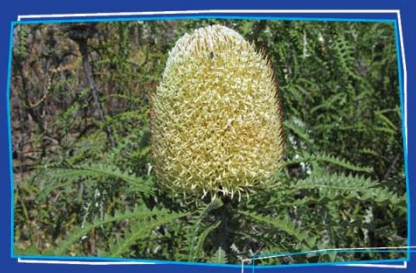
Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report

Site D – Cape Le Grand Rd seal widening



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1 Executive Summary

This 'Vegetation, Flora, Fauna and Environmental Considerations and Targeted Flora Report' has been undertaken in accordance with the 'Environmental Protection Authority (EPA) Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2016)' as part of the application to the Department of Water and Environmental Regulations (DWER) to clear 3.8 ha of native vegetation within a 10.7 ha area. Up to 4 m from the edge of the current road is required to be cleared to broaden the bitumen road sealing onto the road's shoulders, increasing the width of the road footprint to 30 m.

2 Introduction

The Shire of Esperance endeavors to maintain a high level of road safety, being proactive in identifying high risk road designs and progressively upgrading them. The Shire of Esperance is submitting 'Cape Le Grand Rd seal widening' project as Site D under the '2020 Strategic Purpose Permit' (Figure 1), for the purpose of altering the road design of Cape Le Grand Rd. The proposed works are located ~30 km east of Esperance, within the Shire of Esperance managed road reserve of Cape Le Grand Rd. Specifically, it is located from 1.7 to 5.2 km south of Merivale Rd, at straight line kilometre (SLK) 1.7 to 5.2 (Main Roads 2020). A point within the proposed clearing permit area is -33.849054 S, 122.211214 E (GDA94).

Cape Le Grand Rd services the highly popular tourist attraction, Cape Le Grand National Park. Previous road counters estimate traffic volume is ~410 vehicles per day. Three separate car crashes have occurred in the past five years within the area specified in the clearing permit proposal (Figure 1). It has been identified as a section of road with high safety concerns, requiring alteration of current road design. The Shire of Esperance has applied for funding in the 2020/2021 Australian Government and Western Australian Government's Black Spot Program, which aims to improve safety of roads with proven crash histories.

Proposed works involve sealing the existing gravel shoulders, installing recoverable batters, installing edge line marking and curve speed advisory signage where appropriate. Works will be carried out on a series of curves, on an otherwise straight road. To complete these works, native vegetation up to four metres from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 30 m. To mitigate impact of clearing vegetation, where feasible clearing will not occur to the full permitted width, conserving vegetation.

Figure 1. Location of proposed 'Site D – Cape Le Grand Rd seal widening' project, on Cape Le Grand Rd, located 1.7 to 5.2 km south of Merivale Rd, approximately 30 km east of Esperance. Highlighted is location of car crashes along the proposed road area.

3 Environmental Background

3.1 Scope

The removal of native vegetation to access sand resources has the potential to affect multiple environmental factors.

Possible impacts include;

- Threatened flora (TF) and priority flora (PF).
- Threatened (TEC) and priority (PEC) ecological communities, specifically the Environmental Protection and Biodiversity Conservation (EPBC) 1999 Act listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)'.
- Threatened fauna, specifically potential feeding, nesting and roosting habitat of endangered Carnaby's Black Cockatoo, *Calyptorhynchus latirostris.*

Assessing these impacts involves two approaches; desktop study and field survey. A desktop study will gather background information on the target area. The field survey allows for detailed understanding of vegetation communities, targeted flora surveys for possible TF or PF, environmental condition, presence of PEC and TEC, and overall potential impact of clearing.

3.2 Catchment

The 'Site D – Cape Le Grand Rd seal widening' is located within the Esperance Coastal catchment. The underlying hydrology and rainfall catchment drains directly to the coastline.

3.3 Climate

The Esperance climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2019). The area receives an average annual rainfall of 600 mm.

3.4 Geology

A single geological unit was identified within 'Site D – Cape Le Grand Rd seal widening', by Schoknecht et al. (2004). It is described as Tertiary marine sediments, with aeolian carbonate rich deposits in places.

3.5 Topography

The topography within 'Site D – Cape Le Grand Rd seal widening' is mapped at a fine scale (Schnoknecht et al. 2004). As a result, the project traverses a number of topographic areas. These include:

- Poorly drained, low-lying coastal plain, with very gently undulating sand dunes, lakes and swamps.
- Level plain with moderately inclined dune ridges, and associated swales with occasional seasonally inundated swamps.
- Gently undulating plain of 1-3% slope sand-sheet and subdued longitudinal dunes of 2-6% slope, with swales of seasonally inundated shallow depressions.

3.6 Soils

The soil of 'Site D – Cape Le Grand Rd seal widening' is broadly defined as Quaternary aeolian sands over sediment (Schnoknecht et al. 2004). Within the area, there has been seven soil types recorded. These include:

- Alkaline grey sandy duplex soils and pale deep sands, with minor calcareous deep sands and saline wet soils.
- Calcareous deep sands associated pale deep sands and minor calcareous shallow sands.
- Pale deep sands with associated alkaline grey deep sandy duplex soils.
- Deep uniform sand.
- Semi-wet deep sands and deep sandy duplex soils, with some grey deep sandy duplex soils.
- Wet soils and semi-wet soils.
- Gravelly, yellow mottled duplex soil with 30-80 cm of sand over gravel layer.

3.7 Vegetation

The site is located within the Interim Biogeographic Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) Esperance Plains region (Esp2) and Recherche sub-region. The Esp2 region is described as "Proteaceae Scrub and Mallee heaths on sandplain overlying Eocene sediments, rich in endemics. Herbfields and heaths (rich in endemics) on abrupt granite and quartzite ranges that rise from the plan. Eucalyptus woodlands occur in gullies and alluvial foot-slopes".

