

Monday, 29 June 2026



**Western
Botanical**

Ms Aimee Smithers
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Via email to: ASmithers@prestonconsulting.com.au, gedwards@prestonconsulting.com.au

Re: Revised Memo WB1059: Summary findings from Phase 1 Detailed Flora and Vegetation Assessment of The Proposal for Alinta Energy.

Dear Aimee

We are pleased to provide a revised report on the Alinta alignment project on Mimegarra Road, inclusive of client comments and feedback.

Kind regards

Geoff Cockerton

1. Background

Alinta Energy is currently proposing to construct a natural gas fired plant which includes 400 MW of fast start, open cycle gas turbines (The Proposal). The Proposal has an expected life of 25 years. It is located 150 km north of Perth, in the Shire of Dandaragan in WA.

The Proposal includes open cycle gas turbines (with generators and associated infrastructure) and additional supporting infrastructure, such as transformers. The Proposal includes a maximum of 10 hectares (ha) of ground disturbance, including approximately 0.5 ha for an access road to Mimegarra Road. The majority of the area to be disturbed consists of land previously cleared for farmland and is adjacent to the Cataby Mineral Sands Project. Negligible native vegetation clearing is proposed, limited to small areas of vegetation to enable access to the site.

The Proposal will connect to a 330-kilovolt substation which is adjacent to the site. Gas supply does not form part of this Proposal and will be provided by a third-party gas pipeline proponent, via one of two options:

- APA Group: A new lateral pipeline would be constructed within the existing Parmelia Gas Pipeline (PGP) easement. This new lateral would connect to the Dampier Bunbury Natural Gas Pipeline (DBNGP) near Regans Ford where the PGP and DBNGP easements are adjacent; or
- Australian Gas Infrastructure Group: a new lateral pipeline would be connected within a new easement to be established. This lateral would also connect directly to the DBNGP approximately 10 km to the east of the Proposal.

2. Scope

Via an agreement with Alinta Energy, APA commissioned Western Botanical to conduct a Detailed Flora and Vegetation Assessment of a 12.3 ha strip of vegetation along Mimegarra Road in addition to a broader survey corridor encompassing the PGP. Following an initial field survey in November 2024, a new spatial area was provided, comprising a 782 ha buffer around The Proposal. Within this buffer, approximately 84 ha is considered to contain appreciable native vegetation (i.e., with a condition ranging from Excellent to Degraded) (Keighery 1994). As this new spatial extent was supplied after fieldwork had taken place, this document refers to the Study Area as the area assessed – a 45-ha area comprising the 12.3 ha strip along

Mimegarra Road, an a further 13.3 ha area within the proposed PGP corridor, centred around the Nature Reserve (Figure 1).

3. Methods

A Desktop assessment was conducted for the broader PGP Study Area, consisting of a review of the physical and biological characteristics of the local area, including;

- Regional climate data
- Surface geology
- Soil landscape systems
- Hydrology and hydrogeology
- Interim- Biogeographic Regionalisation of Australia
- Pre-European vegetation
- Groundwater Dependent Ecosystems
- Environmentally Sensitive Areas

A literature review of previous surveys in the local region was conducted, as well as a DBCA database search of Threatened and Priority Flora (TPFL) and Threatened and Priority Ecological Communities (TEC/PEC) in conjunction with a likelihood of occurrence assessment.

The field survey was conducted by Western Botanical senior botanist Jason Paterson and botanist Lindsay Shelton, between 11th and 16th November 2025, with approximately two and a half days allocated to The Proposal Study Area. The Study Area was traversed on foot, in conjunction with a combination of relevé and quadrat assessments, in order to catalogue the flora taxa present, and map the vegetation and its condition across the Study Area. Descriptions of vegetation associations were recorded each time a different association was encountered.

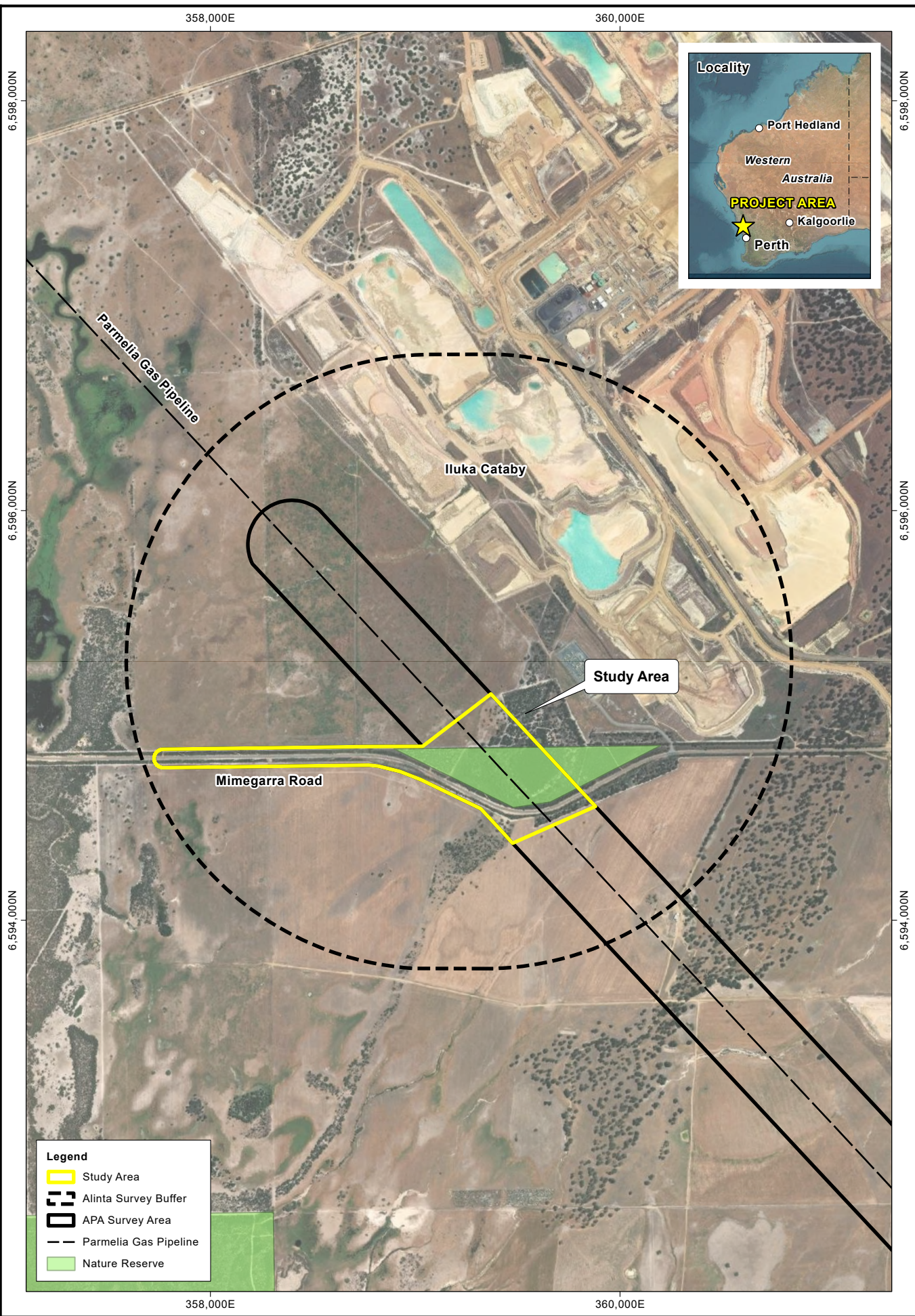
All data was recorded using Fulcrum [Version 2501.4.1 (12281)] [Mobile Application]. Key parameters recorded during quadrat and relevé assessments include;

- **General:** vegetation association, date, persons recording, quadrat size;
- **Location:** unique site number, project name, coordinates recorded on handheld GPS, datum GDA94 (accuracy +/- 5m), digital photograph;
- **Vegetation:** species present, height and projected foliar cover (PFC) for each species, species outside of the quadrat (but not noted within), structural description (Based on NVIS level 5 '*Association*' descriptions);
- **Disturbance:** vegetation condition, fire age;
- **Physical Conditions:** rock type, soil, landform description, runoff.



Figure 1. The Proposal Study Area





Legend

- Study Area
- Alinta Survey Buffer
- APA Survey Area
- Parmelia Gas Pipeline
- Nature Reserve

 Imagery: Maxar	0 500m Scale: 1:25,000 GDA 1994 MGA Zone 50	 Western Botanical	Alinta Energy - Proposal Study Area Alinta Survey Area Location	
	CAD Ref: a3086_F003_00		Author: J. Paterson	Ref:
	Date: February 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Flora not readily recognised in the field were collected and pressed for later identification, using the resources of the Western Australian Herbarium. Locations and abundances of all known flora of Conservation significance, including Priority flora taxa, and introduced species were recorded.

