PILBARA PORTS AUTHORITY – PORT OF ASHBURTON – EASTERN PORT PRECINCT
ADDITIONAL CLEARING AREAS FLORA SURVEY

FEBRUARY 2020

Prepared for Pilbara Ports Authority

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Prepared for:
Pilbara Ports Authority

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1. INTRODUCTION

1.1 Project Background

The Port of Ashburton (the Port) is located on the west Pilbara coastline approximately 1,150km north of Perth and 12km south-west of Onslow.

Under the *Port Authorities Act 1999*, Pilbara Ports Authority (PPA) has responsibility for the management of waters (254 km^2) and lands (365 ha) within the Port, which abut the Chevron Wheatstone LNG Project development. PPA owns and operates multi-user facilities within the Port, including the shipping channel and turning basin, the Ashburton Cargo Wharf (ACW), ACW access channel and turning basin, navigation aids, developed landside areas, and the Eastern Infrastructure Corridor – a dedicated road link which separates the Wheatstone Project from Onslow Salt.

PPA aims to progressively develop its lands at the Port as demand increases. In 2015, PPA was granted a Native Vegetation Clearing Permit (CPS 6669/1) (the Permit) to support the development of an area of Port land to the east of the ACW, now referred to by PPA as the Eastern Port Precinct (EPP). The Permit allows clearing of up to ~14 ha of native vegetation to support this development (Figure 1)

As a result of a review of the EPP in early 2019, PPA has identified a need to extend the area of the Permit by 12.276 ha to the north and east of the EPP, which will require some native vegetation clearing. The primary reason for this clearing is to allow for the construction of rock revetments along the northern boundary, which are necessary as protection for Port lands and associated infrastructure from coastal erosion and impacts associated with storm waves and climate change.

PPA engaged Vicki Long and Associates (VLA) to undertake a native vegetation and flora survey to support PPA's application to extend the Permit (CPS 6669/1) to include clearing of additional native vegetation under Section 51K of the *Environmental Protection Act 1986*. The required survey was to assess vegetation and flora within the proposed 12.276 ha Permit area which includes the adjacent coastal dune system to the north and east of existing cleared areas in the Eastern Port Precinct.

1.2 Scope

The scope of work for this project included:

- Undertaking a desktop assessment within a 20km radius of the native vegetation and flora survey area (Survey Area) (further defined in Section 1.3), including database searches and literature review of available resources
- Conducting a flora and vegetation assessment over the Survey Area in accordance with PPA requirements and relevant State Technical Guidance (EPA 2016) to support PPA's application to amend the Permit (CPS 6669/1) under Section 51K of the *Environmental Protection Act 1986*. This includes:
    - Verification of the desktop assessment
    - Composing a species list, including recording locations of Threatened (Declared Rare), Priority flora and introduced flora
    - Vegetation mapping with supporting photographs of each vegetation type
    - Discussion of conservation significant vegetation or flora recorded within the survey area

Figure 1 – Proposed Additional Clearing of Native Vegetation under CPS 6669/1 Eastern Port Precinct

N	Scale: 1:6,000 (at A4 size)	Map: PA-004-014-10-08	0 50 100 150 200 metres
	Horizontal datum: GDA 1994 MGA Zone 50	Date: 2020 06 25	PILBARA PORTS AUTHORITY PORT OF ASHBURTON
	Image source: Landgate June 2018	Drawn: DM	

Ref: PA-004-014-10-08 Proposed Clearing Area Location Figure1

- Preparing and producing a report which addresses the task outlined above and is adequate to be used by PPA in the preparation and development of an application for amending the Permit (CPS 6669/1) under Section 51K of the *Environmental Protection Act 1986*.

1.3 The Survey Area

The Survey Area comprises a 12.276 ha coastal dune area of PPA's land (Lot 569 on DP 71345) at the Port immediately to the north and east of the Eastern Port Precinct.

The Survey Area is situated immediately adjacent to the area approved for clearing by PPA under CPS 6669/1 (the Permit) for the Eastern Port Precinct development as well as two areas of developed Port land that were originally cleared and developed as part of the Wheatstone Project. A north-south track providing vehicular access to coastal (beach) areas of the Port traverses an eastern portion of the Survey Area.

The Survey Area is comprised of red sand coastal plain in the areas adjacent to the Eastern Port Precinct and extends in a northerly direction to encompass the coastal beach dunes.

2 REGIONAL INFORMATION

2.1 IBRA Bioregions and Subregions

The Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological and geographical/geological attributes. These bioregions are subdivided into 419 subregions, as part of a refinement of the IBRA framework. The survey area lies within the Carnarvon bioregion.

Carnarvon Bioregion (CAR): There are two biological sub-regions within the Carnarvon bioregion. The survey area is within the Cape Range bioregion which is described as:

Rugged tertiary limestone ranges and extensive areas of red aeolian dunefields, quarternary coastal dunes and mud flats. Acacia shrublands (Acacia stuartii or Acacia bivenosa) over Triodia on limestone and red dune fields. Triodia hummock grassland with sparse Eucalyptus trees and shrubs on the Cape Range. The Exmouth Gulf supports extensive mangroves in tidal mudflats and sheltered embayments, while the hinterland area supports a mosaic of samphire low shrublands in saline alluvial plains (Kendrick and Mau, 2002).

2.2 Land Systems

The survey area falls within the 'Littoral' land system which is described by van Vreeswyk et al. 2004 as:

Bare coastal mudflats with mangroves on seaward fringes, Tecticornia (samphire) flats, sandy islands, coastal dunes and beaches; vegetation mostly in good to very good condition;

2.3 State and Commonwealth Conservation Categories and Management

The legislative protection of flora and fauna within Western Australia is governed by three Acts:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- The State *Biodiversity Conservation Act, 2016* (BC Act)
- The State *Environmental Protection Act 1986* (EP Act)

At Commonwealth level, the EPBC Act provides a legal framework to protect and manage Matters of National Environmental Significance (MNES) including listed flora, fauna and ecological communities. These listed flora and fauna are allocated conservation categories, which are summarised in Table A.1 (Appendix A).

An ecological community is defined as a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat (Department of Agriculture, Water and the Environment (DAWE) 2020a). An ecological community may be subject to processes that threaten to destroy or significantly modify it across much of its range. These communities are identified as Threatened Ecological Communities (TECs) and are listed at both Commonwealth level under the EPBC Act and at State level by the Western Australian Minister for Environment. Conservation categories for Commonwealth listed TECs are given in Table A.2 – Appendix A).