The site is mapped by Beard (1973) as Vegetation Association (VA) Fanny Cove 7048, as determined by WALGA's LGMap (2019). VA 7048 is described as 'Shrublands: Banksia scrub-heath on sandplain in the Esperance Plains Region'. 78.9% of pre-European distribution remains of VA 7048, in both the Esp2 IBRA region and Shire of Esperance boundaries (DPaW 2017). Of this, 82.38% is conserved within the International Union for Conservation of Nature (IUCN) reserves across Western Australia.

3.8 Land use

The area directly included in the clearing permit application 'Site D – Cape Le Grand Rd, seal widening' is currently intact and vegetated 40 m wide road reserve, managed by the Shire of Esperance. The current road footprint occupies 22 m. Previous sand extraction had occurred at 5.2 km south of Merivale Rd, SLK 5.21, with the site now with patchy cover after self-rehabilitating. The surrounding land use consists of private agricultural cattle grazing, Blue Gum plantations and unallocated crown land.

4 Methodology

4.1 Desktop study

A desktop study was completed prior to the field survey. A Geographical Information System (GIS) review was conducted, including the following;

- Existing site digital orthophotos, as sourced from LandGate (Merivale 2018).
- Western Australian Local Government Association's (WALGA) 'Local Government Mapping (LGMap 2019)' program was used to assess spatial information of geology, topography, soil profiles, native and planted vegetation, water bodies and Interim Biogeographical Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) classification system.
- Data provided by Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Herbarium in October 2019 was used to assess threatened flora (TF), priority flora (PF), and threatened (TEC) and priority (PEC) ecological communities within 20 km radius of the site. Specifically, spatial data included;

- WAHerb extract (DBCA 2019g).
- Threatened and Priority Reporting (TPFL; DBCA 2019e).
- Esperance District Threatened Flora (DBCA 2019b).
- TEC and PEC 'Likely to Occur' buffer and boundary areas (DBCA 2019f).

- To assess fauna, NatureMap was used with a 20km buffer from the center of the site (122° 18' 13'' E, 30° 40' 34'' S; DBCA & WAM 2020).

4.2 Field investigation: possible ecological impacts

The site was initially inspected on 07/09/2019, by the Shire of Esperance's Environmental Officer's, Julie Waters and Katie White. An assessment of possible ecological impacts included historical clearing, artificial water way constructions, impact of fire regimes, regeneration from disturbance, waterlogging, senescence, weeds, erosion, sedimentation, invasive fauna, *Phytophthora cinnamomi* Dieback, and illegal dumping of rubbish.

Vegetation community was also assessed during the field survey. Broad vegetation types defined by structure and composition were recorded and described. Condition of vegetation was assessed using Keighery (1994) categories, as 'Excellent', 'Very Good', 'Good', 'Degraded' or 'Completely Degraded'. This illustrates how healthy vegetation is, determined by number of dead or dying plants, weed cover and other forms of degradation. Additionally, possible environmentally sensitive areas, such as wetlands or granite, were noted.

Observations of fauna presence, such as call sounds, footprints and scats were also noted, and the area assessed for suitability of endangered Carnaby's Black Cockatoo (*Calyptorhynchus latirostris)* feeding, roosting and nesting habitat. Additionally, species identified in the desktop 20 km radius search (NatureMap DBCA & WAM 2020) were assessed, including endangered Australasian Bittern (*Botaurus poiciloptilus),* Australasian Little Bittern (*Ixobrychus minutus),* Western Ground Parrot (*Pezoporus flaviventris)* and Glossy Ibis (*Plegadis falcinellus)*.

4.3 Field investigation: Assessing Threatened and Priority Ecological Communities

The vegetation community of 'Site D – Cape Le Grand Rd seal widening' was assessed for the presence a TEC or PEC, specifically the Environmental Protection and Biodiversity Conservation Act 1999 listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC. The presence Kwongkan was identified using diagnostic characteristics defined in the 'Approved Conservation Advice for Kwongkan (Commonwealth of Australia 2014)' as;

> 2a) Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers where these shrubs occur (crowns measured as if they are opaque).
> And/or
> 2b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated.

PEC's do not have published approved conservation advice. Comparison of the vegetation community occurred using 'Priority Ecological Communities for Western Australia Version 28 (DBCA 2019d)' definitions.

4.4 Field Investigation: Targeted flora survey

The targeted flora survey was undertaken following the Environmental Protection Authority's (EPA) 'Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia' (2016). The targeted flora survey occurred in mid spring on 02/10/2019 by Julie

Waters and Katie White, Shire of Esperance's Environmental Officers, and accompanied by work experience student Danika Penson, currently completing a Botany degree. The targeted flora survey involved extensively surveying all species present up to 4 m from the active road footprint, using the road as a continuous transect. Due to being conducted in spring, the majority of flora species were flowering, decreasing the likelihood of overlooking species.

Following the initial targeted flora survey, secondary surveys focusing specifically on priority species were conducted. A known record of priority two species, *Astartea eobalta,* was directly located within the proposed clearing permit area (Specimen 06586228, DBCA 2019c; Figure 10). Katie White surveyed the area around the specimen record on 07/10/2019, but was unable to locate the plant, possibly due to it being a summer flowering species. The site was revisited on 10/12/2019 by Katie White, Julie Waters and Esperance Wildflower Society (EWS) member and original collector of *A. eobalta* specimen 06586228, Coral Turley. The entire road transect was surveyed for unknown or un-recorded populations of *A. eobalta* and ensured no other summer flowering species had been missed during the spring surveys. Lastly, a known record of priority two species, *Aldrovandra vesiculosa* (Specimen 07765037, DBCA 2019c; Figure 14) is also directly present within the clearing permit area, and strongly associated with seasonally damp depressions and wetlands. These areas were surveyed for *A. vesiculosa, Utricularia helix,* and *Utricularia westonii* on 15/01/2020 by Julie Waters and EWS member who has previously collected *A. vesiculosa*, Ken Mills.