4. Results

4.1. Flora

A total of 143 flora taxa from 91 genera and 39 families have been recorded across The Proposal Study Area during the survey. The Proteaceae, Myrtaceae and Fabaceae families were the most dominant families, each with 18 species. Considering the brevity of the survey within The Proposal Study Area, these numbers are expected to increase following further survey work. Particularly, within the Nature Reserve (No. 27993). A systematic species list is presented in Table 1.

Table 1. Systematic species list of flora taxa recorded across the Study Area.

Family	Genus	Cons. Status
Anarthriaceae	<i>Lyginia imberbis</i>	
Apiaceae	<i>Actinotus leucocephalus</i>	
Araliaceae	<i>Trachymene cyanopetala</i>	
Asparagaceae	<i>Lomandra marginata</i>	Range Extension (160km S)
Asparagaceae	<i>Lomandra</i> sp. Indet	
Asparagaceae	<i>Sowerbaea laxiflora</i>	
Asparagaceae	<i>Thysanotus ?manglesianus</i>	
Asparagaceae	<i>Thysanotus sparteus</i>	
Asteraceae	<i>Gnephosis tenuissima</i>	
Asteraceae	<i>Hyalosperma cotula</i>	
Asteraceae	* <i>Hypochaeris radicata</i>	Weed
Asteraceae	<i>Podolepis gracilis</i>	
Asteraceae	<i>Podothea gnaphalioides</i>	
Asteraceae	* <i>Sonchus oleraceus</i>	Weed
Asteraceae	* <i>Ursinia anthemoides</i>	Weed
Boryaceae	<i>Borya sphaerocephala</i>	
Campanulaceae	* <i>Monopsis debilis</i> var. <i>depressa</i>	Weed
Campanulaceae	* <i>Wahlenbergia capensis</i>	Weed
Casuarinaceae	<i>Allocasuarina humilis</i>	
Casuarinaceae	<i>Allocasuarina microstachya</i>	
Centrolepidaceae	<i>Centrolepis aristata</i>	
Centrolepidaceae	<i>Centrolepis polygyna</i>	
Colchicaceae	<i>Burchardia congesta</i>	
Cyperaceae	<i>Caustis dioica</i>	
Cyperaceae	* <i>Cyperus tenellus</i>	Weed
Cyperaceae	<i>Ficinia marginata</i>	Weed

Family	Genus	Cons. Status
Cyperaceae	<i>Isolepis hookeriana</i>	Range Extension (120km N)
Cyperaceae	<i>Mesomelaena pseudostygia</i>	
Cyperaceae	<i>Mesomelaena tetragona</i>	
Cyperaceae	<i>Schoenus badius</i>	Priority 2
Cyperaceae	<i>Schoenus caespititius</i>	
Cyperaceae	<i>Schoenus griffinianus</i>	Priority 4
Cyperaceae	<i>Schoenus nanus</i>	
Cyperaceae	<i>Schoenus</i> sp. Indet	
Cyperaceae	Unknown sp. Indet	
Dasyopogonaceae	<i>Dasyopogon obliquifolius</i>	
Dilleniaceae	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	
Dilleniaceae	<i>Hibbertia</i> sp. Indet.	
Droseraceae	<i>Drosera</i> ? <i>pallida</i>	
Droseraceae	<i>Drosera erythrorhiza</i>	
Droseraceae	<i>Drosera glanduligera</i>	
Droseraceae	<i>Drosera omisssa</i>	
Ecdeiocoleaceae	<i>Ecdeiocolea monostachya</i>	
Ericaceae	<i>Conostephium</i> ? <i>pendulum</i>	
Ericaceae	<i>Conostephium pendulum</i>	
Fabaceae	<i>Acacia auronitens</i>	
Fabaceae	<i>Acacia pulchella</i> var. <i>glaberrima</i>	
Fabaceae	<i>Acacia saligna</i>	
Fabaceae	<i>Acacia stenoptera</i>	
Fabaceae	<i>Chamaecytisus palmensis</i>	
Fabaceae	<i>Daviesia incrassata</i> subsp. <i>teres</i>	
Fabaceae	<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	
Fabaceae	<i>Gastrolobium</i> ? <i>celsianum</i>	
Fabaceae	<i>Gastrolobium plicatum</i>	
Fabaceae	<i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>	
Fabaceae	<i>Jacksonia floribunda</i>	
Fabaceae	<i>Jacksonia furcellata</i>	
Fabaceae	<i>Jacksonia nutans</i>	
Fabaceae	<i>Jacksonia sternbergiana</i>	
Fabaceae	* <i>Lotus angustissimus</i>	Weed
Fabaceae	* <i>Ornithopus compressus</i>	Weed
Fabaceae	* <i>Ornithopus sativus</i>	Weed
Fabaceae	* <i>Trifolium campestre</i>	Weed
Gentianaceae	<i>Schenkia australis</i>	
Geraniaceae	* <i>Erodium botrys</i>	Weed
Goodeniaceae	? <i>Scaevola canescens</i>	
Goodeniaceae	<i>Dampiera spicigera</i>	
Goodeniaceae	<i>Lechenaultia floribunda</i>	
Goodeniaceae	<i>Scaevola repens</i> var. <i>repens</i>	
Haemodoraceae	<i>Anigozanthos</i> ? <i>pulcherrimus</i>	
Haemodoraceae	<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	Priority 4
Haemodoraceae	<i>Conostylis</i> sp. Indet	

Family	Genus	Cons. Status
Hemerocallidaceae	<i>Corynotheca micrantha</i>	
Hemerocallidaceae	<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>	
Hemerocallidaceae	<i>Tricoryne elatior</i>	
Hemerocallidaceae	<i>Tricoryne</i> sp. Indet.	
Iridaceae	* <i>Romulea rosea</i>	Weed
Lauraceae	<i>Cassytha ?glabella</i> forma <i>dispar</i>	
Lauraceae	<i>Cassytha</i> sp. Indet.	
Loganiaceae	<i>Orianthera campanulata</i>	
Loganiaceae	<i>Orianthera spermacoea</i>	
Loranthaceae	<i>Nuytsia floribunda</i>	
Myrtaceae	<i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>	
Myrtaceae	<i>Calothamnus sanguineus</i>	
Myrtaceae	<i>Chamelaucium uncinatum</i>	
Myrtaceae	<i>Eremaea ?pauciflora</i> var. <i>pauciflora</i>	
Myrtaceae	<i>Eremaea</i> sp. Indet	
Myrtaceae	<i>Eucalyptus gomphocephala</i>	Rehab
Myrtaceae	<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	Priority 4
Myrtaceae	<i>Eucalyptus todiana</i>	
Myrtaceae	<i>Eucalyptus utilis</i>	Rehab
Myrtaceae	<i>Kunzea glabrescens</i>	
Myrtaceae	<i>Leptospermopsis erubescens</i>	
Myrtaceae	<i>Melaleuca ciliosa</i>	
Myrtaceae	<i>Melaleuca clavifolia</i>	
Myrtaceae	<i>Melaleuca teretifolia</i>	
Myrtaceae	<i>Verticordia densiflora</i> var. <i>densiflora</i>	
Myrtaceae	<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	Priority 4
Myrtaceae	<i>Verticordia pennigera</i>	
Myrtaceae	<i>Verticordia</i> sp. Indet.	
Orchidaceae	Unknown sp. Indet. (Orchidaceae) 1	
Orchidaceae	Unknown sp. Indet. (Orchidaceae) 2	
Phyllanthaceae	<i>Poranthera microphylla</i>	
Poaceae	<i>Austrostipa elegantissima</i>	
Poaceae	<i>Austrostipa macalpinei</i>	
Poaceae	<i>Austrostipa mollis</i>	
Poaceae	* <i>Avena barbata</i>	Weed
Poaceae	* <i>Avena fatua</i>	Weed
Poaceae	* <i>Briza maxima</i>	Weed
Poaceae	* <i>Ehrharta calycina</i>	Weed
Poaceae	* <i>Eragrostis curvula</i>	Weed
Poaceae	<i>Lachnagrostis filiformis</i>	
Poaceae	* <i>Lolium temulentum</i> forma <i>temulentum</i>	Weed
Poaceae	<i>Neurachne alopecuroidea</i>	
Poaceae	* <i>Pentameris airoides</i>	Weed
Poaceae	* <i>Vulpia muralis</i>	Weed
Poaceae	Unknown sp. Indet. (Poaceae)	
Polygalaceae	<i>Comesperma rhadinocarpum</i>	Priority 3
Proteaceae	<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	

