KI Flora and Vegetation Survey.aprx (FlettN), Layout: 60657418_Fig7_DesktopFloraComm_A4P_v2, Last exported: 1/07/2021 4:31 PM

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5.4 Weeds

Three Declared Pest species are known to occur on Koolan Island:

- **Jatropha gossypiifolia* (Bellyache Bush) Declared Plant (P1 all WA; P4 Derby – West Kimberley)
- **Senna alata* (Candle Bush) Declared Plant (P1 and P2 all WA)
- **Cryptostegia madagascariensis* (Rubber Vine) Declared Plant (P1 and P2 all WA)

Additional weeds considered significant for Koolan Island Operations are defined in the Quarantine Management Plan:

- **Passiflora foetida* var. *hispida* (Passion Vine)
- **Leucaena leucocephala* (White Lead Tree)
- **Gliricidia sepium* (Mexican Lilac)
- **Pennisetum pedicellatum* subsp. *unispiculum* (Annual Mission Grass)
- **Hyptis suaveolens* (Hyptis)
- **Arundo donax* (Giant Reed)
- **Spathodea campanulata* (African Tulip Tree).

6.0 Field Survey Results

6.1 Vegetation

No Threatened or Priority ecological communities were recorded, nor were any TECs or PECs anticipated to occur. Seven vegetation communities were described and mapped. All seven communities aligned with previous mapping. Descriptions including NVIS codes were updated to reflect the vegetation within the survey area. These descriptions may not be accurate for that vegetation association across the island.

The seven vegetation communities included:

- Eucalypt Woodlands – including three subgroups to capture canopy density and landform
- Callitris Woodland on slopes and gullies
- Mangroves restricted to the waters edge
- Rainforest/Vine thicket which acts as a buffer between the Mangroves and higher landforms
- Rehabilitation area restricted to a small disturbed location devoid of native vegetation.

Delineation of vegetation communities was based on historical mapping and analysis of floristic data using the Bray-Curtis similarity matrix (see Figure 8). The matrix is symbolised by vegetation community, including historical mapping.

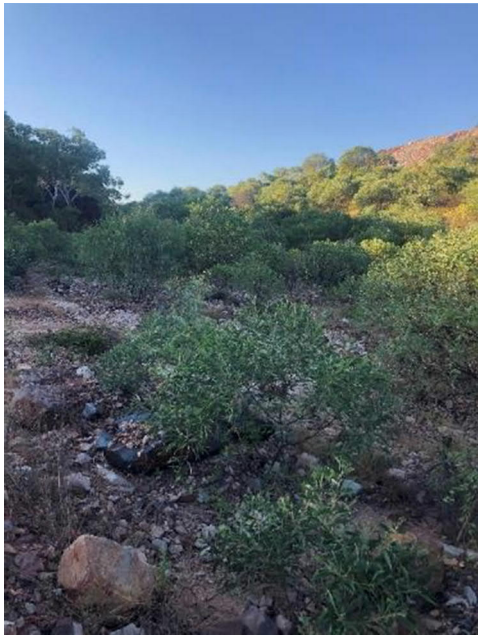
Vegetation community details are described in Table 15 and mapped in Figure 9 with the vegetation community flora species inventory grouped by family presented in Appendix B and quadrat/relevé data in Appendix C.

Table 15 Vegetation community details and photographs

Unit	Description	Additional Details	Photograph
1	**NVIS Code:** CdCeTb **Community:** Open Woodland **Description:** *Corymbia dendromerinx, Eucalyptus miniata* and *Corymbia cadophora* low woodland over *Calytrix exstipulata, Grevillea agrifolia* and *Acacia sphaerostachya* mid open shrubland over *Triodia bynoei, Eriachne ciliata* and *Sorghum stipoideum* low mixed hummock and tussock grassland. Includes herbaceous stratum of *Trachymene didiscoides, Afrohybanthus aurantiacus* and *Gonocarpus leptothecus*. **Characteristics:** Includes slopes, shallow to steep gullies and hill tops.	**Survey effort:** Q01, Q02, Q09 and floristically Q10 **Species richness:** 86 native and one weed species **Extent:** 20.52 ha **Condition:** Excellent	
1a	**NVIS Code:** EmDhTb **Community:** *Eucalyptus miniata* woodland along stony ridge crests and slopes. **Description:** *Eucalyptus miniata, Callitris columellaris* and *Buchania obovata* low woodland over *Dodonaea hispidula, Premna acuminata* and *Wrightia saligna* mid open shrubland over *Triodia bynoei, Heteropogon contortus* and *Chrysopogon latifolius* low open mixed hummock and tussock grassland. Includes herbaceous stratum of *Trachymene didiscoides, Afrohybanthus aurantiacus* and *Euphorbia armstrongiana* var. *distans* and numerous climbers including *Rhynchosia australis, Vigna lanceolata* var. *filiformis* and *Cajanus geminatus*. **Characteristics:** Characterised by a dense stony ground cover, sometimes with boulders, and is restricted to the crests and upper slopes of haematite ridges.	**Survey effort:** R05 **Species richness:** 63 native species **Extent:** 14.72 ha **Condition:** Excellent	

Unit	Description	Additional Details	Photograph
1c	**NVIS Code:** EmAsTb **Community:** Very Open Woodland **Description:** *Eucalyptus miniata, Callitris columellaris* and *Brachychiton viscidulus* low woodland over *Acacia sphaerostachya, Dodonaea hispidula* and *Phyllanthus exilis* low sparse shrubland over *Triodia bynoei, Eriachne avenacea* and *Triodia pungens* s. lat. Low open mixed hummock and tussock grassland. **Characteristics:** Very open woodland surveyed in the current survey is primarily distinguished by the scarcity of the overstorey, with very scattered *Corymbia confertiflora*, *Calytrix exstipulata*, *Ficus platypoda*, *Acacia tumida* var. *tumida*, *A. hippuroides* and *Grevillea agrifolia* present, over varied low shrubs, herbs, soft grasses and *Triodia bitextura.* In the current survey area, this quadrat is within the mapped Very Open Woodland however floristically is a better representation of 1a. The description above is based on this quadrat but may not be an accurate reflection of this community.	**Survey effort:** R07 **Species richness:** 46 native and one weed species **Extent:** 1.53 ha **Condition:** Excellent	
2	**NVIS Code:** CaTbRa **Community:** Rainforest/Vine Thickets **Description:** *Canarium australianum* var. *velutinum*, *Erythroxylum ellipticum* and *Vitex acuminata* low forest over *Triumfetta breviaculeata, Melhania oblongifolia* and *Premna acuminata* mixed low shrub and herbland with *Rhynchosia australis, Adenia heterophylla* and *Abrus precatorius* climbers. **Characteristics:** thick vegetation dominated by trees and climbers. This community may vary across the Island from this description.	**Survey effort:** Q03 **Species richness:** native species **Extent:** 1.73 ha **Condition:** Excellent	

Unit	Description	Additional Details	Photograph
3	**NVIS Code:** CcDhTd **Community:** *Callitris columellaris* forest along deep gullies **Description:** *Callitris columellaris, Erythroxylum chlorostachys* and *Corymbia dendromerinx* mid open forest over *Dodonaea hispidula, Phyllanthus exilis* and *Acacia tumida* var. *tumida* low sparse shrubland over *Trachymene didiscoides, Melhania oblongifolia* and *Goodenia sepalosa* var. *sepalosa* low sparse herbland. **Characteristics:** This community was described as restricted to deep gullies, however it is interspersed with Eucalypt Woodland along hill slopes and gullies. It is largely comprised of forest canopy over sparse shrubs and herbs and lacking a grass stratum.	**Survey effort:** Q04, Q08 **Species richness:** 105 native and two weed species **Extent:** 14.86 ha **Condition:** excellent	
4	**NVIS Code:** Am **Community:** Mangroves **Description:** The vegetation consists of a single dense stratum of tall shrubs/low trees, predominantly below five metres, consisting of mixtures of *Osbornia octodonta*, *Avicennia marina*, *Rhizophora stylosa* and *Camptostemon schultzii*, with *Excoecaria ovalis* also present sometimes at the edges of the community. Inaccessible.	**Survey effort:** observation only **Extent:** 0.61 ha **Condition:** Excellent	

Unit	Description	Additional Details	Photograph
5	**Rehabilitation** Planted vegetation of Acacia shrubs over mixed native and weed grasses.	**Extent:** 0.08 ha	