Due to the high diversity and complexity of the flora in the Esperance region, all species were recorded to compile an incidental species list (Appendix 8.2). For species not identifiable in the field, material was collected under Katie White's Regulation 61 Flora Taking Licence FT61000029, and identified existu, using local botanical knowledge, DBCA's Esperance District Herbarium, Florabase (DBCA 2019c) and other guides. Any species that were unable to be identified were submitted to the WA Herbarium for formal identification. This ensured no PF or TF were overlooked during the targeted flora survey.

Over the course of the 2019 wildflower season, surveyors re-familiarised themselves with key taxonomic indicators and associated habitat by visiting verified known populations of *Banksia prolata* subsp. *prolata* (P3)*, Dampiera sericantha* (P3)*, Daviesia pauciflora* (P3)*, Lasiopetalum maxwelli* (P2)*, Thysanotus volubilis* (P2)*, Verticordia verticordina* (P3)*,* as PF species identified in the desktop survey within a 20 km radius. For other TF and PF identified in the desktop survey as possible to occur, scans of pressed specimens from the local Esperance District Herbarium were scanned and taken into the field. Any flora thought to be TF or PF was formally collected, counted and mapped, using a Panasonic FS-G1 Toughpad with the program ROAM or a GPS Garmin GPS64. Specimens were then lodged with the WA Herbarium for formal verification. When PF were confirmed, TPFL forms were completed and submitted to DBCA's district Conservation Officer, and Species and Communities Branch.

5 Results and Discussion

5.1 Ecological Impact

5.1.1 Vegetation Communities

Overall, vegetation communities have a high level of diversity across the site, with 116 native species recorded (Appendix 8.1). Three vegetation communities were identified within the 'Site D – Cape Le Grand Rd seal widening' area, as defined by vegetation composition and structure (Table 1; Figure 2). The largest of these was vegetation type one, which appropriately matches the described Beard's

(1973) vegetation association 4801. It also has significantly the highest diversity. The proposed clearing permit area was identified in the background scope as Beard's (1973) vegetation associated 7048 (Section 3.7), which is believed to be an appropriate description for vegetation type two. Vegetation type three is dominated by wetland species, reliant on very specific hydrological regimes, and is therefore considered a sensitive environment. These areas included ephemeral small water bodies. Proposed works will likely impact on the hydrological regimes of vegetation type three, by removing part of the wetland area by infilling or clearing of vegetation that directly affects the hydrological regime.

Table 1. Vegetation communities identified within proposed 'Site D – Cape Le Grand Rd seal widening' project area.

Type	Description	Figure	Beard Vegetation Association	Area (ha)	Diversity (species)
1	*Nuytsia floribunda* and *Acacia cyclops* over low heathland.	3	4801; Shrublands and heathland with scattered *Nuytsia floribunda* on sandplain.	2.52 in 6.67 area	122
2	Dune crests dominated by *Banksia speciosa* woodland.	4	7048; Shrublands dominated by Banksia scrub-heath on sandplain in the Esperance Plains Region.	0.26 in 0.93 area	43
3	Low lying semi-permanent wetlands, dominated by wetland vegetation, such as *Taxandria callistachys* and Sedges.	5	Most closely relates to 51; Sedgeland, formed by reed swamps and occasional heath.	1.00 in 3.12 area	23