Family	Genus	Cons. Status
Proteaceae	<i>Banksia dallanneyi</i> ?var. <i>dallanneyi</i>	
Proteaceae	<i>Banksia grandis</i>	Rehab
Proteaceae	<i>Banksia kippistiana</i> var. <i>kippistiana</i>	
Proteaceae	<i>Banksia menziesii</i>	
Proteaceae	<i>Banksia prionotes</i>	
Proteaceae	<i>Banksia sclerophylla</i>	
Proteaceae	<i>Conospermum stoechadis</i> subsp. <i>stoechadis</i>	
Proteaceae	<i>Hakea conchifolia</i>	
Proteaceae	<i>Hakea costata</i>	
Proteaceae	<i>Hakea incrassata</i>	
Proteaceae	<i>Hakea prostrata</i>	
Proteaceae	<i>Petrophile brevifolia</i> subsp. <i>rosea</i>	
Proteaceae	<i>Petrophile linearis</i>	
Proteaceae	<i>Petrophile macrostachya</i>	
Proteaceae	<i>Petrophile pilostyla</i> subsp. <i>austrina</i>	
Proteaceae	<i>Stirlingia</i> ? <i>abrotanoides</i>	
Proteaceae	<i>Stirlingia latifolia</i>	
Restionaceae	? <i>Alexgeorgea nitens</i>	
Restionaceae	<i>Alexgeorgea nitens</i>	
Restionaceae	<i>Chordifex sinuosus</i>	
Restionaceae	<i>Hypolaena exsulca</i>	
Restionaceae	<i>Leptocarpus coangustatus</i>	
Rubiaceae	<i>Opercularia vaginata</i>	
Stylidiaceae	<i>Levenhookia stipitata</i>	
Thymelaeaceae	<i>Pimelea angustifolia</i>	
Thymelaeaceae	<i>Pimelea floribunda</i>	
Thymelaeaceae	<i>Pimelea</i> sp. Indet. (? <i>sulphurea</i>)	
Xanthorrhoeaceae	<i>Xanthorrhoea</i> sp. (<i>J. Paterson & L. Shelton s.n.</i>)	Species of Interest
Zamiaceae	<i>Macrozamia fraseri</i>	

4.2. Unresolved Taxa

Twenty-three species recorded across The Proposal Study Area were unable to be definitively identified to species or subspecies level (Table 1), six were unable to be identified to genera level. This was typically due to poor collection material (i.e., only sterile plants available at the time of the survey). Of these unresolved taxa, three are considered as potentially representing Conservation significant flora, including; a sterile *Hibbertia* with similar leaves to *Hibbertia subvillosa* (P3) which occurs in the area; *Thysanotus* ?*manglesianus* (multiple Conservation-significant *Thysanotus* occur in the region); and *Verticordia* sp. Indet. (multiple Conservation significant *Verticordias* occur in the area).

Additional survey work during the early spring will be required to revisit and recollect these taxa with suitable flowering material to enable definitive identification.

Xanthorrhoea species in Western Australia are poorly dealt with taxonomically and there are significantly more species becoming known within the state than is currently accepted by the WA Herbarium. The *Xanthorrhoea* sp. (J. Paterson & L. Shelton s.n.) recorded during the survey likely represents more than one species, none of which are currently described to assessed for conservation significance. Broadly, *Xanthorrhoea* of the Mimegarra Rd region would fall under the currently accepted *Xanthorrhoea preissii* group.

An assessment undertaken in May 2026 (Western Botanical, 2026) in a farmland remnant directly north of and abutting the Wild Dog Swamp Nature Reserve north of Mimegarra Rd and inclusive of this Study Area, recorded two novel *Xanthorrhoea* species: *Xanthorrhoea* sp. Mimegarra Rd (G. Cockerton & L. Dalglish 4238) square leaf and *Xanthorrhoea* sp. Mimegarra Rd (G. Cockerton & L. Dalglish 4326) flat leaf. Neither of these have been assessed within the Study Area for this project. Both these novel species were observed within the remnant south of the farmland remnant during the May 2026 assessment.

4.3. Priority Flora

Six Priority flora taxa were recorded across The Proposal Study Area (Table 2), and a further three, recorded within the adjacent PGP Study Area. These included one record of *Ptilotus tetrandrus* (P1), and unconfirmed occurrences of *Hibbertia ?subvillosa* (P3) and *Haemodorum ?loratum* (P3). These records were confirmed after the field survey was completed, in the specimen identification process, and are only indicative of the presence of these species. Additional targeted Priority flora searches are required to determine their distributions and abundances across The Proposal Study Area. All of these are expected to occur in greater numbers.

Locations of Priority flora species recorded in this assessment are presented in Figure 2.

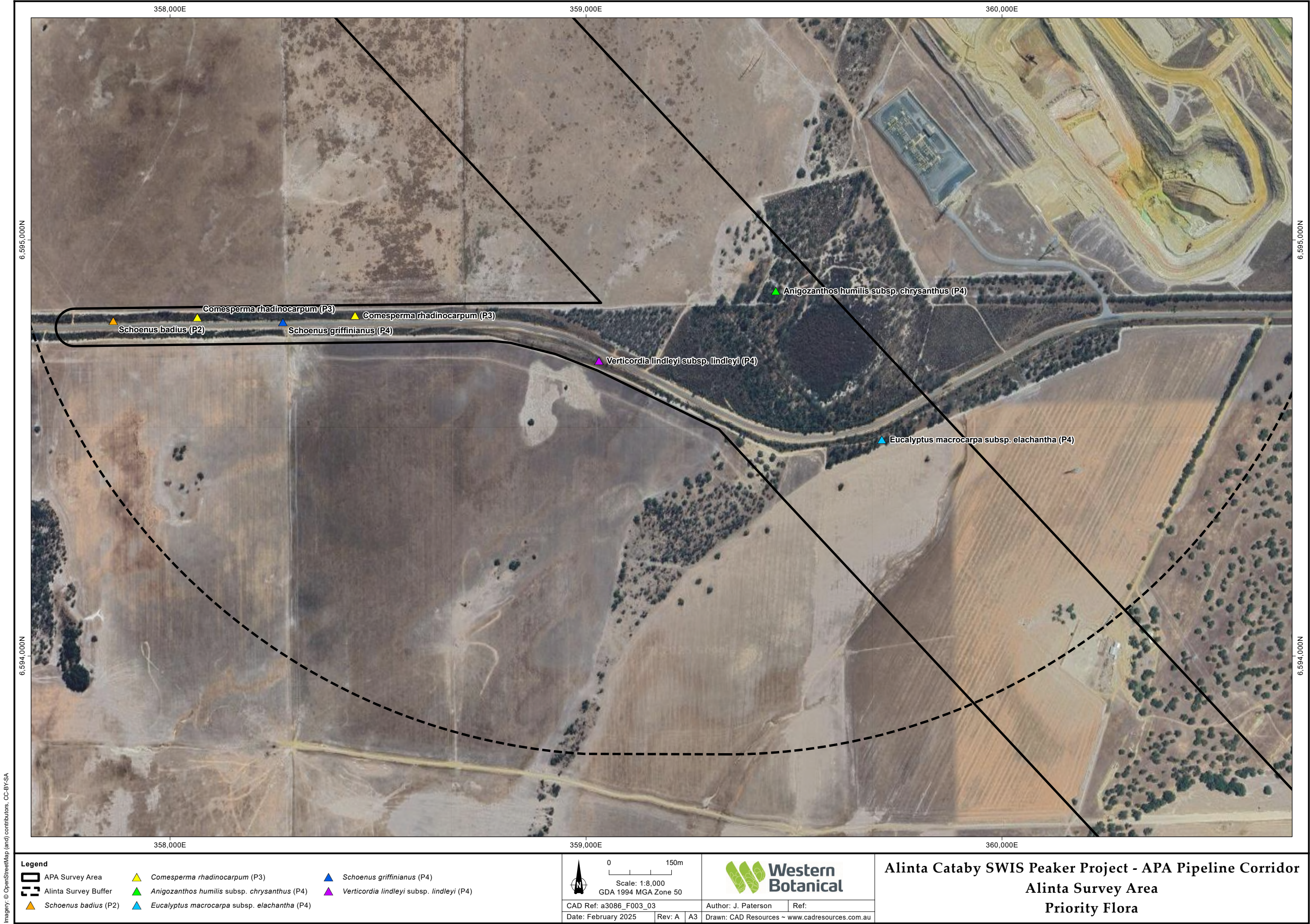
Table 2. Conservation significant flora taxa recorded across the Study Area.

Family	Species	Cons. Status	Abundance
Cyperaceae	<i>Schoenus badius</i>	Priority 2	1
Polygalaceae	<i>Comesperma rhadinocarpum</i>	Priority 3	2
Cyperaceae	<i>Schoenus griffinianus</i>	Priority 4	1
Haemodoraceae	<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	Priority 4	1
Myrtaceae	<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	Priority 4	1
Myrtaceae	<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	Priority 4	1



Figure 2. Indicative Priority Flora Occurrences across The Proposal Study Area.