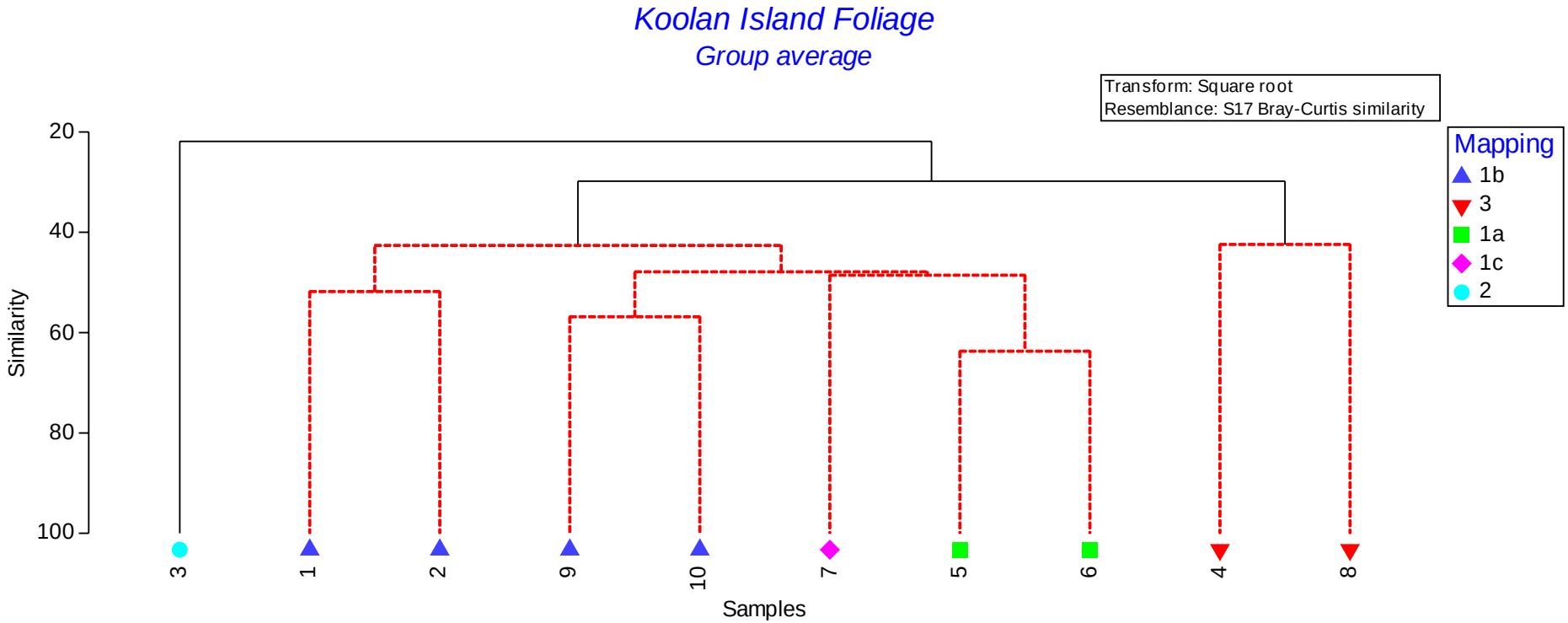
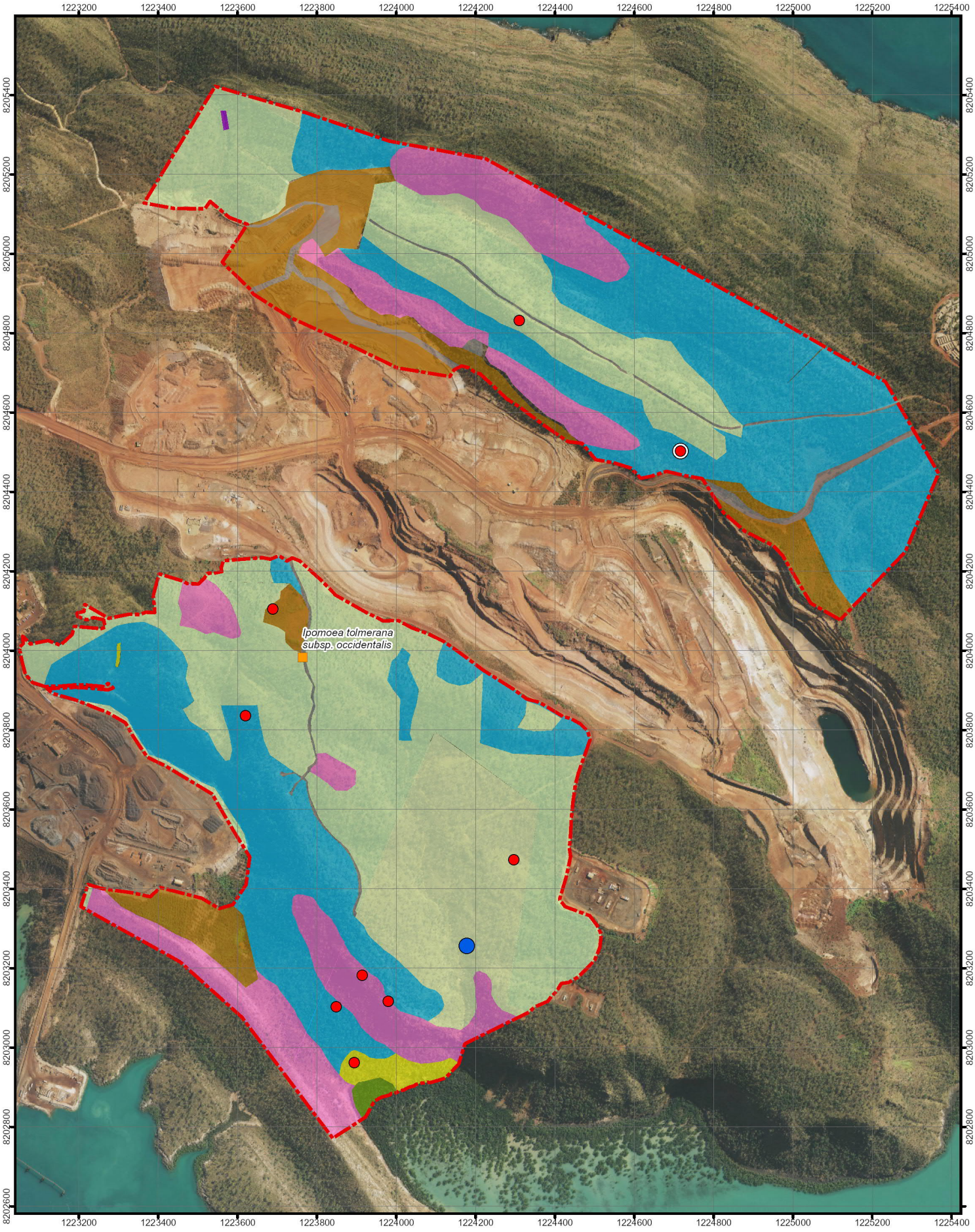


Figure 8 Dendrogram showing similarity of quadrats completed at Koolan Island



PROJECT ID	60657418
CREATED BY	FLETTN
APPROVED BY	F. DE WIT
LAST MODIFIED	16 AUG 2021

AECOM
www.aecom.com

N
1:12,500
(when printed at A4)

Datum: GDA 1994 MGA Zone 50

0 50 100 150 200
metres

Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010) Geoscience Australia, Streetpro

LEGEND

- Targeted survey area
- *Jacquemontia* sp. Keep River (J.L. Egan 5015) (P1)
- *Synostemon rhytidospermus* (Range Extension)
- *Flemingia ?parviflora* (Range Extension)
- WA Herbarium database (WAHERB)
  - P1
- *Callitris columellaris* forest
- *Eucalyptus miniata* woodland along stony ridge crests and slopes
- Mangroves
- Melaleuca Woodland
- Open Woodland
- Rainforest/Vine Thickets
- Rehabilitation
- Roads and Cleared Areas

Vegetation Communities

MOUNT GIBSON MINING

KOOLAN ISLAND FLORA AND VEGETATION ASSESSMENT

Figure 9

Project: P:\606X\60657418\900_CAD_GIS\920_GIS\02_MXDs\KoolanIsland\60657418_KI Flora and Vegetation Survey.aprx (FlettN), Layout: 60657418_Fig9_VegCommunities_A4P_v2, Last exported: 21/07/2021 2:19 PM

A4 size

6.2 Condition

Vegetation condition was predominantly Excellent across the survey area. Some evidence of human presence was noted during the field survey, including scattered weeds along drainage gullies. Other areas of disturbance within the survey area included partial clearing, rehabilitation, rock dumps, and thickets of weeds.

6.3 Flora

6.3.1 Conservation Significant Flora

No species listed as threatened under the EPBC Act or the BC Act were recorded.

One Priority flora species was recorded during this survey, while another Priority species has been recorded during previous surveys. These are all described in detail below.

***Ipomoea tolmerana* subsp. *occidentalis* (P1)**

Previously known as *Ipomoea* sp. A Kimberly Flora, the species has been recorded once from Koolan Island (APM 2019, Plate 1). The species known distribution is in Dampierland, north to the Buccaneer Archipelago in open savanna woodland on sandy loam soils (APM, 2019). This record is included on Florabase (WAH, 1998) and has therefore been verified.

The known location of *I. tolmerana* subsp. *occidentalis* was visited by the field team, however, was not found. It has obvious identifying features (Plate 2).

If this species does occur, it is likely to occur in very low numbers.

Table 16 *Ipomoea tolmerana* subsp. *occidentalis* population details

Data Reference	Populations	Individuals
AECOM 2021 Survey	0	0
Previous Surveys APM (2019)	1	1
DBCA Data	1	2

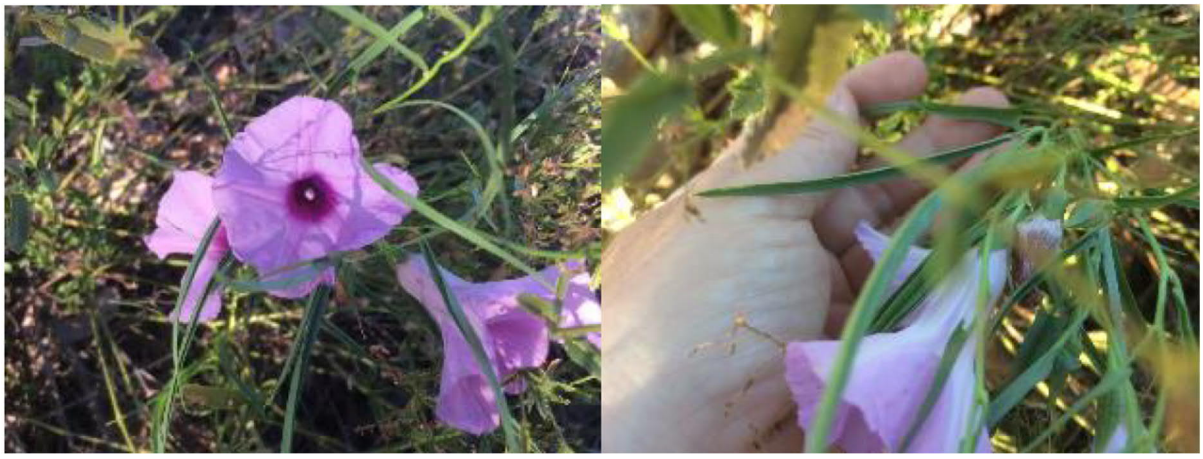


Plate 1 *Ipomoea tolmerana* subsp. *occidentalis* (Source: APM, 2019)

Plate 2 ***Ipomoea tolmerana*** **subsp.** ***occidentalis*** **(Source: Koolan Island Herbarium)**

Jacquemontia sp. Keep River (J.L. Egan 5051) (P1)

J. sp. Keep River was recorded on Koolan Island in 1993 with a record location of low accuracy supplied (Keighery *et al.* 1995; APM 2018). At the time of collection in 1993, the species was described as a "prostrate many stemmed shrub, flowers yellow, in flower" and was collected in February on a hilltop, with black sand over sandstone near water tank (AoLA, 2021). This species has not been recorded during numerous subsequent surveys.

Two samples were collected during the survey, one of these was confirmed as the Priority 1 species (collection FdW 210506-02, see Plate 3). This species was considered locally common, recorded at five of the quadrats in low numbers (1-5 individuals) and at four GPS locations (see Figure 9). The DBCA report form is presented in Appendix D.

The species closely resembles a common species on the island, at this time it is difficult to determine with accuracy whether this species is locally common across the island. The sample will be submitted to WAH for lodgement.

Table 17 ***Jacquemontia*** **sp. Keep River (P1) population details**

Data Reference	Populations	Individuals
AECOM 2021 Survey	9	~20
Previous Surveys Keighery et al (1995)	2	Not counted
DBCA Data	2	N/A

Plate 3 ***Jacquemontia*** **sp. Keep River (Source: Floora de Wit)**

6.3.2 Flora Inventory

A total of 138 flora species from 47 families were recorded. Species richness is comparable with previous surveys relative to survey effort and extent of the survey area. The best represented families include Fabaceae (24 taxa), Malvaceae (15 taxa) and Poaceae (11 taxa).

Two species, *Flemingia ?parviflora* and *Synostemon rhytidospermus* represent range extensions. *F. ?parviflora* is known from approximately 200 km on the mainland, associated with Beverley Springs Homestead, and numerous record from Mitchell River national Park more than 300 km northeast. The specimen was unable to be confidently confirmed, lacking fruiting or flowering material. The nearest record of *S. rhytidospermus* is more than 100 km on the mainland associated with Harding Range. This species has been recorded across the Kimberley and Pilbara region. Both *F. parviflora* and *S. rhytidospermus* were recorded at one location in the survey area.

A vegetation community flora species inventory, grouped by family is presented in Appendix B and field survey site data including quadrats and relevés in Appendix C.