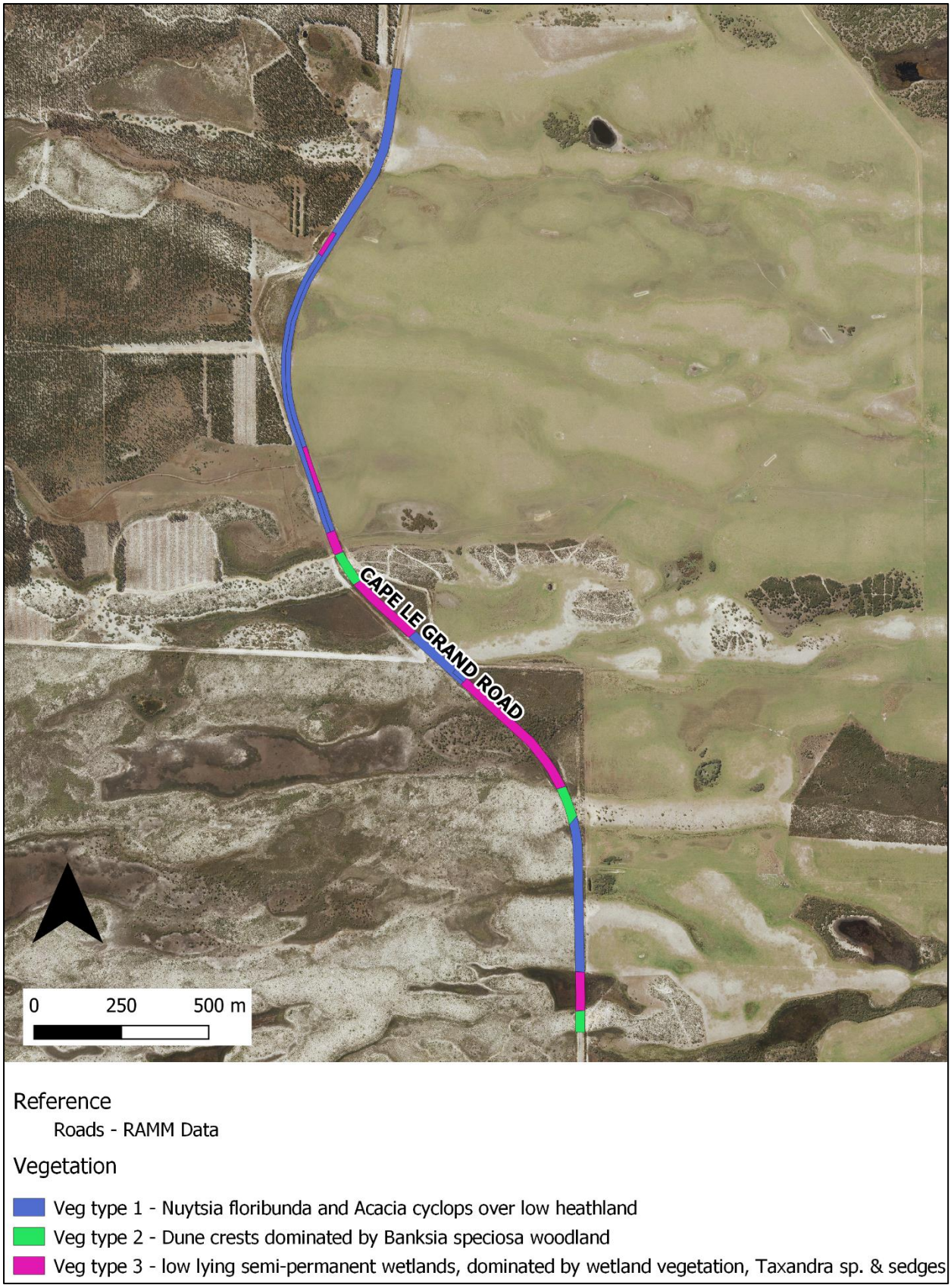

Figure 2. Vegetation communities identified within 'Site D - Cape Le Grand Rd seal widening' project.

Figure 3. Vegetation type one identified in 'Site D – Cape Le Grand Rd seal widening' project, described as *Nuytsia floribunda*, and *Acacia cyclops* over low heathland.

Figure 4. Vegetation type two identified in 'Site D – Cape Le Grand Rd seal widening' project, described as dune crests dominated by *Banksia speciosa* woodland.

Figure 5. Vegetation type three identified in 'Site D – Cape Le Grand Rd seal widening' project, described as low lying semi-permanent wetlands, dominated by wetland vegetation, such as *Taxandria callistachys* and Sedges.

5.2 Vegetation Condition

The majority of the area was burnt in the 2015 Merivale fires. The vegetation is rapidly regenerating across vegetation communities, but cover still remains relatively low, compared to a mature vegetation structure.

Due to the fire it was difficult to detect any signs of *Phytopthora cinnamomi* dieback disease within the clearing permit area. It is known to take at least five years for visual markers of Dieback to become apparent due to the tolerance of juveniles to the adverse effects of *P. cinnamomi,* A qualified dieback interpreter also cannot determine dieback presence for five years after a bushfire. Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2020) data does not show any positive or negative Dieback sample results in the immediate area. However, a positive *P. cinnamomi* sample has been tested from the nearby intersection of Cape Le Grand Rd and Merivale Rd, which is only 1.7 km north of the site. DIDMS also displayed a positive *P. cinnamomi* point on the northern boundary of Cape Le Grand National Park, which is 5.6 km south of the site. Cape Le Grand Rd and the area of the proposed 'Site D – Cape Le Grand Rd seal widening' project forms a continuous transect and vector through vehicle movements between these positive points. It is therefore highly likely, there are positive *P. cinnamomi* dieback infection areas within the proposed clearing permit area. Proposed works will be conducted using appropriate hygiene measures to limit spreading of the disease, including clearing in dry conditions and clean down of vehicles and machinery before entering the site. However, there is always a possibility that proposed works will extensively spread *P. cinnamomi* dieback along Cape Le Grand Rd due to proposed works.

There was extensive weed invasion across the entirety of the proposed 'Site D – Cape Le Grand Rd seal widening' area. Overall, 25 invasive species were identified within the project area (Appendix 8.1). Of these, the most extensive and of serious concern were Victorian Tea Tree (*Leptospermum laevigatum)* and African Love Grass (*Eragrostis curvula*). It is highly likely that proposed works will increase the distribution of weeds and degrade vegetation along the entire road reserve where works occur. Ideally, regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species needs to occur. However, this will be extremely expensive to employ contractors and mobilise equipment, which may not be feasible with given budgets.

African Love Grass was extensively present to the north of the project area, across 1.3 km of roadside, from 1.7 km to 3 km south of Merivale Rd (Figure 6). In this area it has become the dominant species, degrading native vegetation and reduce biodiversity significantly. A combination of road maintenance activities slashing vegetation spreading the weed, adjacent pastoral land use, and landowners clearing firebreaks on the road reserve, could have attributed to the degradation.

Additionally, approximately ~ 1.4 km of Cape Le Grand roadside within the 'Site D – Cape Le Grand Rd seal widening' area has dense stands of Victorian Tea Tree weeds growing (Figure 7). It is likely the 2015 Merivale fires resulted in a higher weed density and distribution, as is known to trigger germination events in Victorian Tea Tree. It is believed without treatment the highly invasive nature of Victorian Tea Tree will result in large areas of intact native vegetation being outcompeted.