4.4. Range Extensions

Two flora species, *Lomandra marginata* (160 km Range Extension southwards) and *Isolepis hookeriana* (120 km Range Extension northwards), recorded across the Study Area represent significant extensions to previously known ranges. While several other species identified in the adjacent PGP Study Area also represent range extensions, these have not yet been encountered within The Proposal Study Area. All specimens representing range extensions will be lodged for vouchering at the Western Australian Herbarium.

4.5. Introduced Species

A total of 21 introduced weed species were recorded across The Proposal Study Area, as well as three species occurring outside of their native habitat, planted in rehabilitation areas (Table 3). Of the 21 introduced weed species, all are recognised and common weeds, and categorised in the *Biosecurity and Agriculture Management Act 2007* (BAM Act) as Permitted – s11. No Declared Pests have been encountered across The Proposal Study Area.

Table 3. Introduced species recorded across the Alinta Study Area.

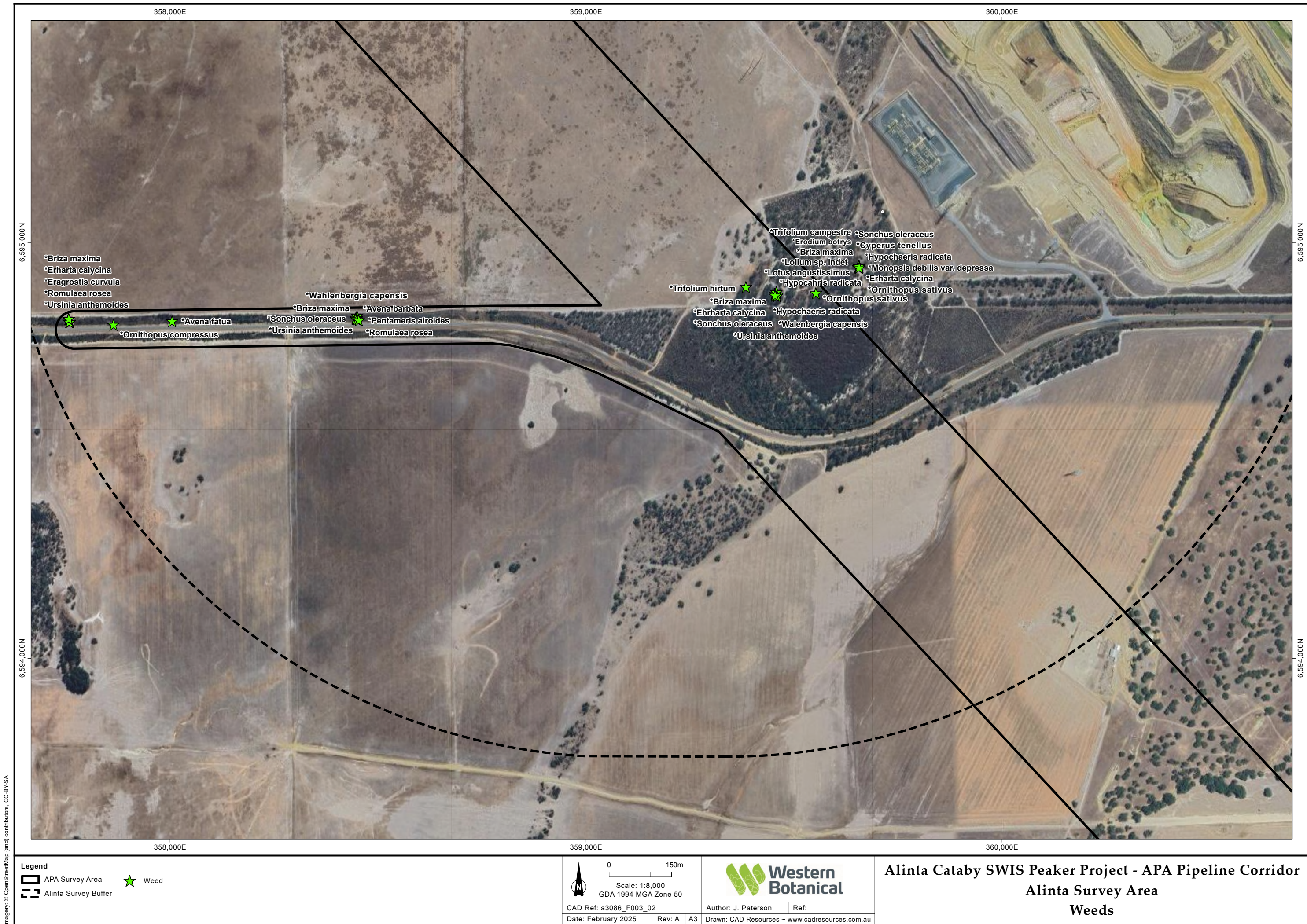
Family	Species	Comment
Asteraceae	* <i>Hypochaeris radicata</i>	
Asteraceae	* <i>Sonchus oleraceus</i>	
Asteraceae	* <i>Ursinia anthemoides</i>	
Campanulaceae	* <i>Monopsis debilis</i> var. <i>depressa</i>	
Campanulaceae	* <i>Wahlenbergia capensis</i>	
Cyperaceae	* <i>Cyperus tenellus</i>	
Cyperaceae	* <i>Ficinia marginata</i>	
Fabaceae	* <i>Lotus angustissimus</i>	
Fabaceae	* <i>Ornithopus compressus</i>	
Fabaceae	* <i>Ornithopus sativus</i>	
Fabaceae	* <i>Trifolium campestre</i>	
Geraniaceae	* <i>Erodium botrys</i>	
Iridaceae	* <i>Romulea rosea</i>	
Myrtaceae	<i>Eucalyptus gomphocephala</i>	Encountered in rehabilitation area
Myrtaceae	<i>Eucalyptus utilis</i>	Encountered in rehabilitation area
Poaceae	* <i>Avena barbata</i>	
Poaceae	* <i>Avena fatua</i>	
Poaceae	* <i>Briza maxima</i>	
Poaceae	* <i>Ehrharta calycina</i>	
Poaceae	* <i>Eragrostis curvula</i>	
Poaceae	* <i>Lolium temulentum</i> forma <i>temulentum</i>	
Poaceae	* <i>Pentameris airoides</i>	
Poaceae	* <i>Vulpia muralis</i>	
Proteaceae	<i>Banksia grandis</i>	Encountered in rehabilitation area

Locations of weed species occurring across The Proposal Study Area are presented in Figure 3. These represent individual plants recorded under reconnaissance-style survey work to catalogue the different species across the Study Area and do not represent the actual distribution and density of weeds across the Study Area. Considering the highly-fragmented and disturbed nature of the local region due to a history of agriculture and mining, the large number weed species encountered across The Proposal Study Area is not unexpected.



Figure 3. Preliminary Locations of Weed Species across The Proposal Study Area.





Imagery: © OpenStreetMap (and) contributors, CC-BY-SA

Legend

 APA Survey Area

 Alinta Survey Buffer

 Weed



0150m

Scale: 1:8,000

GDA 1994 MGA Zone 50

CAD Ref: a3086_F003_02		
Date: February 2025	Rev: A	A3



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Author: J. Paterson	Ref:
Drawn: CAD Resources ~ www.cadresources.com.au	

Alinta Cataby SWIS Peaker Project - APA Pipeline Corridor

Alinta Survey Area

Weeds

4.6. Vegetation Associations

Preliminary Vegetation Mapping has been conducted across The Proposal Study Area. A total of 11 Vegetation Associations have been encountered and described, including seven natural associations (i.e., still retaining basic structure) and four artificial or degraded associations (including rehabilitated and parkland-cleared areas). These Vegetation Associations (subject to change) are listed in Table 4.