Two weed species were recorded including **Passiflora foetida* and **Melinis repens*. Neither of these species are listed as Declared Pest species under the *Biosecurity Agriculture Management Act 2007* or a Weed of National Environmental Significance.

7.0 Discussion

Koolan Island is one of many islands forming the Buccaneer Archipelago off the coast of Western Australia in the Kimberley region. Several ecological surveys have been undertaken across Koolan Island where vegetation communities have been mapped. AECOM were engaged by MGM to conduct a detailed flora and vegetation assessment within the infill areas, and a systematic targeted flora survey across the entire survey area to assess the environmental values of flora and vegetation.

7.1 Vegetation

Vegetation communities described and mapped within the survey area align with previous mapping undertaken on the Island. The distribution of these communities was in line with the broader contextual area of the survey, with communities changing across the various landforms. All vegetation communities recorded in the survey area have previously been recorded on the island (Figure 9).

7.2 Flora

Flora within the survey area was considered diverse, with 137 native flora species recorded within 272 ha, representing 25% of all native flora species recorded from within 20 km (545 native flora recorded from 502,569 ha). The diversity reflects the various landforms encountered across the survey area including drainage gullies, stony ridge crests and slopes.

Of the 165 flora samples collected across the survey area, five were unable to be accurately determined to species due to insufficient material. This indicates that majority of species had flowers / fruit and there is adequate knowledge available to identify the species.

Targeted flora searches and sampling floristic data from quadrats and relevés were completed simultaneously. Flora species that were targeted during the survey were informed by previous surveys completed and the DBCA desktop results. The majority of Priority flora records from the Island are from 2005 or earlier and have not been recorded since this time. Nine Priority flora species were targeted based on the presence of suitable habitat and proximity of known records.

It should be noted that numerous Priority flora recorded during previous surveys were not found at the listed coordinates for the record. This could reflect the low accuracy of the record location provided, senescence of the species, seasonal changes, updated taxonomy of these species and improvement in our current understanding of species morphology and available material for identification at the WA Herbarium. Some species previously recorded are not known to occur in the IBRA region, and many have not been recorded since their initial identification in 2005.

Two Priority species, *Jacquemontia* sp. Keep River (J.L Egan 5051) and *Ipomoea tolmerana* subsp. *occidentalis*, are known to occur within the survey area following the 2021 assessment. The two species known to occur, and the other nine species that were considered likely to occur, are discussed below.

***Jacquemontia* sp. Keep River (J.L. Egan 5051) (P1)**

One Priority flora species, *Jacquemontia* sp. Keep River (J.L. Egan 5051) (P1) was recorded at nine locations at low numbers within the survey area. *Jacquemontia* sp. Keep River is a small inconspicuous species with no photographs or detailed morphological features available *Jacquemontia* sp. Keep River was recorded on Koolan Island in 1993 with a record location of low accuracy supplied (DEC, 1995; APM, 2018). This species has not been recorded in subsequent surveys conducted on the island prior to this survey.

Two *Jacquemontia* samples were collected during the survey to verify identification, one of these was confirmed as the Priority 1 species (collection FdW 210506-02). The other collected sample represented a locally common species and is likely to occur at more locations than indicated on Figure 9. Due to its absence from historical records despite the numerous surveys undertaken, it was considered unlikely that the sample collected would represent the Priority species. Further, its description of having yellow flowers does not match the Koolan Island sample. For this reason, the specimen will be lodged with the WA Herbarium to improve records and knowledge of this species.

Ipomoea tolmerana subsp. *occidentalis* (P1)

Ipomoea tolmerana subsp. *occidentalis* has been recorded at one location on Koolan Island (APM, 2019). This record had been verified at the WA Herbarium and incorporated in the DBCA database. The species was recorded in open woodland of *Eucalyptus miniata* and *Corymbia cadophora* subsp. *cadophora* near the topsoil stockpiles and the access track of the Mangrove survey area.

This location was visited on the first day of the field survey to verify its features prior to commencing targeted flora surveys. This species was not found despite considerable search effort. Flowers and fruits of *Ipomoea tolmerana* subsp*. occidentalis* have been recorded in March and April. Koolan Island recorded lower than average rainfall in January, February and April of 2021.There is potential the species was not in flower during the survey, contributing to the species not being able to be located at the recorded site.

This species is still considered to occur in the survey area at the historical location identified by APM (2019) and has therefore been included on Figure 9.

Triodia sp. Hidden Island (T. Handasyde TH 6109)

T. sp. Hidden Island was first recorded on Koolan Island in 2018 (APM, 2018) on steep rocky slopes on the south coast of the Island and represented a common understorey species. Another collection was made on the south coast of the Island in 2021 (APM, 2021), which is approximately 500 m from the edge of the Mangrove targeted survey area. Prior to these records, the species was considered restricted to Hidden Island, approximately 27 km from Koolan Island (APM, 2021).

Triodia specimens are notoriously difficult to identify when sterile. This may cause discrepancies between identifications. To reduce the potential for misidentification, AECOM collected multiple samples of *Triodia* and had them identified by Mike Hislop and *Triodia* specialist Matt Barrett. All samples were returned as *Triodia pungens* sens. lat. Identification material (flowering/fruiting) was not available for all samples collected, however M. Hislop was confident that they did not represent *Triodia* sp. Hidden Island. Further investigation regarding *Triodia* sp. Hidden Island recorded from Area F nearby revealed that this original identification was based on sterile material and may not be accurate. Given the intensive search effort and samples collected, *Triodia* sp. Hidden Island is not considered likely to occur in the survey area.

Gymnanthera cunninghamii (P3)

G. cunninghamii was recorded at one location on Koolan Island (Ecologia, 2005a) and has not been collected since this time (APM, 2021). There are no records of this species in the vicinity on the DBCA database or Naturemap. *G. cunninghamii* is known from drainage lines and sandy soils (WAH, 1998). The deep drainage gully in the south of the Mangrove survey area may represent suitable habitat. This area was traversed on foot and several plants were investigated that had similar characteristics to *G. cunninghamii*. It is possible that the species does occur in the major drainage line and it was not recorded during the field survey, however its likelihood has been reduced to ‘may occur’.

Pterocaulon globuliflorum (P2)

P. globuliflorum has been recorded at seven locations on Koolan Island (ecologia, 2005a), with no collections made of this species since this time (APM, 2018). There are no records on the DBCA database or Naturemap of this species within 100 km of the survey area. The preferred habitat includes sand and sandstone cliffs (WAH, 1998). This habitat was not observed in the survey area, therefore this species is considered unlikely to occur in the survey area.

Brachychiton xanthophyllus (P4)

B. xanthophyllus was recorded by ecologia (2005a) at one location which has since been cleared for mining. Subsequent surveys have collected and identified numerous *Brachychiton* samples which were identified as *Brachychiton* sp. (?novel – Koolan Island) with limited diagnostic material available to confirm the identification (ecologia, 2005; APM, 2018).

The species is differentiated from *Brachychiton viscidulus* by leaf morphology and viscidity of surface (Mount Gibson Iron, 2012). Ten *Brachychiton* sp. samples were collected during the survey and submitted to the WAH for identification. Most of the material was also sterile and limited the ability to confirm this identification. None were identified as the Priority species B. *xanthophyllus*. There are no records of this species occurring on Koolan Island on the DBCA database or Naturemap and therefore this species is considered unlikely to occur in the survey area.

Dendrophthoe odontocalyx (P3)

D. odontocalyx is a parasitic plant on *Melaleuca*, *Eucalyptus*, *Grevillea* and *Syzygium* in monsoon forest. Habitat for this species is limited within the survey area. The species was previously recorded on the island in 1993 from near mangroves south of the survey area (DEC, 1995).

One collection was taken during the current survey and submitted to the WAH for verification. The species submitted was not identified as the Priority species *D. odontocalx*. It is possible that the species occurs in the survey area and was not recorded during the field survey, however its likelihood has been reduced to 'may occur'.

Hibiscus marenitensis (P1)

H. marenitensis has been recorded on alluvial soils and sandstone, along watercourses and coastal areas (WAH, 1998). The species has previously been recorded by Fryxell *et al.* (1985) and at one location by Ecologia (2008). Following targeted searches, no suitable habitat was observed in the survey area, it is therefore considered unlikely to occur within the survey area.

Eucalyptus kenneallyi (P1)

E. kenneallyi was first collected on Koolan Island by JA Wannan in 1974 and has not been collected since this time (Ecologia, 2005a; MBS, 2012; APM; 2018). The species is easily confused with *Eucalyptus rupestris*. Numerous collections of *Eucalypts* were made during the survey to verify identification. Suitable fruiting material was available on less than 5% of *Eucalypt* species observed in the survey area. None were identified as representing *E. kenneallyi*. This species is considered unlikely to occur in the survey area.

Eragrostis spartinoides (P3)

E. spartinoides was recorded on rehabilitated waste rock by APM (2018) at one location. This species prefers red clay over basalt, loam and sandy clay and is commonly found along creek banks (WAH, 1998). Prior to 2018 this species had not been previously recorded on Koolan Island. The known location was visited by the survey team and 30 minutes was spent searching with no individuals recorded. Habitat within the survey area is not considered suitable for this species. It is therefore unlikely to occur within the survey area.

Stackhousia clementii (P3)

S. clementii was recorded at one location by Ecologia (2005a) in recently burnt woodland. This species has not been recorded since that time and is not known from the Kimberley region. The species was searched for during the targeted flora searches and no individuals were recorded. It is considered unlikely to occur within the survey area.

8.0 Conclusion

The detailed flora and vegetation assessment and targeted flora survey were successfully undertaken within the Mangrove Area and the Coral Trout survey area.

No Threatened or Priority ecological communities were recorded in the survey area. Vegetation communities aligned with previous vegetation mapping that has been undertaken on the Island. The majority of the vegetation within the survey area was considered to be Excellent in condition, with some areas displaying evidence of human presence such as scattered weeds, partial clearing, rehabilitation, rock dumps and thickets of weeds.

One Priority species, *Jacquemontia* sp. Keep River (Priority 1) was identified and recorded at nine locations. The species has not been recorded on the Island since 1993.

No significant limitations were identified that would influence the outcome of the flora and vegetation assessment. The survey area incorporated several steep slopes that were unable to be traversed, however these areas are not likely to support significant flora species not previously identified. Survey effort is considered adequate and together with the historical surveys, the results provide a thorough understanding of environmental values present.