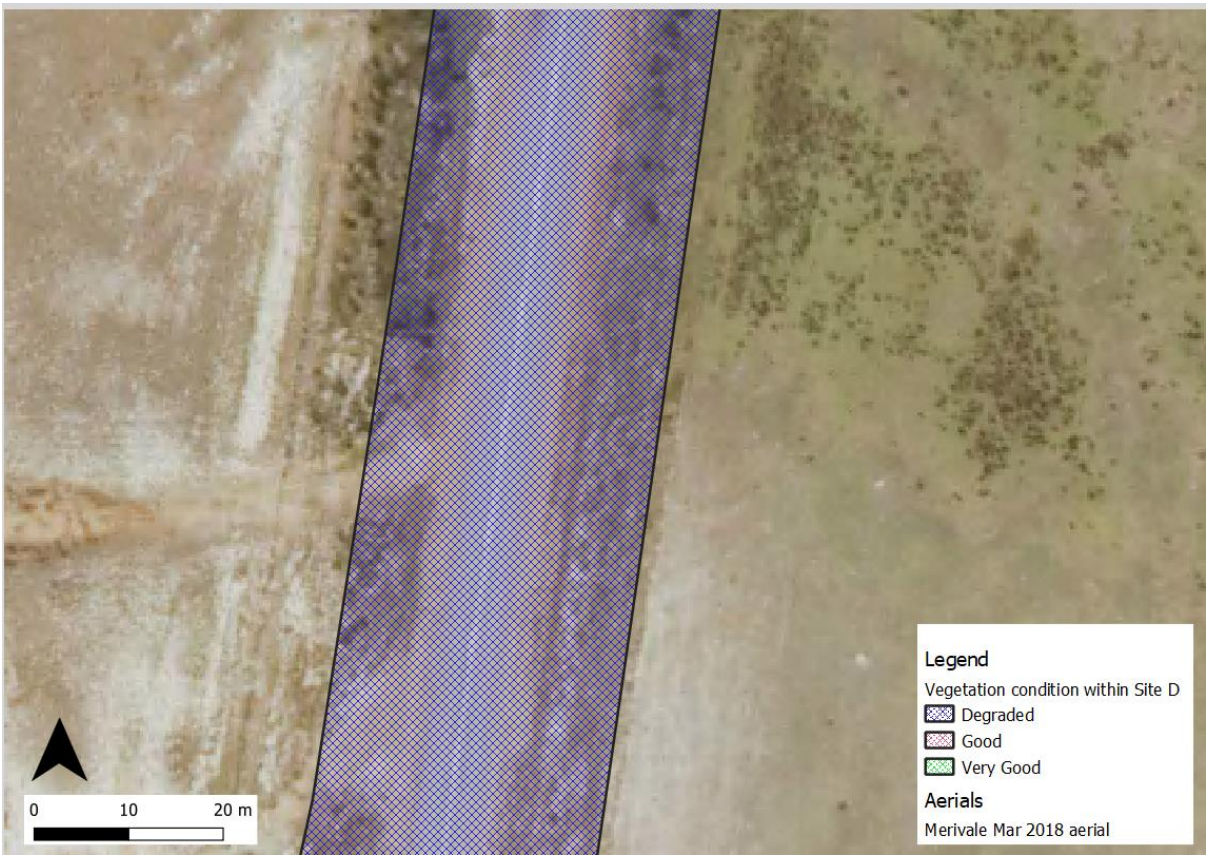

Figure 6. The northern area of 'Site D – Cape Le Grand Rd seal widening' that is dominated by invasive species African Lovegrass, *Eragrostis curvula*. A point within this area is 426546.1 E, 6256396.3Y (UTM Zone 51H; GDA94). It is evident that extensive slashing and mowed firebreaks on adjacent pastoral private land has occurred.

