BROOME REGIONAL RESOURCE RECOVERY PARK

DETAILED FLORA & VEGETATION ASSESSMENT

PREPARED FOR: TALIS CONSULTANTS | SHIRE OF BROOME

Spectrum ECOLOGY

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Report Details			
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Prepared For:	Talis Consultants | Shire of Broome		
Project ID:	2008		
Version History	Author	Reviewer	Date of Issue
Version 2	Chris Shaw, Tim Hammer	Melissa Hay	3-July-2020

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EXECUTIVE SUMMARY

The Shire of Broome is investigating two sites ('D2' and 'G1' – the Study Areas) for the placement of a new community recycling centre and/or landfill. The D2 Study Area is 122 ha and located approximately 10 km north of Broome. The G1 Study Area is 98 ha and located approximately 33 km north-east of Broome. As part of the site investigations, a range of hydrogeological and geotechnical works are required which will involve the removal of native vegetation (approximately 2.5 ha for D2 and 3.0 ha for G1).

Talis Consultants, on behalf of the Broome Shire, commissioned Spectrum Ecology (Spectrum) to undertake a detailed flora and vegetation assessment for the Broome Regional Resource Recovery Park (RRRP) Project.

A total of 127 confirmed vascular plant taxa were recorded during the survey, of which four were introduced taxa. No Threatened Flora taxa were recorded in the survey. Three Priority Flora taxa have been recorded within D2 Study Area: *Corymbia paractia* (Priority 1), *Jacquemontia* sp. Broome (A.A. Mitchell 3028) (Priority 1), and *Terminalia kumpaja* (Priority 3). No Priority species were recorded from G1 Study Area. All Priority Flora taxa recorded in the Study Areas were assessed to have low local and regional significance. None of the introduced flora are listed as Declared Pests in Western Australia.

No floristic Threatened Ecological Communities were recorded within the Study Areas. The desktop assessment found the Mangarr (Minyjuru) (P1) Priority Ecological Community (PEC) was present in north-west corner of the D2 Study Area. Scattered *Sersalisia sericea* (Minyjuru) trees were recorded in the D2 Study Area outside the current PEC; however, it is unlikely that these individuals indicate the presence of the Mangarr PEC. The *Corymbia paractia* (P1) PEC was likely recorded at the D2 Study Area based on the known distribution of *C. paractia*, abundance recorded in the survey, and the location of the Study Area. TEC or PECs are not likely to occur within the G1 Study Area.

One vegetation type was recorded within the two Study Areas and is described as: *Corymbia greeniana* low open woodland with *Acacia eriopoda* and *Bauhinia cunninghamii* tall open shrubland, over *Triodia schinzii* and *Triodia caelestialis* low sparse hummock grassland and *Chrysopogon pallidus* and *Sorghum plumosum* low sparse tussock grassland. The vegetation unit (V001) was considered to have low regional and local significance as the distribution was not restricted within the bioregion and did not provide habitat for restricted significant flora.

1. INTRODUCTION

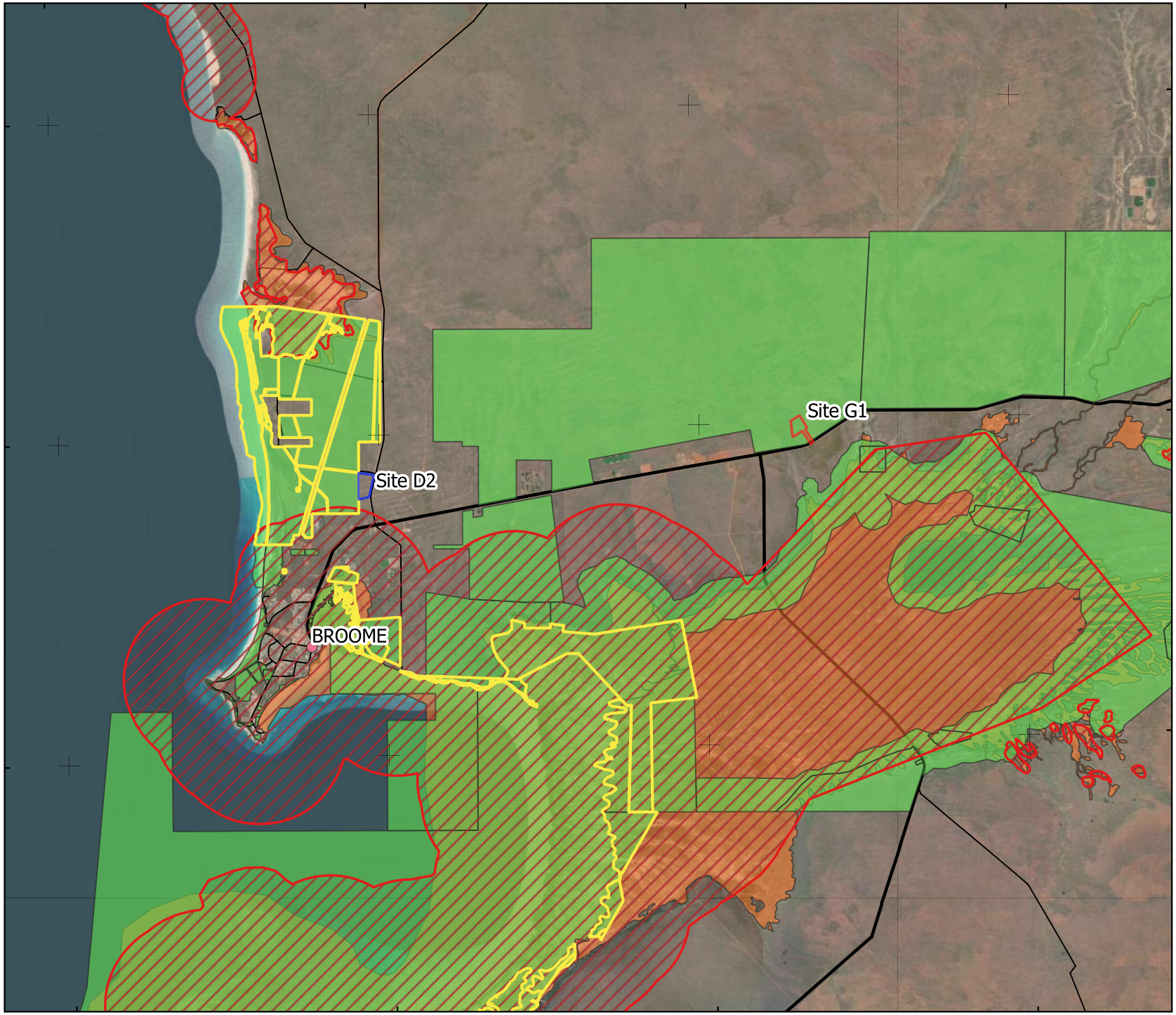
1.1. Project Background

The Shire of Broome is investigating two sites ('D2' and 'G1') for the placement of a new community recycling centre and landfill. The D2 Study Area is 122 ha and located approximately 10 km north of Broome. The G1 Study Area is 98 ha and located approximately 33 km north-east of Broome. As part of the site investigations, a range of hydrogeological and geotechnical works are required which will involve the removal of native vegetation (approximately 2.5 ha for D2 and 3.0 ha for G1). The disturbance to vegetation will include access tracks, boreholes, and trial pits. To allow such works to occur, a Native Vegetation Clearing Permit (NVCP) will be necessary and, as such, flora and fauna surveys are required to be undertaken in support of the NVCP application. Flora and Fauna surveys have previously been conducted at the G1 prior to the movement of the site boundary to its current location.

1.2. Objectives

Talis Consultants, on behalf of the Broome Shire, commissioned Spectrum Ecology (Spectrum) to undertake a detailed flora and vegetation assessment for the Broome RRRP Project. Spectrum Ecology previously conducted a reconnaissance flora and level 1 fauna survey at the D2 and G1 Study Areas in December 2019 to determine the environmental values present at the sites (Map 1.1) and provide support to relevant applications to undertake initial hydrogeological and geotechnical investigations for the development of the RRRP project.

The following is a brief technical report and survey data that satisfies the relevant regulatory guidance statements and documents the results, findings, and limitations of the survey.



Legend

- D2 Study Area
- G1 Study Area
- CAPAD Protected Areas
- Environmentally Sensitive Areas (ESA)
- Yawuru Indigenous Protected Area
- Directory of Important Wetlands

Roads

- Principal Road
- Minor Road

N

0 2 4 6 8 10 km

Scale 1:330,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 19-06-2020

Location of Study Area & Significant Lands

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map
1.1

1.3. Bioregion & Climate

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia into regions based on dominant landscape, climate, lithology, geology, landform, and vegetation (Thackway & Cresswell, 1995).

The Study Area is located in the Pindanland (DAL02) IBRA subregion within the larger Dampierland (DAL) region (Figure 1.1). The Pindanland subregion comprises the western half of Dampierland, including the sandplains of the Dampier Peninsula, extending south along the hinterland of Eighty Mile Beach and north to include the paleodelta of the Fitzroy River (Graham, 2002). It is further described as having a fine-textured sand-sheet with low dunes covered by pindan vegetation, being the coastal, semi-arid, north-western margin of the Canning Basin (Graham, 2002). Inland vegetation typically consists of *Triodia* spp. (spinifex) or *Chrysopogon* spp. (ribbon grass) grasslands under *Acacia* spp. open shrub with low open woodlands of *Eucalyptus* species.

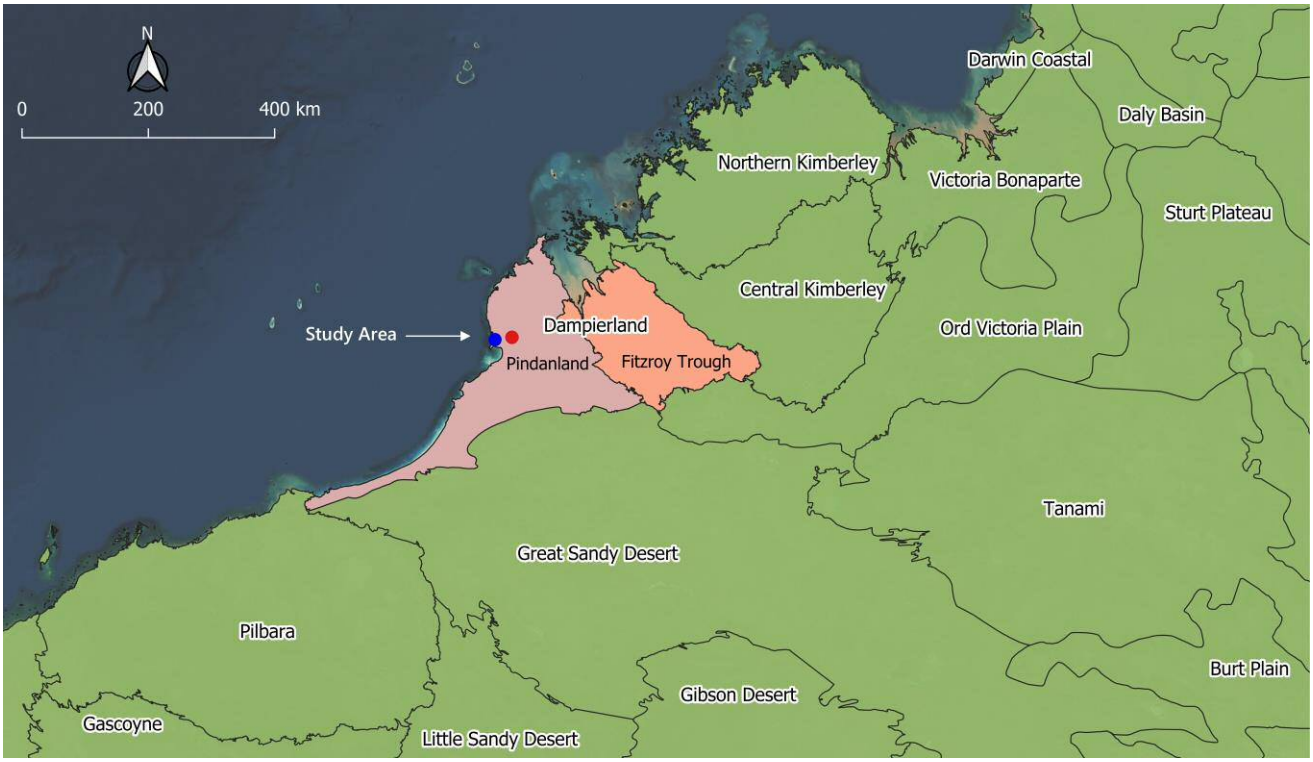


Figure 1.1: IBRA Classification of the Study Areas

The climate near Broome is dry, hot, and tropical and divided into a dry and wet season. The dry season runs from April to November, with very little rain and daily temperatures around 30°C. During the wet season, from December to March, average temperatures are several degrees higher along with erratic, often heavy rainfall, high humidity, and the possibility of tropical cyclones. The median annual rainfall is 561 mm, however the range of recorded annual rainfall is highly variable, from 132 mm to 1599 mm (Bureau of Meteorology, 2019).

1.4. Disturbance History

The dominant land uses for the Pindanland subregion include grazing on native pastures, unallocated crown land, and crown reserves. At the time of survey, the most recent fire within the Study Area and surrounds occurred in 2019.

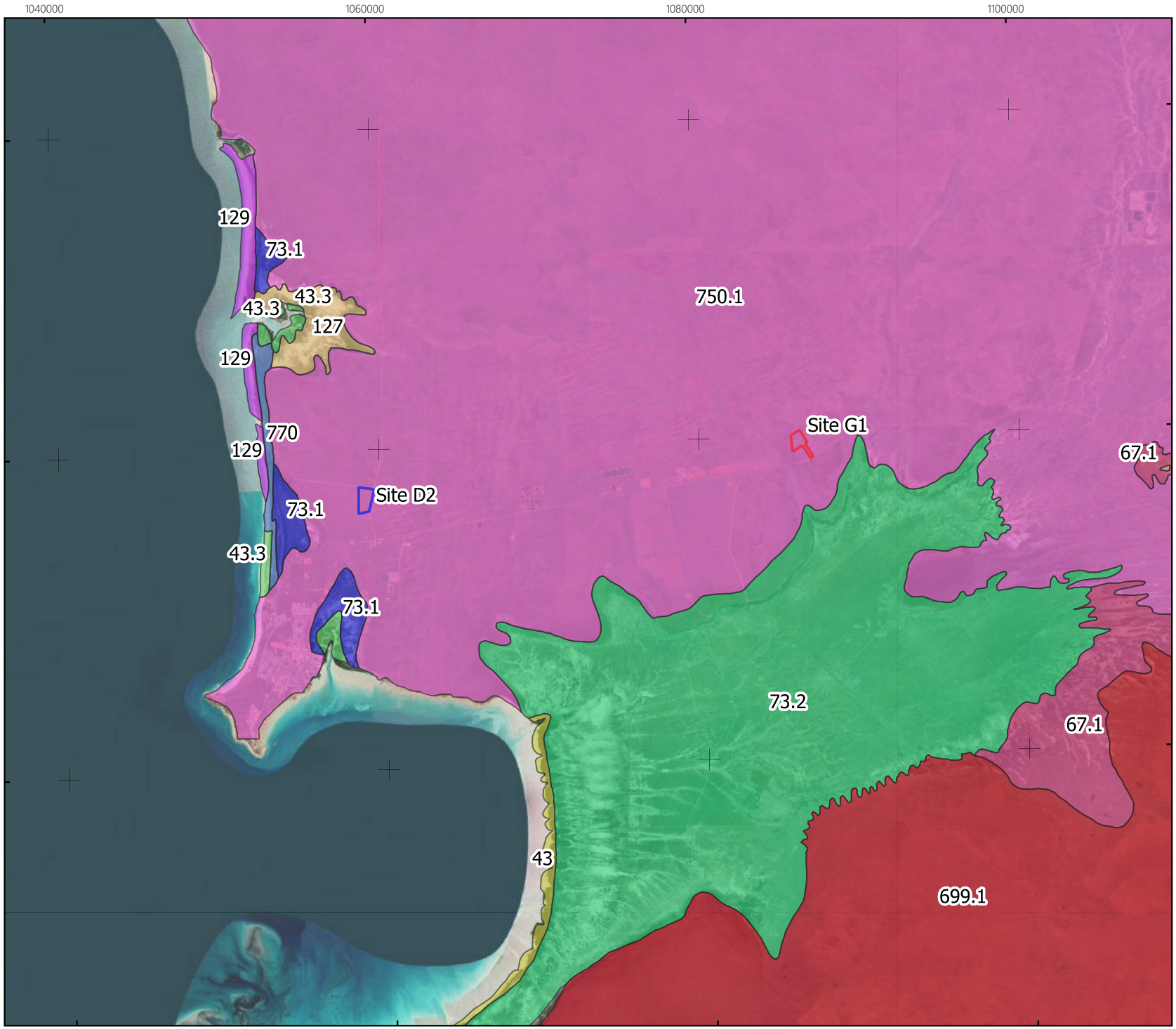
1.5. Beard Vegetation

Pre-European vegetation mapping was originally undertaken by J. S. Beard at various scales across the state and has since been updated to be consistent with the National Vegetation Information System (NVIS) descriptions at a scale of 1:250,000 (DPIRD 2020). State-wide vegetation statistics are available for these units, listing pre-European extent, current extent, and area in DBCA managed lands, are a useful tool to determine if a vegetation unit is rare or otherwise significant (WAGov, 2019). The unit mapped at the Study Areas has more than 99.7% of its pre-European extent remaining.

Both Study Areas occur entirely within one vegetation sub-association (750.1). This sub-association is restricted to the Dampierland IBRA region but is the second largest sub-association within the region and widespread. The vegetation classification is listed in Table 1.1 and presented in Map 1.2.

Table 1.1: Beard Vegetation

Sub-association	NVIS Level VI Vegetation Description	Area in Study (ha)	% of Study Area	Pre-European Whole State (ha)	Current Extent State (ha)	% Remaining	% of Current Extent in DBCA Land
750.1	*Corymbia polycarpa*, *Corymbia papuana* and *Corymbia setosa* woodland, over *Acacia eriopoda*, *Acacia holosericea* and *Dolichandrone occidentalis* tall shrubland, over *Chrysopogon* sp. open tussock grassland	D2 – 122 G1 – 98	D2 – 100% G1 – 100%	1,221,911.2	1,218,020.5	99.7	2.7



Legend

D2 Study Area

G1 Study Area

Beard Vegetation Units

- 43.0
- 43.3
- 67.1
- 73.1
- 73.2
- 125.0
- 127.0
- 129.0
- 699.1
- 750.1
- 770.0

N

0 2 4 6 8 10 km

Scale 1:330,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 19-06-2020

Beard Vegetation

Broome Regional Resource Recovery Park

Map 1.2

Prepared for
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1.6. Geology

The geology of Western Australia (WA) has been mapped at a scale of 1:50,000, 1:100,000, 1:250,000, and 1:500,000. The township of Broome has been mapped to the finer scale 1:50,000 (Map 1.3), the surrounding region limited to a 1:250,000 and 1:500,000 scales.

Both study areas are located over the Broome, Mowla and Melligo Sandstones (K-bm-st) 1:500,000 geological unit, the total extent of this geological unit is 2,260,980 ha in WA and 1,980,210 ha in the Dampierland IBRA. The K-bm-st geological unit mapped at the Study Areas is widespread across WA and the Dampierland IBRA. The unit has less than 0.001% of its total occurrence within the Study Areas.

The D2 Study Area occurs within the Sm10 (1:50k) and Qz (1:250k) geological units. Both units are described as homogenous fine-grained red sands. The G1 Study Area is located over the Qs (1:250k) geological unit which is comprised of sand and silt and occurs extensively in the surrounding region. Extrapolating from the 1:50,000 geological units, the G1 site likely falls within the Sm10 (1:50k) geological unit (Table 1.2; Map 1.3). The geological units are listed in Table 1.2 and mapped at 1:50,000 in Map 1.3.