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Appendix A

Desktop Results

Appendix A - Conservation Significant Flora Desktop Assessment

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Acacia capillaris	P2	Along creek, steep rocky slope.		May	No records nearby, habitat present.
Acacia kenneallyi	P3	Skeletal sandy soils over sandstone or dolerite	14/02/2009	Unlikely	No records nearby, no suitable habitat.
Acacia phacelia	P3	Nearest record on mainland 108 km found in hummock grassland with *Brachychiton viscidulus, Owenia vernicosa* and *Triodia* spp.		May	No records nearby, habitat present.
Acmella grandiflora var. *brachyglossa*	P3	Three records on WAH (1998), nearest record has no habitat information. Record from desert described as *E. miniata, Petalostigma pubescens* and *Sorghum* sp. habitat.	12/04/1997	May	No records nearby, habitat present.
Acrostichum aureum	P1	Mangrove swamps, cliff faces by the sea.	16/11/1992	Unlikely	No records nearby, no suitable habitat.
Actinostachys digitata	P2	Sand. Gullies.	26/05/2009	May	No records nearby, no suitable habitat.
Alysicarpus major	P3	Floodplains.	14/03/2001	Unlikely	No records nearby, no suitable habitat.
Alysicarpus suffruticosus	P2	Sandy clay. Creek crossing	11/03/2001	Unlikely	No records nearby, no suitable habitat.
Amyema pyriformis	P1	Aerial shrub, hemiparasitic on stems. Exclusively on Eucalyptus.	13/05/1986	Unlikely	No records nearby, not recorded on the island.
Aponogeton kimberleyensis	P3	Permanent running stream.	26/06/2002	Unlikely	No records nearby, no suitable habitat.
Arivela kenneallyi	P2	Recorded on foredunes in hummock grasslands.	15/02/2009	Unlikely	No records nearby, no suitable habitat.
Borya subulata	P4	Sandstone.	13/01/2010	Unlikely	No records nearby, no suitable habitat.
Brachychiton sp. (novel - Koolan Island)	Of interest	Hill slopes, very similar to *Brachychiton viscidulus* (common).		Known	Recorded by APM (2018) and Ecologia (2008).
Brachychiton tridentatus	P3	Sand, sandstone. Rocky hills & ridges.	28/04/2007	May	No records nearby, not recorded on the island
Brachychiton xanthophyllus	P4	Soils over granite, limestone or basalt. Upper slopes, crests & rock outcrops.		May	Recorded by Ecologia (2005a). Species not recorded on island since this time. Not known from this Local Government Area.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Corymbia aff. *cadophora*	Of interest	Open woodland.		Likely	Species recorded noth of survey area, near northern end of Island in 2018. The WA Herbarium has only two specimens identified as Corymbia aff. cadophora, both collected on Koolan Island by Keighery and Gibson during the 1993 surveys. Surveys completed by Ecologia between 2003 and 2007 recorded one potential specimen of this species but identification could not be confirmed.
Corymbia sp. Yampi Peninsula (R.L. Barrett & A.N. Start RLB 2280)	P1	Recorded on flat sandstone plateau on top of mesa in open woodland at Yampi Sound.	13/03/2001	Unlikely	No records nearby, no suitable habitat.
Croton aridus	P3	Deep red sand, pindan soil. Sandplains or ridges, spinifex sandplains.	30/05/2009	Unlikely	No records nearby, no suitable habitat.
Cullen candidum	P1	Clayey sand.	17/09/1987	Unlikely	No records nearby, no suitable habitat.
Cyperus victoriensis	P1	Along creeks.	14/06/1976	Unlikely	No records nearby, no suitable habitat.
Dendrolobium cheelii	P3	Red clay, loam	3/07/1996	Unlikely	No suitable habitat. Several records on mainland (34 km) from survey area.
Dendrophthoe odontocalyx	P3	On Melaleuca.	11/02/1993	Likely	Recorded on Koolan Island (Keighery et al. 1995). Suitable habitat present.
Eragrostis petraea	P1	Black, peaty, waterlogged soil. Permanent flowing springs, sandstone hills.	2/06/1995	Unlikely	No records nearby, no suitable habitat.
Eragrostis spartinoides	P3	Red clay over basalt, loam, sandy clay. Creek banks.	23/05/2009	Known	Recorded by APM 2018 in survey area, in rehabilitated waste rock landform. Nearest record on adjacent mainland from 1992 on stream bed.
Eriachne filiformis	P3	Nearest record was sampled from sandstone pavement with grasses and herbs at Zigzag Creek.	22/04/2008	Unlikely	No records nearby, no suitable habitat.
Eriachne sp. Carson Escarpment (R.L. Barrett & M.D. Barrett RLB 4884)	P3	Shallow sand over sheeting sandstone on plateau.	22/04/2008	Unlikely	No records nearby, no suitable habitat.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Eucalyptus fitzgeraldii	P2	Clay or clayey soils on basalt or dolerite. Rocky hillsides, plains.	29/07/1994	Unlikely	No records nearby, no suitable habitat.
Eucalyptus kenneallyi	P1	Tree, to 8 m high, bark smooth, white to grey, brown or pink, shedding in large flakes or plates. Fl. white-cream. Skeletal sandy soils on hard siliceous outcrops. Coastal areas.	17/07/1990	Unlikely	Recorded previously on the island by JA Wannan in 1974. Dedicated searches have failed to locate the species sice 1974, which has remained unverified despite the Keighery et al (1995) and Ecologia (2005) comprehensive surveys. The original collection has remained unverified. Only one collection on Storr Island known to date.
Fimbristylis pachyptera	P1	Gravelly laterite.	30/05/2009	Unlikely	No records nearby, no suitable habitat.
Fimbristylis sieberiana	P3	Mud, skeletal soil pockets. Pool edges, sandstone cliffs.	12/07/2018	May	No records nearby, no suitable habitat.
Fimbristylis sp. E Kimberley Flora (C.R. Dunlop 5403)	P1	Gravelly soils, loam over basalt. Known from Northern Kimberley - Wyndham-East Kimberley IBRA region.		Unlikely	Several records from Koolan Island (Ecologia 2005a). No verified records in IBRA region, likely to represent a missidentification.
Fimbristylis subaristata	P1	Damp sites.	10/02/2010	May	No records nearby, habitat may be present.
Gardenia gardneri	P3	Sandstone.	21/06/1988	Unlikely	No records nearby, no suitable habitat.
Glycine albicans	P3	Lateritic loam.	17/03/2002	Unlikely	No records nearby, no suitable habitat.
Gomphrena cucullata	P3	Red sandy loam, clayey sand. Open floodplains.	28/04/2010	Unlikely	No records nearby, no suitable habitat.
Goodenia byrnesii	P3	Edge of creek, sand. Records near coastline include rocky headlands with black soil and pea gravel, sandstone outcrops, and drainage lines with boulders.	28/04/2007	Unlikely	No records nearby, marginal habitat.
Goodenia sepalosa var. *glandulosa*	P3	Red sand or loam.	14/07/2018	Unlikely	No records nearby, no suitable habitat.
Grevillea donaldiana	P2	Sandstone scree.	12/05/1987	Unlikely	No records nearby, no suitable habitat.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Gymnanthera cunninghamii	P3	Sandy soils of the Pilbara, Carnarvon, Gascoyne and Great Sandy Desert.		Unlikely	No known occurrences of this species in the IBRA region. Recorded by Ecologia (2005) and APM (2018), not verified since this time. Potential mis-identification or lack of suitable diagnostic material or published taxonomic information available at that time.
Gynochthodes jasminoides	P3	Altitudinal range in northern Australia from near sea level to 1500 m. Grows in monsoon forest, lowland, upland and mountain rain forest. (Australian Tropical Rainfall Plants, 2021)	17/07/1990	Unlikely	No records nearby, no suitable habitat.
Haemodorum basalticum	P2	Endemic to the north Kimberley of Western Australia, where it is known only from basalt soils over laterite or massive basalt sheets in the Mitchell Plateau to Theda Station area. Occurs in eucalypt woodland with Terminalia fitzgeraldii and Livistona eastonii as associated species (Barrett et al., 2015)	9/02/2010	Unlikely	No records nearby, no suitable habitat.
Haemodorum capitatum	P1	Endemic to the south-west Kimberley of Western Australia, where it is known only from low depressions on pindan sand plains on grey and white sands. Associated species include Corymbia polycarpa, Crotalaria crispata, Eucalyptus tectifica, Melaleuca acacioides, Terminalia canescens and Verticordia verticillata (Barrett et al., 2015)	22/08/1985	Unlikely	No records nearby, no suitable habitat.
Helicteres sp. Mertens Falls (K.F. Kenneally 7887)	P3	Nearest record from ephemeral creekline at base of steep sided rocky slope. Also recorded on sandstone ridge.	26/05/2009	May	Recorded on Molema Island, habitat may be present.
Heliotropium calvariavis	P1	Sandy soils. Nearest record on flat blacksoil plains in low grasslands.	10/03/2001	Unlikely	No records nearby, no suitable habitat.
Helminthostachys zeylanica	P3	Black peat. Shady sites in gallery forest, margins of creeks.	25/05/1993	Unlikely	No records nearby, no suitable habitat.
Hibiscus kenneallyi	P3	Coastal soils, sandstone. In rock crevices, cliff tops.	16/06/1982	May	No records nearby, suitable habitat may be present
Hibiscus marenitensis	P3	Alluvial soils, sandstone. Rises, along watercourses, coastal areas.	30/05/2009	Likely	Recorded on Koolan Island by Ecologia (2008) and Keighery et al (1994).
Hibiscus stewartii	P3	Black loam, sandstone. Plateaus & rocky areas.	13/05/1986	Unlikely	No records nearby, no suitable habitat.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Ipomoea gracilis	P4	Black cracking clay or black sand. Irrigated areas. Usually grows in open forest but also found in vine thicket and monsoon forest edges (Australian Tropical Rainforest Plants, 2019)	14/03/2001	Unlikely	No records nearby, no suitable habitat.
Ipomoea tolmerana subsp. *occidentalis*	P1	Recorded on Koolan Island in open woodland of *Eucalyptus miniata* and *Corymbia cadophora* subsp. *cadophora* in gully (APM 2019; WAH 1998).	19/05/2019	Known	Recorded by APM (2019).
Jacquemontia sp. Keep River (J.L. Egan 5051)	P1	Two records on Koolan Island described as occurring in *Eucalyptus miniata* open woodland on red sandy loam over sandy limestone.	14/02/1993	Likely	Recorded on Koolan Island by Keighery et al. (1995), suitable habitat present.
Lechenaultia mimica	P1	Nearest record from shallow sand over sheeting sandstone on plateau.	13/01/2010	Unlikely	No records nearby, no suitable habitat.
Lepturus repens	P3	Calcareous sand, limestone	24/05/1987	Unlikely	No records nearby, no suitable habitat.
Lophostemon grandiflorus subsp. *grandiflorus*	P3	Neraest record is from coastal dune system with Melaleuca and Grewia vine thicket.	27/12/1988	May	No records nearby, suitable habitat present.
Malaccotristicha australis	P2	Attached to rocky sandstone substrates. In flowing water, along margins of watercourses.	22/06/1987	Unlikely	No records nearby, no suitable habitat.
Micraira sp. Harding Range (M.D. Barrett & R.L. Barrett MDB 1827)	P1	One verified record on skeletal soils over sandstone north of Walcott Inlet.	19/01/2007	Unlikely	No records nearby, no suitable habitat.
Minuria macrorhiza	P2	Red clay or loam, laterite, bauxite. Sandstone gullies, exposed sheets basalt, among tumbled boulders, in grasslands.	/09/1923	Unlikely	No records nearby, no suitable habitat.
Myriophyllum foveicola	P3	Known from rockholes on sheeting sandstone.	19/01/2007	Unlikely	No records nearby, no suitable habitat.
Nymphoides parvifolia	P1	Neraest record is from rockhole near small creek.	19/01/2007	Unlikely	No records nearby, no suitable habitat.
Olearia arguta var. *arguta*	P3	Skeletal sandy soils, red clay or loam. Stony slopes.	31/07/1977	May	No records nearby, suitable habitat present.
Parsonsia kimberleyensis	P1	Vine thickets.	23/05/2009	May	No records nearby, suitable habitat present.
Pentalepis walcottii	P3	Growing in sandy soils, on outcrops or gravel beds, on sandstone or basalt, often associated with creeks, rivers and bays (Orchard and Cross, 2012).	19/05/1986	May	Recorded on Koolan Island in 1986, suitable habitat may be present.
Peripleura spechtii var. *kimberleyensis*	P2	Nearest record associated with *E. miniata* over mixed shrubs over *Triodia* spp. On summitt of King Leopold Sandstone ridge with rock outcrops.	4/06/2009	May	Record nearby, suitable habitat may be present.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Pterocaulon globuliflorum	P2	Sand. Sandstone cliffs & scree slopes.		Known / Unlikely	Recorded by Ecologia (2005) however location not verified since this time and not recorded on Koolan Island since this time. Known from only one record (WAH 1998) at Devil's Pass, Napier Range.
Scleria polycarpa	P1	Pools.	10/07/2018	Unlikely	No records nearby, no suitable habitat.
Solanum carduiforme	P2	Clayey sand or sandstone. Recorded nearby on mainland on lower sandstone slopes in Eucalypt woodland with hummock grassland understorey.	13/06/2008	May	Record nearby, suitable habitat present. Majority of records are from inland desert.
Solanum cataphractum	P3	Sand. Sandstone rocks.	17/03/2002	May	No records nearby, no suitable habitat.
Solanum leopoldense	P3	Sandstone. Rocky gullies & creeklines. Records nearby from Eucalypt woodlands with hummock grassland understorey.	15/05/2002	Likely	Records nearby, suitable habitat present.
Solanum vansittartense	P2	Sand over sandstone. Only one verified record nearby on Cockatoo Island from disturbed soil on margin of sandstone.	14/06/2008	May	Records nearby, suitable habitat may be present.
Spermacoce sp. Berthier Dunes (R.L. Barrett RLB 5753)	P3	Associated with beaches.	/06/1978	Unlikely	No records nearby, no suitable habitat.
Stackhousia clementii	P3	Skeletal soils. Sandstone hills. Known from Pilbara, Carnarvon, Central Ranges, Great Sandy Desert, Great Victoria Desert and Murchison regions.		Unlikely	Recorded on Koolan Island by Ecologia (2005a). This species is not known from the IBRA region. The collection is likely to reflect a missidentification.
Stylidium pindanicum	P3	Nearby records associated with freshwater creek and seepage areas.	27/05/1993	Unlikely	No records nearby, no suitable habitat.
Tephrosia valleculata	P3	Sandy, often shallow, soil around sandstone. Rock outcrops.	6/09/1988	May	No records nearby, suitable habitat present.
Trachymene dusenii	P3	One record nearby from rocky ridge on Pasco Island.	16/06/1982	May	One old record nearby, suitable habitat present,
Tribulopis sp. Koolan Island (K.F. Kenneally 8278)	P1	Skeletal sand, sandstone. Gorges, shelly beaches, mudflats, mangroves. Despite its name, it has not been recorded on Koolan Island, but on Sunday Island.	11/06/1982	May	One record nearby (1982), suitable habitat may be present.
Triodia acutispicula	P3	Sandy soils. River levees, pindan plains, rocky hillslopes & outcrops.	11/02/2010	May	No records nearby, suitable habitat present.