Table 4. Vegetation Associations encountered in The Proposal Study Area

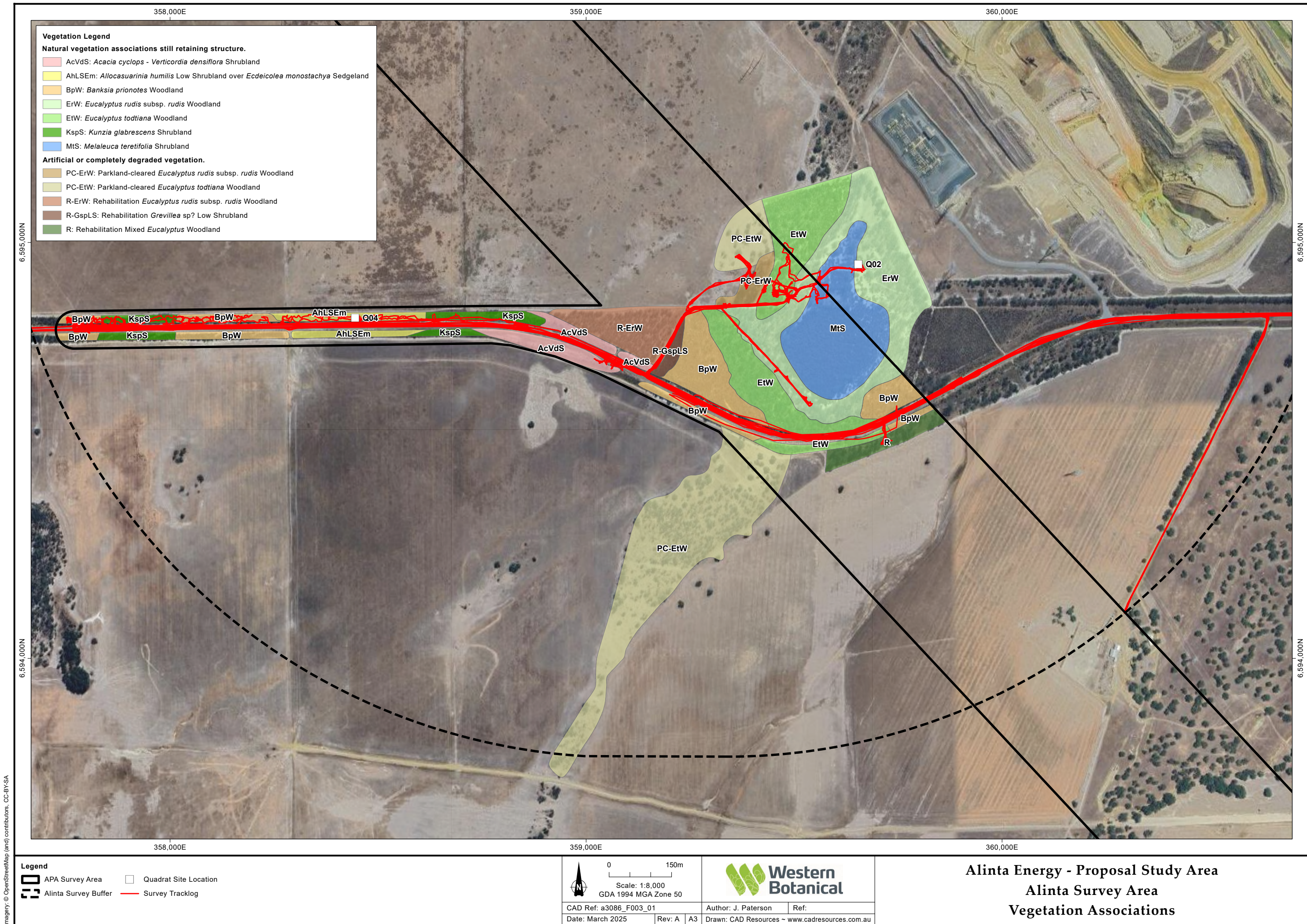
Vegetation Condition	Code	Vegetation Associations
Natural vegetation associations still retaining structure	ErW	<i>Eucalyptus rudis</i> subsp. <i>rudis</i> Woodland
	EtW	<i>Eucalyptus todtiana</i> Woodland ¹
	BpW1	<i>Banksia prionotes</i> Woodland
	KspS	<i>Kunzea glabrescens</i> Shrubland
	MtS	<i>Melaleuca teretifolia</i> Shrubland
	AhLSEm	<i>Allocasuarina humilis</i> Low Shrubland over <i>Ecdeiocolea monostachya</i> Sedgeland
	AcVdS	<i>Acacia cyclops</i> - <i>Verticordia densiflora</i> Shrubland
Artificial or completely degraded vegetation.	PC-EtW	Parkland-cleared <i>Eucalyptus todtiana</i> Woodland
	PC-ErW	Parkland-cleared <i>Eucalyptus rudis</i> subsp. <i>rudis</i> Woodland
	R-GspLS	Rehabilitation <i>Grevillea</i> sp? Low Shrubland
	R-ErW	Rehabilitation <i>Eucalyptus rudis</i> subsp. <i>rudis</i> Woodland

¹ This is considered equivalent to the *Banksia* Woodland with emergent *Eucalyptus todtiana* Woodland reported in Western Botanical (2026) which occurs in the farmland remnant north of the Wild Dog Swamp Nature Reserve.



Figure 4. Preliminary Vegetation Association Mapping across The Proposal Study Area.





Vegetation Legend

Natural vegetation associations still retaining structure.

- AcVdS: *Acacia cyclops* - *Verticordia densiflora* Shrubland
- AhLSEm: *Allocasuarinia humilis* Low Shrubland over *Ecdeicola monostachya* Sedgeland
- BpW: *Banksia prionotes* Woodland
- ErW: *Eucalyptus rudis* subsp. *rudis* Woodland
- EtW: *Eucalyptus tottiana* Woodland
- KspS: *Kunzia glabrescens* Shrubland
- MtS: *Melaleuca teretifolia* Shrubland

Artificial or completely degraded vegetation.

- PC-ErW: Parkland-cleared *Eucalyptus rudis* subsp. *rudis* Woodland
- PC-EtW: Parkland-cleared *Eucalyptus tottiana* Woodland
- R-ErW: Rehabilitation *Eucalyptus rudis* subsp. *rudis* Woodland
- R-GspLS: Rehabilitation *Grevillea* sp? Low Shrubland
- R: Rehabilitation Mixed *Eucalyptus* Woodland

Legend

- APA Survey Area
- Alinta Survey Buffer
- Quadrat Site Location
- Survey Tracklog

0 150m

Scale: 1:8,000
GDA 1994 MGA Zone 50

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CAD Ref: a3086_F003_01			Author: J. Paterson	Ref:
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Alinta Energy - Proposal Study Area
Alinta Survey Area
Vegetation Associations

ErW – *Eucalyptus rudis* subsp. *rudis* Woodland

The *Eucalyptus rudis* subsp. *rudis* Woodland Vegetation Association was confined to the riparian zone of the wetland within Nature Reserve No. 27993 (Unnamed Reserve on Mimegarra Rd.). It consists of an upper stratum of *Eucalyptus rudis* subsp. *rudis* 10-15m over occasional *Melaleuca teretifolia* 2m over an understory dominated by weed species. As Western Botanical had not been granted a Regulation 4 licence to take flora in Calm Act Lands at the time of the survey, a Detailed assessment has not been conducted within this Association. Further work is required to adequately describe this Vegetation Association.

The *Eucalyptus rudis* subsp. *rudis* Woodland vegetation appeared to range from a Good to Degraded condition with high densities of understory weeds. No photo has been taken for this Association.

MtS – *Melaleuca teretifolia* Shrubland

The *Melaleuca teretifolia* Shrubland is characterised by an absent upper stratum, and a mid-stratum dominated by *Melaleuca teretifolia* 3-6m with a PFC of 50-100%. The *Melaleuca teretifolia* Shrubland is associated with seasonally inundated grey silty soils, occurring within Nature Reserve No. 27993 (Unnamed Reserve on Mimegarra Rd.). One quadrat has been established within this unit, located north of the Reserve. Within this site, the condition was Degraded, with an understory dominated by grassy weeds including **Ehrharta calycina* 0.7m, **Erodium botrys* 0.1m, **Lolium temulentum* forma *temulentum* 0.3m, **Monopsis debilis* var. *depressa* 0.1m, **Trifolium campestre* 0.2m, **Vulpia muralis* 0.2m and **Ornithopus sativus* 0.1m with a PFC of 80%.

Further work is required to assess this Vegetation Association. No photo has been taken.

EtW – *Eucalyptus todtiana* Woodland

The *Eucalyptus todtiana* Woodland consists of a dominant upper stratum of *Eucalyptus todtiana* 10m with *Nuytsia floribunda* 10m, *Banksia menziesii* 5m, *Banksia attenuata* 6m, and *Jacksonia sternbergiana* 6m with a PFC of 25% over a mid-stratum open shrubland of *Chamelaucium uncinatum* 5m, *Xanthorrhoea* sp. (J. Paterson & L. Shelton s.n.) 1.7m and *Macrozamia fraseri* 1.7m with a PFC of 5% over a lower stratum of shrubs, grasses and herbs including *Corynotheca micrantha* 0.6m, *Hibbertia hypericoides* subsp. *hypericoides* 0.5m, *Conostephium pendulum* 0.6m, *Alexgeorgea nitens* 0.1m, *Dasypogon obliquifolius* 0.3m, *Sowerbaea laxiflora* 0.3m and weeds including **Ehrharta calycina* 1m, **Briza maxima* 0.1m, **Ursinia anthemoides* 0.1m, **Hypochaeris radicata* 0.05m and **Wahlenbergia capensis* 0.1m with a PFC of 20%.