Table 1.2: Geological Units

Scale	Code	Description	Area in Study Area (ha)	% of Study Area
D2 Study Area				
1:50k	Sm10	Silky sand: red, fine-grained, sub-rounded quartz, variable silt content, homogeneous	122	100%
1:250k	Qz	Red sand, fine to medium; minor silt; aeolian	122	100%
1:500k	K-bm-st	Fine- to coarse-grained sandstone; minor mudstone and conglomerate	122	100%
G1 Study Area				
1:50k*	Sm10	Silty sand: red, fine-grained, sub-rounded quartz, variable silt content, homogeneous	98	100%
1:250k	Qs	Sand, silt; minor gravel: mixed alluvial and aeolian	98	100%
1:500k	K-bm-st	Fine- to coarse-grained sandstone; minor mudstone and conglomerate	98	100%

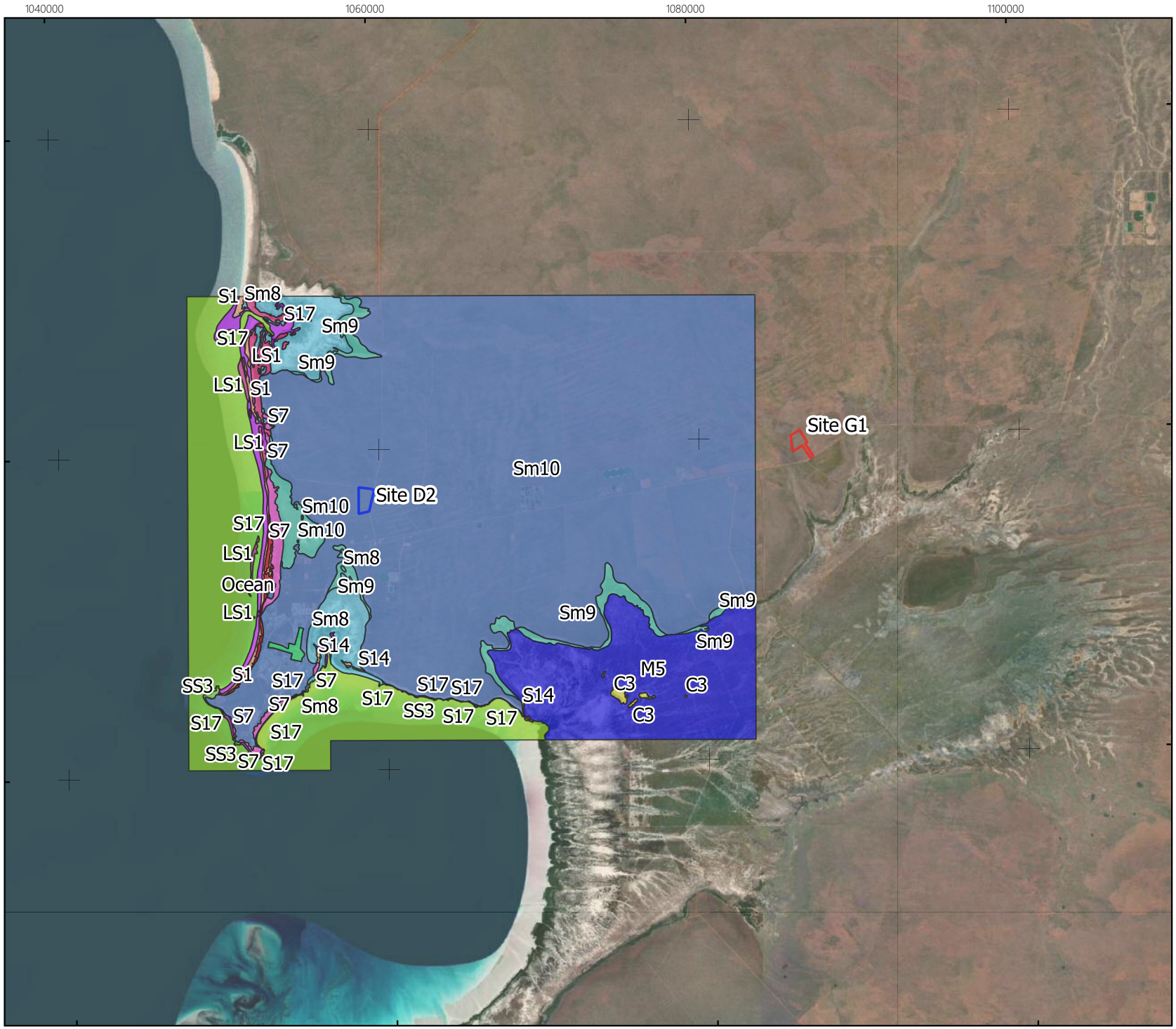
*Estimate based on 1:50,000 and 1:250,000 geological units.

1.7. Land Systems

Study Areas are on the boundary between Yeeda and Wanganut land systems (Schoknecht & Payne, 2011). The Yeeda land system is dominated by red sandplains supporting pindan vegetation with dense *Acacia* shrubs, scattered bloodwood and grey box trees and curly spinifex and ribbon grass. The Wanganut land system is dominated by low-lying sandplain and dunefields with through-going drainage (Schoknecht & Payne, 2011). The land systems associated with the Study Areas are presented in Table 1.3 and Map 1.4.

Table 1.3: Land Systems

Land System	Description	Area in Project (ha)	Total Extent (ha)	Location & Description of Occurrence
Yeeda	Sandplain, deep red and yellow sands, pindan and tall woodlands.	D2 – 24 G1 – 95	2,130,800	Widespread across the Dampierland IBRA region. Predominantly found on the Pindanland IBRA subregion.
Wanganut	Low-lying sandplain and dunefields with through-going drainage, pindan.	D2 – 98 G1 – 3	697,300	Located in the northern half of the Dampierland IBRA region. Found evenly across both the Pindanland and Fitzroy Trough IBRA subregions.



Legend

- D2 Study Area
- G1 Study Area

Geological Units 1:50,000

- C3
- Gsb1
- LS1
- M5
- Made grd
- S1
- S14
- S17
- S2
- S7
- Sm10
- Sm8
- Sm9
- SS3
- Ocean

N

0 2 4 6 8 10 km

Scale 1:330,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

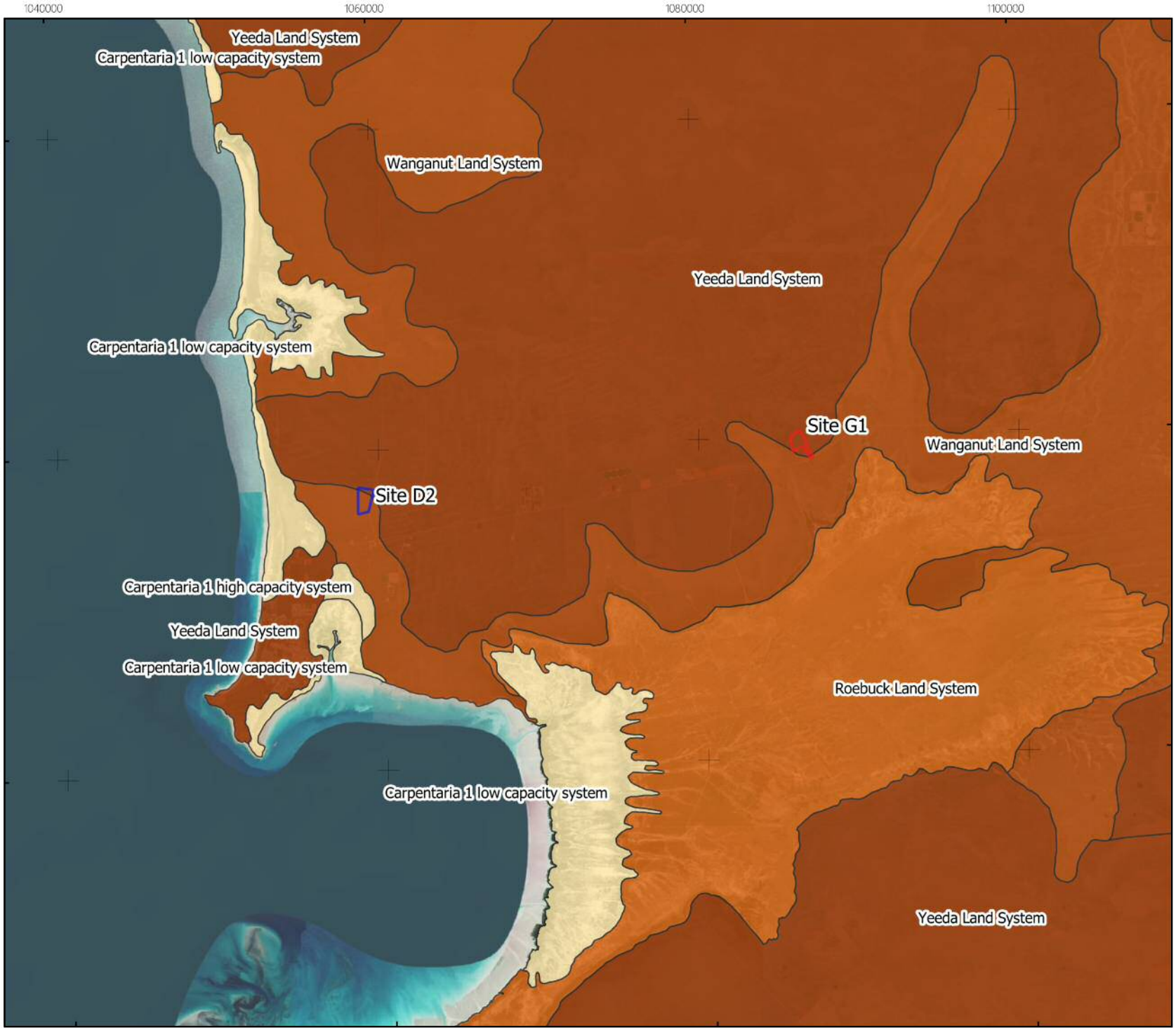
Date: 19-06-2020

Geology (1:50,000)

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map
1.3



Legend

- D2 Study Area
- G1 Study Area

Land Systems

- Carpentaria 1 high capacity system
- Carpentaria 1 low capacity system
- Roebuck Land System
- Wanganut Land System
- Yeeda Land System

N

0 2 4 6 8 10 km

Scale 1:330,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 19-06-2020

Land Systems

Broome Regional Resource Recovery Park

Map 1.4

Prepared for
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1.8. Significant Lands

1.8.1. Environmentally Sensitive Lands

Environmentally Sensitive Areas (ESA) that are associated with flora and vegetation are areas that are defined by the Department of Water and Environmental Regulation (2019) as:

- A defined wetland and the area within 50 m of a wetland;
- The area covered by vegetation within 50 m of Threatened Flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened Flora is located;
- The area covered by a TEC;
- A Bush Forever site;
- Areas covered by the Gnangara Mound Crown Land Policy and Western Swamp Tortoise Policy; and
- Areas covered by lakes, wetlands and fringing vegetation of the Swan Coastal Plain Lakes Policy, including South West Agricultural Zone Wetlands Policy and Swan and Canning Rivers Policy.

No ESAs were mapped within the Project. Both Study Areas are located to the north of a large ESA that comprises the Roebuck Bay and associated Roebuck Plain areas (Map 1.1).

1.8.2. Australian Wetlands Database

The Australian Wetlands Database includes nationally significant wetlands (as listed in the directory of important wetlands), wetlands listed under the Ramsar convention, wetlands that are representative, rare or unique, or wetlands that are considered of international importance (DoEE, 2019).

No nationally significant wetlands, including Ramsar wetlands, were mapped within the Project (Map 1.1).

1.8.3. Conservation Estate

A search of the Collaborative Australian Protected Area Database (CAPAD), identified several protected areas located within 50 km of the Study Areas. These protected areas and their approximate distance from the Study Areas are listed in Table 1.4.

The G1 Study Area is located within the Yawuru Indigenous Protected Area (IPA). The combined area of the 5(1)(h) Reserves listed in Table 1.4 make up a small portion of the greater Yawuru IPA. The D2 Study Area is not located within any protected areas though is immediately east of the Yawuru Birragun Conservation Reserve. Conservation Estate, ESAs, nationally significant wetlands, and the extent of the Yawuru IPA are displayed on Map 1.1.

Table 1.4: Significant Lands Within 50 km of the Study Areas

Reserve Name (Protected Area ID)	Relevant to the Study Area		Jurisdiction/ Size
	Distance	Direction	
5(1)(h) Reserves			
Broome Bird Observatory (WA_41066)	D2 – 13.8 km G1 –23.9 km	Southeast Southwest	Western Australia, 2.7 ha
Broome Wildlife Centre (WA_47964)	D2 – 6.5 km G1 – 32.3 km	Southwest West southwest	Western Australia, 5.0 ha
Unnamed (WA_51105)	D2 – 11.9 km G1 –26.6 km	South Southwest	Western Australia, 317.0 ha
Yawuru Conservation Estate (WA_51162)	D2 – 5.5 km G1 – 30.5 km	West West	Western Australia, 2,515.6 ha
Unnamed (WA_51497)	D2 – 4.6 km G1 – 28 km	South Southwest	Western Australia, 716.5 ha

Reserve Name (Protected Area ID)	Relevant to the Study Area		Jurisdiction/ Size
	Distance	Direction	
Unnamed (WA_51583)	D2 – 11.9 km G1 – 13.3 km	Southeast Southwest	Western Australia, 4,896.0 ha
Unnamed (WA_51617)	D2 – 13.6 km G1 – 24.9 km	Southeast Southwest	Western Australia, 5.7 ha
Unnamed (WA_51932)	D2 – 19.4 km G1 – 20.8 km	Southeast Southwest	Western Australia, 5,778.5 ha
Yawuru Birragun Conservation Park (WA_52354)	D2 – Directly adjacent G1 – 25km	West West	Western Australia, 7,223.8 ha
Indigenous Protected Areas			
Yawuru (CWTH_IPA75)	D2 – Directly adjacent G1 – Located within IPA	West Within	Commonwealth of Australia, 210,763.7 ha

2. METHODOLOGY

2.1. Project Team & Licenses

Spectrum Ecology staff involved with this assessment are listed in Table 2.1, along with their role, years of experience and relevant licenses.

Table 2.1: Project Team & Licences

Staff	Role	Experience	Licences
Melissa Hay (Principal Botanist)	Reporting, QA	12 years	-
Chris Parker (Senior Botanist/Ecologist)	Field Assessment, reporting, data analysis	10 years	Flora: FB62000009-2
Chris Shaw (Botanist)	Field Assessment, reporting, data analysis	3 years	Flora: FB62000241
Dr Tim Hammer (Taxonomist/Botanist)	Plant IDs, reporting	5 years	-

2.2. Field Survey Timing

Climate data and conditions leading up to the detailed flora survey recorded at Broome Airport (Bureau of Meteorology station #003003) are presented in Figure 2.1 and Table 2.2. The D2 and G1 Study Areas are located approximately 10 km north-north-east and 33 km east-north-east of the Broome Airport weather station, respectively.

The reconnaissance flora survey was undertaken after a period of below annual rainfall. Broome Airport recorded 265 mm under the median total annual rainfall (Table 2.2).

Total rainfall for the 12-month period prior to the detailed flora survey (April 2019–March 2020) was 512 mm, 49 mm higher than the median total annual rainfall recorded at Broome Airport (561 mm). Total rainfall for the three-month period prior to the field survey (January–March) was 433 mm, 3 mm above the long term median for the same period of time (430 mm) (Table 2.2). Seasonal conditions were above median for the timing of the detailed field survey, as recommended by the technical guidance (EPA, 2016b).

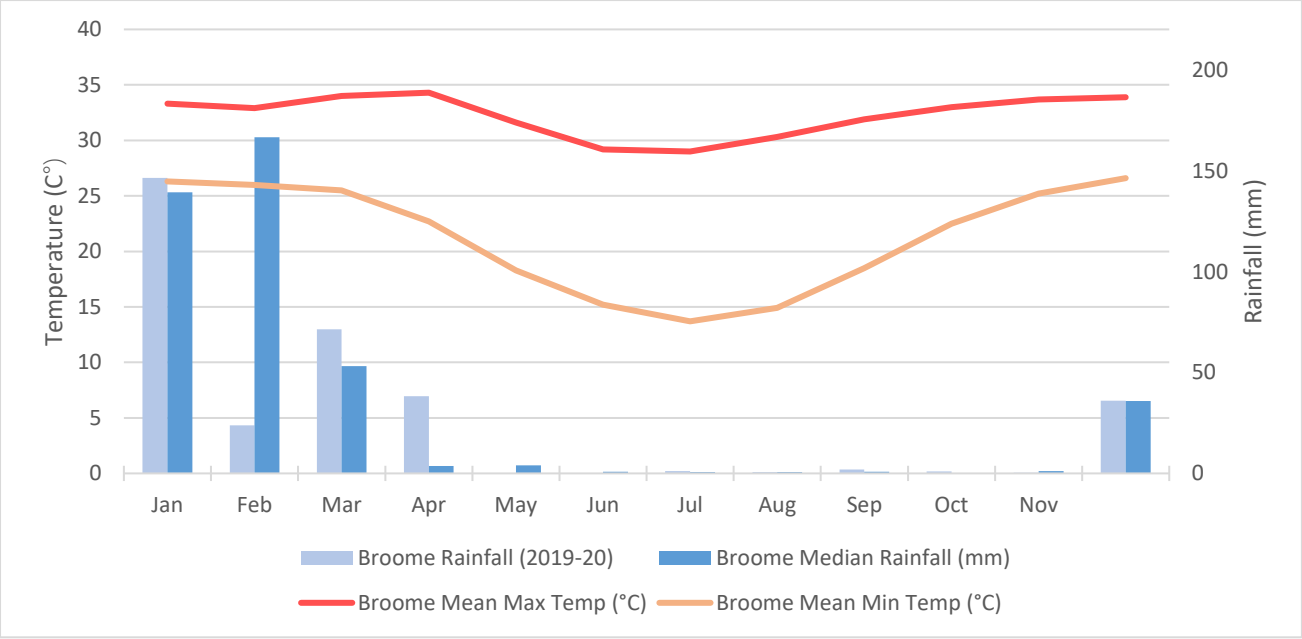


Figure 2.1: Climate Data (1940-2020) for Broome Airport (#003003)

Table 2.2: Field Survey Timing & Rainfall

Field Survey	Date	Person Days	BOM Station	Rainfall (mm)					
				3 Months Prior	3 Month Median	+/-	12 Months Prior	Annual Median	+/-
Reconnaissance flora survey	26 Nov 2019	1	Broome Airport	4	5	-2	296	561	-265
Detailed flora survey	19 – 23 April 2020	10	Broome Airport	433	430	3	512	561	49

2.3. Legislation & Guidelines

Flora and fauna in Western Australia are protected by various legislation, including:

- The State *Biodiversity Conservation Act 2016* (BC Act);
- The National *Environmental Protection Act 1986* (EP Act); and
- The National *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This detailed assessment is compliant with the appropriate flora guidelines as outlined in:

- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

2.4. Significant Flora & Vegetation Definitions

Flora and vegetation can be considered significant for a range of reasons.

Significant flora can include (EPA, 2016a):

- Being identified as Threatened: Critically Endangered, Endangered or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Being identified as Priority species: Priority 1 to 4 (DBCA, 2019);
- Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or anomalous features that indicate a potential new species;
- Representative of the range of a species (particularly, at the extremes of range recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant vegetation can include (EPA, 2016a):

- Threatened Ecological Community (TEC): Critically Endangered, Endangered or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Priority Ecological Community (PEC): Priority 1 to 5 (DBCA, 2020);
- Restricted distribution;
- Degree of historical impact from threatening processes;
- A role as a refuge; or
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

2.5. Introduced Flora & Declared Plant Categories

Introduced flora can pose a threat to native vegetation and biodiversity. The Department of Primary Industries and Regional Development (DPIRD) keeps a database of organisms that are declared pests in Western Australia. This database is regulated under the Biosecurity and Agricultural Management Act (WA Gov, 2007). The legal status and control requirements for these environmentally significant weeds are provided in Appendix A.

2.6. Nomenclature

Flora nomenclature used in this report is consistent with the DBCA Census of Western Australian Plants database, provided through FloraBase (Western Australian Herbarium, 2020) and is current at the time of report preparation.

2.7. Desktop Assessment

A desktop review of all relevant and available flora and vegetation data sources was undertaken prior to the field survey to determine the species and communities that are likely to occur in the Study Area. This review included searches of relevant databases and a review of relevant literature from the surrounding region.

2.7.1. Database Searches

The database searches completed for this project are listed in Table 2.3.