Species	WA Cons Status[1]	Habitat (FloraBase)[2]	Record Date	Likelihood	Justification
Triodia sp. Hidden Island (T. Handasyde TH 6109)	P1	Found on the very Open Woodland, steep cliff faces, and into the Rainforest/Vine Thicket gully at Koolan Island (APM, 2018).	17/02/2010	Likely	Species recorded on Koolan Island by APM (2018; 2021). Suitable habitat present.
Triumfetta mitchellii	P3	Soil pockets, sandstone uplands.	22/04/2008	Unlikely	No records nearby, no suitable habitat.
Utricularia bidentata	P3	Nearest record along Hunter Creek, another on flat plains at Yampi Sound.	10/03/2001	Unlikely	No records nearby, no suitable habitat.
Viscum ovalifolium	P1	Aerial shrub, hemiparasitic on stems. Recorded on Celtis phillippinensis.	19/06/1988	Unlikely	No records nearby, no suitable habitat.
Vittadinia sp. A Kimberley Flora (R.J. Cranfield 6527)	P3	Sandy clay. Gorges.	17/06/1982	Unlikely	No records nearby, no suitable habitat.
Xanthostemon psidioides	P2	On and at the base of sandstone cliffs.	16/05/1986	Unlikely	No records nearby, no suitable habitat.
Zehneria mucronata	P1	Vine thickets.	16/05/1986	May	No records nearby, suitable habitat present.

1. Priority Species List: Priority 1, P2, P3, P4, P5
2. Habitat descriptions obtained from Florabase (WAH, 1998) unless otherwise stipulated.

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Appendix B

Vegetation Community Flora Species Inventory Grouped by Family

Appendix A - Flora Species by Family and Community

		Community				
Family	**Taxon**	**1**	**1a**	**1c**	**2**	**3**
Acanthaceae						
	Rostellularia adscendens var. *clementii*	X	X		X	X
	Dicliptera armata	X	X			X
Amaranthaceae						
	Ptilotus polystachyus				X	X
Anacardiaceae						
	Buchanania obovata	X	X	X		X
Apocynaceae						
	Alstonia linearis	X			X	X
	Cynanchum pedunculatum		X	X	X	X
	Cynanchum viminale				X	
	Vincetoxicum flexuosum	X				X
	Wrightia saligna		X			
Araliaceae						
	Trachymene didiscoides	X	X	X		X
Asteraceae						
	Blumea saxatilis					X
Bignoniaceae						
	Dolichandrone occidentalis		X			
Boraginaceae						
	Heliotropium glabellum	X				
Burseraceae						
	Canarium australianum var. *velutinum*		X		X	X
	Canarium australianum var. *australianum*					
Capparaceae						
	?Capparis sp.				X	X
Caryophyllaceae						
	Polycarpaea involucrata	X				
Combretaceae						
	Terminalia ferdinandiana	X	X	X		X
Commelinaceae						
	Cartonema spicatum	X				X
	Commelina ensifolia				X	X
Convolvulaceae						
	Jacquemontia sp. Keep River (J.L. Egan 5015)	X			X	X
	Jacquemontia paniculata				X	X
	Evolvulus alsinoides var. *decumbens*	X	X			X
	Xenostegia tridentata	X		X		
Cyperaceae						
	Fimbristylis trigastrocarya	X	X			X
	Scleria brownii	X			X	X
Cypressaceae						
	Callitris columellaris	X	X	X	X	X
Dillenaceae						
	Hibbertia lepidota	X	X			X
	Hibbertia oblongata	X		X		
Erythroxylaceae						
	Erythroxylum ellipticum	X	X		X	X
Euphorbiaceae						
	Microstachys chamaelea	X		X		
	Euphorbia armstrongiana var. *distans*	X	X	X	X	X
Fabaceae						
	Abrus precatorius				X	X
	Acacia colei	X		X		X

Appendix A - Flora Species by Family and Community

		Community				
Family	**Taxon**	**1**	**1a**	**1c**	**2**	**3**
	Acacia hippuroides	X	X	X		X
	Acacia multisiliqua	X	X	X		X
	Acacia sphaerostachya	X	X	X		X
	Acacia stigmatophylla	X				X
	Acacia tumida var. *tumida*		X	X	X	X
	Cajanus acutifolius	X	X			
	Cajanus geminatus	X	X	X	X	X
	Chamaecrista mimosoides				X	X
	Christia australasica		X			
	Crotalaria alata	X	X			
	Crotalaria montana var. *angustifolia*	X	X			X
	Erythrophleum chlorostachys			X		X
	Flemingia ?parviflora					X
	Gompholobium subulatum	X				X
	Indigofera sp. Mackinlayi (A.A. Mitchell 7086)	X	X			X
	Rhynchosia australis	X	X		X	X
	Senna goniodes	X				X
	Templetonia hookeri	X	X	X		X
	Tephrosia leptoclada		X	X		X
	Uraria lagopodioides	X		X		X
	Vigna lanceolata var. *filiformis*	X	X	X	X	X
	Vigna lanceolata var. *lanceolata*	X				X
Goodeniaceae		X	X			X
	Goodenia sepalosa var. *sepalosa*	X			X	X
	Scaevola macrostachya	X	X			X
Haloragaceae						
	Gonocarpus leptothecus	X				X
Hybanthaceae						
	Hybanthus enneaspermus				X	X
Lamiaceae						
	Premna acuminata	X	X		X	X
	Vitex acuminata				X	X
	Clerodendrum floribundum var. *ovatum*	X		X		X
	Clerodendrum floribundum var. *coriaceum*	X		X		X
Lauraceae						
	Cassytha filiformis	X	X			
	Cassytha capillaris	X	X	X		
Linderniaceae						
	Lindernia clausa	X				X
Loranthaceae						
	Dendrophthoe acacioides subsp. *acacioides*			X		
	Amyema bifurcata		X			
	Diplatia grandibractea					
Malvaceae						
	Triumfetta breviaculeata		X		X	X
	Brachychiton viscidulus	X	X	X	X	X
	Gossypium costulatum	X	X	X		X
	Grewia breviflora		X		X	X
	Melhania oblongifolia	X	X		X	
	Brachychiton viridiflorus	X	X	X	X	X
	Brachychiton diversifolius subsp. *diversifolius*					X
	Grewia savannicola		X	X		X
	Triumfetta ?plumigera	X	X	X		
	Waltheria indica	X	X			X

Appendix A - Flora Species by Family and Community

		Community				
Family	Taxon	1	1a	1c	2	3
	Helicteres rhynchocarpa	X	X			X
	Triumfetta ryeae subsp. *brevipetala*	X				
	Triumfetta plumigera	X				
	Brachychiton diversifolius					X
	Hibiscus fryxellii					
Moraceae		X	X	X		X
	Ficus platypoda	X	X	X		X
	Ficus aculeata		X			
	Ficus aculeata var. *indecora*	X				X
Myrtaceae						
	Eucalyptus miniata	X	X	X		X
	Corymbia dendromerinx	X	X	X	X	X
Myrtaceae	*Calytrix exstipulata*	X	X	X		X
	Corymbia cadophora	X				X
	Eucalyptus ?miniata	X				
	Eucalyptus tectifica		X		X	X
Oleaceae						
	Jasminum didymum subsp. *didymum*	X			X	X
Orchidaceae						
	Cymbidium canaliculatum				X	X
Orobanchaceae						
	Buchnera linearis	X	X			X
Passifloraceae						
	Adenia heterophylla				X	X
*	*Passiflora foetida*	X		X	X	X
Phyllanthaceae						
	Bridelia tomentosa	X	X		X	X
	Notoleptopus decaisnei var. *decaisnei*			X	X	X
	Phyllanthus ?eremicus		X			
	Phyllanthus aridus sens. lat.	X				X
	Phyllanthus exilis	X	X	X	X	X
	Synostemon rhytidospermus	X				X
Picrodendraceae						
	Petalostigma quadriloculare	X	X			X
Plantaginaceae						
	Stemodia lythrifolia	X		X		
Poaceae						
	Bothriochloa pertusa					X
	Cenchrus elymoides		X		X	X
	Chrysopogon latifolius		X		X	X
	Cymbopogon ambiguus		X		X	X
	Eriachne avenacea		X	X		X
	Eriachne ciliata	X	X	X		X
	Heteropogon contortus	X	X	X		X
*	*Melinis repens*				X	X
	Panicum seminudum					X
	Sorghum stipoideum	X	X		X	X
	Triodia bynoei	X	X	X	X	X
	Triodia pungens sens. lat.		X	X		X
Proteaceae						
	Grevillea agrifolia	X				
	Grevillea cunninghamii	X	X	X		X
	Grevillea pyramidalis	X	X			X
	Persoonia falcata	X				