The *Eucalyptus todtiana* Woodland is associated with light-grey sandy soils, located adjacent to the *Eucalyptus rudis* subsp. *rudis* Woodland Vegetation Association occurring within Nature Reserve No. 27993 (Unnamed Reserve on Mimegarra Rd.).

The condition of the Vegetation is considered to range from Degraded to Good. One quadrat has been established in this Vegetation Association.



Plate 1. EtW – *Eucalyptus todtiana* Woodland

BpW1 – *Banksia prionotes* Woodland

The *Banksia prionotes* Woodland consists of an upper-stratum dominated by *Banksia prionotes* 8m and occasional *Nuytsia floribunda* 5m with a PFC of 20-30% over a mid-stratum open shrubland of *Allocasuarina humilis* 2m, *Adenanthos cygnorum* 3m, *Conospermum stoechadis* subsp. *stoechadis* 1.3m, *Jacksonia floribunda* 1.5m and *Calothamnus quadrifidus* subsp. *quadrifidus* 1.2m with a PFC of 8-12% over a lower-stratum shrubland composed of *Eremaea pauciflora* var. *?pauciflora* 1m, *Stirlingia latifolia* 1m, *Jacksonia nutans* 0.7m, *Hibbertia hypericoides* subsp. *hypericoides* 0.6m, *Dasypogon obliquifolius* 0.6m, *Banksia dallanneyi* ?var. *dallanneyi* 0.3m, *Lyginia imberbis* 0.5m, *Opercularia vaginata* 0.2m, *Verticordia densiflora* var. *densiflora* 0.6m with weeds including **Briza maxima* 0.2m, **Eragrostis curvula* 1.2m, **Ehrharta calycina* 1.5m, **Erodium botrys* 0.1m, **Romulea rosea* 0.1m and **Ursinia anthemoides* with a PFC 40%.

The *Banksia prionotes* Woodland is associated with light brown sands, occurring in several locations along Mimegarra Rd and within the Nature Reserve No. 27993. The vegetation is considered to be in Good Condition. As discussed in section 4.8, based on key diagnostic characters this Vegetation Association is representative of the Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)), however, considering condition thresholds and patch size, only two patches are large enough (>2ha) to warrant referral for Protection under the Environmental Protection and Biodiversity Conservation (EPBC), Act (Clth).



Plate 2. BpW1 – *Banksia prionotes* Woodland

KgS – *Kunzea glabrescens* Shrubland

The *Kunzea glabrescens* Shrubland is heavily modified. It consists of an upper-stratum of *Kunzea glabrescens* 3-4m with a PFC of 10-20% over occasional *Xanthorrhoea* sp. (J. Paterson & L. Shelton s.n.) 2-3m PFC 1% over an outcompeted low shrubland of *Stirlingia latifolia* 1m, *Verticordia densiflora* var. *densiflora* 0.5m, *Petrophile pilostyla* subsp. *austrina* 1m, *Banksia dallanneyi* var. *dallanneyi* 0.3m, *Eremaea pauciflora* var. ?*pauciflora* 0.5m, *Acacia pulchella* var? 0.5m, *Acacia stenoptera* 0.3m, *Caustis dioica* 0.2m, *Mesomelaena tetragona* 0.5m, *Dasypogon obliquifolius* 0.4m, and a dense cover of **Eragrostis curvula* 1m (30-50%), with other weeds including **Pentameris airoides* 0.1m, **Hypochaeris radicata* 0.2m, **Echium plantagineum* 0.2m and **Sonchus oleracea* 0.3m with a PFC of 50-60%.

The *Kunzea glabrescens* Shrubland is associated with artificial drainage, occurring on orange clay over white sand. It was recorded in two locations on Mimegarra Rd. The condition of this Vegetation Association is considered Degraded. No quadrats have been established in this association.



Plate 3. KgS – *Kunzea glabrescens* Shrubland

AhLSEm – *Allocasuarina humilis* Low Shrubland over *Ecdeiocolea monostachya* Sedgeland

The *Allocasuarina humilis* Low Shrubland over *Ecdeiocolea monostachya* Sedgeland is characterised by an absent upper stratum, and a mid-stratum shrubland dominated by *Allocasuarina humilis* 2m and *Acacia stenoptera* 1.5m with a PFC of 8-10% over a lower-stratum sedgeland dominated by *Ecdeiocolea monostachya* 0.5m and low shrubland of *Hakea incrassata* 0.5m, *Allocasuarina microstachya* 0.4m, *Jacksonia furcellata* 0.5m, *Banksia dallanneyi* var. *dallanneyi* 0.2m, *Banksia kippistiana* var. *kippistiana* 0.4m, *Daviesia nudiflora* subsp. *nudiflora* 0.4m, *Borya sphaerocephala* 0.01m, *Comesperma rhadinocarpum* (P3) 0.1m, *Melaleuca clavifolia* 0.6m, *Verticordia pennigera* 0.5m, *Schoenus nanus* 0.01m, *Petrophile pilostyla* subsp. *austrina* 0.4m and *Austrostipa elegantissima* 0.8m with weeds including **Avena barbata* 1.4m, **Avena fatua* 0.4m, **Briza maxima* 0.3m, **Romulea rosea* 0.01m and **Ursinia anthemoides* 0.15m with a PFC of 60%.

The *Allocasuarina humilis* Low Shrubland over *Ecdeiocolea monostachya* Sedgeland Vegetation Association was encountered in a drainage area on Mimegarra Rd. It is associated with clayey light-grey sand. The condition of the vegetation comprising this association is considered Good, with evidence of disturbance from adjacent clearing activities, including push-ups and clay-wash over the soil surface. One quadrat has been established within this association.



Plate 4. AhLSEm – *Allocasuarina humilis* Low Shrubland over *Ecdeiocolea monostachya* Sedgeland

AcVdS – *Acacia cyclops* – *Verticordia densiflora* var. *densiflora* Shrubland

The description of the *Acacia cyclops* – *Verticordia densiflora* var. *densiflora* Shrubland is based on brief relevé assessment. It is characterised by an absent upper-stratum, and a mid-stratum open shrubland of *Acacia cyclops* 3m, *Adenanthos cygnorum* 3m and occasional *Jacksonia sternbergiana* 3m with a PFC of 2% over *Hakea trifurcata* 2m, *Verticordia densiflora* var. *densiflora* 1m, *Acacia pulchella* var.? 0.4m, *Acacia stenoptera* 0.5m, *Levenhookia stipitata* 0.05, *Verticordia lindleyi* subsp. *lindleyi* (P4) 1m, *Podolepis gracilis* 0.3m, *Conostylis teretifolia* subsp. *planescens* 0.2m, *Opercularia vaginata* 0.2m, *Orobanche minor* 0.3m, *Drosera omissa* 0.01m, multiple small Cyperaceae and weeds including **Eragrostis curvula* 1m, **Avena barbata* 1m, **Briza maxima* 0.2m, **Ursinia anthemoides* 0.2m, **Pentameris airoides* 0.1m, **Sonchus oleracea* 0.2m, **Lysimachia arvensis* 0.1m and **Vulpia muralis* 0.2m with a PFC of 30-40%.

The *Acacia cyclops* – *Verticordia densiflora* var. *densiflora* Shrubland Vegetation Association was encountered on Mimegarra Rd on modified drainage with orange clay over white sand. The Vegetation is considered to be in a Degraded condition, with aggressive weeds and evidence of soil disturbance. Further quadrating is required.



Plate 5. AcVdS – *Acacia cyclops* – *Verticordia densiflora* var. *densiflora* Shrubland

Parkland-Cleared Vegetation Associations

Two parkland-cleared associations were encountered across the Proposal Study Area. These represent remnant canopy species, typically Eucalypts or Corymbia, over Completely Degraded understory dominated by weeds. These areas are created via clearing and grazing processes. Parkland-cleared associations recorded and mapped include, PC-EtW- Parkland-cleared *Eucalyptus tottiana* Woodland and the PC-ErW – Parkland-cleared *Eucalyptus rudis* subsp. *rudis* Woodland (Plate 6).



Plate 6. A) Parkland-cleared *Eucalyptus rudis* subsp. *rudis* Woodland; and B) Parkland-cleared *Eucalyptus tottiana* Woodland

Rehabilitation Vegetation Associations

Three Rehabilitation Vegetation Associations have also been encountered across the Proposal Study Area. These include R-GspH - Rehabilitation *Grevillea* sp? Low Shrubland; R-ErW - Rehabilitation *Eucalyptus rudis* subsp. *rudis* Woodland; and R - Rehabilitation Mixed *Eucalyptus* Woodland (Plate 7). These associations are similar to Parkland-cleared areas in terms of low species diversity and weed invasion, the difference being that they have been actively managed at some stage, and contain a number of cultivation species occurring outside of their natural range.