The BC Act came into effect in January 2019 to provide for the conservation and protection of biodiversity and biodiversity components in Western Australia; repealing the *Wildlife Conservation Act 1950* (WA Act). The BC Act provides for native plant species to be specially protected when they are under identifiable threat of extinction, are rare, or otherwise in need of special protection (Table A.3 - Appendix A). (DBCA 2020a). Such specially protected flora is considered under the BC Act to be 'declared rare' (Threatened).

The BC Act also provides for the statutory listing of TECs by the Minister for Environment. DBCA lists WA TECs endorsed by the Minister as protected according to their need (DBCA 2020a). Where an ecological community is considered to be under threat and there is limited information available, it is considered to be a Priority Ecological Community (PEC). The categories of these TECs and PECs are given in Table A.4 and A.5 in Appendix A.

Priority flora includes species considered to be under threat, but for which there is insufficient information available to make a proper evaluation of their conservation status. These flora species are included on a supplementary conservation list managed by Department of Biodiversity, Conservation and Attractions (DBCA) called the *Priority Flora List*. Priority flora are categorised according to level of threat and other information; the conservation categories are described in Table A.6 (Appendix A).

2.4 Introduced Flora (Weeds)

Significant weed species are identified at both the State and National level. At a State level the management of weeds in Western Australia is primarily regulated through the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Species listed under this Act are allocated one of three declared pest categories which define the required level of management (Department of Primary Industries and Regional Development 2019) The Australian Weeds Strategy (Australian Weeds Committee 2012) identifies 'Weeds of National Significance' (WoNS) which have the potential to impact primary industry and/or environmental and social values. The management of weeds in Western Australia is primarily regulated through the BAM Act. Species listed under this act are allocated one of three declared pest categories which define the required level of management

(Department of Primary Industries and Regional Development (DPIRD), 2019). Declared pest categories and listed weed species' priority ratings are presented in Table A.7 (Appendix A).

3. METHODOLOGY

3.1 Desktop Assessment

3.1.1. Database Searches

A search for Environmentally Sensitive Areas (ESAs) within 20 km of the Survey Area was conducted using Western Australian government datasets (Government of Western Australia 2020). TECs and PECs listed by DBCA (DBCA 2020b) were also reviewed to determine if any were analogous with vegetation communities recorded in the Survey Area.

In addition, database searches were conducted to identify listed conservation significant flora and ecological communities within, or near, the survey locations. Search details are summarised in Table 1.

Introduced flora species were compared to the DPIRD list, to determine if any have been listed as declared pests (Department of Primary Industries and Regional Development 2019), and the WoNS list (Australian Weeds Committee 2012).

Table 1: Database searches undertaken.

Database	Date search results received	Search focus	Search area
Department of the Environment and Energy Protected Matters Search Tool (Department of Agriculture, Water and the Environment 2020b)	19/02/2020`	MNES	10 km buffer around an area defined by the coordinates: 115 °03'48"E 21°46'41"S
Threatened and Priority Flora Database (TPFL) (Department of Biodiversity, Conservation and Attractions 2016a)	18/12/16	Listed threatened and priority flora	20km radius around an area defined by co-ordinates: 115 °03'48"E 21°46'41"S
Threatened and Priority Flora List (TP List) (Department of Biodiversity, Conservation and Attractions 2016a)			
Western Australia Herbarium Flora Database (WA Herb) (Department of Biodiversity, Conservation and Attractions 2016a)			20km radius around an area defined by co-ordinates: 115 °03'48"E 21°46'41"S

Database	Date search results received	Search focus	Search area
Threatened and Priority Ecological Communities Database (Department of Biodiversity, Conservation and Attractions 2016b)	18/12/16	Listed threatened and priority ecological communities	20km radius around an area defined by co-ordinates: 115 °03'48"E 21°46'41"S
NatureMap (Department of Biodiversity, Conservation and Attractions 2020c)	19/02/20	Flora of conservation significance	20 km around an area defined by the coordinates: 115 °03'48"E 21°46'41"S

3.1.2. Literature Review

Biological assessments previously undertaken within the vicinity of the Survey Area include:

- Biological surveys undertaken for the Wheatstone Project (Technical appendices I1 and I2 in the Draft Environmental Impact Statement / Environmental Review and Management Programme for the proposed Wheatstone Project (Chevron 2010))
- Onslow Townsite Strategy (ENV 2011).
- *Coral Coast, Western Australia Flora and Vegetation Surveys.* Unpublished report prepared for the Department of Biodiversity, Conservation and Attractions (DBCA). March 2019 (VLA 2019).

In addition to these assessments, broad-scale information was reviewed and available from Beard (1975) and van Vreeswyk et al (2004) for the Pilbara Region.

3.1.3. Likelihood of Occurrence Assessment

Habitat requirements of conservation significant flora species identified from the database and literature searches were assessed to determine whether suitable habitat was present within the survey locations. Descriptions of criteria utilised by VLA to assess the likelihood of species occurrence within the survey locations are presented in Table 2.

Table 2: Likelihood of occurrence of priority flora criteria.