Table 2.3: Details of Database Searches

Data Source	Custodian	Details
Threatened & Priority Flora database (WAH/TPFL)	Department of Biodiversity, Conservation and Attractions (DBCA)	Date: 26/11/2020 Buffer: 50 km around a central point Reference: 27-1119FL
TEC & PEC database		Date: 17/12/2019 Buffer 50 km around a central point Reference: 15-0219EC
Commonwealth Protected Matters Search Tool (PMST)	Department of the Environment and Energy (DoEE)	Date: 13/11/19 Buffer: 40 km
NatureMap	Department of Parks and Wildlife (DPAW) / Western Australian Museum	Date: 13/11/19 Centre point: 17°54'10"S, 122°20'17"E Buffer: 40 km
Index of Biodiversity Surveys of Assessments (IBSA) database.	Department of Water and Environmental Regulation (DWER)	Date: 10/01/2020

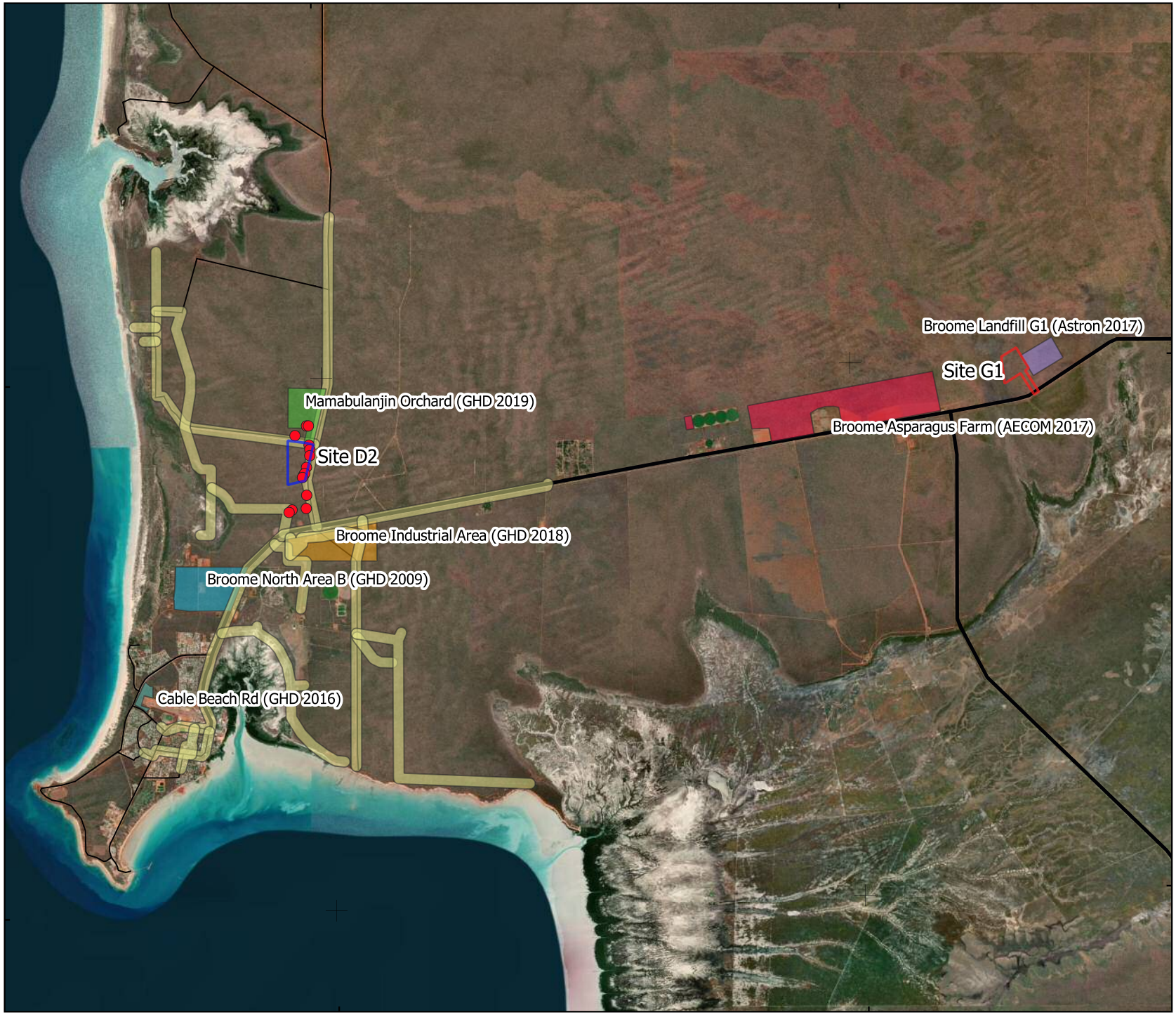
2.7.2. Previously Conducted Flora Assessments

A desktop review of all relevant and available literature was undertaken prior to the field assessment. The following previous survey reports were searched to determine species of conservation significance likely to occur in the Study Area. The Index of Biodiversity Surveys and Assessments (IBSA) was also utilised to access available previous assessment reports from the surrounding region. Details of each report are summarised in Table 2.4 and mapped in Map 2.1.

Table 2.4: Previously Conducted Flora Assessments

Report Title	Level of Assessment	Field Survey Timing
Mamabulanjin Orchard Flora and Fauna Survey (GHD, 2019).	Detailed and targeted flora & vegetation. Level 1 and targeted fauna.	1–2 May 2019 (flora & vegetation).
Distribution, ecology and cultural importance of Gunurru or Cable Beach Ghost Gum *Corymbia paractia* in the Broome area, Western Australia (Environs Kimberley, 2018).	Targeted survey and distribution mapping of Cable Beach Ghost Gum *Corymbia paractia*.	November – December 2016 (flowering period).
Broome Road Industrial Area Targeted Survey (GHD, 2018).	Targeted flora survey (*Polymeria* sp. Broome and *Jacquemontia* sp. Broome).	24–27 April 2017, 10–12 May 2017.
Flora, Vegetation and Fauna Assessment – Broome Asparagus Farm (AECOM, 2017).	Detailed (single phase) flora & vegetation, Level 1 fauna.	8–12 May 2017 (Flora).
Broome Landfill Flora, Vegetation and Fauna Survey (Astron, 2017).	Level 2 flora & vegetation, Level 1 fauna.	2–3 November 2016 (Flora & Fauna). 3–5 April 2017 (Flora).
Broome Motorplex Environmental Site Investigation (GHD, 2016).	Level 2 (single phase) flora & vegetation.	18–24 March 2016 (flora & vegetation).
Priority Ecological Community (PEC) Mapping and condition assessment: "Relict dune system dominated by extensive stands of Mangarr (Minyjuru) *Sersalisia* (formerly *Pouteria*) *sericea*" (Willing & Beames, 2015)^	Targeted survey and condition assessment of the Minyjuru (*Sersalisia sericea*) dominated relict dune system PEC.	November 2013 – March 2014.
Broome North – Northern Portion (Area B). Preliminary Environmental Impact Assessment and Biological Survey (GHD, 2009).	Level 1 flora & vegetation.	Field: 3–6 June 2008.

^ Exact location not known



Legend

- D2 Study Area
- G1 Study Area
- Broome Motorplex Sites (GHD 2016)
- Mamabalanjin Orchard (GHD 2019)
- Targeted Corymbia (Environs Kimb 2018)
- Cable Beach Rd East (GHD 2016)
- Broome Industrial Targeted (GHD 2018)
- Broome Asparagus Farm (AECOM 2017)
- Broome Landfill G1 RevA (Astron 2017)
- Broome North Area B (GHD 2009)
- Principal Road
- Minor Road

N

0 2 4 6 8 km

Scale 1:210,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 11-06-2020

Previously Conducted Flora Assessments

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map 2.1

2.7.3. Number of Plants

The significant flora records from the database searches and literature review vary considerably in the amount of detail, regarding abundance, that is available. Ranging from accurate counts, foliage cover, and general descriptions to no detail at all. Where no value was provided for abundance, the numbers were inferred according to Table 2.5. The assumption of value is likely to be an underestimate and hence final estimates are likely to be conservative. Where a range of potential abundance is provided, the lower middle value of the range was used. Exact duplicates were removed and where abundance values differ, the larger number was used.

Table 2.5: Number of Plants Assumed

Description or Cover Provided	Cover (%)	# Plants Assumed
No value	-	1
Rare, few, scattered, some, isolated plants, isolated clumps, very sparse, uncommon	<2%	3
Several, small group, scarce, sparse, scattered, small population, dozens	2-10%	10
Infrequent, uncommon, many, medium sized patch	10-30%	20
Occasional, moderately common, localised, large patch	30-70%	30
Common, Locally common, locally frequent, locally scattered, locally abundant, mid-dense, healthy population	>70%	50
Frequent, very common, plentiful, abundant, dominant, extensive, dense	>70%	100

2.7.4. Likelihood of Occurrence Assessment

The following information was collated for each significant flora taxon or vegetation community identified during the desktop assessment:

- Conservation status (EPBC Act, WC Act, DBCA listing);
- Description of species and flowering period (flora only);
- Description of habitat requirements and presence within the Project;
- Source of record (DBCA, previous report etc.); and
- Distance of record to the Project.

A likelihood of occurrence assessment was then conducted using the criteria listed in Table 2.6. This included assessing the distance of the record from the Study Areas (historical database records considered not accurate were excluded if required), and presence of appropriate habitats within the Study Areas (using land systems, geology, vegetation mapping, and/or aerial imagery).

Table 2.6: Likelihood of Occurrence Assessment Criteria

Likelihood	Flora & Vegetation
Recorded	Species or vegetation community accurately recorded within the Study Area during the literature review (includes TEC/PEC buffers that intersect).
High	Species or vegetation community recorded in close proximity of the Study Area, and suitable habitat does, or is likely to occur.
Medium	Species or vegetation community recorded outside the Study Area but within 20 km and suitable habitat may occur.
Low	Species or vegetation community rarely or not recorded within 20 km of the Study Area and suitable habitat does not likely occur within the Study Area.

2.7.5. Data for the Index of Biodiversity Survey's for Assessment (IBSA)

The Environmental Protection Authority has given instruction that all biological surveys collecting data on biodiversity submit the report and associated raw data to IBSA as an IBSA data package.

All survey data collected will be provided electronically to comply with IBSA data standards.

2.8. Detailed Flora & Vegetation Assessment

2.8.1. Field Methodology & Sampling Effort

A reconnaissance level flora and vegetation assessment was previously conducted at the Study Areas in November 2019. This was considered appropriate as it is the preliminary investigation into environmental values of the Study Areas. The detailed flora survey was conducted in the months following the wet season (February – April).

During the reconnaissance survey, five relevés were sampled within the Study Areas; including two relevés at D2 Study Area, three relevés in G1 Study Area. The detailed flora survey across both Study Areas was comprised of:

- Five 50 × 50 m quadrats (one located outside the Study Area);
- Five relevés (three located outside the Study Area); and
- 45 km of traverses with 100m spacing.

A combination of quadrats, relevés, traverses, and opportunistic sampling is appropriate for a detailed level survey as stipulated in the guidance statement (EPA, 2016b). These survey techniques are described in Table 2.7. Sites and traverses surveyed at the Study Areas are mapped in Map 2.2 and Map 2.3, respectively.

Table 2.7: Detailed Flora & Vegetation Assessment Survey Technique

Technique	Description
Quadrat	Quadrats are a comprehensive survey technique for gathering information for detailed flora and vegetation surveys. Each vegetation unit must be represented by a minimum of three quadrat sites over two seasons and have at least one corner (NW) permanently marked. Information collected at each quadrat includes: • Site code, date, location, botanist; • Four photographs, one from each corner of the site; • Vegetation condition and disturbances (including fire); • Landform, including slope, soil, rock type, aspect; • Flora and vegetation information; dominant cover, structure and species count where necessary; and • Comprehensive recording of every species within the quadrat boundary (50 × 50 m).
Relevés	Relevés used in a detailed survey are employed to support the vegetation mapping and survey effort. They are a lower intensity survey technique or sampled where quadrats are too dangerous to set up. Information collected at each relevé is the same as that of a quadrat site, excluding the comprehensive collection of every species within the quadrat boundary, and the requirement to permanently mark the site's corners.
Traverses	A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for detailed survey, and targeting significant flora or vegetation. Information recorded along a traverse is as for the relevé, with the addition of noting vegetation changes and relationships between vegetation and substrate.

Technique	Description
Opportunistic Sampling	Flora and vegetation not recorded through other sampling methods was opportunistically sampled as encountered in the study area. Opportunistic sampling also included recording locations of significant, introduced (weed) and unknown species.
Targeted Sampling	Areas likely to support significant flora or vegetation were targeted during the survey, including areas with existing records of significant flora. Areas were selected based on existing records from database searches, geology, vegetation mapping and known Environmentally Sensitive Areas. Where possible, unusual, and restricted geological features within the study area were sampled. When potentially significant flora were encountered during the survey, sufficient information was recorded to complete a Threatened and Priority Flora Report Form (TPRF).

Legend

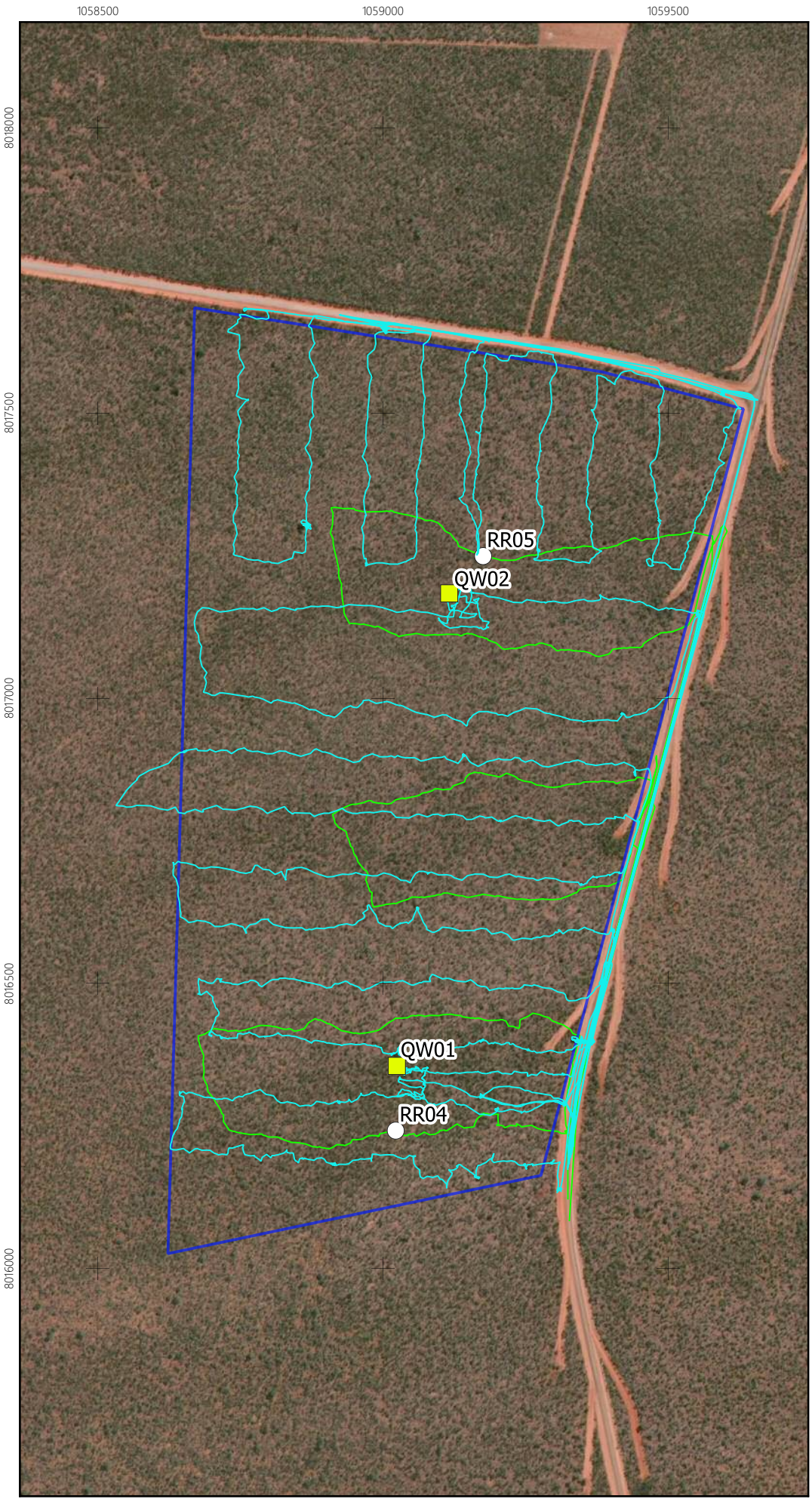
- D2 Study Area

Detailed Flora Survey

- Quadrat
- Site Traverse

Reconnaissance Flora Survey

- Releve
- Site Traverse



Spectrum ECOLOGY

Date: 19-06-2020

Author: CS

N

0 0.2 0.4 km

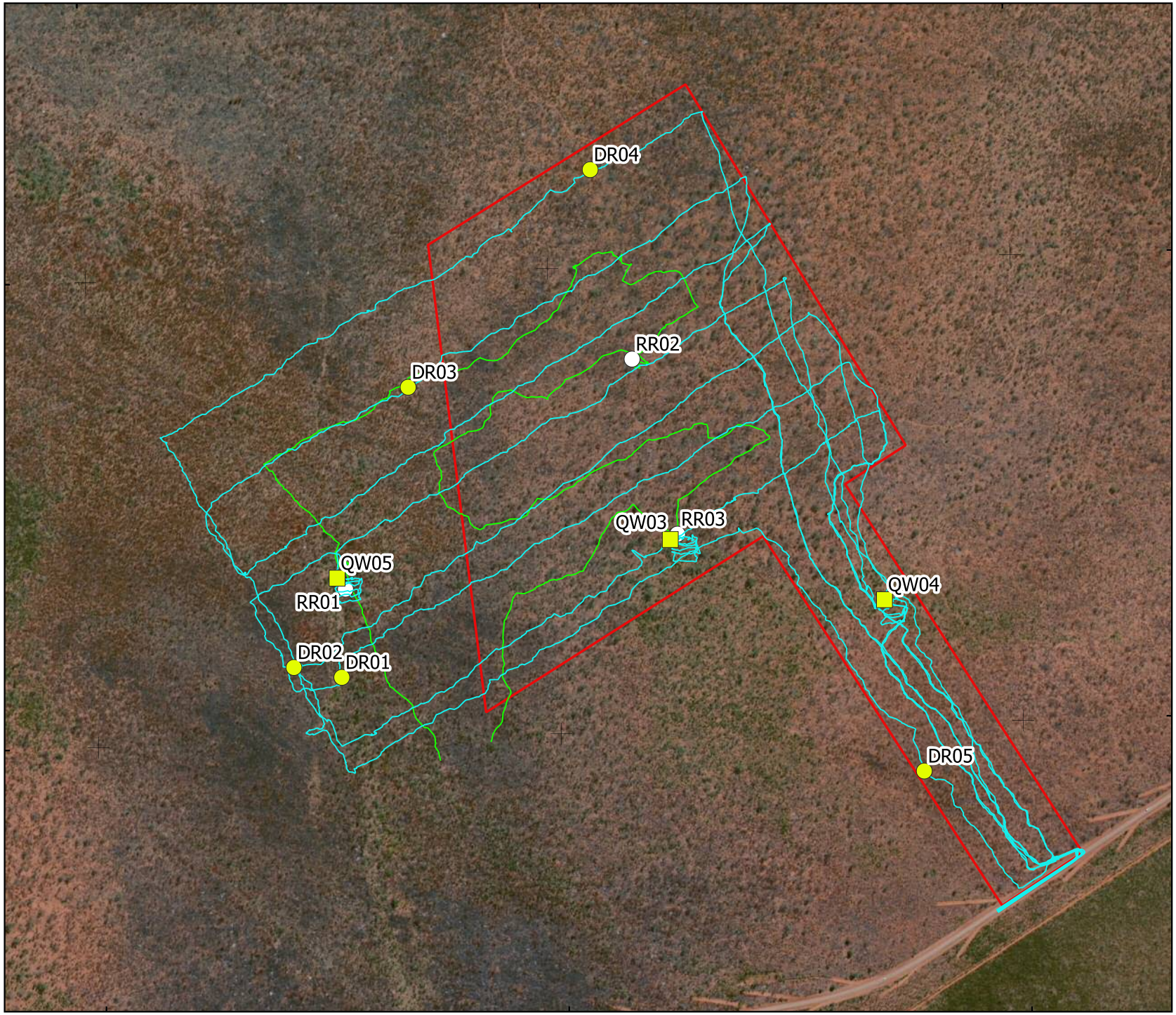
Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Scale 1:10,000

D2 Study Area
Flora Survey Effort

Broome Regional Resource Recovery Park

Map
2.2



Legend

G1 Study Area

Detailed Flora Survey

- Quadrat
- Releve
- Site Traverse

Reconnaissance Flora Survey

- Releve
- Site Traverse

N

0 0.2 0.4 km

Scale 1:12,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 12-06-2020

G1 Study Area
Flora Survey Effort

Broome Regional Resource Recovery Park

Map 2.3

Prepared for
Talis | Broome Shire

2.8.2. Vegetation & Condition Mapping

The data collected from relevés, traverses, as well as general field notes, observations and aerial photography were used to map the vegetation across the study areas. Vegetation was classified structurally based on the dominant species. The vegetation classification is consistent with NVIS Level V – association vegetation descriptions (referred to as a 'vegetation unit' for the local scale in this report). This level of description provides information on the dominant growth form, height and cover for up to three species for each of the upper, mid and ground strata (ESCAVI, 2003).