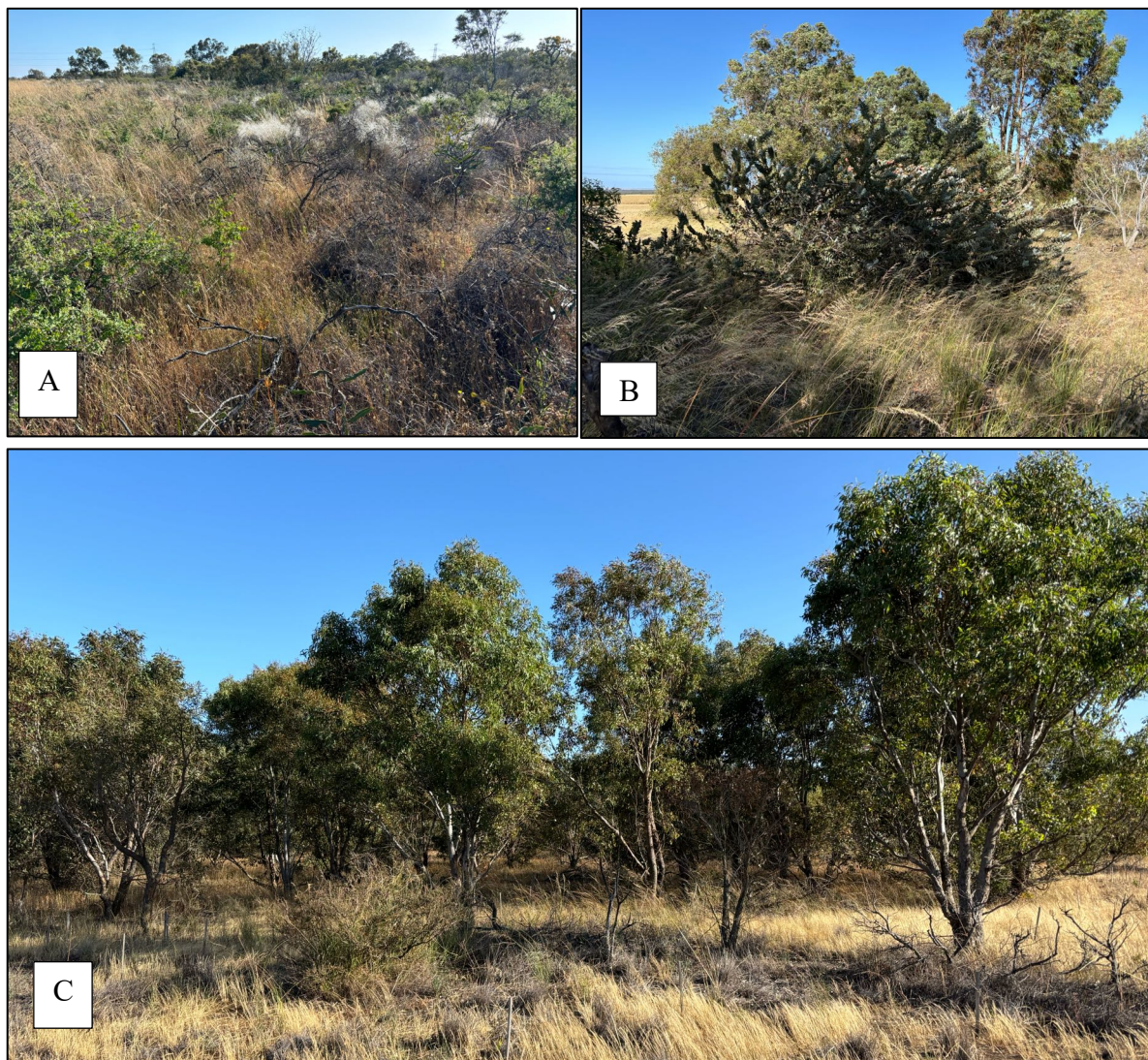


Plate 7. A) Rehabilitation *Grevillea* sp? Low Shrubland; B) Rehabilitation Mixed *Eucalyptus* Woodland; and C) Rehabilitation *Eucalyptus rudis* subsp. *rudis* Woodland.

4.7. Vegetation Condition

The Proposal Study Area is located in a highly-fragmented landscape as a result of historic agriculture and mining activities. Within the Mimegarra road reserve, there is evidence to suggest a number of areas have been previously cleared, with the current vegetation structure exhibiting varying post-disturbance successional trajectories and conditions.

Majority of the Nature Reserve (No. 27993) and the western portion of the Mimegarra road reserve was considered to be in a “Good” condition; retaining basic vegetation structure or ability to regenerate, with the vegetation structure significantly altered by obvious signs of multiple disturbances including very aggressive weeds, partial clearing, dieback and grazing (Keighery 1994) (Figure 5).

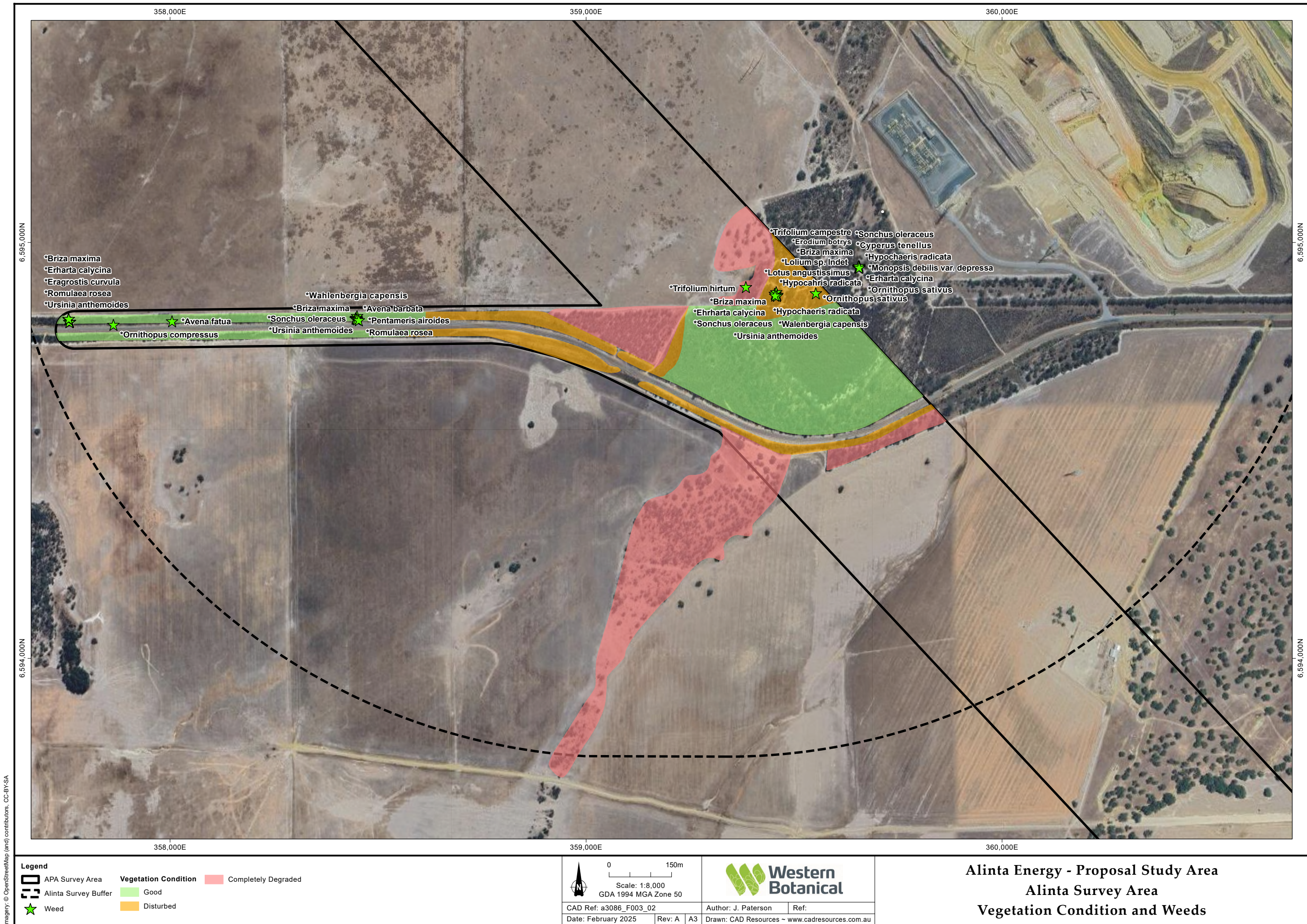
Directly north of the Nature Reserve (No. 27993) and towards the central portion of the Mimegarra road reserve, the condition appeared to decline to a degraded state; basic vegetation structure severely impacted by disturbance, with scope for regeneration but not to a state approaching good condition without intensive management. These disturbances to vegetation structure are caused by the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.