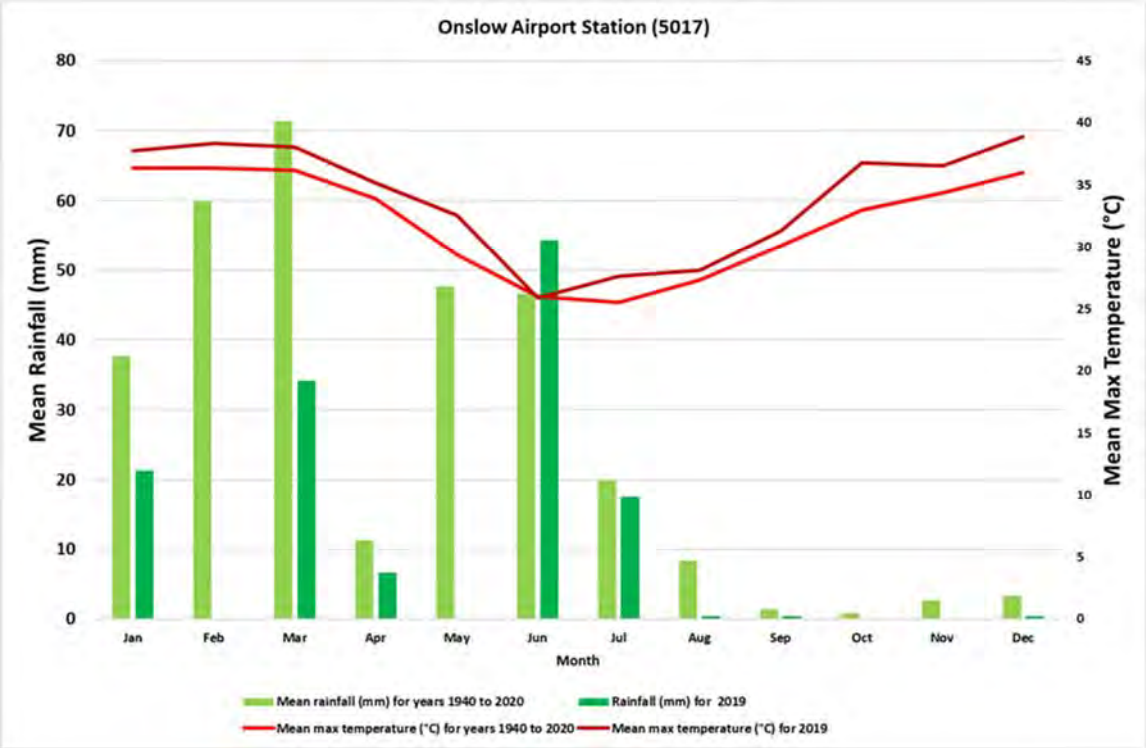
Likelihood of Occurrence	Desktop Criteria
Likely	o Species has been recorded before in survey area or within 10 km of the Survey Areas o Known to be present in the Survey Areas based on site observations (expert advice) o Species has been recorded within the same habitat as occurs in the Survey Areas
Potential	o Species has been recorded within 20 km of the Survey Areas o Species reported as known in the Survey Areas by local community o Species has been recorded within the same habitat type as occurs in the Survey Areas.
Unlikely	o Species has not been recorded within 20 km of the Survey Areas o No suitable habitat occurs in the Survey Areas

Following the survey, the conservation significant flora species identified during the desktop assessment as having the highest potential to occur within the survey locations, but not recorded during the current surveys, were again assessed to determine their likelihood of occurrence within the survey locations. Post-field survey likelihood was primarily based on validating the presence (and thorough inspection) of suitable habitats within each of the survey locations, combined with life form, habitat and flowering information for each flora species.

3.2 Field Survey

3.2.1 Weather

In the twelve month period prior to the survey being undertaken, a total of 136.2 mm of rain had been recorded at the Onslow Airport weather station (5017) (Bureau of Meteorology 2020). This rainfall is below average for that period (Graph 1).



Graph 1: Mean (for years 1940 to 2020) and actual (2019) monthly rainfall and temperature data for Onslow Airport weather station (05017) (BOM 2020)

3.2.2 Flora and Vegetation Survey

The field survey was conducted by Vicki Long, a botanist/ecologist with over 35 years of experience in the Pilbara. Vicki has conducted numerous flora and vegetation surveys in the Onslow area since 1987 and is well qualified to identify vegetation and flora of conservation significance.

The survey within the Port of Ashburton was conducted on the 19th and 20th February 2020.

A single rain event of 1mm was recorded in January 2020 (BOM 2020), which is well below the average of 60mm for this period.

The survey was conducted in accordance with the scope of work dated 4 February 2020. Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016) was also consulted to ensure consistency with recognised botanical survey guidance in Western Australia.

In order to achieve the scope of work, a minimum of two 30m x 30m quadrats per vegetation type encountered, were sampled to be consistent with regulatory expectations for the Carnarvon biogeographic region floristic quadrats.

The following information was collected for each quadrat:

- Location – co-ordinates measured using a hand-held GPS (MGA 50, GDA94). One set of co-ordinates taken from the south-eastern corner of each quadrat;
- Recorder and date - personnel involved in sampling that location and date;
- Species – all vascular plant species present, including weed species. Species that are not readily identifiable during the field survey will be collected for later identification in the VLA office herbarium, or at the WA Herbarium. GPS co-ordinates were recorded for any conservation significant flora identified;
- Foliar cover – the estimated percent cover for the dominant species in each stratum;
- Vegetation description – vegetation units will be described according to Aplin's (1979) modification of the vegetation classification system of Specht (1970) (Appendix B) and the National Vegetation Information System Level 5 (Department of Agriculture, Water and the Environment, 2020c). At this level vegetation is described to 'association' where up to three dominant genera for each of the upper, mid and ground strata are categorised based on dominant growth form, cover and height;
- Vegetation condition – assessed according to the vegetation condition classification adapted by Trudgen (1988) (Appendix B);
- Habitat – a broad description of the surrounding landscape based on landform, topography and soil;
- Disturbance – records of any obvious disturbances such as fire, tracks, weed infestations;
- Photographs – a photograph will be taken of each quadrat and vegetation unit.

3.3 Limitations

Following completion of the desktop assessment and field surveys, a review of any limitations that may have affected a complete assessment of the data collected was conducted.

Table 3 is based on those suggested as considerations in Section 10.2 of the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016)

Table 3: Statement of limitations

Potential limitation	Statement regarding potential limitations
(i) Sources of information and availability of contextual information Is the region well documented?	Previous biological surveys have been conducted in the broader regional area, and broad-scale information is available from Beard (1975) and Payne et al. (1980). More specifically, various surveys have been conducted for the Wheatstone Project area which describe vegetation and flora at a detailed level. Contextual information is therefore not a limiting factor for this survey.