Vegetation condition was recorded at relevés and where areas of different vegetation condition were observed from both ground truthing and aerial imagery. The vegetation condition was mapped across the study area at the same scale as the vegetation mapping. Vegetation condition ratings follow the scale recommended for the Northern Botanical Province (EPA, 2016), summarised in Table 2.8.Table 2.8

Table 2.8: Vegetation Condition Scale & Criteria – Northern Province

Vegetation Condition	Disturbance Criteria
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
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.

2.8.3. Specimen Identification & Lodgement

Flora specimens were collected of any suspected or known significant flora and to confirm species recorded during the relevés for vegetation mapping. Specimens were identified by plant Taxonomist Dr Timothy Hammer using the appropriate taxonomic keys and, where required, relevant taxonomic experts at the Western Australian Herbarium were consulted.

Specimens are vouchered with the Western Australian Herbarium as per guidance; when they represent new populations of Threatened or Priority Flora, new occurrences of TECs or PECs, individuals that have atypical characteristics, or bioregional range extensions.

2.8.4. Limitations & Constraints

Survey specific limitations and constraints for the flora and vegetation assessment of the Study Areas are discussed in Table 2.9.

Table 2.9: Limitations & Constraints

Limitation	Constraint	Comment
Availability of contextual information at a regional and local scale.	No	There were several surveys identified in the Literature Review and available from the IBSA database in close proximity (20 km) to the study areas (see Table 2.4). These surveys gave excellent local and regional contextual information, particularly for conservation significance. For historical context, Beard mapping has been used, however this mapping is conducted at a coarse scale (1:250,000) and can only provide an approximate comparison.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed.	No	Botanist Chris Parker has ten years' experience in conducting botanical surveys throughout Western Australia, including experience within the Dampier Peninsula and Kimberly bioregion. Botanist Chris Shaw has 3 years' experience.
Restrictions to, or functionality of survey equipment and tools to complete the flora and vegetation assessment.	No	There were no restrictions to or compromised functionality of survey equipment or tools that would adversely affect the flora and vegetation equipment during the current survey.
Proportion of flora recorded and/or collected, any identification issues.	No/ Somewhat	Proportion of flora collected was consistent with expectations for this type of survey and survey timing in the context of other surveys of a similar level and seasonality. There was adequate floristic material available for the majority of the Priority Flora species listed with a high to low Likelihood of occurring within the Study Areas. The survey was conducted when these plants were expected to be flowering. The only exception was *Corymbia paractia* (P1) which was not flowering at the time of the survey and fruit was rarely present on trees. Without adequate floristic material *Corymbia paractia* is difficult to distinguish between other species, such as *Corymbia flavescens* which has a similar distribution. Plants were identified by taxonomist Tim Hammer who has botanical and taxonomic experience throughout Western Australia. Where there were complexities specialist taxonomists at the Western Australian herbarium were consulted. Thirteen specimens were unable to be confirmed or left with a query on their species confirmation due to poor quality material. This may also be contributed to the seasonal conditions for several specimens.
Survey effort and extent.	No	Prior to the field survey, quadrat sites were selected to represent the diversity of vegetation and geology present at the study area. This was sufficient to map and classify the vegetation of the study area for the Reconnaissance assessment. All the vegetation types identified are common for this area. The Study Area was adequately assessed in accordance with the Guidance Statement Guidelines
Access restrictions within the survey area.	No	There were no access limitations in the flora and vegetation survey.

Limitation	Constraint	Comment
Survey timing, rainfall, season of survey.	No	The field survey timing was considered appropriate season for a flora and vegetation survey conducted in the Kimberley Botanical Province. Despite surveying the sites when *Corymbia paractia* typically flowers (April – May) there was inadequate floristic material for the identification for many individuals.
Disturbance that may have affected the results of survey such as fire, flood or clearing.	No/ Somewhat	Large areas of the G1 Study Area were recorded as recently burnt. However; two quadrats were placed in unburnt areas that allowed adequate interpretation of flora and vegetation composition.

3. RESULTS

3.1. Flora

3.1.1. Desktop Assessment

Twenty significant flora taxa were recovered during the flora desktop assessment. One Threatened species, *Seringia exastia*, was assigned a Medium likelihood of occurring at the Site D2 due to its proximity (<10 km) and the possibility of suitable habitat occurring. *Seringia exastia* was given a Low probability of occurring at Site G1.

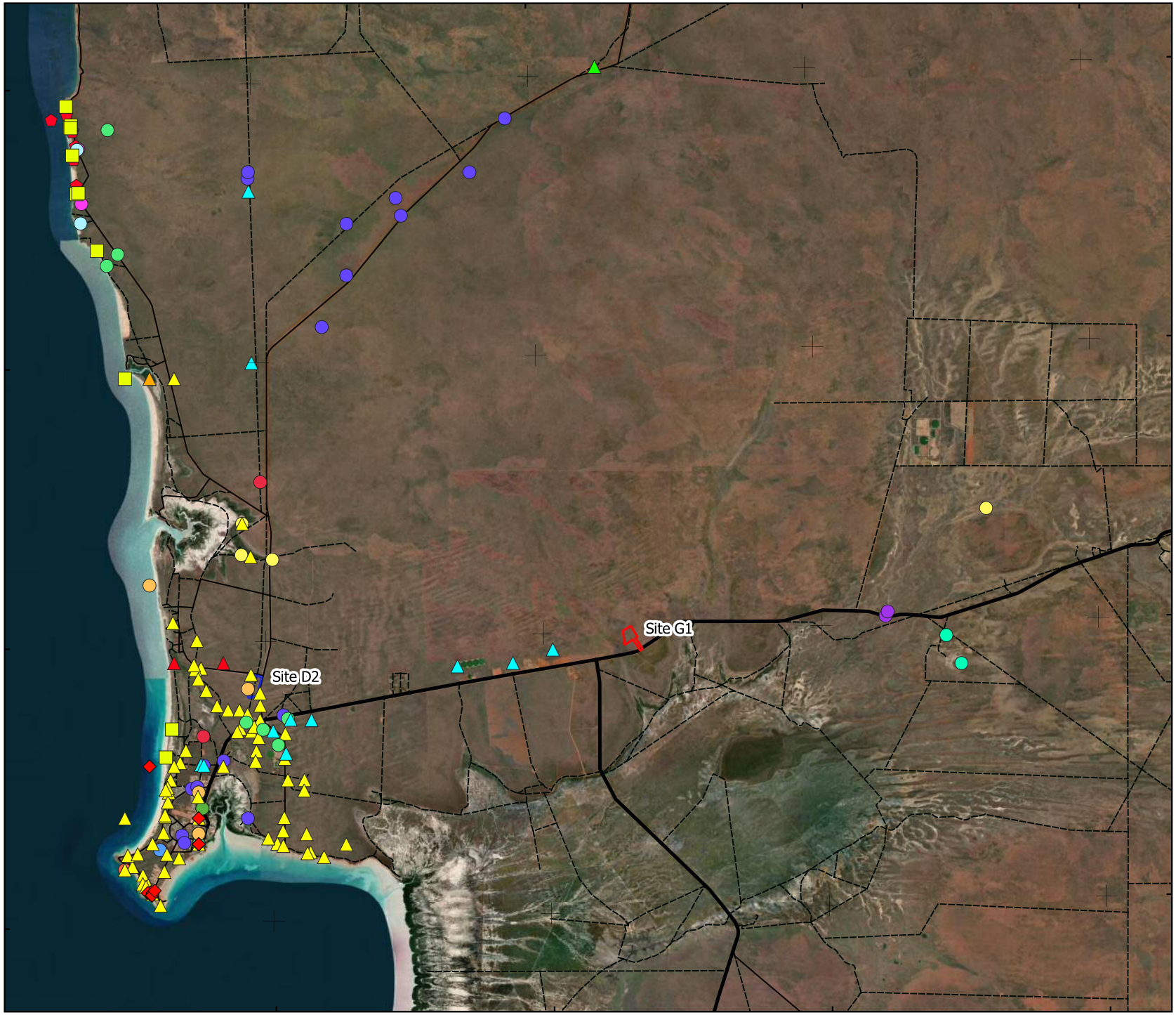
Corymbia paractia (Priority 1) was identified as Recorded within Site D2, with multiple individuals having been recorded along McGuigan Rd and Broome-Cape Leveque Rd by previous surveys. Five taxa have been assigned a High likelihood of occurrence at Site D2 due to the proximity of previous records and the occurrence of suitable habitat:

- *Jacquemontia* sp. Broome (A.A. Mitchell 3028) (Priority 1);
- *Aphyllodium glossocarpum* (Priority 3);
- *Glycine pindanica* (Priority 3);
- *Polymeria* sp. Broome (K.F. Kenneally 9759) (Priority 3); and
- *Terminalia kumpaja* (Priority 3).

Jacquemontia sp. Broome (A.A. Mitchell 3028) was given a Medium likelihood of occurrence at Site G1 due proximity of previous records and suitable habitat occurring within. No significant taxa were assigned High likelihood of occurrence at Site G1. The likelihood of occurrence for all significant flora recorded during the desktop are listed in Table 3.1 and detailed in Appendix B. Records are mapped in Map 3.1

Table 3.1: Significant Flora – Desktop Assessment

Likelihood	Status	Species
Site D2		
Recorded	Priority 1	*Corymbia paractia*
High	Priority 1	*Jacquemontia* sp. Broome (A.A. Mitchell 3028)
	Priority 3	*Aphyllodium glossocarpum*, *Glycine pindanica*, *Polymeria* sp. Broome (K.F. Kenneally 9759), *Terminalia kumpaja*
Medium	Threatened	*Seringia exastia*
	Priority 3	*Seringia katatona*, *Stylidium pindanicum*
Low	Priority 1	*Aphyllodium parvifolium*, *Ipomoea tolmerana* subsp. *occidentalis*, *Thespidium basiflorum*
	Priority 2	*Gomphrena pusilla*
	Priority 3	*Acacia monticola* x *tumida* var. *kulparn*, *Bonamia oblongifolia*, *Fuirena incrassata*, *Goodenia byrnesii*, *Lophostemon grandiflorus* subsp. *grandiflorus*, *Nymphoides beaglensis*
	Priority 4	*Pittosporum moluccanum*
Site G1		
Medium	Priority 1	*Jacquemontia* sp. Broome (A.A. Mitchell 3028)
Low	Threatened	*Seringia exastia*
	Priority 1	*Aphyllodium parvifolium*, *Corymbia paractia*, *Ipomoea tolmerana* subsp. *occidentalis*, *Thespidium basiflorum*
	Priority 2	*Gomphrena pusilla*
	Priority 3	*Acacia monticola* x *tumida* var. *kulparn*, *Aphyllodium glossocarpum*, *Bonamia oblongifolia*, *Fuirena incrassata*, *Glycine pindanica*, *Goodenia byrnesii*, *Lophostemon grandiflorus* subsp. *grandiflorus*, *Nymphoides beaglensis*, *Polymeria* sp. Broome (K.F. Kenneally 9759), *Seringia katatona*, *Stylidium pindanicum*, *Terminalia kumpaja*
	Priority 4	*Pittosporum moluccanum*



Legend

Study Areas
- D2 Study Area
- G1 Study Area

Roads
- Minor Road
- Principal Road
- Track

Threatened Flora
- Seringia exastia

Priority 1 Flora
- Aphyllodium parvifolium
- Corymbia paractia
- Ipomoea tolmerana subsp. occidentalis
- Jacquemontia sp. Broome (A.A. Mitchell 3028)
- Thespidium basiflorum

Priority 2 Flora
- Gomphrena pusilla

Priority 3 Flora
- Acacia monticola x tumida var. kulparn
- Aphyllodium glossocarpum
- Bonamia oblongifolia
- Fuirena incrassata
- Glycine pindanica
- Goodenia byrnesii
- Lophostemon grandiflorus subsp. grandiflorus
- Nymphoides beaglensis
- Polymeria sp. Broome (K.F. Kenneally 9759)
- Seringia katatona
- Stylidium pindanicum
- Terminalia kumpaja

Priority 4 Flora
- Pittosporum moluccanum

N

0 5 10 km

Scale 1:400,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: TH

Date: 19-06-2020

Desktop Assessment Significant Flora Records

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map 3.1

3.1.2. Current Survey

A total of 127 taxa from 39 families and 93 genera were recorded during the survey. The most species rich family was Fabaceae, with 26 species from 14 genera recorded, followed by Poaceae with 16 species from 11 genera. The most species rich genus was *Acacia* with five species recorded. Of the 125 taxa recorded, three were significant flora and four were introduced species. The complete species list is presented in Appendix C.

3.1.2.1. Species Accumulation Curve

The species accumulation curve (SAC) is presented in Figure 3.1. The Chao 2 non-parametric species richness estimator indicated that 89.8% of flora species were recorded in the quadrats. The SAC was plotted using the *specaccum* function in the *vegan* package in R v.4. Appendix D lists the site by species matrix.

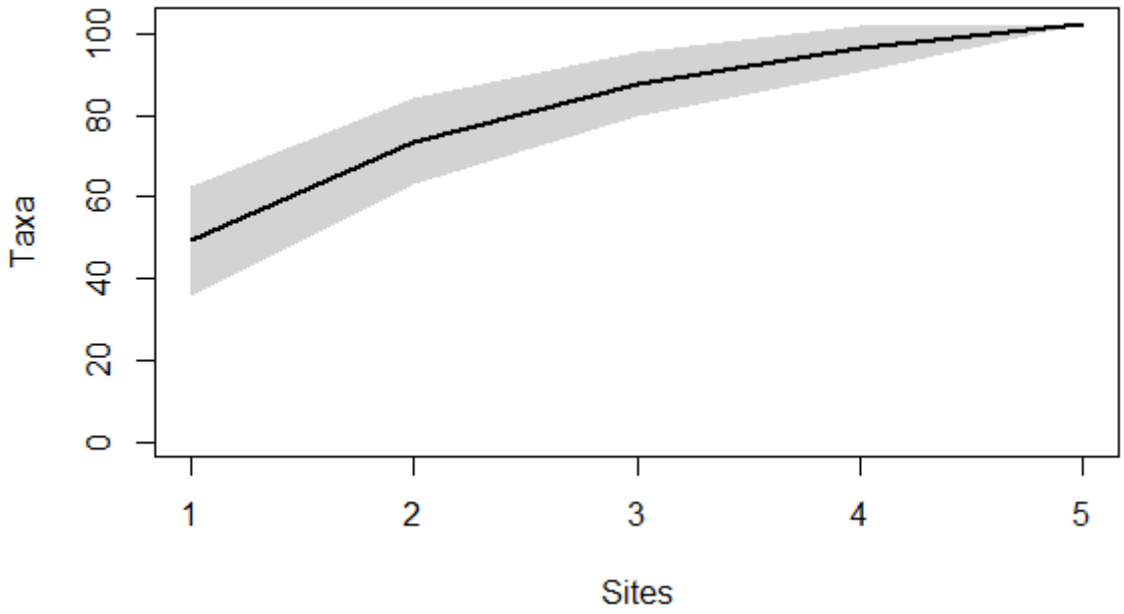


Figure 3.1: Species Accumulation Curve

3.1.2.2. Significant Flora

No Threatened Flora taxa were recorded within the Study Areas.

Three Priority Flora taxa were recorded within Site D2:

- *Corymbia paractia* (Priority 1);
- *Jacquemontia* sp. Broome (A.A. Mitchell 3028) (Priority 1); and
- *Terminalia kumpaja* (Priority 3).

No Priority species were recorded from Site G1. *Sersalisia sericea*, a PEC indicator species, was recorded within both Study Areas. The Priority species recorded are outlined in Table 3.2 and mapped in Map 3.2 and Map 3.3.

Table 3.2: Significant Flora

	Taxon	Description	Study Area	# of Individuals		Photograph
P1	*Corymbia paractia*	Tree (often several-stemmed), 4-6(-12) m high, bark smooth, white, shedding in thin scales.	D2	14		
P1	*Jacquemontia* sp. Broome (A.A. Mitchell 3028)	Perennial herb or subshrub with creeping habit. Flowers pink.	D2	715		
P3	*Terminalia kumpaja*	Small tree to 6 m, bark deeply fissured and corky.	D2	80		

Map images used with permission of the Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions (https: florabase.dpaw.wa.gov.au/help/copyright). Accessed on 15/06/2020.

Legend

- D2 Study Area

Detailed Flora Survey

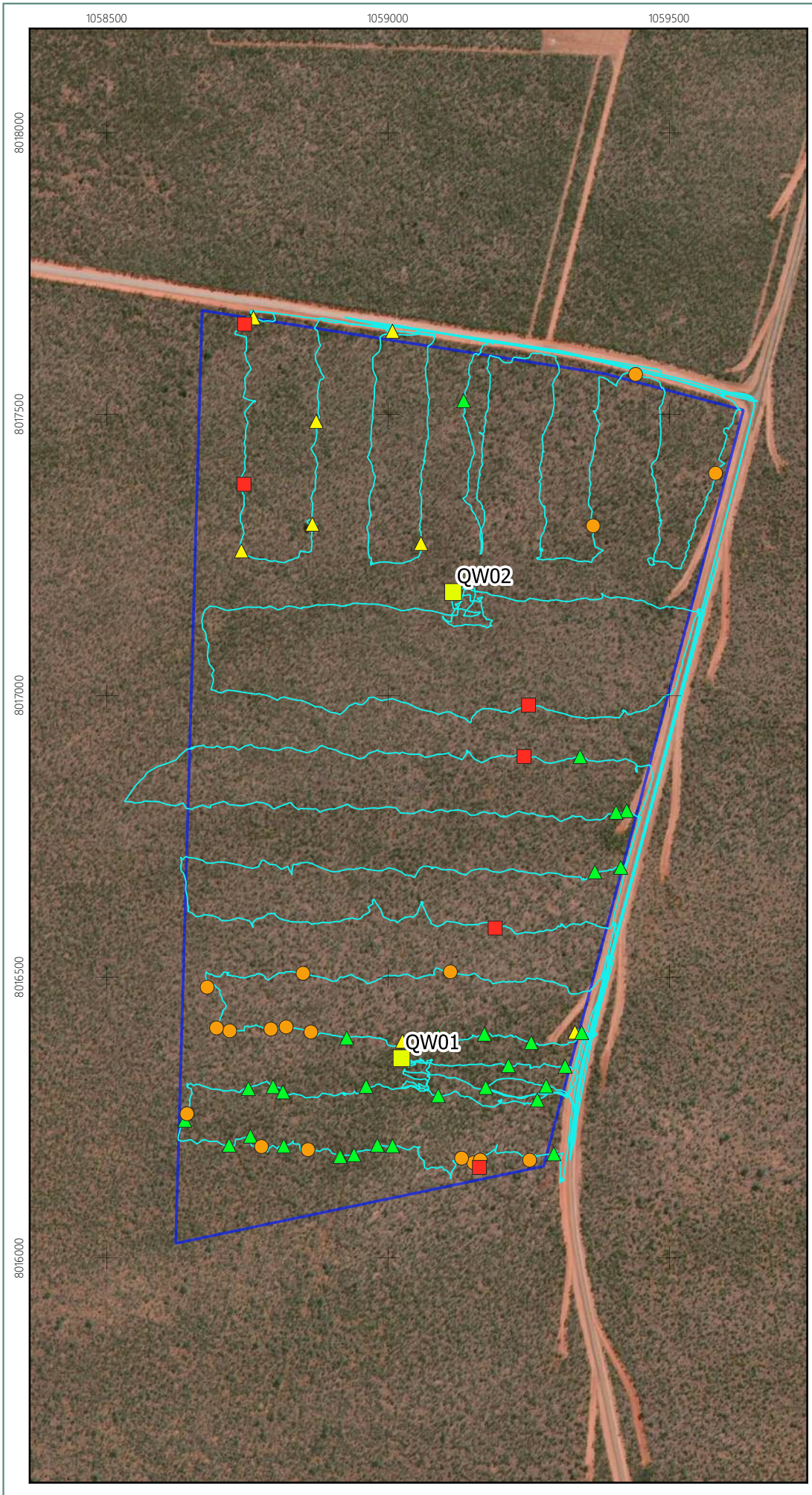
- Quadrat
- Site Traverse

Priority Flora

- Corymbia paractia (P1)
- Jacquemontia sp. Broome (P1)
- Terminalia kumpaja (P3)

PEC Indicator Species

- Sersalisia sericea



Spectrum ECOLOGY

Date: 19-06-2020

Author: TH

N

0 0.2 0.4 km

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Scale 1:10,000

D2 Study Area
Significant Flora Records

Broome Regional Resource Recovery Park

Map
3.2

Legend

- G1 Study Area

Detailed Flora Survey

- Quadrat
- Releve
- Site Traverse

PEC Indicator Species

- Sersalisia sericea

N

0 0.2 0.4 km

Scale 1:12,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: TH

Date: 19-06-2020

G1 Study Area Significant Flora Records

Broome Regional Resource Recovery Park

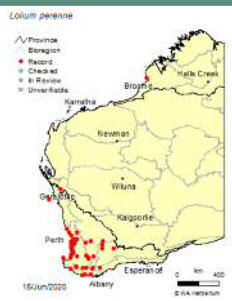
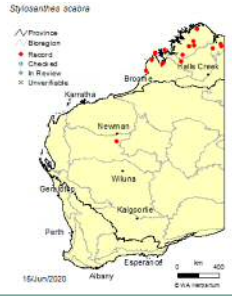
Prepared for
Talis | Broome Shire

Map 3.3

3.1.2.3. Introduced Flora

Four introduced flora species were recorded from one quadrat and two relevé sites (Table 3.3). *Stylosanthes hamata* was the most common and was recorded at one relevé in G1 and seven opportunist collections in D2 and G1, especially near the roads. None of these species are Declared Pests in Western Australia. The records are mapped in Map 3.4.