Appendix A - Flora Species by Family and Community

		Community				
Family	**Taxon**	**1**	**1a**	**1c**	**2**	**3**
	Stenocarpus acacioides					X
Pteridaceae						
	Cheilanthes ?caudata				X	X
Rubiaceae						
	Pavetta muelleri	X				
	Spermacoce brachystema	X	X			
Santalaceae						
	Santalum lanceolatum	X	X			X
	Exocarpos latifolius			X		
Sapindaceae						
	Dodonaea hispidula	X	X	X	X	X
	Dodonaea hispidula var. *arida*					X
	Dodonaea lanceolata	X				
Sapotaceae						
	Mimusops elengi				X	
	Sersalisia sericea		X			
Stylidiaceae		X				X
	Stylidium semipartitum	X				X
Violaceae						
	Afrohybanthus aurantiacus	X	X	X	X	X
	Afrohybanthus enneaspermus			X		X
Vitaceae						
	Ampelocissus acetosa		X			X

Appendix C

Quadrat and Relevé Data

Appendix C Quadrat and Relevé Data

Site No: 1	Type: Quadrat	Longitude: 123.76003	Latitude: -16.143646
Date: 07/05/2021		Soil Types: Rocky with shallow loam	
Topography: Slope facing west		Soil Colour:	
Surface: 25% twigs and leaves, and 25% bare rock and small boulders		Soil Condition: Dry	
Community (2021): 3		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Corymbia cadophora	1050	0.5
	Eucalyptus ?miniata	1000	8
	Brachychiton viridiflorus	1000	5
	Brachychiton viscidulus	600	10
	Corymbia dendromerinx	500	3

Weed	Taxon	Height (cm)	% Alive
	Callitris columellaris	500	10
	Erythroxylum ellipticum	400	4
	Ficus aculeata var. *indecora*	400	2
	Grevillea pyramidalis	300	0.1
	Ficus platypoda	300	0.5
	Acacia colei	300	0.5
	Petalostigma quadriloculare	300	5
	Calytrix exstipulata	250	3
	Bridelia tomentosa	250	3
	Buchanania obovata	200	0.5
	Triodia bynoei	100	0.5
	Grevillea agrifolia	80	0.5
	Premna acuminata	80	0.1
	Trachymene didiscoides	80	0.1
	Dodonaea hispidula	70	15
	Templetonia hookeri	60	5
	Acacia stigmatophylla	50	
	Acacia hippuroides	50	0.5
	Acacia sphaerostachya	50	0.5
	Triumfetta ryeae subsp. *brevipetala*	40	0.1
	Buchnera linearis	40	0.01
	Melhania oblongifolia	40	0.1
	Acacia multisiliqua	40	0.01
	Afrohybanthus aurantiacus	30	0.1
	Dicliptera armata	30	0.01
	Gonocarpus leptothecus	30	0.1
	Hibbertia oblongata	20	1
	Indigofera sp. Mackinlayi (A.A. Mitchell 7086)	20	0.01
	Phyllanthus exilis	20	0.1
	Scaevola macrostachya	15	0.01
	Synostemon rhytidospermus	10	0.01

Weed	Taxon	Height (cm)	% Alive
	Triumfetta plumigera	10	0.01
	Waltheria indica	10	0.01
	Jasminum didymum subsp. *didymum*	0	0.1
	Senna goniodes	0	0.01
	Crotalaria alata	0	25
	Heliotropium glabellum	0	0.5
	Crotalaria montana var. *angustifolia*	0	0.1
	Eriachne ciliata		1
	Spermacoce brachystema		0.1
	Stemodia lythrifolia		
	Stylidium semipartitum		0.5
	Fimbristylis trigastrocarya		0.1
	Lindernia clausa		
	Polycarpaea involucrata		
	Cajanus geminatus		
	Cassytha capillaris		
	Cassytha filiformis		
*	*Passiflora foetida*		
	Rhynchosia australis		
	Triumfetta ?plumigera		
	Vigna lanceolata var. *filiformis*		
	Vincetoxicum flexuosum		
	Xenostegia tridentata		

Site No: 2	Type: Quadrat	Longitude: 123.761058	Latitude: -16.141663
Date: 07/05/2021		Soil Types: Shallow loam	
Topography: Slope		Soil Colour:	
Surface: 50% leaves, 20% boulders and rocks		Soil Condition: Dry	
Community (2021): 1b		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Eucalyptus ?miniata	1500	8
	Brachychiton viridiflorus	300	0.5
	Brachychiton viscidulus	300	1
	Corymbia dendromerinx	300	0.5
	Clerodendrum floribundum var. *coriaceum*	250	0.5
	Clerodendrum floribundum var. *ovatum*	250	1
	Erythroxylum ellipticum	250	0.1
	Acacia colei	200	0.5

Weed	Taxon	Height (cm)	% Alive
	Buchanania obovata	200	0.5
	Calytrix exstipulata	200	5
	Pavetta muelleri	200	0.1
	Templetonia hookeri	200	0.5
	Santalum lanceolatum	180	0.5
	Acacia sphaerostachya	150	0.1
	Acacia stigmatophylla	150	2
	Petalostigma quadriloculare	150	1
	Trachymene didiscoides	150	
	Triodia bynoei	150	20
	Callitris columellaris	100	5
	Sorghum stipoideum	100	0.1
	Dodonaea hispidula	60	1
	Grevillea agrifolia	60	0.1
	Grevillea cunninghamii	50	0.5
	Acacia hippuroides	40	0.1
	Waltheria indica	40	0.1
	Afrohybanthus aurantiacus	30	0.5
	Buchnera linearis	30	0.1
	Cartonema spicatum	30	0.01
	Hibbertia lepidota	30	0.01
	Indigofera sp. Mackinlayi (A.A. Mitchell 7086)	30	0.1
	Phyllanthus exilis	30	0.1
	Scaevola macrostachya	30	0.01
	Phyllanthus aridus sens lat.	30	0.1
	Synostemon rhytidospermus	30	0.1
	Gompholobium subulatum	20	0.01
	Microstachys chamaelea	20	0.5
	Eriachne ciliata	15	0.01
	Cajanus geminatus	10	0.01
	Heliotropium glabellum	10	0.01

Weed	Taxon	Height (cm)	% Alive
	Stylidium semipartitum	10	0.01
	Goodenia sepalosa var. *sepalosa*	5	0.01
	Premna acuminata	5	0.01
	Cassytha filiformis	0	0.1
	Gossypium costulatum	0	0.5
	Jacquemontia sp. *Keep River* (J.L. Egan 5015) (P1)	0	0.01
	Triumfetta ?plumigera	0	0.01
	Vigna lanceolata var. *filiformis*	0	0.01
	Vigna lanceolata var. *lanceolata*	0	0.01

Site No: 3	Type: Quadrat	Longitude: 123.7610589	Latitude: -16.143645
Date: 07/05/2021		Soil Types: Shallow loam	
Topography: Low slope		Soil Colour:	
Surface: 80% leaves and branches with numerous ironstone rocks and boulders		Soil Condition: Dry	
Community (2021): 3		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Jasminum didymum subsp. *didymum*	1050	0.5
	Callitris columellaris	1000	8
	Eucalyptus tectifica	1000	5
	Canarium australianum var. *velutinum*	600	10
	Acacia tumida var. *tumida*	500	3
	Erythroxylum ellipticum	500	10
	Corymbia dendromerinx	400	4

Weed	Taxon	Height (cm)	% Alive
	Grewia breviflora	400	2
	Alstonia linearis	300	0.1
	Brachychiton viridiflorus	300	0.5
	Brachychiton viscidulus	300	0.5
	Vitex acuminata	300	5
	?Capparis sp.	250	3
	Premna acuminata	250	3
	Sorghum stipoideum	200	0.5
	Triodia bynoei	100	0.5
	Bridelia tomentosa	80	0.5
	Chrysopogon latifolius	80	0.1
*	*Melinis repens*	80	0.1
	Triumfetta breviaculeata	70	15
	Melhania oblongifolia	60	5
	Dodonaea hispidula	50	
	Jacquemontia sp. *Keep River* (J.L. Egan 5015) (P1)	50	0.5
	Mimusops elengi	50	0.5
	Cenchrus elymoides	40	0.1
	Chamaecrista mimosoides	40	0.01
	Notoleptopus decaisnei var. *decaisnei*	40	0.1
	Ptilotus polystachyus	40	0.01
	Cymbopogon ambiguus	30	0.1
	Phyllanthus exilis	30	0.01
	Scleria brownii	30	0.1
	Abrus precatorius	20	1
	Hybanthus enneaspermus	20	0.01
	Rostellularia adscendens var. *clementii*	20	0.1
	Euphorbia armstrongiana var. *distans*	15	0.01
	Cheilanthes ?caudata	10	0.01
	Commelina ensifolia	10	0.01
	Goodenia sepalosa var. sepalosa	10	0.01

Weed	Taxon	Height (cm)	% Alive
	Cajanus geminatus	0	0.1
	Cymbidium canaliculatum	0	0.01
	Rhynchosia australis	0	25
	Cynanchum pedunculatum	0	0.5
	Vigna lanceolata var. *filiformis*	0	0.1
	Adenia heterophylla	0	1
	Afrohybanthus aurantiacus	0	0.1
	Cynanchum viminale	0	
	Jacquemontia paniculata	0	0.5
*	*Passiflora foetida*	0	0.1

Site No: 4	Type: Quadrat	Longitude: 123.757014	Latitude: -16.145126
Date: 8/05/2021		Soil Types: Shallow loam	
Topography: Flat		Soil Colour:	
Surface: 100% leaf litter		Soil Condition: Dry	
Community (2021): 3		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Callitris columellaris	1500	60
	Corymbia dendromerinx	600	1
	Erythrophleum chlorostachys	400	2
	Brachychiton viridiflorus	250	0.1
	Acacia colei	200	0.5
	Acacia tumida var. *tumida*	200	0.5
	Canarium australianum var. *velutinum*	200	0.1
	Erythroxylum ellipticum	200	0.5