Potential limitation	Statement regarding potential limitations
(ii) Scope The level of survey and detail required to undertake the survey. Was there adequate time to complete the survey to the desired standard?	There was adequate time to complete the flora and surveys and conduct targeted searches for Threatened and Priority flora within identified preferred habitats and landforms within the survey area. Time was not considered a limiting factor.
(iii) Proportion of flora and fauna identified, recorded and/or collected Was the survey sampling, timing and intensity considered adequate? Was the survey conducted at what was considered an appropriate time of the year for plant identification? Were any taxonomic groups considered to be under-represented?	The single survey was considered adequate despite conditions being dry. The field botanist is very experienced with Pilbara coastal flora having worked with it for 35 years. Beach dune and near coastal vegetation is relatively specific and not particularly diverse. Some species were dormant, some defoliated but their particular habit still allowed the field botanist to determine their identity . The one Priority flora species one would expect to find in this habitat (coastal behind dunes) was recorded. It was dormant. The survey area is very small and the proportion of species identified was considered to be adequate for that habitat.
(iv) Completeness Is there further work which may be required i.e. was the relevant area fully surveyed?	The Survey Area was considered adequately surveyed to compile representative lists of species, (including Priority and introduced flora species), as well as describe vegetation at a level appropriate for management decisions. The Survey Area was comprehensively surveyed and as such completeness is not a limiting factor.
(v) Mapping reliability Were the aerial photographs, satellite images and site maps available considered adequate to fully understand the area surveyed? Was the mapping generated considered to have a high degree of reliability?	Colour aerial photography at a scale of 1:5,000 was used to locate the Survey Area and to assist in navigation and delineation of vegetation boundaries. The aerial photography was of good resolution and, in general, accurately represented ground conditions. As such mapping reliability was not considered a limiting factor.
(vi) Timing When was the survey conducted in terms of season, rainfall, severe weather events etc. Was the survey conducted at an appropriate time for access, observation of the optimal suite of species and for identification of flowering and fruiting species?	Seasonal conditions were considered dry, especially for a February survey. However coastal vegetation is predominantly perennial and although many species were dormant, they were still able to be identified by the field botanist. Despite the dry conditions, the diversity of species however was still considered to be representative.
(vii) Disturbance Had the survey area been impacted by any disturbance which may have limited the survey, i.e. fire, flood, accidental human intervention etc.?	Approximately 50% of the Survey Area was impacted by the introduced buffel grass, the presence of which is historical and typical of the leeward side of dunes and coastal plain in the Pilbara, particularly if the area was historically pastoral. Some disturbance, a legacy of the Wheatstone Project construction was obvious on the site. The Survey Area is particularly small, any disturbance is historical and not seen as a limitation to what is currently present.

Potential limitation	Statement regarding potential limitations
(viii) Intensity In retrospect, was the intensity considered to be adequate?	The intensity of the survey was considered adequate to compile representative species lists. Intensity was not considered a limiting factor.
(ix) Resources Were the appropriate tools and materials available to complete the task effectively?	Resources were adequate to complete the survey and all appropriate tools and materials required to complete the task were available. Resources were not considered a limiting factor.
(x) Access Were there any factors limiting access to the survey area?	The entire Survey Area was accessible and was traversed in its entirety by foot.
(xi) Experience Were personnel undertaking the field survey and plant identification trained and/or experienced in undertaking the required tasks?	The field botanist responsible for undertaking the field survey has considerable (35 years) experience in conducting vegetation and flora surveys along the Pilbara/Carnarvon/Kimberley coastline including offshore islands. Personnel experience was not considered a limiting factor.

4 RESULTS

4.1 Desktop Assessment

4.1.1 Vegetation

The vegetation of the survey area has been described by Biota (2010) as consisting of two vegetation types. These being:

1. *Acacia coriacea* subsp *coriacea, Crotalaria cunninghamii* tall shrubland over *Spinifex longifolius (*Cenchrus ciliaris)* open tussock grassland, and

2. *Acacia coriacea* subsp *coriacea* tall shrubland over *Crotalaria cunninghamii, Trichodesma zeylanicum* var *grandiflorum* open shrubland over *Triodia epactia* open hummock grassland with **Cenchrus ciliaris* open tussock grassland.

These vegetation types are found to be widespread in and around the Onslow area. Their conservation value lies in the fact that the species present help to stabilise these vulnerable coastal dunes, which are constantly subject to very dynamic coastal processes, rather than the component species themselves.

4.1.2 Vegetation of Conservation Significance

No TECs or PECs have been previously recorded within the Survey Area. Database search results indicate that the nearest reserve is Cane River Conservation Park, located approximately 74 km south-east of the survey site. The Peedamullah Marsh Vegetation Complex, a P1 State-listed PEC lies approximately 20 km north-east of the survey site (DBCA 2019). Neither of these areas of significance will be impacted by the proposed clearing activities.

4.1.3 Flora

Database search results indicated that no Threatened (T) flora species, and five Priority (P) P3 species have been recorded within 20 km of the survey locations (DBCA 2020c). Of the five Priority flora species identified from the desktop assessment, one P3, *Abutilon sp*. Pritzelianum (S. van Leeuwen 5095) is considered to have potential to occur in the Survey Area, based on pre-survey assessment of previous location and preferred habitat information. The likelihood of occurrence assessment is provided in Table 4.

Table 4: Likelihood of occurrence of Threatened and Priority flora recorded within 20 km of the survey area (DBCA 2020c).

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Threatened (Declared Rare Flora)					
Not applicable					
Priority 3					
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	Tall spindly shrub to 2 m, with grey-green roundish leaves with 5 yellow petalled flowers which are purple at the throat.	Perennial	Red-brown sands and loamy sands. The Onslow population tends to occur on the reddish brown sandy plain immediately landward of the coastal beach dunes.	Potential	Recorded
Eleocharis papillosa	Herb. Brown flowers in Nov.	Annual	Occurs on Red clay over granite, open clay flats. Claypans.	Unlikely	Unlikely
Eremophila forrestii subsp. *viridis*	Much-branched shrub, around 1 m high. Pink-cream flowers in August.	Perennial	Red sand dune habitats	Unlikely	Unlikely
Stackhousia clementii	Dense broom-like herb, to 0.45 m high. Green/yellow/brown flowers.	Perennial	Skeletal soils. Sandstone hills.	Unlikely	Unlikely
Triumfetta echinata	Low growing shrub reaching a maximum of 30 cm in height. This species produces yellow flowers in July and August, and is easily recognised by its spiky, round seed pods approximately 2–3 cm in diameter.	Perennial	Red sandy soils and sand dune habitats	Unlikely	Unlikely

4.2 Field Survey

4.2.1 Vegetation

The vegetation within the Survey Area has been subject to previous disturbance. In the western portion of the Survey Area, adjacent to the Wheatstone plant site boundary, vegetation has been cleared and regrowth modified by imported red-brown silts. Vegetation clearing for an existing north-south track which provides access to the beach from the Port area has occurred in the past. Vegetation has also been partially removed along a narrow two wheeled track around the eastern end of the existing PPA Clearing Permit Area (CPS 6669/1). Additionally, vegetation is naturally disturbed by strong coastal winds and extreme weather events such as tropical cyclones.

Due to the dry conditions preceding the survey, many perennial species were dormant and most annual species absent.