Table 3.3: Introduced Flora Recorded at the Study Area

Family	Species	# of Individuals	Distribution	Environmental Significance
Poaceae	*?*Lolium perenne*	# of records: 2 # of plants: 4		Permitted – s11
Asteraceae	**Conyza bonariensis*	# of records: 1 # of plants: 1		Permitted – s11
Fabaceae	**Stylosanthes hamata*	# of records: 8 # of plants: 339		Permitted – s11
Fabaceae	**Stylosanthes scabra*	# of records: 1 # of plants: 3		Permitted – s11

Map images used with permission of the Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions (https: florabase.dpaw.wa.gov.au/help/copyright). Accessed on 15/06/2020.

Legend

- D2 Study Area
- G1 Study Area

Introduced Flora

- ?*Lolium perenne
- *Conyza bonariensis
- *Stylosanthes hamata
- *Stylosanthes scabra

N

0 2.5 5 km

Scale 1:170,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: TH

Date: 19-06-2020

Introduced Flora

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map 3.4

3.2. Vegetation

3.2.1. TEC & PEC Communities

Twelve ecosystems of conservation significance, consisting of 118 records, were identified from the database search and are listed in Table 3.4 and mapped in Map 3.5.

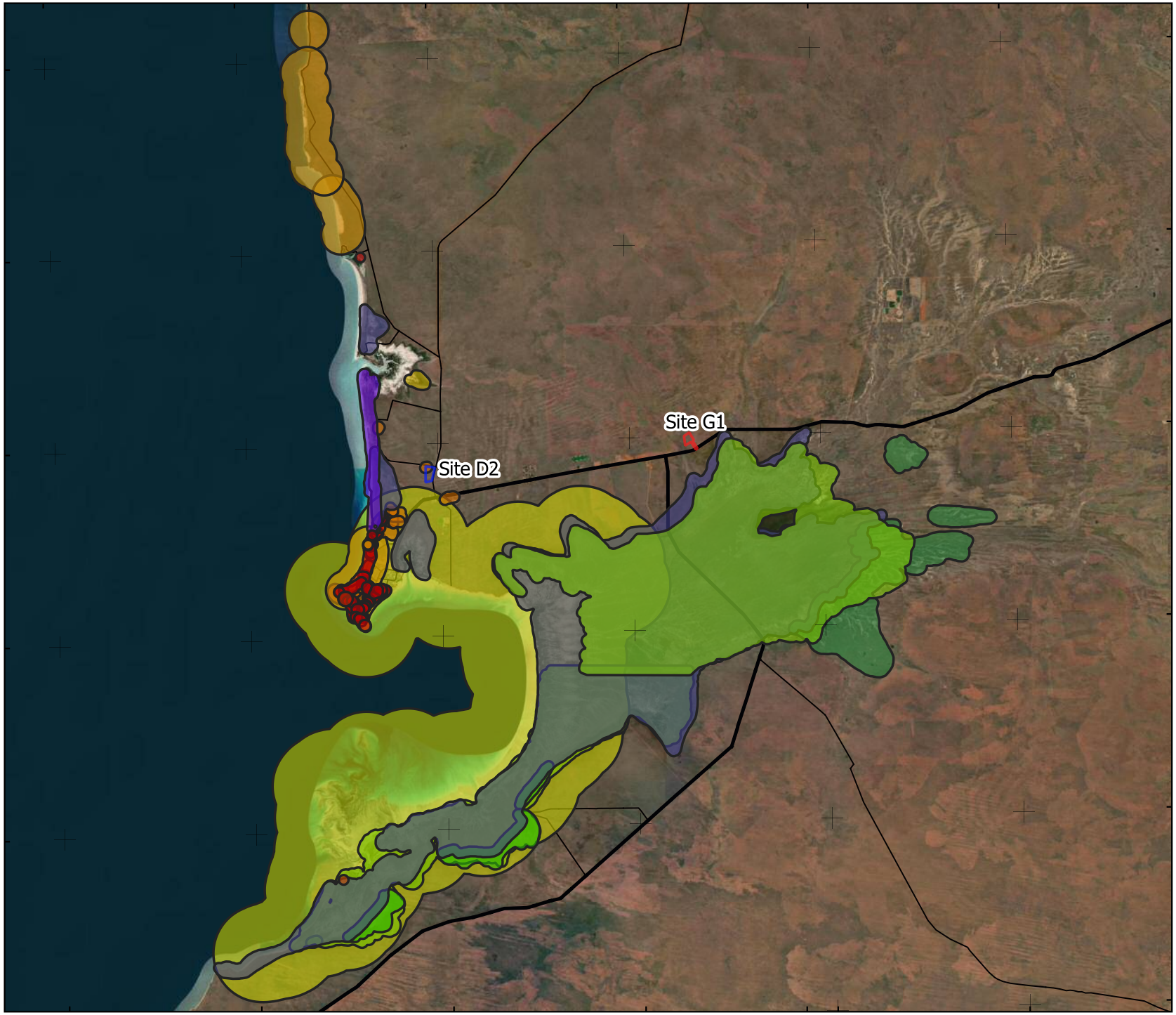
One floristic Threatened Ecological Community (TECs) occurs within 50 km of the Study Areas (Table 3.4). The Monsoon Thickets TEC is listed as Vulnerable and restricted to coastal sand dunes. The Study Areas have a low likelihood of containing the Monsoon Thickets TEC as they are mapped on different geological and vegetation units.

Four Priority 1 Priority Ecological Communities (PECs) were recorded within 50 km of the Study Areas (Table 3.4). The Mangarr (Minyjuru) P1 PEC was recorded within the north-west corner of the D2 Study Area (Map 3.5). The *Corymbia paractia* P1 PEC was classified as a high likelihood of occurring within the D2 Study area due to their proximity to the PEC and potential for suitable habitat within the Study Areas. The Dwarf Pindan Heath P1 PEC and Vegetation Association 770 P1 PEC were classified as low likelihood of occurring within the Study Areas due to their location and vegetation description.

Five Priority 3 and one Priority 4 PECs occurred within 50 km of the Study Areas (Table 3.4). The Vegetation Association 73 P3 PEC was classified as a medium likelihood of occurring within both Study Areas due to their close proximity to the PEC buffer (Map 3.5).

Table 3.4: TEC & PEC Desktop Assessment

Likelihood		Status	PEC	Description	Distance from Project
D2	G1				
Low	Low	Vulnerable / Endangered TEC	Monsoon Thickets	Monsoon (vine) thickets on coastal sand dunes of Dampier Peninsula.	D2 – 5.9 km SE G1 – 32.7 km SE
Low	Low	Vulnerable TEC	Roebuck Bay Mudflats	Species-rich faunal community of the intertidal mudflats of Roebuck Bay.	D2 – 0.6 km S G1 – 8.6 km SE
High	Low	PEC P1	*Corymbia paractia*	*Corymbia paractia* dominated community on dunes.	D2 – 5.2 km SE G1 – 31.8 km E
Low	Low		Dwarf Pindan Heath	Dwarf pindan heath community of Broome coast.	D2 – 14.0 km SE G1 – 38.0 km SE
Recorded	Low		Mangarr (Minyjuru)	Relict dune system dominated by extensive stands of Minyjuru (Mangarr - *Sersalisia sericea*).	D2 – Within buffer G1 – 24.1 km E
Low	Low		Vegetation Association 770	Shrublands; Wattle thicket near Broome.	D2 – 4.9 km E G1 – 31.8 km E
Low	Low	PEC P3	Eighty Mile Land System	Beach foredunes, longitudinal coastal dunes and sandy plains with tussock grasslands and spinifex grasslands.	D2 – 41.7 km S G1 – 57.2 km SE
Low	Low		Roebuck Land System	Paleo-tidal coastal plains and tidal flats with saline soil supporting salt-water couch grasslands, samphire low shrublands, melaleuca thickets and mangroves.	D2 – 10.1 km SW G1 – 2.1 km SW
Low	Low		Vegetation Association 37	Shrublands; teatree thicket.	D2 – 31 km SW G1 – 35 km SE
Low	Low		Vegetation Association 67	Grasslands, tall bunch grass savanna, sparse low tree; ribbon grass & paperbarks.	D2 – 39.9 km SE G1 – 19.6 km E
Medium	Medium		Vegetation Association 73	Grasslands, short bunch grass savanna, grass; salt water grassland (*Sporobolus virginicus*).	D2 – 3.1 km W G1 – 1.7 km SE
Low	Low	PEC P4	Nimalarica Claypan	Nimalaica claypan is a unique, almost permanent, freshwater lake inland from Willie Creek, Broome.	D2 – 7.9 km N G1 – 26.9 km NE



Legend

D2 Study Area

G1 Study Area

TEC-PEC

- Corymbia paractia
- Dwarf pindan heath
- Eighty Mile Land System
- Mangarr (Minyjuru)
- Monsoon thickets
- Nimalarica Claypan
- Roebuck Bay mudflats
- Roebuck Land System
- Vegetation Association 37
- Vegetation Association 67
- Vegetation Association 73
- Vegetation Association 770

Roads

- Principal Road
- Minor Road

N

0 5 10 15 20 km

Scale 1:580,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 19-06-2020

TEC & PEC Search Results

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map 3.5

3.2.2. Vegetation Types

Two vegetation types were recorded; however, only one vegetation type was recorded within the Study Areas. The two vegetation types are described in Table 3.5. The vegetation types at the D2 and G1 Study Areas are presented in Map 3.6 and Map 3.7, respectively. The dendrogram is presented in Figure 3.2. Two clusters containing QW01 and QW03 and QW02 and QW04 were identified in the dendrogram but were not given separate vegetation units due to the short distance or low dissimilarity (dissimilarity = 0.49) between clusters (Figure 3.2). Furthermore, the similarity in the vegetation between the two clusters was confirmed by comparing the dominant species. Site descriptions are presented in Appendix E.

Table 3.5: Vegetation Types

Unit	Description	Associated Species (Priority Species in Bold)	Quadrats	Area (ha)	Representative Photo
V001	*Corymbia greeniana low open woodland* with *Acacia eriopoda* and *Bauhinia cunninghamii* tall open shrubland, over *Triodia schinzii* and *Triodia caelestialis* low sparse hummock grassland and *Chrysopogon pallidus* and *Sorghum plumosum* low sparse tussock grassland.	*Acacia colei* var. *colei* *Aristida hygrometrica* *Corymbia zygophylla* *Grewia pindanica* ***Corymbia paractia*** ***Jacquemontia* sp. Broome (A.A. Mitchell 3028)** ***Terminalia kumpaja***	QW01 QW02 QW03 QW04	220	
V002	*Brachychiton diversifolius* subsp. *diversifolius* low open woodland over, *Atalaya hemiglauca*, *Codonocarpus cotinifolius*, and *Grewia pindanica* mid sparse shrubland, over *Aristida holathera* var. latifolia sparse tussock grassland.	*Acacia platycarpa* *Bauhinia cunninghamii* *Triodia schinzii*	QW05	0	

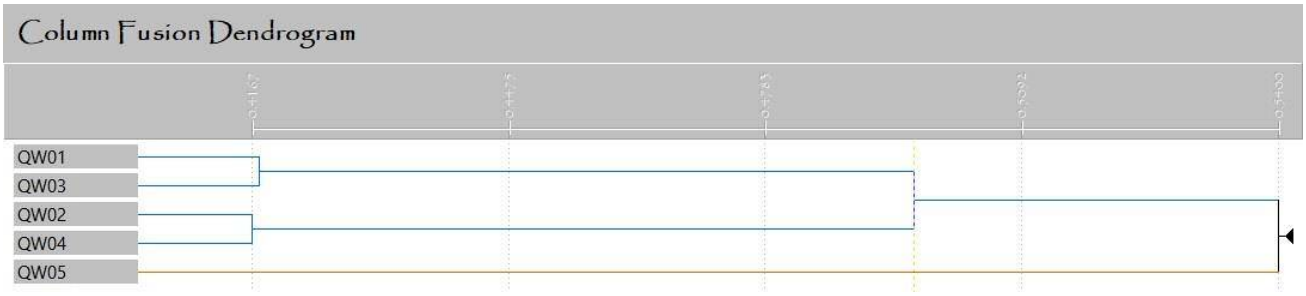


Figure 3.2: Dendrogram of Floristic Analysis

3.2.3. Vegetation Condition

The two Study Areas were mapped as having Excellent (100%) vegetation condition. Weeds were rarely recorded in the Study Areas Map 3.4.

Legend

- D2 Study Area

Detailed Flora Survey

- Quadrat

Reconnaissance Flora Survey

- Releve

Vegetation Units

- V001

Spectrum ECOLOGY

Date: 19-06-2020

Author: CS

N

0 0.2 0.4 km

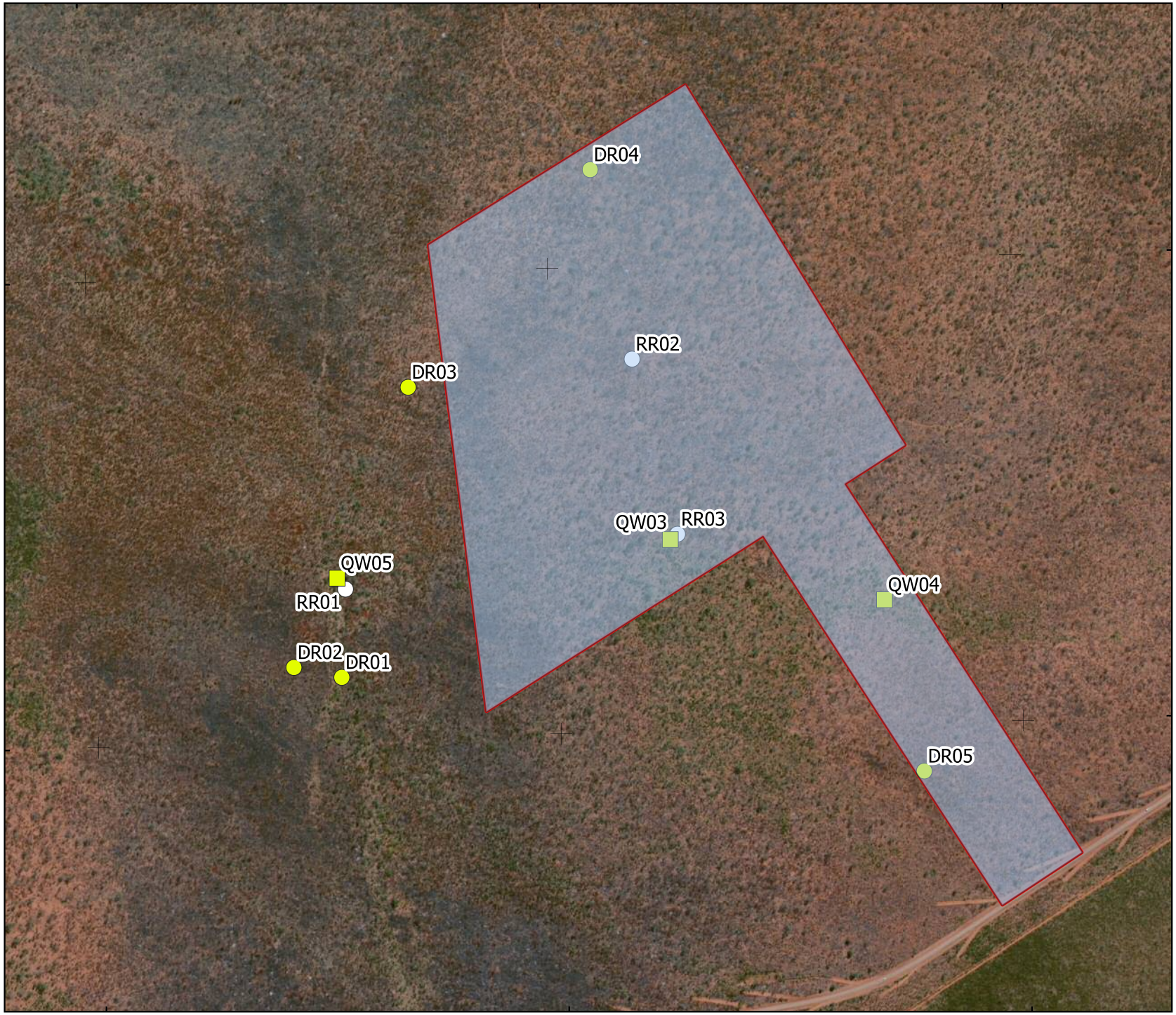
Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Scale 1:10,000

D2 Study Area
Vegetation Mapping

Broome Regional Resource Recovery Park

Map
3.6



Legend

- G1 Study Area

Detailed Flora Survey

- Quadrat
- Releve

Reconnaissance Flora Survey

- Releve

Vegetation Units

- V001

N

0 0.2 0.4 km

Scale 1:12,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CS

Date: 19-06-2020

G1 Study Area Vegetation Mapping

Broome Regional Resource Recovery Park

Prepared for
Talis | Broome Shire

Map 3.7

4. DISCUSSION

4.1. Threatened Flora

No Threatened Flora taxa were recorded in the current survey or considered likely to occur.

One Threatened Flora taxon was recorded during the desktop assessment, *Seringia exastia*, located 9 km south-west of Site D2 and 33 km south-west of Site G1.

4.1.1. Local & Regional Significance

There were three significant flora taxa recorded from Site D2, *Corymbia paractia* (Priority 1), *Terminalia kumpaja, and Jacquemontia* sp. Broome (A.A. Mitchell 3028). Other significant flora taxa assessed in the desktop were thoroughly searched for but were not found.

Corymbia paractia (Priority 1) was confirmed to occur in Site D2, where it was Recorded in the desktop assessment. Site D2 is within the modelled distribution of the species that was performed by Environs Kimberley (2018). A previous record of *Terminalia kumpaja* (Priority 3) was within 40 m of the Site D2, and it was recorded as occurring from Site D2 at 18 new locations. Thirty-one new locations of *Jacquemontia* sp. Broome (A.A. Mitchell 3028) were recorded from Site D2.

The three Priority taxa recorded from Site D2 were assigned a Low local and regional significance. This is in addition to *Glycine pindanica* (Priority 3) that was given a High likelihood of occurring in Site D2 during the desktop assessment, but which was not recorded during the survey. These taxa are locally common around the Broome area, as well as being known from additional records in the region that were outside of the 50 km database search radius.