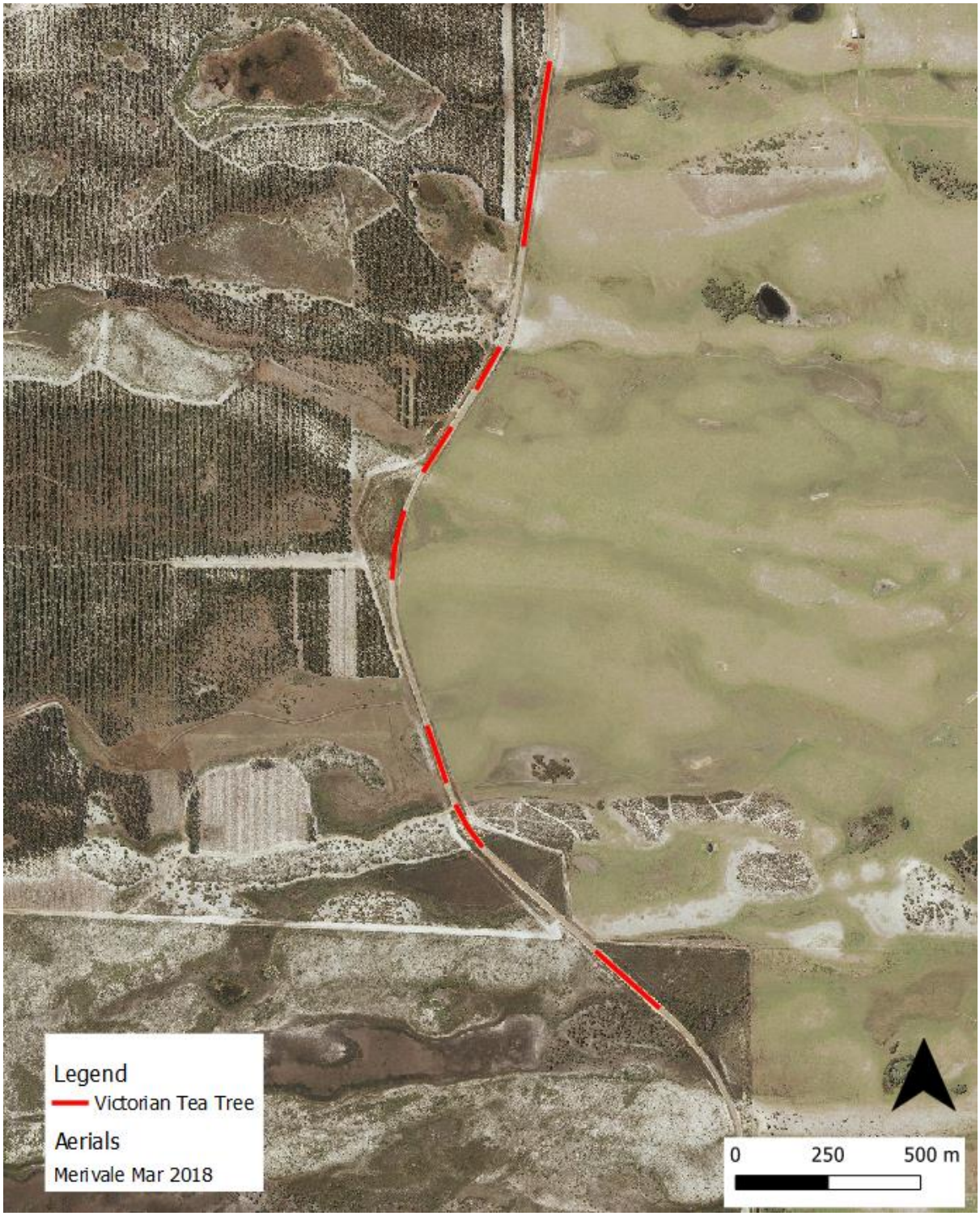

Figure 7. Victorian Tea Tree, *Leptospermum laevigatum*, present within the 'Site D – Cape Le Grand Rd seal widening' project area, covering ~1.4 km of roadside.

Primarily due to the degrading nature of invasive species, vegetation condition varies dramatically across the 'Site D – Cape Le Grand Rd seal widening' project area (Figure 8). Other degrading factors included limited diversity from loss of sensitive species in the northern area and scattered rubbish. No evidence of invasive fauna, such as scats or digging, were observed. However, it is highly likely that foxes, rabbits and feral cats are extensive throughout the area. In total;

- 2.26 of vegetation within a 6.47 ha footprint (59%) is in very good condition,
- 0.45 of vegetation within a 2.14 ha footprint (12%) is in good condition and,
- 1.09 of vegetation within a 2.09 ha footprint (29%) is in poor to degraded condition.