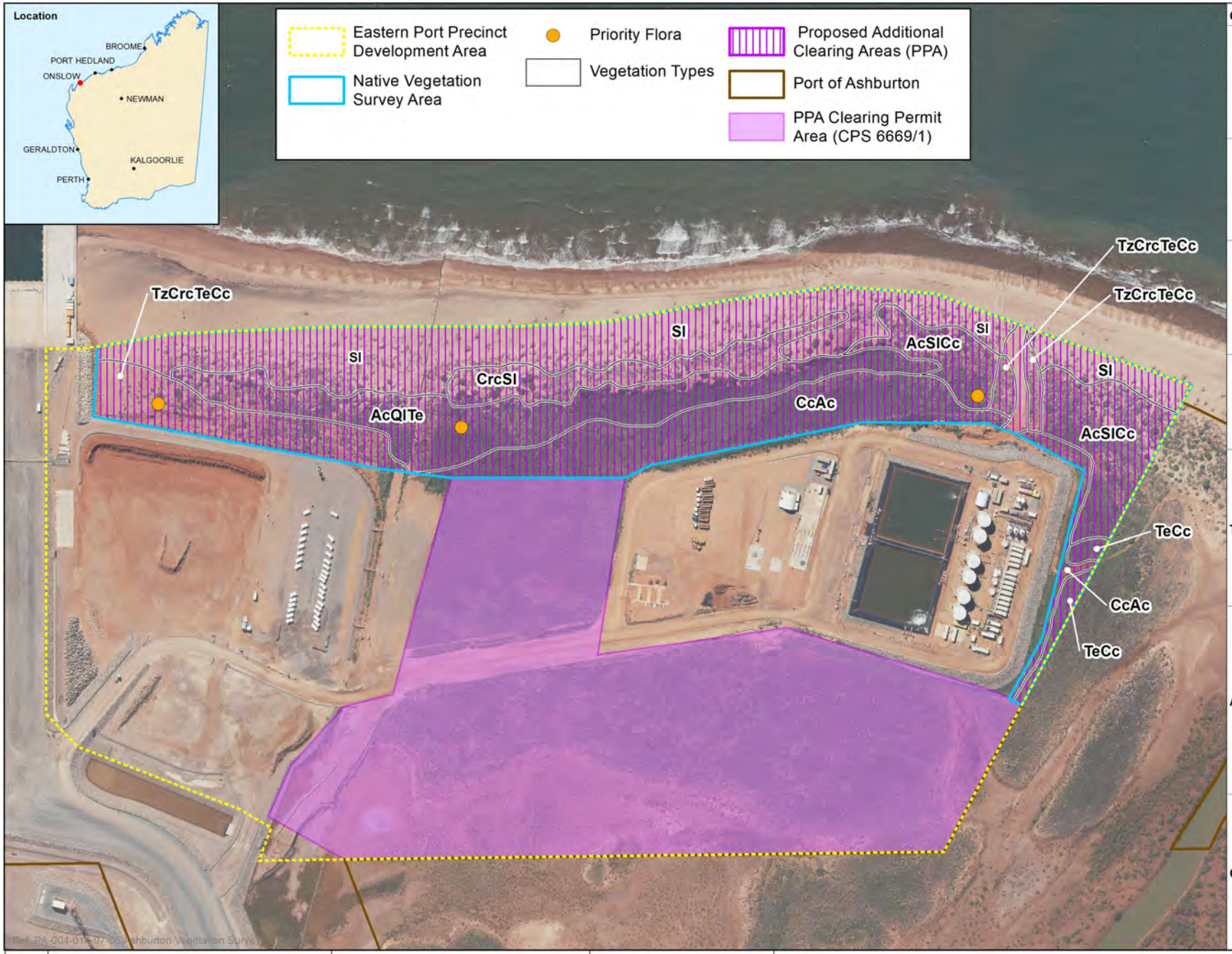
The vegetation types recorded in the survey area are consistent with those described by Biota (2010) and detailed in Section 4.1.1. Seven detailed plant communities classified by dominant species and cover in each stratum were identified within the two vegetation types described in Section 4.1.1. These are summarised in Table 5, along with representative photos of each and shown on Figure 2.

4.2.2 Vegetation Condition

Vegetation condition was assessed using the Trudgen (1988) condition scale, as recommended by the EPA (2016). It is rated predominantly on external factors such as man-made disturbance, fire, clearing, grazing and weeds and does not account for seasonality (dry conditions where flora may be dormant and dry) or the impacts of natural events such as coastal processes and cyclones. Therefore, although the vegetation at the time of this survey was dry, with a large number of dormant species (some species were leafless, whilst the annual species were mostly dead), and vegetation along the beach itself was sparse on hummocky dunes, it was still considered generally to be in 'Good' condition.

According to the assessment scale, two areas within the Survey Area were considered in 'Poor' condition. One located at the eastern end of the Survey Area was classified as disturbed (plant community: TzCrcTeCc**)** and is currently intersected by an access track used to access beach areas to the east of the Port facilities. The other was located on a semi-disturbed coastal plain on the southern side of the primary dunes (plant community: CcAc). The area is directly north of PPA's existing area approved for clearing under native vegetation clearing permit (CPS 6669/1) and the eastern (developed) portion of the Eastern Port Precinct. Both these areas are dominated by ****Cenchrus ciliaris***.

Vegetation Condition ratings for each vegetation type identified in the survey area given in Table 5 and shown on Figure 3.



Code	Description
TeCc	*Triodia epactia* hummock grassland with patchy **Cenchrus ciliaris*. (more dense near disturbance). Scattered *Acacia coriacea* subsp *coriacea* on coastal plain with pale pinky-brown silts.
AcSlCc	*Acacia coriacea* subsp *coriacea* open tall shrubland over mixed *Spinifex longifolius*/ **Cenchrus ciliaris* tussock grassland. Scattered *Crotalaria cunninghamii*.
CrcSl	*Crotalaria cunninghamii* shrubland with *Trichodesma zeylanicum* var *grandiflorum* over *Spinifex longifolius* open tussock grassland on hummocky low swale with pale pink sands.
Sl	*Spinifex longifolius* open tussock grassland on naturally eroded hummocky beach berm and face of primary dune, pale pinkish beach sand.
TzCrcTeCc	*Trichodesma zeylanicum* var *grandiflorum, Crotalaria cunninghamii, Adriana tomentosa* scattered to open mixed tall shrubs over *Triodia epactia, *Cenchrus ciliaris* open grassland on disturbed area with imported red-brown silts with scattered stones and pebbles.
AcQlTe	*Acacia coriacea* subsp *coriacea* tall shrubland over *Quoya loxocarpa, Adriana tomentosa, Trichodesma zeylanicum* subsp *grandiflorum* mixed shrubland over *Triodia epactia* hummock grassland, sometimes patchy with patchy **Cenchrus ciliaris* tussock grass on crest and leeward face of primary dune.
CcAc	**Cenchrus ciliaris* tussock grassland to closed tussock grassland with scattered *Acacia coriacea* subsp *coriacea, Trichodesma zeylanicum* subsp *grandiflorum*. Patches of *Triodia epactia*. On semi-disturbed coastal plain behind foredune with pinky silts.