Aphyllodium glossocarpum (Priority 3) was also assigned a High likelihood of occurring at Site D2 in the desktop assessment. This species was ranked as having a High local significance if it were to be found at the Study Area, as it is known from only two previous records around Broome, which was it was reported as the sole individual when collected. Given the effort of the current survey, it is unlikely that this species occurs within either Study Area. While maybe rare or under-collected in the Broome area, the species is known from records north to Dampier Peninsula and in the Shire of Wyndham-East Kimberley, and for this reason is considered to have a Low regional significance.

Table 4.1: Priority Flora of Local & Regional Significance

Taxa	Recorded in Survey	Desktop Likelihood	Local Significance		Regional Significance	
Priority 1						
Corymbia paractia	Yes	Recorded (D2) Low (G1)	Locally common in the near-coastal areas around Broome.	Low	Recorded from the Dampierland IBRA region, from Broome townsite to Coulomb Point Nature Reserve. An outlying record exists north of Camballin.	Low
Jacquemontia sp. Broome (A.A. Mitchell 3028)	Yes	High (D2) Medium (G1)	Known from several previous locations in the vicinity of Broome.	Low	Recorded from the Dampierland IBRA region, with most records around Broome townsite.	Low
Priority 3						
Aphyllodium glossocarpum	No	High (D2) Low (G1)	Known from two records in the local area, where it was recorded as rare.	High	Known from records from Broome townsite to Shire of Wyndham-East Kimberley.	Low
Glycine pindanica	No	High (D2) Low (G1)	Many records in the local area. Recorded on a widespread landform type that is not restricted.	Low	Recorded from the Dampierland IBRA region from Broome townsite to the Dampier Peninsula.	Low
Terminalia kumpaja	Yes	High (D2) Low (G1)	Known from several previous locations in the vicinity of Broome.	Low	Recorded from the Dampierland and Great Sandy Desert IBRA regions. More common and widespread in the vicinity of Eighty Mile Beach.	Low

4.2. Vegetation

4.2.1. Vegetation Resembling TEC/PEC

Two TECs and ten PECs were recorded within 50 km of the Study Areas and of these the Mangarr (Minyjuru) PEC was recorded within the D2 Study Area in the desktop assessment (Map 3.5) and the *Corymbia paractia* PEC was assigned a high likelihood of occurrence within the D2 Study Area.

The Mangarr PEC "contains frequent mature (100 years +) *Sersalisia sericea* or otherwise known as Minyjuru" and occurs on parallel dunes in the area south east of Gantheaume Point (DBCA, 2020). Stands of *Sersalisia sericea* (Minyjuru) occur in association with the Monsoon vine thicket TEC (DBCA, 2020). Woodland and desert/aridlands plant species associated with Mangarr PEC and records of these plant species during the detailed flora survey are presented in Table 4.2.

Table 4.2: Mangarr (Minyjuru) PEC *Sersalisia sericea* & Associated Plant Species

Associated Taxa	D2 Records			G1 Records		
	QW01 Cover %	QW02 Cover %	Opportunistic Count #	QW03 Cover %	QW04 Cover %	Opportunistic Count #
Sersalisia sericea	-	-	10	-	-	1
Corymbia zygophylla	1.0	-	1	-	0.2	-
Corynotheca micrantha	-	-	-	-	-	-
Erythrophleum chlorostachys	-	-	-	-	-	-
Goodenia sepalosa	0.01	0.01	-	0.01	-	-
Gyrostemon tepperi	0.1	-	-	-	-	-
Hakea macrocarpa	-	-	-	-	0.01	-
Scaevola parvifolia	-	-	-	-	-	1
Senna costata	-	0.01	-	0.25	-	-
Solanum cunninghamii	-	-	-	-	-	-
Triodia species	25	17	-	3	5	-

Ten *Sersalisia sericea* trees were identified at six locations within the D2 Study Area (Table 4.2; Map 3.2). Four *Sersalisia sericea* trees occurred within the existing PEC at D2 and were likely recorded by Willing & Beames (2015) during the mapping and condition assessment of the Mangarr PEC. Six *Sersalisia sericea* trees were located 200–250 m from the D2 Study Area's eastern boundary (Map 3.2). Three of these *Sersalisia sericea* trees were located outside the PEC but within the D2 Study Area and were recorded by Willing & Beames (2015). Willing & Beames (2015) did not classify this small cluster of trees as a Mangarr PEC as they exist outside defined patches due to historical clearing and the degradation of vegetation. It is unlikely the *Sersalisia sericea* trees recorded outside the existing Mangarr PEC but within the D2 Study Area represent the PEC based on previous mapping of its distribution by Willing & Beames (2015). Willing & Beames (2015) suggested the outlier *Sersalisia sericea* trees be protected from clearing.

A single *Sersalisia sericea* tree was recorded at the G1 Study Area (Table 4.2). The individual *Sersalisia sericea* tree recorded at the G1 Study Area does not represent the Mangarr PEC as there were no frequent mature individuals recorded in the detailed flora survey (Table 4.2).

The *Corymbia paractia* PEC is described as "*Corymbia paractia* dominated community on dunes" (DBCA, 2020). The current *Corymbia paractia* PEC occurs in the Broome township area, and the PEC may occur in the transition zone between coastal vine thickets and Pindan vegetation (DBCA, 2020). The D2 Study Area

is located in the transition zone between coastal vine thickets and Pindan vegetation (see Section 1.5). Distribution modelling of *Corymbia paractia* indicates the species is common in vegetation surrounding Broome, including the D2 Study Area (Environs Kimberley, 2018). *Corymbia paractia* was extensively recorded at the D2 Study Area along tracks (Environs Kimberley, 2018). *Corymbia paractia* was recorded 10 times (13 individuals) within the D2 Study Area (Map 3.1; Map 3.2). The D2 Study Area likely contains the *Corymbia paractia* PEC given the distribution of the species, abundance of the species, the presence of associated vegetation, and existing protections placed on individuals in the township of Broome.

4.2.2. Local & Regional Significance

Regional significance was determined by comparing the vegetation units of the Project with the pre-European vegetation association mapping undertaken by Beard (DPIRD, 2019; see Section 1.5) to determine potential regional extent. Local significance was determined using the other definitions for significant vegetation (Section 2.4); whether it plays a role as refuge, has a degree of historical impact from threatening processes or maintains integrity of a significant ecosystem.

The Beard vegetation unit associated with the two Study Areas has a wide distribution throughout the Dampierland IBRA region. The Study Areas represent a small fraction of the Yeeda and Wanganut Land Systems which are widespread across the Dampierland IBRA region and Western Australia. The V001 vegetation type mapped at both Study Areas have a low regional significance.

The V001 vegetation unit mapped at both Study Areas is considered to have a low significance. The D2 Study Area overlaps with a Mangarr PEC and likely contains the *Corymbia paractia* PEC; however, these PECs are not locally restricted. The V001 vegetation unit provides refuge to three significant flora, these three species recorded at the D2 study Area are locally and regionally widespread.

4.3. Principles for Clearing Native Vegetation

An assessment on how the proposed vegetation clearing applies to the native vegetation clearing principles is present below in Table 4.3

Table 4.3: 10 Native Vegetation Clearing Principles

Principle Number	Principle	Assessment	Outcome
(a)	It comprises a high level of biological diversity.	There was one vegetation type identified from the Study Areas derived from flat Pindan Plains. There were 127 taxa from 39 families and 93 genera were recorded during the survey. The proportion of flora collected was consistent with expectations for this type of survey and survey timing in the context of other surveys of a similar level and seasonality. Both Study Areas fall in the 750.1 Pre-European Vegetation mapping classification. This vegetation unit covers more than 1.2 million hectares, of which, approximately 99% is undisturbed. There were 31 and 38 vertebrate fauna species found within the D2 and G1 Study Areas, respectively. Given the species count, vegetation types, literature review and the Pre-European vegetation units, the vegetation at the Study Areas is not considered to have a high level of biological diversity.	The Proposal at the Study Areas is not likely to be at variance to this Principle.
(b)	It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The Pindan shrubland habitat that occurs in the Study Areas is homogenous and the microhabitats present are not thought likely to support short range endemic invertebrate species. Overall, the Pindan Shrubland habitat recorded from within the Study Areas occurs across a large continuous extend across the Dampier Peninsula, which indicates that there is a low likelihood that the habitat within the Study Areas supports any taxa with a distribution restricted to either Study Area.	The Proposal at the Study Areas is not likely to be at variance to this Principle.

Principle Number	Principle	Assessment	Outcome
(c)	It includes, or is necessary for the continued existence of, rare flora.	No Threatened Flora were recorded in the reconnaissance or detailed survey at the D2 and G1 Study Areas. One Threatened Flora species *Seringia exastia* was identified in the database searches. This species was considered to have a medium likelihood of occurrence at D2 and a low likelihood of occurrence at G1. *Seringia exastia* was not recorded during the exhaustive detailed and targeted assessment. Three Priority Flora, *Corymbia paractia* (P1), *Jacquemontia* sp. Broome (P1), and *Terminalia kumpaja* (P3) were recorded within the D2 Study Area. Nineteen Priority Flora were recorded in the desktop assessment, *Aphyllodium glossocarpum* (P3), *Glycine pindanica* (P3), and *Polymeria* sp. Broome (P3) were considered to have a high likelihood of occurrence in the D2 Study Area. Although the D2 Study Area includes conservation significant flora and has appropriate habitat for conservation significant flora, clearing of the D2 Study Area is unlikely to threaten the continued existence of the recorded Priority Flora and other Priority Flora with High Likelihood of occurrence. Vegetation at the D2 Study Area is not necessary for the continued existence of this conservation significant flora. The disturbance footprint within the D2 Study Area can be located in an area that avoids recorded conservation significant flora. No Priority Flora were recorded at the G1 Study Area. Although the G1 Study Area has appropriate habitat for conservation significant flora, clearing of the G1 Study Area is unlikely to threaten the continued existence of these Priority Flora.	The Proposal at the D2 Study Area is not likely to be at variance to this Principle. The Proposal at the G1 Study Area is not likely to be at variance to this Principle.

Principle Number	Principle	Assessment	Outcome
(d)	It comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	No Threatened Ecological Communities were recorded within the D2 and G1 Study Areas. One federally listed TEC (State listed Vulnerable) was identified from the database searches, Monsoon vine thicket. An additional State listed, Vulnerable Ecological Community, Roebuck Bay mudflats was identified form the database searches. These ecological communities are associated with riparian vegetation and do not resemble any vegetation communities of the Study Areas. The buffers of two P1 Priority Ecological Communities (PEC) were recorded in the D2 Study Area during the database searches. The Mangarr (Minyjuru) PEC is described as "relict dune system dominated by extensive stands of Minyjuru (Mangarr - *Sersalisia sericea*)". The Mangarr PEC was previously recorded in the north-west corner of the D2 Study Area. During the survey, *Sersalisia sericea* trees were targeted during the 100 m spaced traverses and six trees were recorded outside the current PEC boundary in the north-west corner; however, it is unlikely these trees represent the Mangarr PEC based on previous surveys of the Study Area. The *Corymbia paractia* PEC is described as "*Corymbia paractia* dominated community on dunes". The D2 Study Area vegetation can be described as "transition zone between coastal vine thickets and Pindan vegetation" which is where the *Corymbia paractia* PEC occurs. *Corymbia paractia* trees were recorded within the D2 Study Area. The D2 Study Area likely contains the *Corymbia paractia* PEC given the distribution of the species in the surrounding area, abundance of the species, the presence of associated vegetation, and existing protections placed on individuals in the township of Broome. The disturbance footprint within the D2 Study Area can be located in an area that avoids the *Corymbia paractia* trees that likely represent the *Corymbia paractia* PEC. No PECs or TECs were recorded from the G1 Study Area. Three PECs are within 10 km to the south of the G1 Study Area. Each of these PECs are associated with riparian communities and do not occur at the G1 Study Area. Native vegetation at the G1 Study Area does not comprise the whole or part of, or is necessary for the maintenance of a TEC.	The Proposal at the D2 Study Area is somewhat at variance to this Principle. The Proposal at the G1 Study Area is not likely to be at variance to this Principle.

Principle Number	Principle	Assessment	Outcome
(e)	It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The Study Areas are 100% comprised of the 750.1 Beard vegetation unit. The vegetation unit is widespread and 99.7% of its pre-European extent remains. The Study Areas represent a small fraction of the vegetation unit. The vegetation at the Study Areas is not significant as the vegetation unit has not been extensively cleared.	The Proposal at the Study Areas is not likely to be at variance to this Principle.
(f)	It is growing in, or in association with, an environment associated with a watercourse or wetland.	No nationally significant wetlands, including Ramsar wetlands or watercourses were located within the Study Areas. The D2 Study Area occurs 1 km north of the buffer surrounding the Roebuck bay Mudflats; Species-rich faunal community of the intertidal mudflats of Roebuck Bay.	The Proposal at the Study Areas is not likely to be at variance to this Principle.
(g)	The clearing of the vegetation is likely to cause appreciable land degradation.	The total area to be cleared at the D2 Study Area is 2.5 ha. The Total area to be cleared at the G1 Study Area is 3.0 ha. Considering the small area proposed to be cleared, the history of minimal land clearing in the area and existing vegetation condition of the Study Area, it is unlikely that the proposed clearing will cause appreciable land degradation.	The Proposal at the Study Areas is not likely to be at variance to this Principle.
(h)	The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	One conservation area, Yawuru Birragun Conservation Park (WA_52354) is adjacent and directly west of the D2 Study Area. Clearing of approximately 2.5 ha to establish temporary tracks, bore holes and trial pits at the D2 Study Area is unlikely to impact the environmental values of this area. No conservation areas are within the vicinity of the G1 Study Area as defined by the Land Management Act (1984) as National Parks, Nature Reserves, Conservation Reserve or other areas managed for biodiversity conservation. The clearing of vegetation (3.0 ha) in the G1 Study Area is not considered to impact on the environmental values of any adjacent or nearby conservation area.	The Proposal at the Study Areas is not likely to be at variance to this Principle.

Principle Number	Principle	Assessment	Outcome
(i)	The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	The proposed clearing of native vegetation at D2 (2.5 ha) and G1 (3.0 ha) to establish temporary tracks, bore holes and trial pits at the Study Areas is not expected to cause deterioration in the quality of surface or underground water. Further site investigation works including hydrological surveys will provide more information as the project matures.	The Proposal at the Study Areas is not likely to be at variance to this Principle.
(j)	The clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The remnant vegetation proposed to be cleared at the D2 and G1 Study Areas is 2.5 ha and 3.0 ha, respectively. These areas are small and are not expected to cause or exacerbate the instance of flooding.	The Proposal at the Study Areas is not likely to be at variance to this Principle.

5. CONCLUSION

5.1. Threatened Flora

No Threatened Flora have previously been recorded within the Study Areas. One Threatened Flora taxon was assigned a medium likelihood of occurrence, *Seringia exastia*, but was not found in the current survey.

5.2. Significant Flora

A total of three Priority Flora taxa have been recorded within the Study Areas:

- *Corymbia paractia* (Priority 1);
- *Jacquemontia* sp. Broome (A.A. Mitchell 3028) (Priority 1); and
- *Terminalia kumpaja* (Priority 3).

All Priority Flora taxa recorded in the Study Areas were assessed to have Low local and regional significance.

5.3. Vegetation

Twelve ecosystems of conservation significance were recorded in the vicinity of the Study Areas.

The Desktop Assessment found the Mangarr (Minyjuru) (P1) Priority Ecological Community was present in north-west corner of the D2 Study Area. Scattered *Sersalisia sericea* (Minyjuru) trees were recorded in the D2 Study Area but were unlikely to indicate the presence of the Mangarr PEC based on previous surveys.

The *Corymbia paractia* P1 PEC is likely to occur within the D2 Study Area based on the known distribution of *C. paractia*, the abundance of the species, and the presence of associated vegetation. TEC or PECs are not likely to occur within the G1 Study Areas.

One vegetation unit (V001) was mapped at the three Study Areas. The vegetation unit is not likely to have local and regional significance.

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Appendix A: Conservation Codes

Appendix A1: Definitions of Conservation Categories under the EPBC Act

Category	Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Appendix A2: Definitions of Conservation Categories under the BC Act (DBCA 2019)

Threatened Species: Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).

Threatened fauna s that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened Flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Definition
CR	**Critically endangered species** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	**Endangered species** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	**Vulnerable species** Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species: Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

Category	Definition
EX	**Extinct species** Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.
EW	**Extinct in the wild species** Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere

	in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no Threatened fauna or Threatened Flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species: Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as Threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI	Migratory species Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
CD	Species of special conservation interest (Conservation dependant fauna) Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
OS	Other specially protected species Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
[1] The definition of flora includes algae, fungi and lichens. [2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).	

Appendix A3: Definitions of Priority Species Classification (DBCA 2019)

Priority species: Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened fauna or flora.

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. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Definition
P1	**Priority 1: 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, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	**Priority 2: 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, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently Threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of Threatened species during the past five years for reasons other than taxonomy

Appendix A4: Legal Status Definition of Listed Plants in Western Australia

Legal Status	Definition
Declared Pest, Prohibited – s12	Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits.
Declared Pest – s22(2)	Declared pests must satisfy any applicable import requirements when imported and may be subject to control keeping requirements.
Permitted – s11	Permitted organisms must satisfy applicable import requirements and import permits (where required).
Permitted, Requires Permit – r73	Regulation 73 permitted organisms may be subject to restriction under legislation other than the BAM Act (2007).
Unlisted	Unlisted organisms are prohibited in WA.
Control Categories	**Definition**
C1 Exclusion	Organisms should be excluded from parts or all of WA.
C2 Eradication	Organisms should be eradicated from all or parts of WA.
C3 Management	Organisms should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Declared pest that are recognised as having a harmful impact under certain circumstances where their subsequent control requirements are determined by a plan or other legislative arrangements under the Act.
Keeping Categories	**Definition**
Prohibited keeping	Can only be kept under a permit for public display, education or scientific purposes.
Restricted keeping	Kept under a permit by private individuals due to a low risk of becoming a problem for the environment.
Exempt keeping	No permit or conditions are required for keeping. Organism may be subject to restrictions under the Wildlife Conservation Act (WCA, 1950).