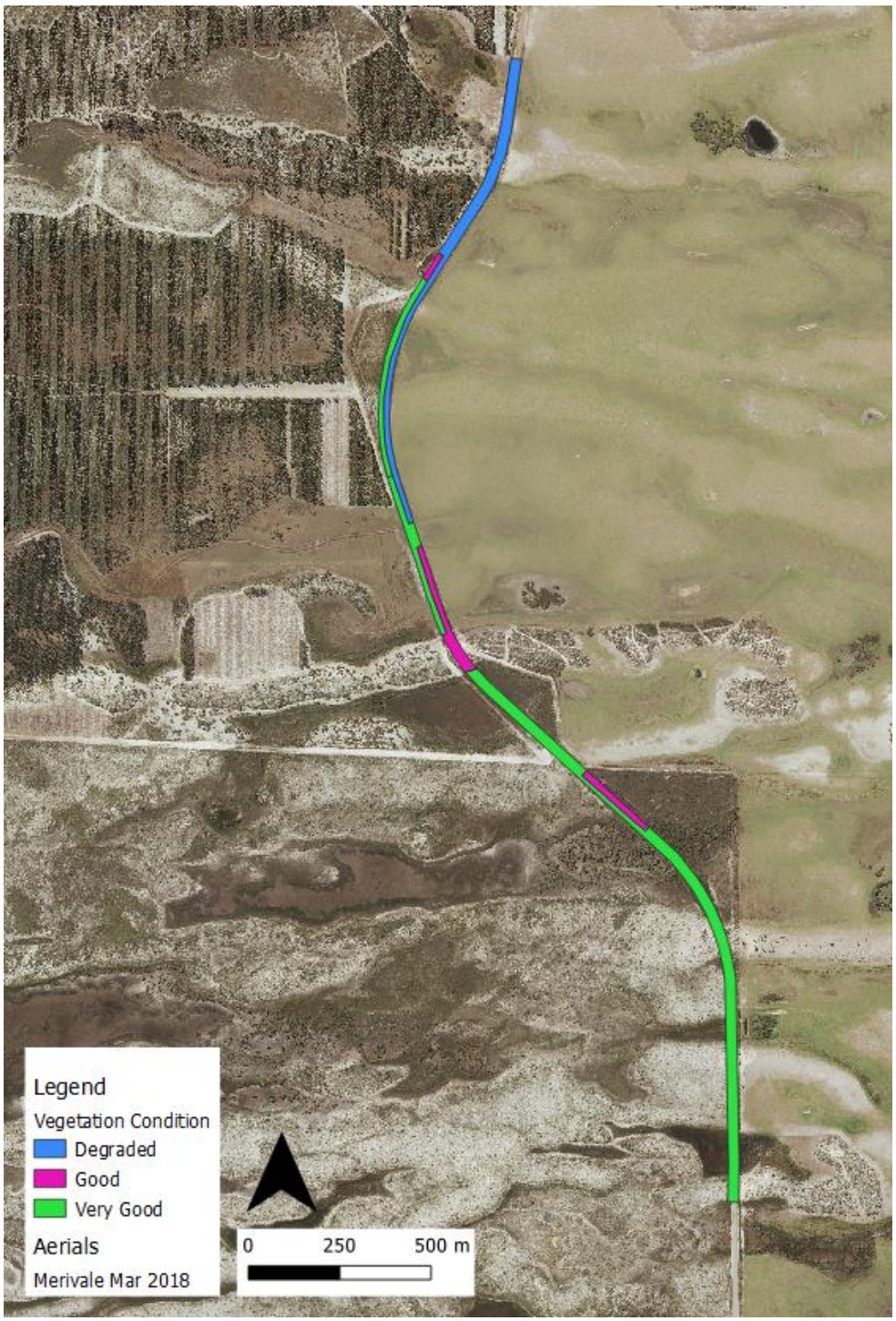

Figure 8. Vegetation condition varies across 'Site D – Cape Le Grand Rd seal widening' project, ranging from very good to degraded condition, due to primarily to degradation from invasive species.

5.3 Threatened and Priority Ecological Communities

The desktop study identified the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 listed threatened ecological community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' within 'Site D – Cape Le Grand Rd seal widening' project area. No other TEC's or priority ecological communities (PEC) were identified by the desktop study as being within "Site D – Cape Le Grand Rd seal widening" or within a 20km buffer of the site.

Due to the site recently being burnt, using the 'Approved Conservation Advice for Kwongkan (Commonwealth of Australia 2014)' for assessing the presence of Kwongkan, assessment relied on determining if two or more Proteaceae species were diagnostic, and will form a significant vegetative component when mature. Both vegetation type one, '*Nuytsia floribunda* and *Acacia cyclops* over low heathland' and vegetation type two, 'Dune crests dominated by *Banksia speciosa* woodland', met criteria to be considered as Kwongkan TEC. However, due to invasive species and degrading factors, only areas within these vegetation communities in very good condition were considered as TEC (Figure 9). In total, 1.54 ha of vegetation within a 3.01 footprint was considered as Kwongkan TEC present within 'Site D – Cape Le Grand Rd seal widening' area.

The vegetation community described as 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' is listed as a PEC (DBCA 2019d). Within the 'Site D – Cape Le Grand Rd seal widening' project area, vegetation type two was described as a wetland community. Scattered *E. occidentalis* were present but did not form a continuous dominant Swamp Yate woodland. Thus, it is believed vegetation type three is unlikely to meet criteria as a PEC.