N

0 50 100
Metres

Scale: 3,500 (at A3 size)	Map: PA-004-014-07-05
Datum: GDA 1994 MGA Zone 50	Date: 25 06 2020
Image source: Landgate 2018	Drawn: DM

Figure 2. Vegetation Types and Priority Flora in Proposed Additional Clearing Areas

PILBARA PORTS AUTHORITY
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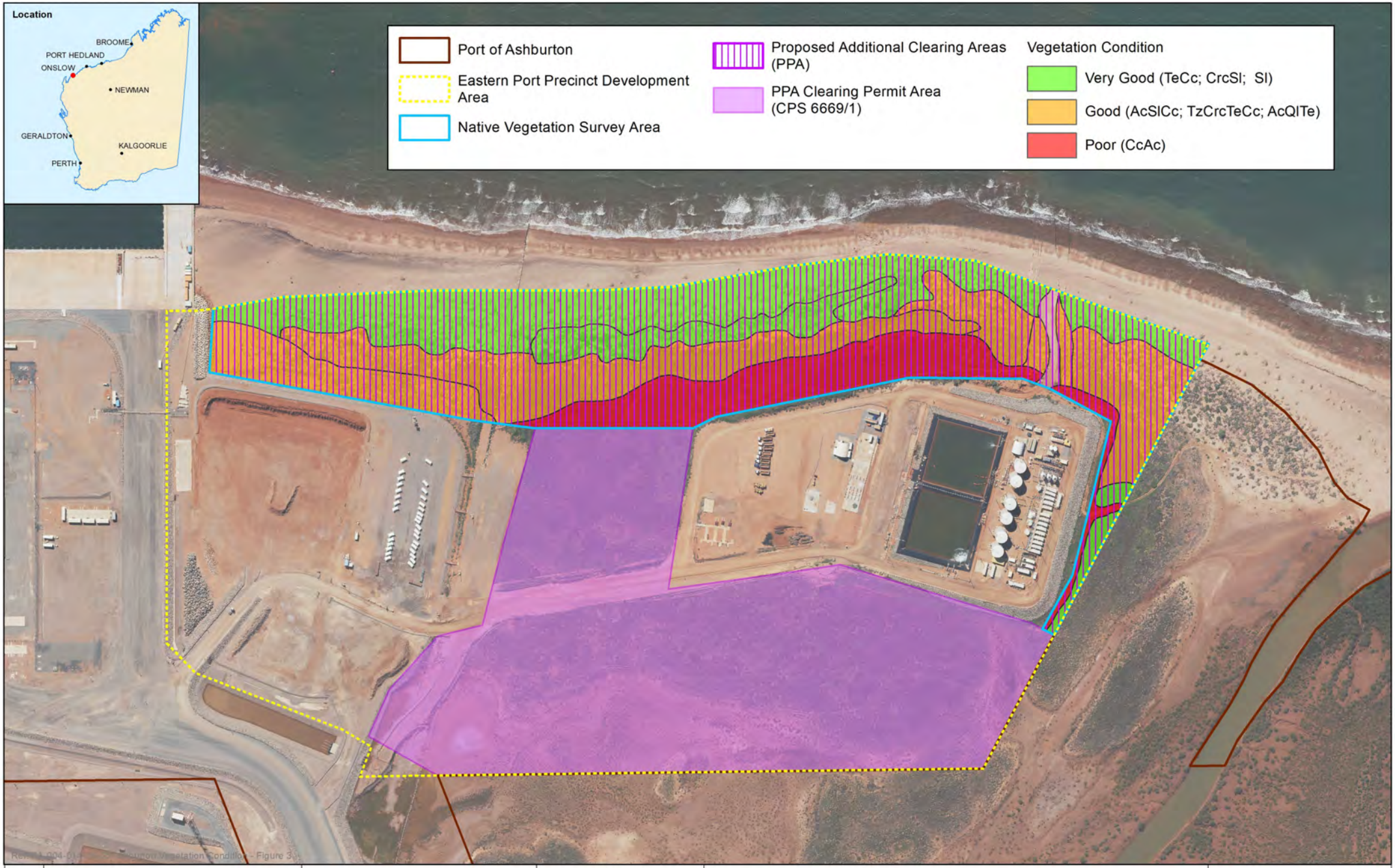

N	0 50 100 Metres	Scale: 3,500 (at A3 size)	Map: PA-004-014-08-05
		Datum: GDA 1994 MGA Zone 50	Date: 25 06 2020
		Image source: Landgate 2018	Drawn: DM

Figure 3. Vegetation Condition in Proposed Additional Clearing Areas

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Table 5: Vegetation description and condition within the survey area

Vegetation Type as mapped by Biota (2010). Number refers to those used in Section 4.1.1	Code	GPS UTM E/N	Description and Condition (Trudgen 1988)	Representative Photo
2	**TeCc**	0295024 7600363	*Triodia epactia* hummock grassland with patchy **Cenchrus ciliaris*. (more dense near disturbance). Scattered *Acacia coriacea* subsp *coriacea* on coastal plain with pale pinky-brown silts. **Condition:** Very Good	
1	**AcSlCc**	0295074 7600633	*Acacia coriacea* subsp *coriacea* open tall shrubland over mixed *Spinifex longifolius/ *Cenchrus ciliaris* tussock grassland. Scattered *Crotalaria cunninghamii*. **Condition:** Good	

Vegetation Type as mapped by Biota (2010). Number refers to those used in Section 4.1.1	Code	GPS UTM E/N	Description and Condition (Trudgen 1988)	Representative Photo
1	**CrcSl**	0294752 7600658	*Crotalaria cunninghamii* shrubland with *Trichodesma zeylanicum* var *grandiflorum* over *Spinifex longifolius* open tussock grassland on hummocky low swale with pale pink sands. **Condition:** Very Good	
1	**Sl**	0294410 7600667	*Spinifex longifolius* open tussock grassland on naturally eroded hummocky beach berm and face of primary dune, pale pinkish beach sand. **Condition:** Very Good	