Appendix B: Flora Desktop Assessment

Status	Family	Taxon	Description	Habitat	Closest Record to D2 (km)	Closest Record to G1 (km)	Likelihood (D2)	Likelihood (G1)
P3	Fabaceae	*Acacia monticola* x *tumida* var. *kulparn*	Low shrub. Hybrid of *Acacia monticola* and *A. tumida* var. *kulparn*.	Coastal cliffs.	10	33	Low	Low
P3	Fabaceae	*Aphyllodium glossocarpum*	Spreading or erect shrub, to 1.2 m high. Flowers pink-purple.	Sand. Pindan.	4	28	High	Low
P1	Fabaceae	*Aphyllodium parvifolium*	Trailing shrub, to 0.3 m high. Flowers purple-pink.	Sand. Sandhills.	22	38	Low	Low
P3	Convolvulaceae	*Bonamia oblongifolia*	Perennial herb or shrub. Flowers blue.	Sandy or gravelly soils.	36	50	Low	Low
P1	Myrtaceae	*Corymbia paractia*	Tree 4-6(-12) m high, bark smooth, white, shedding in thin scales. Flowers white.	Skeletal soils. In transition zone between coastal beach dunes & red pindan soils.	0	24	Recorded	Low
P3	Cyperaceae	*Fuirena incrassata*	Annual sedge 0.1-0.3 m high, perianth of 3 bristles and 3 clawed scales; scales 3-veined in basal part and thickened distally.	Sand, sandy clay. Swamps, creek beds, claypans, semi-saline lakes.	45	18	Low	Low
P3	Fabaceae	*Glycine pindanica*	Prostrate or scrambling perennial, herb or climber. Flowers pink/blue-purple.	Pindan soils.	2	25	High	Low
P2	Amaranthaceae	*Gomphrena pusilla*	Slender branching annual herb, to 0.2 m high. Flowers white.	Fine beach sand. Behind foredune, on limestone.	6	33	Low	Low
P3	Goodeniaceae	*Goodenia byrnesii*	Prostrate to decumbent herb, stems to 30 cm. Flowers yellow.	Sand. Edge of creek.	13	36	Low	Low
P1	Convolvulaceae	*Ipomoea tolmerana* subsp. *occidentalis*	Perennial vine with mid mauve flowers, growing up to 1 m tall.	Red pindan plain.	49	39	Low	Low
P1	Convolvulaceae	*Jacquemontia* sp. Broome (A.A. Mitchell 3028)	Perennial herb or subshrub. Flowers pink.	Red pindan plain.	1	5	High	Medium
P3	Myrtaceae	*Lophostemon grandiflorus* subsp. *grandiflorus*	Tree 4-8 m high. Flowers cream-white.	Damp habitats (swamps, seepages).	34	49	Low	Low
P3	Menyanthaceae	*Nymphoides beaglensis*	Aquatic annual herb. Flowers white/white-pink-purple.	Edges of permanent waterholes or in seasonally inundated claypans & depressions.	22	49	Low	Low

Status	Family	Taxon	Description	Habitat	Closest Record to D2 (km)	Closest Record to G1 (km)	Likelihood (D2)	Likelihood (G1)
P4	Pittosporaceae	*Pittosporum moluccanum*	Tree 2-6 m high. Flower white.	White sand. Sand dunes.	37	50	Low	Low
P3	Convolvulaceae	*Polymeria* sp. Broome (K.F. Kenneally 9759)	Perennial herb or subshrub. Flowers pink.	Red pindan plain.	2	23	High	Low
T	Malvaceae	*Seringia exastia*	Erect compact multi-stemmed shrub to 0.9 m high. Flowers purple.	Red pindan plain.	9	33	Medium	Low
P3	Malvaceae	*Seringia katatona*	Shrub. Flowers mauve.	Red sand.	8	33	Medium	Low
P3	Stylidiaceae	*Stylidium pindanicum*	Annual herb to 20 cm. Flowers pink.	Clay soil. Open woodland over grassland.	8	26	Medium	Low
P3	Combretaceae	*Terminalia kumpaja*	Small tree to 6 m tall. Bark deeply furrowed and corky.	Red pindan plain.	0.04	27	High	Low
P1	Asteraceae	*Thespidium basiflorum*	Densely tufted perennial herb to 0.2 m high. Flowers green.	Sandy soils. Creeks.	2	29	Low	Low

Appendix C: Species List

Family	Taxon	Comment & Significance
Aizoaceae	*Trianthema pilosum*	-
Amaranthaceae	*Ptilotus exaltatus*	-
	Ptilotus lanatus	-
	Ptilotus polystachyus	-
Apocynaceae	*Carissa lanceolata*	-
	Marsdenia viridiflora subsp. *tropica*	-
Araliaceae	*Trachymene oleracea*	-
Asteraceae	*Conyza bonariensis*	Weed
	Pterocaulon intermedium	-
	Pterocaulon serrulatum var. *velutinum*	-
Bignoniaceae	*Dolichandrone occidentalis*	-
	Ehretia saligna var. *saligna*	-
Boraginaceae	*Heliotropium leptaleum*	-
	Heliotropium ovalifolium	-
	Trichodesma zeylanicum	-
Byblidaceae	*Byblis filifolia*	-
Caryophyllaceae	*Polycarpaea longiflora*	-
Celastraceae	*Stackhousia intermedia*	-
Cleomaceae	*Cleome tetrandra* var. *tetrandra*	-
Combretaceae	*Terminalia ferdinandiana*	-
	Terminalia hadleyana	-
	Terminalia kumpaja	Priority 3
Commelinaceae	*Murdannia graminea*	-
Convolvulaceae	*Bonamia ?media*	Sterile
	Evolvulus alsinoides var. *decumbens*	-
	Ipomoea sp.	Sterile
	Jacquemontia sp. Broome (A.A. Mitchell 3028)	Priority 1
	Operculina aequisepala	-
Cucurbitaceae	*Cucumis variabilis*	-
Cyperaceae	*Bulbostylis barbata*	-
	Cyperus conicus	-
	Fimbristylis oxystachya	-
	Scleria brownii	-
Euphorbiaceae	*Euphorbia coghlanii*	-
	Euphorbiaceae sp.	Sterile
Fabaceae	*Acacia adoxa* var. *subglabra*	-
	Acacia colei var. *colei*	-
	Acacia eriopoda	-
	Acacia platycarpa	-
	Acacia tumida var. *tumida*	-
	Bauhinia cunninghamii	-
	Cajanus marmoratus	-
	Chamaecrista moorei	-
	Crotalaria cunninghamii	-
	Crotalaria medicaginea var. *neglecta*	-
	Crotalaria ramosissima	-
	Cullen corallum	-
	Fabaceae sp.	Sterile
	Glycine tomentella	-
	Indigofera colutea	-
	Indigofera linifolia	-
	Jacksonia aculeata	-
	Rhynchosia minima	-
	Senna costata	-
	Senna notabilis	-
	Stylosanthes hamata	Weed
	Stylosanthes scabra	Weed

Family	Taxon	Comment & Significance
	Tephrosia leptoclada	-
	Tephrosia remotiflora	-
	Tephrosia rosea var. rosea	-
	Tephrosia sp.	Sterile
	Zornia chaetophora	-
Goodeniaceae	*Goodenia scaevolina*	-
	Goodenia sepalosa var. *sepalosa*	-
	Scaevola parvifolia subsp. *parvifolia*	-
	Velleia panduriformis	-
Gyrostemonaceae	*Codonocarpus cotinifolius*	-
	Gyrostemon tepperi	-
Malvaceae	*Abutilon australiense*	-
	Abutilon otocarpum	-
	Brachychiton diversifolius subsp. *diversifolius*	-
	Corchorus sidoides subsp. *sidoides*	-
	Corchorus sidoides subsp. *vermicularis*	-
	Gossypium australe	-
	Grewia breviflora	-
	Grewia pindanica	-
	Melhania oblongifolia	-
	Sida rohlenae subsp. *occidentalis*	-
	Sida sp. Pindan (B.G. Thomson 3398)	-
	Waltheria indica	-
Menispermaceae	*Tinospora smilacina*	-
Montiaceae	*Calandrinia strophiolata*	-
Moraceae	*?Ficus aculeata*	Sterile
	Ficus aculeata var. *indecora*	-
Myrtaceae	*Corymbia ?flavescens*	Sterile
	Corymbia flavescens	-
	Corymbia greeniana	-
	Corymbia paractia	Priority 1
	Corymbia zygophylla	-
	Eucalyptus tectifica	-
	Melaleuca nervosa	-
Nyctaginaceae	*Boerhavia gardneri*	-
Oleaceae	*Jasminum didymum* var. *lineare*	-
Orobanchaceae	*Buchnera asperata*	-
	Buchnera ramosissima	-
Phyllanthaceae	*Flueggea virosa* subsp. *melanthesoides*	-
	Phyllanthus maderaspatensis	-
	Synostemon rhytidospermus	-
Poaceae	*?Lolium perenne*	Weed; Insufficient material
	Aristida holathera var. *latifolia*	-
	Aristida hygrometrica	-
	Chrysopogon pallidus	-
	Digitaria bicornis	-
	Enneapogon pallidus	-
	Eragrostis eriopoda	-
	Eriachne melicacea	-
	Eriachne obtusa	-
	Eriachne pindanica	-
	Schizachyrium fragile	-
	Sorghum plumosum	-
	Sorghum timorense	-
	Triodia caelestialis	-
	Triodia schinzii	-
	Yakirra australiensis var. *australiensis*	-

Family	Taxon	Comment & Significance
Proteaceae	*Grevillea pyramidalis* subsp. *pyramidalis*	-
	Hakea macrocarpa	-
	Persoonia falcata	-
Rhamnaceae	*Ventilago viminalis*	-
Rubiaceae	*Dentella misera*	-
	Gardenia pyriformis subsp. *keartlandii*	-
	Oldenlandia mitrasacmoides subsp. *mitrasacmoides*	-
	Spermacoce occidentalis	-
Santalaceae	*Santalum lanceolatum*	-
Sapindaceae	*Atalaya hemiglauca*	-
	Dodonaea hispidula var. *arida*	-
Sapotaceae	*Sersalisia sericea*	PEC Indicator Species
Solanaceae	*Solanum dioicum*	-
Violaceae	*Hybanthus aurantiacus*	-
Zygophyllaceae	*Tribulopis angustifolia*	-

Appendix D: Site by Species Matrix

Taxa	DR01	DR02	DR03	DR04	DR05	QW01	QW02	QW03	QW04	QW05
?Ficus aculeata	-	-	-	-	-	-	-	-	-	-
?Lolium perenne	-	-	2	-	-	-	-	-	-	0.01
Abutilon australiense	-	-	-	-	-	0.01	-	-	-	-
Abutilon otocarpum	-	-	-	-	-	0.01	0.01	0.02	-	0.01
Acacia adoxa var. *subglabra*	-	-	-	-	-	1	-	-	-	-
Acacia colei var. *colei*	-	-	-	-	-	0.5	1	0.25	-	-
Acacia eriopoda	-	0.5	1.5	2	2	20.01	21	5	20	0.2
Acacia platycarpa	15	-	0.1	-	-	-	-	-	-	2
Acacia tumida var. *tumida*	-	-	-	-	-	-	-	-	-	-
Aristida holathera var. *latifolia*	-	-	-	-	-	0.3	0.1	0.5	1.5	0.2
Aristida hygrometrica	6.5	0.5	-	0.3	-	-	0.2	0.2	3	6
Atalaya hemiglauca	2	-	0.1	-	-	-	-	0.1	0.02	1
Bauhinia cunninghamii	3	-	3	6	-	0.2	2	6	-	3
Boerhavia gardneri	-	-	-	-	-	-	0.01	-	-	0.01
Bonamia ?media	-	-	-	-	-	-	-	0.1	-	-
Brachychiton diversifolius subsp. *diversifolius*	-	0.2	-	0.1	1	0.01	-	0.4	1.5	0.2
Buchnera asperata	-	-	-	-	-	-	-	0.01	-	-
Buchnera ramosissima	-	-	-	-	-	-	-	-	-	-
Bulbostylis barbata	-	-	-	-	-	-	-	0.01	0.01	0.01
Byblis filifolia	-	-	-	-	-	-	-	-	-	-
Cajanus marmoratus	0.5	0.1	-	-	-	-	-	0.01	-	-
Calandrinia strophiolata	-	-	-	-	-	-	0.01	0.01	0.01	-
Carissa lanceolata	-	-	0.5	-	-	-	-	1	-	0.2
Chamaecrista moorei	-	-	-	-	-	0.01	0.01	-	-	-
Chrysopogon pallidus	17	3	8	0.5	3	15	5	15	2	4
Cleome tetrandra var. *tetrandra*	-	-	-	-	-	0.01	0.01	0.01	-	-
Codonocarpus cotinifolius	-	-	0.1	-	-	-	0.1	-	0.1	-
Conyza bonariensis	-	-	-	-	-	-	-	-	-	0.01
Corchorus sidoides subsp. *sidoides*	-	-	-	-	-	0.11	-	0.2	-	-
Corchorus sidoides subsp. *vermicularis*	-	0.1	0.1	-	-	-	0.01	-	0.1	0.1
Corymbia ?flavescens	-	-	-	5	-	-	-	3	-	-
Corymbia flavescens	-	-	-	-	-	-	-	-	-	-
Corymbia greeniana	-	-	-	5	1	2	0.5	1	10	-
Corymbia paractia	-	-	-	-	-	-	-	-	-	-
Corymbia zygophylla	-	-	-	-	5	1	-	-	0.2	-
Crotalaria cunninghamii	2	-	-	-	-	-	-	-	-	0.1
Crotalaria medicaginea var. *neglecta*	0.2	-	-	-	-	-	0.01	-	0.01	0.1
Crotalaria ramosissima	-	-	-	-	-	0.01	0.01	0.01	-	-

Taxa	DR01	DR02	DR03	DR04	DR05	QW01	QW02	QW03	QW04	QW05
Cucumis variabilis	-	-	-	-	-	0.01	-	0.01	0.01	0.01
Cullen corallum	-	-	-	-	-	-	-	-	-	-
Cyperus conicus	-	-	-	-	-	-	-	-	-	-
Dentella misera	-	0.01	-	-	-	-	-	-	-	0.01
Digitaria bicornis	-	-	-	-	-	-	-	-	-	-
Dodonaea hispidula var. *arida*	-	-	-	-	-	1	-	-	-	-
Dolichandrone occidentalis	-	-	-	-	-	-	0.5	0.3	0.1	-
Ehretia saligna var. *saligna*	-	0.1	0.1	-	-	0.1	0.2	0.2	-	0.01
Enneapogon pallidus	-	-	-	-	-	-	-	-	-	0.01
Eragrostis eriopoda	-	2	-	-	-	-	0.01	-	0.01	0.01
Eriachne melicacea	-	-	-	-	0.5	-	0.1	0.05	3	-
Eriachne obtusa	-	-	-	-	-	1	-	-	-	-
Eriachne pindanica	-	-	-	-	-	0.01	-	0.1	-	0.01
Eucalyptus tectifica	-	-	-	5	-	-	-	-	-	-
Euphorbia coghlanii	-	-	-	-	-	0.01	0.01	0.01	0.01	-
Euphorbiaceae sp.	-	-	-	-	-	-	-	-	-	-
Evolvulus alsinoides var. *decumbens*	-	-	-	-	-	0.2	0.01	0.01	0.01	0.01
Fabaceae sp.	-	-	-	-	-	-	-	0.1	-	-
Ficus aculeata var. *indecora*	-	-	-	-	-	3	0.5	-	0.01	-
Fimbristylis oxystachya	-	-	-	-	-	0.01	0.01	-	-	-
Flueggea virosa subsp. *melanthesoides*	-	0.1	-	-	-	-	-	-	0.1	0.5
Gardenia pyriformis subsp. *keartlandii*	-	-	-	-	-	-	0.2	1	-	-
Glycine tomentella	-	-	-	-	-	0.02	0.1	0.02	-	-
Goodenia scaevolina	-	-	-	-	-	-	-	-	-	-
Goodenia sepalosa var. *sepalosa*	-	-	-	-	-	0.01	0.01	0.01	-	-
Gossypium australe	-	-	-	-	-	-	-	-	-	-
Grevillea pyramidalis subsp. *pyramidalis*	-	-	0.1	-	-	-	-	1	-	0.2
Grewia breviflora	1	-	0.2	-	-	-	-	0.1	-	2.01
Grewia pindanica	-	-	0.1	-	-	-	0.1	2	-	0.1
Gyrostemon tepperi	-	-	-	-	-	0.1	-	-	-	-
Hakea macrocarpa	-	-	0.2	2	-	-	-	-	0.01	0.01
Heliotropium leptaleum	-	-	-	-	-	0.01	0.01	-	-	-
Heliotropium ovalifolium	-	-	-	-	-	-	0.01	-	-	-
Hybanthus aurantiacus	-	-	-	-	-	0.01	0.01	-	0.01	-
Indigofera colutea	-	-	-	-	-	-	-	0.01	-	-
Indigofera linifolia	-	-	-	-	-	-	0.01	0.01	-	0.01
Ipomoea sp.	-	-	-	-	-	-	0.1	0.01	-	-
Jacksonia aculeata	-	-	-	-	-	-	0.01	-	-	-

Taxa	DR01	DR02	DR03	DR04	DR05	QW01	QW02	QW03	QW04	QW05
Jacquemontia sp. Broome (A.A. Mitchell 3028)	-	-	-	-	-	2	-	-	-	-
Jasminum didymum var. *lineare*	-	-	-	-	-	-	-	-	-	0.01
Marsdenia viridiflora subsp. *tropica*	-	-	-	-	-	0.02	-	0.01	0.01	-
Melaleuca nervosa	5	40	-	-	-	-	-	-	-	-
Melhania oblongifolia	-	-	-	-	-	0.1	-	0.1	-	0.1
Murdannia graminea	-	-	-	-	-	-	0.01	0.01	0.01	0.01
Oldenlandia mitrasacmoides subsp. *mitrasacmoides*	-	-	-	-	-	0.01	0.01	-	-	-
Operculina aequisepala	-	-	-	-	-	-	-	-	-	-
Persoonia falcata	-	-	-	-	-	-	0.1	0.01	-	0.01
Phyllanthus maderaspatensis	-	-	-	-	-	-	0.01	-	0.01	-
Polycarpaea longiflora	-	-	-	-	-	-	-	0.01	-	-
Pterocaulon intermedium	-	-	-	-	-	-	-	-	-	-
Pterocaulon serrulatum var. *velutinum*	0.5	0.1	-	-	-	-	-	-	-	0.51
Ptilotus exaltatus	-	-	-	-	-	-	0.01	-	-	-
Ptilotus lanatus	-	-	-	-	-	-	-	0.1	-	0.01
Ptilotus polystachyus	-	-	-	-	-	-	-	0.01	0.01	-
Rhynchosia minima	-	-	-	-	-	0.01	0.01	-	-	-
Santalum lanceolatum	-	-	2.5	-	-	-	-	-	-	-
Scaevola parvifolia subsp. *parvifolia*	-	0.01	-	-	-	-	-	-	-	-
Schizachyrium fragile	-	-	-	-	-	-	0.01	-	0.01	-
Scleria brownii	-	-	-	-	-	0.1	0.01	0.1	-	-
Senna costata	-	-	-	-	-	-	0.01	0.25	-	-
Senna notabilis	-	-	-	-	-	-	-	-	-	-
Sersalisia sericea	-	-	-	-	-	-	-	-	-	-
Sida rohlenae subsp. *occidentalis*	-	-	-	-	-	-	0.01	-	-	-
Sida sp. Pindan (B.G. Thomson 3398)	-	-	-	-	-	-	0.02	-	-	-
Solanum dioicum	-	-	-	-	-	0.1	0.01	-	0.01	0.01
Sorghum plumosum	-	-	-	4	30	3	0.2	3.05	0.5	0.01
Sorghum timorense	-	-	-	-	0.5	-	-	-	-	-
Spermacoce occidentalis	-	0.01	-	-	-	0.01	0.1	0.01	-	0.01
Stackhousia intermedia	-	-	-	-	-	-	0.01	-	0.01	-
Stylosanthes hamata	0.01	-	-	-	-	-	-	-	-	-
Stylosanthes scabra	-	-	-	-	-	-	-	-	-	-
Synostemon rhytidospermus	-	-	-	-	-	-	-	0.01	-	-
Tephrosia leptoclada	-	-	-	-	-	0.01	0.01	-	-	-
Tephrosia remotiflora	-	-	-	-	-	0.01	-	0.01	-	-
Tephrosia rosea var. *rosea*	-	-	-	-	-	-	-	-	-	-
Tephrosia sp.	-	-	-	-	-	-	-	-	-	-

Taxa	DR01	DR02	DR03	DR04	DR05	QW01	QW02	QW03	QW04	QW05
Terminalia ferdinandiana	-	-	-	-	1	-	-	-	0.1	-
Terminalia hadleyana	-	-	-	-	1	-	0.1	-	0.5	-
Terminalia kumpaja	-	-	-	-	-	-	-	0.01	-	-
Tinospora smilacina	-	-	-	-	-	0.01	0.01	0.01	0.01	0.01
Trachymene oleracea	-	-	-	-	-	-	-	-	-	-
Trianthema pilosum	-	0.01	1	-	-	0.01	0.01	0.02	0.01	-
Tribulopis angustifolia	-	-	-	-	-	-	-	-	0.01	0.01
Trichodesma zeylanicum	-	-	-	-	-	0.2	0.01	0.1	0.05	0.1
Triodia caelestialis	0.1	-	-	-	-	-	17	-	5	0.1
Triodia schinzii	-	4	-	0.1	-	25	-	3	-	-
Velleia panduriformis	-	-	-	-	-	-	-	-	-	-
Ventilago viminalis	-	-	-	-	-	0.01	-	-	-	0.2
Waltheria indica	-	-	-	-	-	0.2	-	0.01	0.01	0.01
Yakirra australiensis var. *australiensis*	-	-	-	-	-	0.02	0.01	0.1	0.01	-
Zornia chaetophora	-	-	-	-	-	-	-	0.01	-	0.01

Appendix E: Sites Sheets

Site: QW01	Type: Quadrat	Size: 50 x 50	Date: 20/04/2020	Botanist: CS

Landform:	Flat, Plain
Slope, aspect:	<1° - Level
Soil:	Clayey sand, Red
Rocks:	No Rocks
Abundance:	-
Size:	-
Fire:	2-5 years
Condition:	Excellent
Notes:	-
Veg Unit:	V001
Location (NW):	51 422737 8024105