Weed	Taxon	Height (cm)	% Alive
	Bothriochloa pertusa	150	0.5
	Chrysopogon latifolius	150	2
	Ficus aculeata var. *indecora*	150	0.1
	Acacia stigmatophylla	100	10
	Eucalyptus tectifica	100	0.5
	Trachymene didiscoides	100	0.1
	Triodia bynoei	100	0.1
	Brachychiton viscidulus	80	0.1
	Grewia breviflora	80	1
	?Capparis sp.	60	2
	Hibbertia lepidota	60	0.01
	Chamaecrista mimosoides	50	0.01
	Dodonaea hispidula	50	10
	Grevillea pyramidalis	50	0.01
	Acacia hippuroides	40	0.01
	Bridelia tomentosa	40	0.1
	Eriachne ciliata	40	10
	Grewia savannicola	40	0.5
	Mimusops elengi	40	0.1
	Waltheria indica	40	0.1
	Melhania oblongifolia	30	0.1
	Panicum seminudum	30	4
	Phyllanthus exilis	30	0.1
	Rostellularia adscendens var. *clementii*	30	0.01
	Tephrosia leptoclada	30	0.1
	Buchnera linearis	20	0.01
	Dodonaea hispidula var. *arida*	20	0.01
	Gonocarpus leptothecus	20	0.01
	Jacquemontia sp. Keep River (J.L. Egan 5015) (P1)	20	0.01
	Scleria brownii	20	0.01
	Goodenia sepalosa var. *sepalosa*	15	0.5

Weed	Taxon	Height (cm)	% Alive
	Hybanthus enneaspermus	15	0.01
	Blumea saxatilis	10	0.01
	Evolvulus alsinoides var. *decumbens*	10	0.01
	Stylidium semipartitum	10	0.1
	Uraria lagopodioides	10	0.01
	Cheilanthes ?caudata	5	0.01
	Ampelocissus acetosa	0	0.01
	Gossypium costulatum	0	0.1
	Jacquemontia paniculata	0	0.01
*	*Passiflora foetida*	0	0.1
	Vigna lanceolata var. *filiformis*	0	0.1
	Vincetoxicum flexuosum	0	0.1
	Brachychiton diversifolius subsp. diversifolius		

Site No: 5	Type: Relève	Longitude: 123.757485	Latitude: -16.144255
Date: 09/05/2021		Soil Types: Shallow loam to bare rock	
Topography: Rocky ridge		Soil Colour:	
Surface: 80% leaves and numerous boulders and rocks		Soil Condition: Dry	
Community (2021): 1a		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Eucalyptus miniata	1000	15
	Callitris columellaris	400	2
	Corymbia dendromerinx	300	1
	Sersalisia sericea	250	1
	Dolichandrone occidentalis	200	2
	Erythroxylum ellipticum	200	0.1
	Ficus platypoda	200	0.5

Weed	Taxon	Height (cm)	% Alive
	Grewia breviflora	200	2
	Sorghum stipoideum	200	0.1
	Terminalia ferdinandiana	200	0.5
	Acacia tumida var. *tumida*	150	1
	Buchanania obovata	150	3
	Premna acuminata	150	3
	Trachymene didiscoides	150	2
	Triodia bynoei	150	8
	Acacia multisiliqua	100	0.5
	Acacia sphaerostachya	100	1
	Brachychiton viridiflorus	100	1
	Brachychiton viscidulus	100	0.5
	Calytrix exstipulata	100	0.5
	Cymbopogon ambiguus	100	0.1
	Heteropogon contortus	100	0.5
	Mimusops elengi	100	0.1
	Templetonia hookeri	100	0.5
	Cajanus acutifolius	80	
	Grevillea cunninghamii	80	0.1
	Cenchrus elymoides	50	0.01
	Gossypium costulatum	50	1
	Grevillea pyramidalis	50	0.1
	Helicteres rhynchocarpa	50	0.01
	Wrightia saligna	50	1
	Bridelia tomentosa	40	0.01
	Chrysopogon latifolius	40	0.5
	Dodonaea hispidula	40	5
	Hibbertia lepidota	40	0.5
	Indigofera sp. *Mackinlayi* (A.A. Mitchell 7086)	40	0.1
	Waltheria indica	40	0.01
	Acacia hippuroides	30	0.1

Weed	Taxon	Height (cm)	% Alive
	Buchnera linearis	30	0.01
	Crotalaria montana var *angustifolia*	30	0.01
	Eriachne avenacea	30	0.1
	Grewia savannicola	30	0.01
	Melhania oblongifolia	30	0.01
	Phyllanthus exilis	30	0.01
	Tephrosia leptoclada	30	0.01
	Triumfetta breviaculeata	30	0.01
	Afrohybanthus aurantiacus	20	0.1
	Crotalaria alata	20	0.01
	Dicliptera armata	20	0.01
	Euphorbia armstrongiana var *distans*	20	0.1
	Fimbristylis trigastrocarya	20	0.01
	Evolvulus alsinoides var *decumbens*	15	0.01
	Eriachne ciliata	10	0.01
	Triumfetta ?plumigera	10	0.01
	Rostellularia adscendens var *clementii*	5	0.01
	Ampelocissus acetosa	0	0.1
	Cajanus geminatus	0	0.1
	Cassytha capillaris	0	0.01
	Cassytha filiformis	0	0.1
	Christia australasica	0	0.01
	Rhynchosia australis	0	4
	Cynanchum pedunculatum	0	0.1
	Vigna lanceolata var. *filiformis*	0	0.1

Site No: 6	Type: Quadrat	Longitude: 123.758714	Latitude: -16.144594
Date: 9/05/2021		Soil Types: Shallow loam	
Topography: Upper slope		Soil Colour:	
Surface: 80% leaves and moderate small boulder		Soil Condition: Dry	
Community (2021): 1a/3		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Eucalyptus miniata	1500	15
	Callitris columellaris	1000	5
	Corymbia dendromerinx	400	6
	Calytrix exstipulata	350	4
	Eucalyptus tectifica	300	0.5
	Ficus aculeata	300	1
	Brachychiton viscidulus	250	0.5
	Canarium australianum var. *velutinum*	250	0.1

Weed	Taxon	Height (cm)	% Alive
	Erythroxylum ellipticum	250	0.5
	Sersalisia sericea	250	0.1
	Acacia sphaerostachya	200	2
	Grevillea pyramidalis	200	0.01
	Heteropogon contortus	200	2
	Santalum lanceolatum	200	0.01
	Acacia tumida var. *tumida*	150	0.01
	Sorghum stipoideum	150	0.5
	Trachymene didiscoides	150	3
	Triodia bynoei	150	20
	Premna acuminata	100	0.1
	Buchanania obovata	80	0.5
	Hibbertia lepidota	80	1
	Templetonia hookeri	80	0.5
	Grevillea cunninghamii	50	0.1
	Grewia breviflora	50	0.5
	Triodia pungens s. lat.	50	0.5
	Acacia hippuroides	40	0.5
	Brachychiton viridiflorus	40	0.01
	Dodonaea hispidula	40	8
	Tephrosia leptoclada	40	0.01
	Afrohybanthus aurantiacus	30	0.1
	Buchnera linearis	30	0.01
	Cajanus acutifolius	30	0.01
	Dicliptera armata	30	0.01
	Eriachne avenacea	30	0.1
	Petalostigma quadriloculare	30	0.01
	Phyllanthus exilis	30	0.01
	Fimbristylis trigastrocarya	30	0.01
	Crotalaria alata	20	0.01
	Crotalaria montana var. angustifolia	20	0.01

Weed	Taxon	Height (cm)	% Alive
	Euphorbia armstrongiana var. *distans*	20	0.01
	Phyllanthus ?eremicus	20	0.01
	Scaevola macrostachya	20	0.01
	Spermacoce brachystema	20	0.01
	Grewia savannicola	10	0.01
	Triumfetta ?plumigera	10	0.1
	Ampelocissus acetosa	0	0.5
	Amyema bifurcata	0	0.01
	Cassytha filiformis	0	0.5
	Gossypium costulatum	0	5
	Rhynchosia australis	0	10

Site No: 7	Type: Relevé	Longitude: 123.758714	Latitude: -16.144594
Date: 10/05/2021		Soil Types: Shallow loam	
Topography: Ridge		Soil Colour: N/A	
Surface:90% leaves and twigs with 40% boulders and rocks		Soil Condition: Dry	
Community (2021): 1c		Fire History: 10+	
Vegetation Condition: Very Good			

Weed	Taxon	Height (cm)	% Alive
	Callitris columellaris	1500	8
	Eucalyptus miniata	1500	30
	Brachychiton viscidulus	200	2
	Buchanania obovata	200	1
	Clerodendrum floribundum var. *coriaceum*	200	0.01
	Dendrophthoe acacioides subsp. *acacioides*	200	0.1
	Erythrophleum chlorostachys	200	5

Weed	Taxon	Height (cm)	% Alive
	Ficus platypoda	200	3
	Acacia sphaerostachya	150	1
	Clerodendrum floribundum var. *ovatum*	150	0.5
	Terminalia ferdinandiana	150	0.1
	Acacia colei	100	0.01
	Acacia tumida var. *tumida*	100	0.1
	Heteropogon contortus	100	0.1
	Templetonia hookeri	100	0.01
	Triodia bynoei	100	4
	Calytrix exstipulata	80	0.01
	Brachychiton viridiflorus	50	0.1
	Corymbia dendromerinx	50	0.1
	Dodonaea hispidula	50	2
	Microstachys chamaelea	50	0.01
	Uraria lagopodioides	50	0.01
	Eriachne avenacea	40	0.5
	Acacia hippuroides	30	0.01
	Acacia multisiliqua	30	0.01
	Afrohybanthus aurantiacus	30	0.01
	Afrohybanthus enneaspermus	30	0.01
	Exocarpos latifolius	30	0.01
	Grevillea cunninghamii	30	0.01
	Grewia savannicola	30	0.01
	Hibbertia oblongata	30	0.01
	Notoleptopus decaisnei var. *decaisnei*	30	0.01
	Phyllanthus exilis	30	0.1
	Tephrosia leptoclada	30	0.01
	Triodia pungens s. lat.	30	0.1
	Euphorbia armstrongiana var. *distans*	20	0.01
	Stemodia lythrifolia	20	0.01
	Trachymene didiscoides	20	0.5

Weed	Taxon	Height (cm)	% Alive
	Eriachne ciliata	15	0.1
	Cajanus geminatus	0	0.01
	Cassytha capillaris	0	0.1
	Gossypium costulatum	0	1
*	*Passiflora foetida*	0	0.01
	Cynanchum pedunculatum	0	0.01
	Triumfetta ?plumigera	0	0.01
	Vigna lanceolata var. *filiformis*	0	0.01
	Xenostegia tridentata	0	0.01

Site No: 8	Type: Quadrat	Longitude: 123.764648	Latitude: -16.132295
Date: 10/05/2021		Soil Types: Loam	
Topography: Lower slope and valley		Soil Colour:	
Surface: 95% leaves and sticks, 5% rocks		Soil Condition: Dry	
Community (2021): 3		Fire History: 10+	
Vegetation Condition: Very Good			

Weed	Taxon	Height (cm)	% Alive
	Callitris columellaris	2000	40
	Eucalyptus miniata	1500	5
	Erythrophleum chlorostachys	500	2
	Corymbia dendromerinx	400	0.5
	Clerodendrum floribundum var. *coriaceum*	250	0.01
	Santalum lanceolatum	200	0.01
	Brachychiton diversifolius	180	0.01
	Acacia colei	150	0.5