Finally, several areas were considered to be Completed Degraded; the structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees and shrubs. The rehabilitation vegetation associations have been included in this category.



Figure 5. Preliminary Vegetation Condition Mapping across the Proposal Study Area.





4.8. Threatened and Priority Ecological Communities (TEC/ PEC)

4.8.1. Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)).

The Proposal Study Area was found to contain several areas of vegetation representing the Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)).

The Banksia Woodlands of the Swan Coastal Plain ecological community is defined as communities with a prominent tree layer of Banksia. The principal structural features of the ecological community are:

- A distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the *Banksia* species identified below.
- An emergent tree layer of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may sometimes be present above the *Banksia* canopy.
- An understory that is often highly species-rich consists of:
 - A layer of sclerophyllous shrubs of various heights; and,
 - A herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs, that sometimes includes grasses. The development of a ground layer may vary depending on the density of the shrub layer and disturbance history.

The Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)) was identified during the desktop assessment as occurring within the Proposal Study Area at the western end of the Mimegarra Rd. alignment. Within this area, the described vegetation association is the *Banksia prionotes* Woodland (BpW1). This vegetation association was also encountered outside areas highlighted in the database search, including one location further east along the Mimegarra Rd. reserve, as well as within the Nature Reserve (No. 27993). While these areas meet the key diagnostic characteristics, the combination of condition thresholds and patch size exclude several areas from gaining protection under the EPBC Act (i.e., a 'Good' condition patch must be greater than 2ha in size). This leaves one patch, 3.16 ha, located within Nature Reserve (No. 27993), as well as the previously recognised area on the western side of Mimegarra Rd.

While one quadrat site has been established within the BpW1 site within the known Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)) extent, additional work is required within subsequent areas – particularly within the Nature Reserve, as a Reg-4 (permit to collect native flora species within a Nature Reserve), had not been organised at the time of

the initial survey. While the extent of the TEC presented in this report is relatively accurate, it remains subject to change following further work.

4.8.2. Assessment of the key diagnostic characteristics and condition thresholds:

Key diagnostic characteristics:

- Location and physical environment: The Vegetation Association occurs in the coastal plain.
- Soils and landform: The Vegetation Association occurs on well drained, low nutrient soils on sandplain landforms (i.e., Bassendean sands).
- Structure: The Vegetation Association is a Low woodland, with a distinctive upper sclerophyllous layer of low trees, dominated by *Banksia prionotes*, without an emergent tree layer >10m (however, this may be due to disturbance), with a highly species-rich understory consisting of; a layer of sclerophyllous shrubs of various heights including the following listed in the Approved Conservation Advice (DCCEEW 2016): *Eucalyptus tottiana*, *Nuytsia floribunda*, *Allocasuarina humilis*, *Conostephium pendulum*, *Eremaea pauciflora*, *Hibbertia hypericoides*, *Jacksonia spp.*, *Petrophile linearis*, *Stirlingia latifolia* and *Xanthorrhoea sp.* (J. Paterson & L. Shelton s.n.); and a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs and grasses, including members of the families Cyperaceae, Droseraceae, Haemodoraceae, Orchidaceae, Restionaceae and "lilies" from various families
- Composition: The canopy is dominated by *Banksia prionotes*. Other trees of medium height include *Eucalyptus tottiana* and *Nuytsia floribunda*. The understory contains high diversity (ca. 50 species recorded in a 10x10 quadrat) of shrub and herb species that often vary from patch to patch

Condition thresholds:

- Vegetation considered to be in Good condition: Structure altered but retains basic vegetation structure or ability to regenerate it. Obvious signs of disturbance, e.g. from partial clearing, dieback, logging, grazing, Presence of very aggressive weeds.

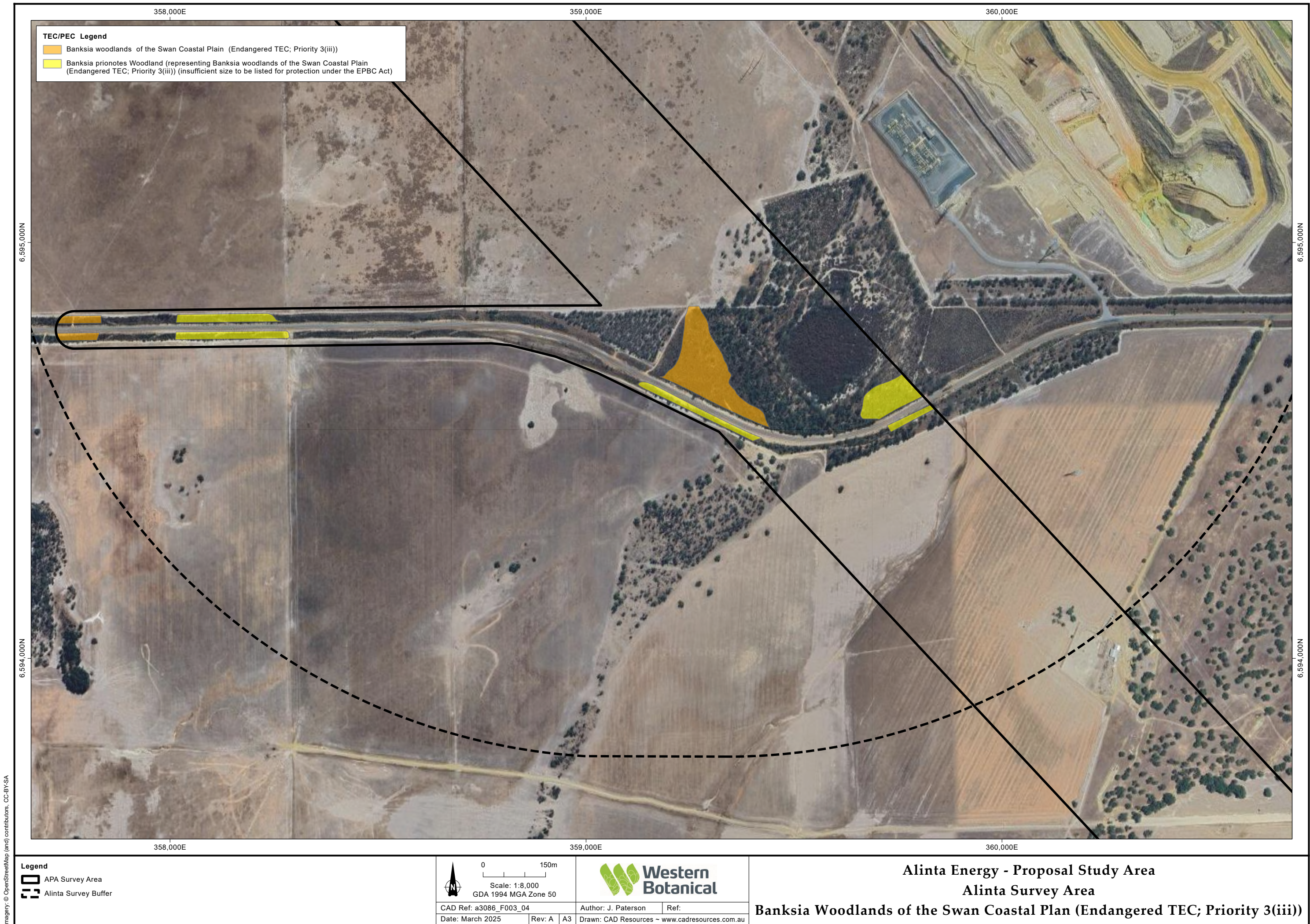
Minimum patch size:

- 'Good' – 2 ha or 20,000 m² (e.g. 200 m x 100 m)



Figure 6. Banksia Woodlands of the Swan Coastal Plain (Endangered TEC; Priority 3(iii)) within the Proposal Study Area.





5. Conclusions and Further Work

Overall, the Proposal Study Area contains a rich diversity of native flora species. Of the 143 species encountered, six were identified as Priority flora, while 21 were identified as common weeds.

As the November 2024 survey represents the first part of a two-phase Detailed Flora and Vegetation Assessment, further survey work is required to obtain the following:

- Describe missing Vegetation Associations (i.e., those within Nature Reserve and additional scope area).
- Rescore Phase 1 quadrat sites (second season survey).
- Attain replication of sample sites (currently each Vegetation Association has approximately one quadrat site).
- Targeted Priority flora searches within suitable habitat.
- Map weed occurrences across the Study Area.
- Confirm TEC PEC within the Nature Reserve by quantitative assessment.
- Review *Xanthorrhoea* species within the Study Area.

In its current form, the work presented here is incomplete, requiring a second season survey and Targeted Flora Assessment, and is inadequate for the purpose of fulfilling requirements of EPA Guidance (2016) for Environmental Impact Assessment.

Kind Regards

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