Species	Height	Cover	Species	Height	Cover
Abutilon australiense	0.4	0.01	*Glycine tomentella*	0.1	0.01
Abutilon otocarpum	0.2	0.01	*Glycine tomentella*	0.2	0.01
Acacia adoxa var. *subglabra*	0.4	1	*Goodenia sepalosa var. sepalosa*	0.1	0.01
Acacia colei var. *colei*	2	0.5	*Gyrostemon tepperi*	1	0.1
Acacia eriopoda	4	20	*Heliotropium leptaleum*	0.3	0.01
Aristida holathera var. *latifolia*	0.3	0.3	*Hybanthus aurantiacus*	0.4	0.01
Bauhinia cunninghamii	2	0.2	*Jacquemontia* sp. Broome (A.A. Mitchell 3028)	0.4	2
Brachychiton diversifolius subsp. *diversifolius*	1.5	0.01	*Marsdenia viridiflora* subsp. *tropica*	0.2	0.01
Chamaecrista moorei	0.3	0.01	*Melhania oblongifolia*	0.4	0.1
Chrysopogon pallidus	0.4	15	*Oldenlandia mitrasacmoides* subsp. *mitrasacmoides*	0.3	0.01
Cleome tetrandra var. *tetrandra*	0.2	0.01	*Rhynchosia minima*	0.1	0.01
Corchorus sidoides subsp. *sidoides*	0.3	0.1	*Scleria brownii*	0.4	0.1
Corymbia greeniana	3	2	*Solanum dioicum*	0.3	0.1
Corymbia zygophylla	3	1	*Sorghum plumosum*	0.4	3
Crotalaria ramosissima	0.2	0.01	*Spermacoce occidentalis*	0.1	0.01
Cucumis variabilis	0.2	0.01	*Tephrosia leptoclada*	0.2	0.01
Dodonaea hispidula var. *arida*	0.5	1	*Tephrosia remotiflora*	0.1	0.01
Ehretia saligna var. *saligna*	2	0.1	*Tinospora smilacina*	0.1	0.01
Eriachne obtusa	0.4	1	*Trianthema pilosum*	0.1	0.01
Eriachne pindanica	0.2	0.01	*Trichodesma zeylanicum*	0.2	0.2
Euphorbia coghlanii	0.2	0.01	*Triodia schinzii*	0.4	25
Evolvulus alsinoides var. *decumbens*	0.3	0.2	*Ventilago viminalis*	1	0.01
Ficus aculeata var. *indecora*	2.5	3	*Waltheria indica*	0.3	0.2
Fimbristylis oxystachya	0.1	0.01	*Yakirra australiensis* var. *australiensis*	0.2	0.01

Site: QW02	Type: Quadrat	Size: 50 x 50	Date: 18/04/2020	Botanist: CP

Landform:	Flat, Plain
Slope, aspect:	1° - Very Gentle, S
Soil:	Clayey sand, Orange
Rocks:	No Rocks
Abundance:	-
Size:	-
Fire:	>5 years
Condition:	Excellent
Notes:	-
Veg Unit:	V001
Location (NW):	51 422797 8024943

Species	Height	Cover	Species	Height	Cover
Abutilon otocarpum	0.15	0.01	*Heliotropium leptaleum*	0.3	0.01
Acacia colei var. *colei*	2.5	1	*Heliotropium ovalifolium*	0.15	0.01
Acacia eriopoda	3	21	*Hybanthus aurantiacus*	0.35	0.01
Aristida holathera var. *latifolia*	0.4	0.1	*Indigofera linifolia*	0.2	0.01
Aristida hygrometrica	0.4	0.2	*Ipomoea* sp.	0.01	0.1
Bauhinia cunninghamii	2.6	2	*Jacksonia aculeata*	0.35	0.01
Boerhavia gardneri	0.2	0.01	*Murdannia graminea*	0.4	0.01
Calandrinia strophiolata	0.15	0.01	*Oldenlandia mitrasacmoides* subsp. *mitrasacmoides*	0.35	0.01
Chamaecrista moorei	0.3	0.01	*Persoonia falcata*	1.7	0.1
Chrysopogon pallidus	0.5	5	*Phyllanthus maderaspatensis*	0.25	0.01
Cleome tetrandra var. *tetrandra*	0.2	0.01	*Ptilotus exaltatus*	0.1	0.01
Codonocarpus cotinifolius	0.5	0.1	*Rhynchosia minima*	0.3	0.01
Corchorus sidoides subsp. *vermicularis*	0.3	0.01	*Schizachyrium fragile*	0.3	0.01
Corymbia greeniana	3	0.5	*Scleria brownii*	0.3	0.01
Crotalaria medicaginea var. *neglecta*	0.2	0.01	*Senna costata*	0.9	0.01
Crotalaria ramosissima	0.2	0.01	*Sida rohlenae* subsp. *occidentalis*	0.4	0.01
Dolichandrone occidentalis	1.8	0.5	*Sida* sp. *Pindan (B.G. Thomson 3398)*	0.3	0.01
Ehretia saligna var. *saligna*	1.8	0.2	*Solanum dioicum*	0.4	0.01
Eragrostis eriopoda	0.35	0.01	*Sorghum plumosum*	0.01	0.2
Eriachne melicacea	0.4	0.1	*Spermacoce occidentalis*	0.2	0.1
Euphorbia coghlanii	0.2	0.01	*Stackhousia intermedia*	0.3	0.01
Evolvulus alsinoides var. *decumbens*	0.2	0.01	*Tephrosia leptoclada*	0.25	0.01
Ficus aculeata var. *indecora*	2.4	0.5	*Terminalia hadleyana*	2.2	0.1
Fimbristylis oxystachya	0.3	0.01	*Tinospora smilacina*	0.2	0.01
Gardenia pyriformis subsp. *keartlandii*	2.4	0.2	*Trianthema pilosum*	0.1	0.01
Glycine tomentella	0.2	0.1	*Trichodesma zeylanicum*	0.2	0.01
Goodenia sepalosa var. *sepalosa*	0.2	0.01	*Triodia caelestialis*	0.4	17
Grewia pindanica	3.5	0.1	*Yakirra australiensis* var. *australiensis*	0.15	0.01

Site: QW03	Type: Quadrat	Size: 50 x 50	Date: 20/04/2020	Botanist: CS

Landform:	Flat, Plain
Slope, aspect:	<1° - Level
Soil:	Clayey sand, Red
Rocks:	No Rocks
Abundance:	-
Size:	-
Fire:	2-5 years
Condition:	Excellent
Notes:	-
Veg Unit:	V001
Location (NW):	51 449797 8028067

Species	Height	Cover	Species	Height	Cover
Abutilon otocarpum	0.1	0.01	*Glycine tomentella*	0.1	0.01
Acacia colei var. *colei*	3	0.25	*Goodenia sepalosa* var. *sepalosa*	0.1	0.01
Acacia eriopoda	3	5	*Grevillea pyramidalis* subsp. *pyramidalis*	1.5	1
Aristida holathera var. *latifolia*	0.3	0.5	*Grewia breviflora*	1.2	0.1
Aristida hygrometrica	0.3	0.2	*Grewia pindanica*	1.5	2
Atalaya hemiglauca	0.5	0.1	*Indigofera colutea*	0.15	0.01
Bauhinia cunninghamii	3.5	6	*Indigofera linifolia*	0.25	0.01
Bonamia ?media	0.1	0.1	*Ipomoea* sp.	0.1	0.01
Brachychiton diversifolius subsp. *diversifolius*	4	0.2	*Marsdenia viridiflora* subsp. *tropica*	0.6	0.01
Buchnera asperata	0.4	0.01	*Melhania oblongifolia*	0.4	0.1
Bulbostylis barbata	0.1	0.01	*Murdannia graminea*	0.2	0.01
Cajanus marmoratus	0.3	0.01	*Persoonia falcata*	0.3	0.01
Calandrinia strophiolata	0.2	0.01	*Polycarpaea longiflora*	0.2	0.01
Carissa lanceolata	1.75	1	*Ptilotus lanatus*	0.5	0.1
Chrysopogon pallidus	0.4	15	*Ptilotus polystachyus*	0.5	0.01
Cleome tetrandra var. *tetrandra*	0.1	0.01	*Scleria brownii*	0.2	0.1
Corchorus sidoides subsp. *sidoides*	0.2	0.1	*Senna costata*	2	0.25
Corymbia ?flavescens	8	3	*Sorghum plumosum*	0.4	3
Corymbia greeniana	4.5	1	*Spermacoce occidentalis*	0.1	0.01
Crotalaria ramosissima	0.1	0.01	*Synostemon rhytidospermus*	0.5	0.01
Cucumis variabilis	0.2	0.01	*Tephrosia remotiflora*	0.5	0.01
Dolichandrone occidentalis	4	0.3	*Terminalia kumpaja*	0.5	0.01
Ehretia saligna var. *saligna*	2	0.2	*Tinospora smilacina*	0.2	0.01
Eriachne melicacea	0.3	0.05	*Trianthema pilosum*	0.1	0.01
Eriachne pindanica	0.2	0.1	*Trichodesma zeylanicum*	0.3	0.1
Euphorbia coghlanii	0.1	0.01	*Triodia schinzii*	0.4	3
Evolvulus alsinoides var. *decumbens*	0.2	0.01	*Waltheria indica*	1.2	0.01
Fabaceae sp.	1.2	0.1	*Yakirra australiensis* var. *australiensis*	0.2	0.1
Gardenia pyriformis subsp. *keartlandii*	2.5	1	*Zornia chaetophora*	0.25	0.01

Site: QW04	Type: Quadrat	Size: 50 x 50	Date: 20/04/2020	Botanist: CP

Landform:	Flat, Plain
Slope, aspect:	1° - Very Gentle
Soil:	Clayey sand; Red, Orange
Rocks:	No Rocks
Abundance:	-
Size:	-
Fire:	2-5 years
Condition:	Excellent
Notes:	-
Veg Unit:	V001
Location (NW):	51 450199 8027895

Species	Height	Cover	Species	Height	Cover
Acacia eriopoda	3.2	20	*Flueggea virosa* subsp. *melanthesoides*	1.5	0.1
Aristida holathera var. *latifolia*	0.4	1.0	*Hakea macrocarpa*	2.1	0.01
Aristida hygrometrica	0.45	3	*Hybanthus aurantiacus*	0.3	0.01
Atalaya hemiglauca	1.2	0.01	*Marsdenia viridiflora* subsp. *tropica*	0.3	0.01
Brachychiton diversifolius subsp. *diversifolius*	4.5	1.5	*Murdannia graminea*	0.4	0.01
Bulbostylis barbata	0.15	0.01	*Phyllanthus maderaspatensis*	0.3	0.01
Calandrinia strophiolata	0.1	0.01	*Ptilotus polystachyus*	0.4	0.01
Chrysopogon pallidus	0.4	2	*Schizachyrium fragile*	0.15	0.01
Codonocarpus cotinifolius	0.9	0.1	*Solanum dioicum*	0.35	0.01
Corchorus sidoides subsp. *vermicularis*	0.3	0.1	*Sorghum plumosum*	1.1	0.5
Corymbia greeniana	6.5	10	*Stackhousia intermedia*	0.3	0.01
Corymbia zygophylla	3.5	0.2	*Terminalia ferdinandiana*	2.2	0.1
Crotalaria medicaginea var. *neglecta*	0.25	0.01	*Terminalia hadleyana*	4.5	0.5
Cucumis variabilis	0.3	0.01	*Tinospora smilacina*	0.9	0.01
Dolichandrone occidentalis	3	0.1	*Trianthema pilosum*	0.1	0.01
Eragrostis eriopoda	0.3	0.01	*Tribulopis angustifolia*	0.15	0.01
Eriachne melicacea	0.4	3	*Trichodesma zeylanicum*	0.5	0.04
Euphorbia coghlanii	0.15	0.01	*Triodia caelestialis*	0.4	5
Evolvulus alsinoides var. *decumbens*	0.2	0.01	*Waltheria indica*	0.4	0.01
Ficus aculeata var. *indecora*	0.5	0.01	*Yakirra australiensis* var. *australiensis*	0.15	0.01

Site: QW05	Type: Quadrat	Size: 50 x 50	Date: 20/04/2020	Botanist: CP

Landform:	Drainage, Drainage line on flat
Slope, aspect:	Gentle - 3°, S
Soil:	Sandy clay, Light orange
Rocks:	No rocks
Abundance:	
Size:	
Fire:	2-5 years
Condition:	Excellent
Notes:	-
Veg Unit:	V002
Location (NW):	51 449030 8027941

Species	Height	Cover	Species	Height	Cover
?Lolium perenne	0.7	0.01	*Flueggea virosa* subsp. *melanthesoides*	1.5	0.5
Abutilon otocarpum	0.4	0.01	*Grevillea pyramidalis* subsp. *pyramidalis*	1.9	0.2
Acacia eriopoda	2.5	0.2	*Grewia breviflora*	0.5	0.01
Acacia platycarpa	2.2	2	*Grewia breviflora*	3.2	2
Aristida holathera var. *latifolia*	0.3	0.2	*Grewia pindanica*	0.8	0.1
Aristida hygrometrica	0.5	6	*Hakea macrocarpa*	1.8	0.01
Atalaya hemiglauca	0.9	0.5	*Indigofera linifolia*	0.2	0.01
Bauhinia cunninghamii	3	3	*Jasminum didymum* var. *lineare*	0.9	0.01
Boerhavia gardneri	0.2	0.01	*Melhania oblongifolia*	0.4	0.1
Brachychiton diversifolius subsp. *diversifolius*	2.8	0.2	*Murdannia graminea*	0.4	0.01
Bulbostylis barbata	0.15	0.01	*Persoonia falcata*	2.4	0.01
Carissa lanceolata	1.6	0.2	*Pterocaulon serrulatum* var. *velutinum*	0.4	0.3
Chrysopogon pallidus	0.4	4	*Ptilotus lanatus*	0.3	0.01
Conyza bonariensis	0.3	0.01	*Solanum dioicum*	0.4	0.01
Corchorus sidoides subsp. *vermicularis*	0.3	0.1	*Sorghum plumosum*	1	0.01
Crotalaria cunninghamii	1.5	0.1	*Spermacoce occidentalis*	0.15	0.01
Crotalaria medicaginea var. *neglecta*	0.6	0.1	*Tinospora smilacina*	1.5	0.01
Cucumis variabilis	0.6	0.01	*Tribulopis angustifolia*	0.2	0.01
Dentella misera	0.05	0.01	*Trichodesma zeylanicum*	0.8	0.1
Ehretia saligna var. *saligna*	2.5	0.01	*Triodia caelestialis*	0.3	0.1
Enneapogon pallidus	0.5	0.01	*Ventilago viminalis*	4.5	0.2
Eragrostis eriopoda	0.3	0.01	*Waltheria indica*	0.4	0.01
Eriachne pindanica	0.2	0.01	*Zornia chaetophora*	0.3	0.01
Evolvulus alsinoides var. *decumbens*	0.2	0.01			

Site: DR01	Type: Releve	Size: NA	Date: 20/04/2020	Botanist: CP

Landform:	Drainage, Drainage line on flat
Slope, aspect:	Very gentle - 1°, S
Soil:	Sandy clay, Light orange
Rocks:	No rocks
Abundance:	
Size:	
Fire:	<1 year
Condition:	Excellent
Notes:	-
Veg Unit:	-
Location (NW):	51 449030 8027941

Species	Height	Cover	Species	Height	Cover
Acacia platycarpa	2.2	15	*Crotalaria medicaginea* var. *neglecta*	0.5	0.2
Aristida hygrometrica	0.5	5	*Grewia breviflora*	1.2	1
Atalaya hemiglauca	1.5	1	*Melaleuca nervosa*	1.8	5
Bauhinia cunninghamii	4	3	*Pterocaulon serrulatum* var. *velutinum*	0.4	0.5
Cajanus marmoratus	0.25	0.5	*Stylosanthes hamata*	0.4	0.01
Chrysopogon pallidus	0.4	15	*Triodia caelestialis*	0.3	0.1
Crotalaria cunninghamii	1.2	2			

Site: DR02	Type: Releve	Size: NA	Date: 20/04/2020	Botanist: CS
Landform:	Flat, Plain			
Slope, aspect:	Very gentle - 1°, S			
Soil:	Sandy clay, orange			
Rocks:	No rocks			
Abundance:				
Size:				
Fire:	<1 year			
Condition:	Excellent			
Notes:	-			
Veg Unit:	-			
Location (NW):	51 448928 8027745			

Species	Height	Cover	Species	Height	Cover
Acacia eriopoda	0.9	0.5	*Eragrostis eriopoda*	0.4	2
Aristida hygrometrica	0.3	0.5	*Flueggea virosa* subsp. *melanthesoides*	0.8	0.1
Brachychiton diversifolius subsp. *diversifolius*	2.8	0.2	*Melaleuca nervosa*	0.4	40
Cajanus marmoratus	0.15	0.1	*Pterocaulon serrulatum* var. *velutinum*	0.4	0.1
Chrysopogon pallidus	0.3	3	*Scaevola parvifolia* subsp. *parvifolia*	0.2	0.01
Corchorus sidoides subsp. *vermicularis*	0.3	0.1	*Spermacoce occidentalis*	0.1	0.01
Dentella misera	0.05	0.01	*Trianthema pilosum*	0.1	0.01
Ehretia saligna var. *saligna*	0.5	0.1	*Triodia schinzii*	0.3	4

Site: DR03	Type: Releve	Size: NA	Date: 21/04/2020	Botanist: CP

Landform:	Flat, Plain
Slope, aspect:	Level - 1°
Soil:	Sandy clay, light orange
Rocks:	No rocks
Abundance:	
Size:	
Fire:	<1 year
Condition:	Excellent
Notes:	Similar to QW05, just recently burnt
Veg Unit:	-
Location (NW):	51 449175 8028350

Species	Height	Cover	Species	Height	Cover
?Lolium perenne	0.4	2	*Corchorus sidoides* subsp. *vermicularis*	0.3	0.1
Acacia eriopoda	0.7	1.5	*Ehretia saligna* var. *saligna*	0.9	0.1
Acacia platycarpa	0.4	0.1	*Grevillea pyramidalis* subsp. *pyramidalis*	1.6	0.1
Atalaya hemiglauca	2.2	0.1	*Grewia breviflora*	1.5	0.2
Bauhinia cunninghamii	3	3	*Grewia pindanica*	0.5	0.1
Carissa lanceolata	0.5	0.5	*Hakea macrocarpa*	2.2	0.2
Chrysopogon pallidus	0.6	8	*Santalum lanceolatum*	0.6	2.5
Codonocarpus cotinifolius	1.7	0.1	*Trianthema pilosum*	0.05	1

Site: DR04	Type: Releve	Size: NA	Date: 21/04/2020	Botanist: CS
Landform:	Flat, Plain			
Slope, aspect:	Level - 1°			
Soil:	Sandy clay, orange			
Rocks:	No rocks			
Abundance:				
Size:				
Fire:	<1 year			
Condition:	Excellent			
Notes:	Burnt recently			
Veg Unit:	-			
Location (NW):	51 449563 8028812			

Species	Height	Cover	Species	Height	Cover
Acacia eriopoda	1.5	2	*Corymbia greeniana*	0.3	0.1
Aristida hygrometrica	0.4	0.3	*Eucalyptus tectifica*	0.9	0.1
Bauhinia cunninghamii	4	6	*Hakea macrocarpa*	2.2	0.2
Brachychiton diversifolius subsp. *diversifolius*	2.5	0.1	*Santalum lanceolatum*	0.6	2.5
Corymbia ?flavescens	10	5	*Sorghum plumosum*	1.5	0.2
Chrysopogon pallidus	0.6	8	*Trianthema pilosum*	0.05	1
Codonocarpus cotinifolius	1.7	0.1	*Triodia schinzii*	0.5	0.1

Site: DR05	Type: Releve	Size: NA	Date: 21/04/2020	Botanist: CP

Landform:	Flat, Plain
Slope, aspect:	Very Gentle - 1°
Soil:	Clayey sand, red orange
Rocks:	No rocks
Abundance:	
Size:	
Fire:	<1 year
Condition:	Excellent
Notes:	-
Veg Unit:	-
Location (NW):	51 450292 8027532

Species	Height	Cover	Species	Height	Cover
Acacia eriopoda	0.6	2	*Sorghum plumosum*	2	30
Aristida hygrometrica	0.45	1	*Sorghum timorense*	0.4	0.5
Brachychiton diversifolius subsp. *diversifolius*	4	1	*Terminalia ferdinandiana*	4.5	1
Corymbia greeniana	5	1	*Terminalia hadleyana*	5	1
Corymbia zygophylla	5	5	*Hakea macrocarpa*	2.2	0.2
Chrysopogon pallidus	0.6	8	*Santalum lanceolatum*	0.6	2.5
Codonocarpus cotinifolius	1.7	0.1	*Trianthema pilosum*	0.05	1
Eriachne melicacea	0.4	0.5			