Weed	Taxon	Height (cm)	% Alive
	Brachychiton viscidulus	150	0.1
	Buchanania obovata	150	0.01
	Stenocarpus acacioides	150	0.01
	Terminalia ferdinandiana	150	0.1
	Triodia bynoei	150	0.1
	Acacia sphaerostachya	100	0.5
	Grevillea cunninghamii	100	0.1
	Templetonia hookeri	100	0.1
	Acacia multisiliqua	50	0.01
	Dodonaea hispidula	50	0.1
	Indigofera sp. *Mackinlayi (A.A. Mitchell 7086)*	40	0.01
	Chamaecrista mimosoides	30	0.01
	Chrysopogon latifolius	30	0.01
	Cymbopogon ambiguus	30	0.01
	Eriachne avenacea	30	0.1
	Gompholobium subulatum	30	0.1
	Grewia savannicola	30	0.01
	Heteropogon contortus	30	1
	Hibbertia lepidota	30	0.01
	Phyllanthus exilis	30	0.01
	Tephrosia leptoclada	30	0.01
	Uraria lagopodioides	30	0.01
	Acacia hippuroides	20	0.01
	Afrohybanthus enneaspermus	20	0.01
	Euphorbia armstrongiana var. *distans*	20	0.01
	Notoleptopus decaisnei var. *decaisnei*	20	0.1
	Fimbristylis trigastrocarya	20	0.01
	Trachymene didiscoides	20	0.01
	Waltheria indica	20	0.01
	Dicliptera armata	10	0.01
	Evolvulus alsinoides var. decumbens	10	0.01

Weed	Taxon	Height (cm)	% Alive
	Goodenia sepalosa var. *sepalosa*	10	0.1
	Stylidium semipartitum	10	0.01
	Ampelocissus acetosa	0	0.5
	Cajanus geminatus	0	0.01
	Flemingia ?parviflora	0	0.01
	Gossypium costulatum	0	0.01
	Jacquemontia sp. *Keep River (J.L. Egan 5015) (P1)*	0	0.01
	Rhynchosia australis	0	0.01
	Vigna lanceolata var. *filiformis*	0	0.1

Site No: 9	Type: Quadrat	Longitude: 123.758869	Latitude: -16.141332
Date: 10/05/2021		Soil Types: Loam and sand	
Topography: Lower slope and minor channel		Soil Colour:	
Surface: 80% leaves and twigs, 10% rocks		Soil Condition: Dry	
Community (2021): 1b		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Callitris columellaris	1500	5
	Eucalyptus miniata	1500	15
	Alstonia linearis	400	0.01
	Clerodendrum floribundum var. *coriaceum*	400	0.01
	Corymbia cadophora	400	3
	Corymbia dendromerinx	400	2
	Calytrix exstipulata	300	1

Weed	Taxon	Height (cm)	% Alive
	Erythroxylum ellipticum	300	2
	Persoonia falcata	300	0.01
	Terminalia ferdinandiana	300	0.1
	Acacia colei	200	0.1
	Buchanania obovata	200	0.5
	Clerodendrum floribundum var. *ovatum*	200	0.1
	Ficus aculeata var. *indecora*	200	0.1
	Acacia sphaerostachya	150	3
	Dodonaea lanceolata	150	3
	Helicteres rhynchocarpa	150	0.1
	Petalostigma quadriloculare	150	0.5
	Triodia bynoei	150	30
	Acacia multisiliqua	100	0.01
	Dodonaea hispidula	100	0.5
	Grevillea agrifolia	100	4
	Heteropogon contortus	100	0.1
	Trachymene didiscoides	100	1
	Brachychiton viridiflorus	50	0.01
	Cajanus acutifolius	50	0.01
	Hibbertia lepidota	50	0.1
	Templetonia hookeri	50	0.1
	Acacia hippuroides	30	0.5
	Afrohybanthus aurantiacus	30	0.1
	Brachychiton viscidulus	30	0.01
	Buchnera linearis	30	0.01
	Euphorbia armstrongiana var. *distans*	30	0.1
	Evolvulus alsinoides var. *decumbens*	30	0.01
	Gonocarpus leptothecus	30	0.5
	Grevillea cunninghamii	30	0.01
	Phyllanthus exilis	30	0.1
	Rostellularia adscendens var. clementii	30	0.01

Weed	Taxon	Height (cm)	% Alive
	Scleria brownii	30	0.01
	Phyllanthus aridus sens lat.	30	0.01
	Synostemon rhytidospermus	30	0.01
	Triumfetta ryeae subsp. *brevipetala*	30	0.01
	Uraria lagopodioides	30	0.01
	Waltheria indica	30	0.01
	Crotalaria alata	20	0.01
	Melhania oblongifolia	20	0.01
	Stemodia lythrifolia	20	0.01
	Cartonema spicatum	15	0.01
	Scaevola macrostachya	15	2
	Gompholobium subulatum	10	0.1
	Stylidium semipartitum	10	0.1
	Fimbristylis trigastrocarya	10	0.1
	Triumfetta ?plumigera	10	0.1
	Cajanus geminatus	0	0.01
	Cassytha capillaris	0	0.1
	Rhynchosia australis	0	0.01
	Xenostegia tridentata	0	0.01

Site No: 10	Type: Relevé	Longitude: 123.760777	Latitude: -16.129463
Date: 11/05/2021		Soil Types: Shallow loam	
Topography: Upper slope to ridge		Soil Colour:	
Surface: 40% rocks and boulders, and 20% leaves and twigs		Soil Condition: Dry	
Community (2021): Ib		Fire History: 10+	
Vegetation Condition: Excellent			

Weed	Taxon	Height (cm)	% Alive
	Eucalyptus miniata	2000	10
	Callitris columellaris	1000	15
	Brachychiton diversifolius subsp. *diversifolius*	500	1
	Brachychiton viscidulus	400	4
	Corymbia cadophora	400	5
	Eucalyptus tectifica	400	2
	Grevillea pyramidalis	400	0.1

Weed	Taxon	Height (cm)	% Alive
	Erythrophleum chlorostachys	350	0.5
	Calytrix exstipulata	250	1
	Santalum lanceolatum	250	0.1
	Acacia colei	200	0.1
	Brachychiton viridiflorus	200	0.1
	Ficus platypoda	200	0.1
	Terminalia ferdinandiana	200	0.5
	Ficus aculeata var. indecora	180	0.1
	Acacia sphaerostachya	150	1
	Clerodendrum floribundum var. *ovatum*	150	1
	Sorghum stipoideum	150	4
	Trachymene didiscoides	150	8
	Triodia bynoei	150	30
	Buchanania obovata	100	0.1
	Petalostigma quadriloculare	100	0.1
	Acacia multisiliqua	80	0.01
	Bridelia tomentosa	50	0.01
	Dodonaea hispidula	50	0.5
	Premna acuminata	50	0.01
	Premna acuminata	50	0.01
	Templetonia hookeri	50	0.01
	Canarium australianum var. *velutinum*	40	0.01
	Cartonema spicatum	40	0.01
	Senna goniodes	40	0.1
	Afrohybanthus enneaspermus	30	0.1
	Buchnera linearis	30	0.01
	Chrysopogon latifolius	30	0.01
	Dicliptera armata	30	0.01
	Euphorbia armstrongiana var. *distans*	30	0.01
	Gonocarpus leptothecus	30	0.01
	Grewia savannicola	30	0.01

Weed	Taxon	Height (cm)	% Alive
	Indigofera sp. *Mackinlayi* (A.A. Mitchell 7086)	30	0.01
	Lindernia clausa	30	0.01
	Phyllanthus exilis	30	0.1
	Scaevola macrostachya	30	0.5
	Scleria brownii	30	0.01
	Phyllanthus aridus sens lat.	30	0.1
	Synostemon rhytidospermus	30	0.1
	Tephrosia leptoclada	30	0.1
	Triodia pungens s. lat.	30	0.1
	Crotalaria montana var. *angustifolia*	20	0.01
	Eriachne ciliata	20	0.1
	Evolvulus alsinoides var. *decumbens*	20	0.01
	Helicteres rhynchocarpa	20	0.01
	Stenocarpus acacioides	20	0.01
	Hibbertia lepidota	15	0.01
	Rostellularia adscendens var. *clementii*	15	0.01
	Gompholobium subulatum	10	0.01
	Jacquemontia sp. *Keep River* (J.L. Egan 5015) (P1)	10	0.01
	Stylidium semipartitum	10	0.01
	Ampelocissus acetosa	0	0.01
	Cajanus geminatus	0	0.1
	Gossypium costulatum	0	0.1
	Melhania oblongifolia	0	0.01
*	*Passiflora foetida*	0	0.01
	Vigna lanceolata var. *lanceolata*	0	0.01

Appendix D

Threatened and Priority Flora Report Form

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Jacquemontia sp. Keep River (J.L. Egan 5015) **TPFL Pop. No:**

OBSERVATION DATE: 06/05/2021 **CONSERVATION STATUS:** P1 **New population** ☒

OBSERVER/S: Floora de Wit **PHONE** 0439 727 543

ROLE: Botanist **ORGANISATION:** AECOM

EMAIL: Floora.dewit@aecom.com

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

Koolan Island, 130m south of administration offices

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:

GDA94 / MGA94 ☐

AGD84 / AMG84 ☐

WGS84 ☐

Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)

DecDegrees ☒ DegMinSec ☐ UTMs ☐

Lat / Northing:

Long / Easting:

ZONE:

METHOD USED:

GPS ☒ Differential GPS ☐ Map ☐

No. satellites: _____ Map used: _____

Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole _____ to _____	Specify other:Mine tenement

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☒ Area observed (m²): 268 ha

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☒ Count method: _____

(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	4			4
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. _____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒

Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 50%

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Mining	N	H	M
•			
•			

Please return completed form to **Species And Communities Program** DBCA,

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☒
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☒
Limestone ☐
Quartz ☐
Specify other: _____

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☒
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: _____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☐
Black ☐
Specify other: _____

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☒ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:

Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. *Eucalyptus miniata, Callitris columellaris* and *Buchania obovata* low woodland
2. *Dodonaea hispidula, Premna acuminata* and *Wrightia saligna* mid open shrubland
3. *Triodia bynoei, Heteropogon contortus* and *Chrysopogon latifolius* low open mixed hummock and tussock grassland
4.

ASSOCIATED SPECIES:

Trachymene didiscoides, Afrohybanthus aurantiacus and *Euphorbia armstrongiana* var. *distans* and numerous climbers including *Rhynchosia australis, Vigna lanceolata* var. *filiformis* and *Cajanus geminatus*.

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☒ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☒

FENCING: Not required ☒ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☒ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Collected at -16.144394 123.757606

Also found at: -16.144966 123.75823

-16.138611 123.754669

-16.136179 123.75523

There may be more individuals, lack of flowering material makes it hard to id correctly in the field.

FLORA AUTHORISATION / LICENCE No: FB62000137 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: FDW210506 WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other: _____

Submitter of Record: F de Wit Role: Botanist Signed: F. de Wit Date: 12/08/2021

Please return completed form to **Species And Communities Program** DBCA,

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

About AECOM

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