Vegetation Type as mapped by Biota (2010). Number refers to those used in Section 4.1.1	Code	GPS UTM E/N	Description and Condition (Trudgen 1988)	Representative Photo
Disturbed	**TzCrcTeCc**	0294208 7600632	*Trichodesma zeylanicum* var *grandiflorum, Crotalaria cunninghamii, Adriana tomentosa* scattered to open mixed tall shrubs over *Triodia epactia, *Cenchrus ciliaris* open grassland on disturbed area with imported red-brown silts with scattered stones and pebbles. **Condition:** Poor	

Vegetation Type as mapped by Biota (2010). Number refers to those used in Section 4.1.1	Code	GPS UTM E/N	Description and Condition (Trudgen 1988)	Representative Photo
2	**AcQlTe**	0294499 7600599	*Acacia coriacea* subsp *coriacea* tall shrubland over *Quoya loxocarpa, Adriana tomentosa, Trichodesma zeylanicum* subsp *grandiflorum* mixed shrubland over *Triodia epactia* hummock grassland, sometimes patchy with patchy **Cenchrus ciliaris* tussock grass on crest and leeward face of primary dune. **Condition:** Good	

Vegetation Type as mapped by Biota (2010). Number refers to those used in Section 4.1.1	Code	GPS UTM E/N	Description and Condition (Trudgen 1988)	Representative Photo
2	**CcAc**	0294637 7600617	**Cenchrus ciliaris* tussock grassland to closed tussock grassland with scattered *Acacia coriacea* subsp *coriacea, Trichodesma zeylanicum* subsp *grandiflorum.* Patches of *Triodia epactia*. On semi-disturbed coastal plain behind foredune with pinky silts. **Condition:** Poor	

4.2.3 Flora

Flora health and diversity was impacted by the dry conditions preceding the survey with many perennial species being either completely de-foliated or having died back to rootstock. Most annual species were not present. An exception to this was the presence of some species near the rock batter in the eastern section of the survey area. The rock batter provides shelter from the wind as well as moisture in the form of condensation off the rocks.

Coastal flora is specifically adapted to the exposed, semi-saline, extremely windy conditions of the coastline and diversity on coastal dunes tends to be low. It is considered that a high proportion of the species, at least the perennial species, expected to be present in this environment were recorded during the survey.

A total of 40 vascular species from seventeen families were recorded during the survey (Appendix C). Thirty-six of the plants recorded were perennial, with more annual species likely to be present following decent rain. The most represented family was Fabaceae (pea family) with seven species, followed by Poaceae (grasses) with six species. The species recorded are all typically found along the Pilbara and Carnarvon region coastlines.

4.2.3.1 Conservation Significant Flora

The Priority 3 species, *Abutilon* sp Pritzelianum (S. van Leeuwen 5095) was recorded at several locations within the Survey Area. Approximately 10 plants were recorded showing signs of dormancy in the disturbed area with imported soils at the western end of the Survey Area and within the proposed additional clearing area (plant community: TzCrcTeCc). One individual was recorded approximately mid-way along the Survey Area (not in the proposed additional clearing area) on the dune crest (plant community: AcQlTe) and another individual at the eastern end of the Survey Area and on the border of the proposed clearing area (plant community: CcAc). Locations are marked on Figure 2 and summarised in Table 6.

Table 6: Locations of P3 *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)

Species	GPS Location UTM (E/N)	Number of Individuals	Representative Photo
Abutillon sp Pritzelianum (S. van Leeuwen 5095)	0295005 7600623	1	
	0294517 7600601	2	
	0294198 7600620	10	

4.2.3.2 Introduced Flora

The only introduced species recorded during the survey was buffel grass (*Cenchrus ciliaris*), which has commonly infested coastal dunes in both the Pilbara and Carnarvon coastal regions. Buffel grass was dominant in plant community CcAc, was co-dominant with *Triodia epactia* in plant communities AcSlCc and TzCrcTeCC and was patchy in plant communities AcQlTe and TeCc. It did not occur in the two plant communities associated with the beach, Sl and CrcSl.

5 DISCUSSION AND RECOMMENDATIONS

The vegetation and flora recorded within the Survey Area is typical of that found along the Pilbara and Carnarvon coastlines (VLA 2019, VLA 2019b, VLA 2018). The Survey Area has been subjected to disturbances in the past, particularly in the 10 m wide area immediately north of the boundary of PPA's existing developed Port lands. The rest of the Survey Area, closer to the beach, is naturally disturbed by coastal processes. This is evidenced by the dunes which are mobile and shaped by ever-changing winds and tides. Vegetation growing on the dunes provides a superficial stabilisation. Therefore, it is PPA's intent to have the ability to reprofile the coastal dune system following severe storm events in order to protect Port infrastructure associated with the EPP development. The coastal plain behind the beach dunes is degraded predominantly by buffel grass (*Cenchrus ciliaris*). Colonising species, which quickly revegetate in disturbed areas are also present in this area. These species do not have a high conservation value and will rapidly regenerate.

The Priority 3 species, *Abutilon* sp Pritzelianum (S. van Leeuwen 5095), occurs within the western portion of the clearing area, on the imported red-brown silts. Most of these conservation significant species recorded during the survey were found at this location. Of the other two individuals, one was found in its natural state on undisturbed hind dune and the other in semi-disturbed vegetation on the border of PPA's developed lands within the Eastern Port Precinct.

It should be noted that the various flora surveys conducted for the Wheatstone Project (Chevron 2010) did not record this Priority species, despite it being observed to occur (by the author) in hind dune habitats in the Onslow coastal area. These surveys did record an *Abutilon* sp which potentially could have been this plant.

Although the southern Pilbara population of the *Abutilon* sp. (the northern-most extent of this population being Onslow) is more scattered than the northern population (found around Turner River), its occurrence is relatively common along the coastline in the Onslow vicinity. The author has recorded it in coastal hind dune areas immediately adjacent to Onslow, between Onslow and Sunset Beach and on hind dunes on Urala Station. The author has not recorded it between Onslow and Turner River, where the northern population occurs. The clearing of vegetation within the proposed additional clearing area may require removing up to 12 *Abutilon* plants. However, this is not seen as a significant impact to the population in the broader Onslow region.

The flora recorded during the survey was dry and dormant and lacked annual species. The P3 annual species *Eleocharis papillosa*, identified as occurring within 20 km of the survey area (Table 4), is unlikely to be present in the Survey Area due to lack of suitable habitat. Therefore, clearing within this area is unlikely to have a significant impact on conservation significant flora.

Only buffel grass (**Cenchrus ciliaris*) was recorded in the Survey Area. This is typical for Carnarvon and Pilbara coastal areas. Potentially following adequate rainfall, kapok (**Aerva javanica*) may emerge from plants established in the adjacent developed PPA land areas within and adjacent to the Eastern Port Precinct. No *Prosopis pallida* (mesquite), the Declared Pest and WONS species which has become very abundant around the Wheatstone Project area in the past 10 years, was found within the Survey Area.

PPA conducts regular weed monitoring and audits throughout their leases and these will detect any new infestations of weeds in the proposed additional clearing area as well as adjacent developed PPA lands, which can then be managed appropriately.

It is not the intention of PPA to clear or disturb all of the coastal dune topography during the EPP development, hence, it is not considered that this clearing will have any impact on the extent of vegetation types or populations of flora within the local area. Should clearing be more extensive due to coastal dune re-profiling, PPA will monitor natural revegetation of the area and will undertake any necessary revegetation if this is necessary.

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Appendix A: Conservation Categories for Flora, Fauna and Ecological Communities, and Categories for Introduced Flora

Table A.1: Categories and definitions for threatened flora and fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999.*

Conservation category	Definition
Extinct	Taxa with no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa known to survive only in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriated seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered (E)	Taxa are not critically endangered; and are facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (V)	Taxa are not critically endangered or endangered; and are facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation dependent (CD)	Taxa are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or the following subparagraphs are satisfied: i) the taxa is a species of fish; ii) the taxa is the focus of a management plan that provides management actions necessary to stop the decline of, and support the recovery of, the taxa so that its chances of long term survival in nature are maximized; iii) the management plan is in force under a law of the Commonwealth or of a State or Territory; iv) Cessation of the management plan would adversely affect the conservation status of the taxa Fish includes all taxa of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals/reptiles.

Table A.2: Definitions and criteria for threatened ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999.*

Categories of ecological communities	
Critically endangered	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	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Table A.3: Conservation codes for Western Australian flora and fauna under the *Biodiversity Conservation Act 2016*.

Code	Conservation category	Definition
Threatened		
CR	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.	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"
EN	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.	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"
VU	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.	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"
Extinct		
EX	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.	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).
EW	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		
MI	Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018	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).

CD	Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.	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).
OS	Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.	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).

Table A.4: Categories of Threatened Ecological Communities (Department of Environment and Conservation 2013).

PD: Presumed Totally Destroyed
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B): A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or** B) All occurrences recorded within the last 50 years have since been destroyed.
CR : Critically Endangered
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more of** the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
En: Endangered

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting **any one or more** of the following criteria (A, B, or C): A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement **and either or both** of the following apply (i or ii): i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years); ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years); ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
VU: Vulnerable
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B or C): A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Possible Threatened Ecological Communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5 (Table A.6).

Table A.5: Definitions and criteria for Priority Ecological Communities (Department of Parks and Wildlife 2017).

P1: Priority One – Poorly-known ecological communities
Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two – Poorly-known ecological communities
Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority Three – Poorly-known ecological communities
(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority Four
Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5: Priority Five – Conservation dependent ecological communities
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Table A.6: Priority species under *Western Australian Biodiversity Conservation Act 2016.*

P1: Priority One – Poorly known taxa
Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2: Priority Two – Poorly known taxa
Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3: Priority Three – Poorly known taxa
Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4: Priority Four: Rare, near threatened and other taxa in need of monitoring
(a)Rare Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5: Priority Five: Conservation dependent taxa
Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

Table A.7: Declared pests control categories as gazetted under the *Biosecurity and Agriculture Management Regulations 2013*.

Category	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

Category	Description
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Appendix B: Vegetation Classification and Condition Scales

Table B.1: Vegetation Classification System Specht (1970) as modified by Aplin (1979).

Stratum	70-100% cover	30-70% cover	10-30% cover	2-10% cover	<2% cover
Trees > 30 m	Tall closed forest	Tall open Forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees < 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs > 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs < 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, sedges, herbs	Closed tussock grassland/ sedgeland/ herbland	Tussock grassland/ sedgeland/ herbland	Open tussock grassland/ sedgeland/ herbland	Very open tussock grassland/ sedgeland/ herbland	Scattered tussock grasses /sedges/herbs

Table B.2: Vegetation condition scale as adapted from Trudgen (1988) (Environmental Protection Authority 2016a).

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

Appendix C: Flora Species recorded during the Field Survey

Table C.1: Flora Species recorded during the Field Survey

Family	Species	A/P[1]	Status
Amaranthaceae	*Ptilotus exaltatus* (dead but Identifiable)	A	
Anthericaceae	*Corynotheca pungens* (defoliated)	P	
Asteraceae	*Olearia dampieri* subsp *dampieri*	P	
	Pluchea dentex	P	
	Pluchea rubelliflora	P	
	Pterocaulon sphaeranthoides	A	
Boraginaceae	*Trichodesma zeylanicum* subsp *grandiflorum*	P	
Chenopodiaceae	*Enchylaena tomentosa* var *tomentosa*	P	
	Neobassia astrocarpa	P	
	Salsola australis (dead but identifiable)	A	
	Threlkeldia diffusa	P	
Convolvulaceae	*Ipomoea muelleri*	P	
	Ipomoea pes-caprae	P	
Euphorbiaceae	*Adriana tomentosa* var *tomentosa*	P	
	Euphorbia coghlanii (dead but identifiable	A	
	Euphorbia tannensis subsp *eremophila*	A	
Goodeniaceae	*Scaevola sericophylla*	P	
	Scaevola spinescens (broad form)	P	
Lamiaceae	*Quoya loxocarpa*	P	
Lauraceae	*Cassytha capillaris*	P	
Malvaceae	*Abutilon cunninghamii*	P	
	Abutilon sp Pritzelianum (S. van Leeuwen 5095)	P	P3
	SIda ? rohlenae (leafless)	A	
Fabaceae	*Acacia coriaceae* subsp *coriacea*	P	
	Acacia tetragonaphylla	P	
	Crotalaria cunninghamii	P	
	Indigofera colutea	P	
	Indigofera trita	P	
	Tephrosia gardneri	P	
	Vigna sp Hamersley Clay (AA Mitchell PRP 113)	P	
Nyctaginaceae	*Boerhavia burbidgeana*	P	
Poaceae	**Cenchrus ciliaris*	P	Weed
	Eriachne gardneri	P	
	Sporobolus virginicus	P	
	Spinifex longifolius	P	
	Triodia epactia	P	
	Whiteochloa airoides	P	
Scrophulariaceae	*Stemodia* sp Onslow (AA Mitchell 76/148)	P	
Solanaceae	*Solanum lasiophyllum*	P	
Zygophyllaceae	*Tribulus occidentalis*	P	