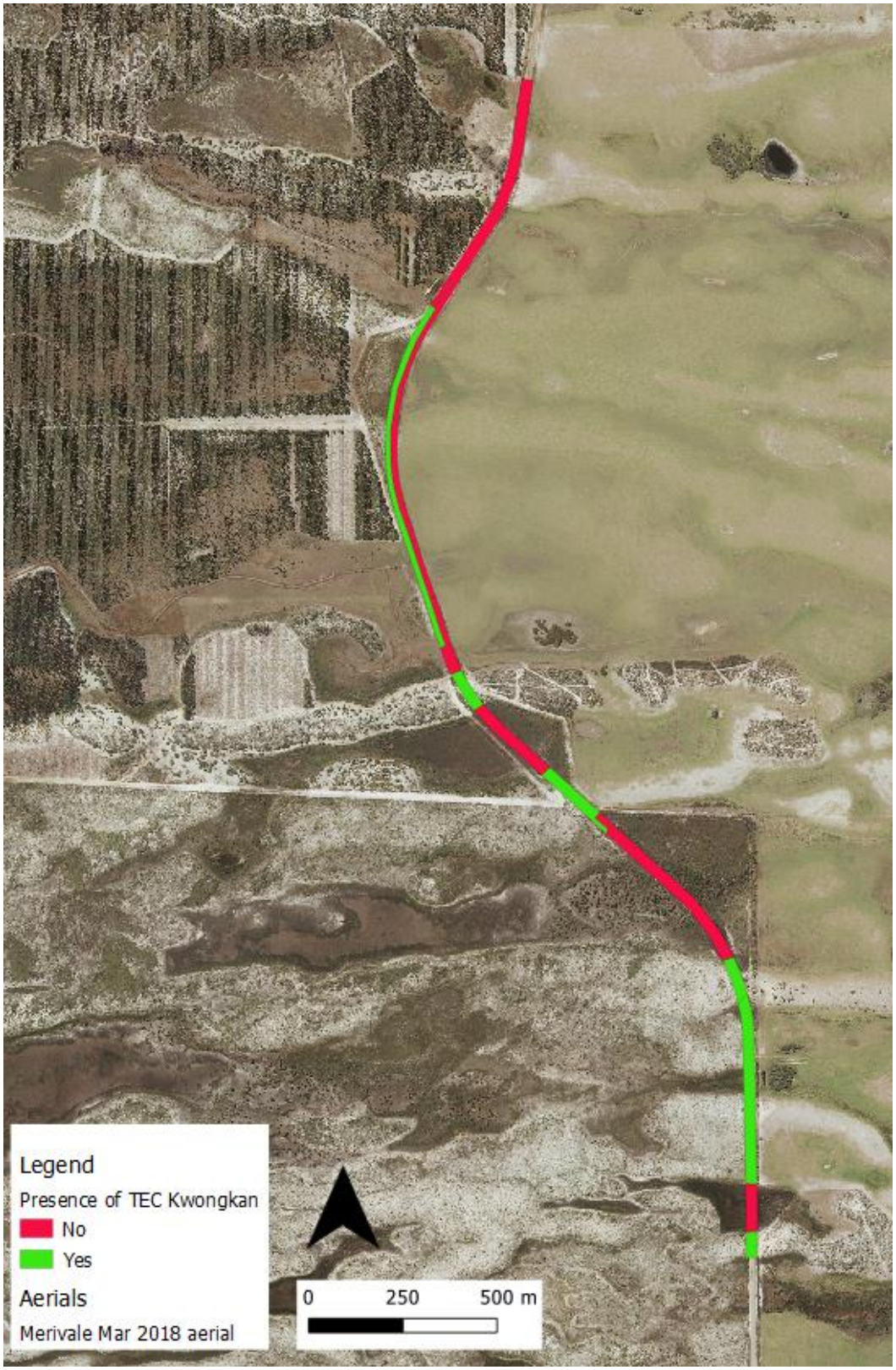

Figure 9. Vegetation communities of vegetation type one '*Nuytsia floribunda* and *Acacia cyclops* over low heathland' and vegetation type two, 'Dune crests dominated by *Banksia speciosa* woodland' in very good condition meeting threatened ecological community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' within 'Site D – Cape Le Grand Rd seal widening' project.

5.4 Threatened and Priority Flora

Four threatened flora (4) and 39 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Table 2; DBCA 2019b, DBCA 2019e, DBCA 2019g). Of these, 19 PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of 'Site D – Cape Le Grand Rd seal widening' project. Confirmed records, indicating known populations, of *Astartea eobalta* (P2) and *Aldrovandra vesiculosa* (P2) were directly located within the clearing permit area.

Table 2. Threatened or priority flora identified by the desktop study to be present within a 20 km radius of 'Site D - Cape Le Grand Rd seal widening' project area, using Threatened and Priority Flora Reporting (TPFL; DBCA 2019e), WA Herbarium (DBCA 2019g) and Esperance District Threatened Flora (DBCA 2019b).
Nt. Acronyms used in the table include priority flora (P), threatened flora (TF), Biodiversity Conservation (BC) Act 2018, Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, critically endangered (CN) and endangered (EN).

Species	Conservation Status	Associated Habitat	Likely to occur
Acacia incanicarpa	P2	Granite	No
Acacia nitidula	P2	Granite	No
Aldrovandra vesiculosa	P2	Associated with ephemeral swamps and wetlands.	Yes
Atriplex muelleri	P1	Limited information available. Described on Florabase (DBCA 2019) as associated with cracking clays.	Unlikely
Banksia prolata subsp. *prolata*	P3	Granite	No
Boronia scabra subsp. *attenuata*	P2	Granite	No
Calectasia jubilaea	P2	Associated with diverse Kwongkan heathland.	Yes
Comesperma lanceolatum	P2	Grows on marine plains, sand dunes, and quartzite ridges.	Yes
Commersonia apella	TF – CR under BC Act 2016 and EPBC Act 1999	Recorded along creek-lines.	Unlikely
Conostylis seorsiflora subsp. *longissima*	P2	Granite	No
Dampiera decurrens	P2	Granite	No
Dampiera sericantha	P1	Recorded across a variety of soil types on plans, including sand or gravel.	Yes
Daviesia pauciflora	P3	Recorded on deep sand, associated with heathland.	Yes
Eucalyptus aquilina	P2	Recorded in shallow valleys, creek beds and on hillsides in dense heath.	Possible
Eucalyptus insularis	TF – EN under BC Act 2016 and not listed	Granite	No

	under EPBC Act 1999		
Eucalyptus ligulata subsp. *ligulata*	P4	Associated with moist granitic sand around inselbergs, peaks and outcrops.	No
Eucalyptus missilis x	P4	Associated with sand over limestone.	Unlikely
Eucalyptus semiglobosa	P3	Grows on white sand over laterite, silty sand on edge of granite shelf, limestone. Associated with various topography, including hillslopes, gullies, cliffs.	Unlikely
Gonocarpus pycnostachyus	P3	Associated with seasonal wet depressions and pools on granite rocks.	Yes
Gonocarpus simplex	P4	Grows in swamps, and seasonally inundated areas.	Yes
Goodenia quadrilocularis	P2	Recorded on sand dunes, and granite slope & outcrops.	Possible
Lambertia echinata subsp. *echinata*	TF – CR under BC Act 2016 and EN under EPBC Act 1999	Recorded exclusively on gravel. Only known populations are in Cape Le Grand National Park.	Unlikely
Lasiopetalum maxwellii	P2	Recorded on range of habitats, including sandy soils and granite slopes.	Possible
Lepyrodia fortunata	P2	Associated with peaty swampy sand and seasonally inundated swamps.	Yes
Leucopogon apiculatus	P3	Granite	No
Leucopogon interruptus	P3	Grows on grey sand over granite.	No
Leucopogon multiflorus	P2	Associated with various habitats, including rocky slopes, coastal sand dunes, amongst quartzite or granite rocks.	Yes
Leucopogon rotundifolius	P3	Recorded on granite outcrops, and steep hillslopes.	No
Myosotis australis	P4	Associated with grey sand over limestone.	No
Myoporum vellutinum	TF – EN under BC Act 2016 and not listed under EPBC Act 1999.	Exclusively recorded on creek-lines.	Unlikely
Opercularia hirsuta	P2	Associated with sandy soils over granite or quartzite.	Unlikely

Patersonia inaequalis	P2	Grows on sandy clay, lateritic or granitic sand.	Possible
Persoonia scabra	P3	Recorded on white sand or sandy loam.	Yes
Platysace haplosciadia	P2	Associated with seasonally wet areas.	Yes
Ricinocarpos pilifer	P2	Granite	No
Rumicastrum chamaecladum	P2	Associated with clay loam, on winter-wet creek edges.	Yes
Scaevola paludosa	P2	Grows on sandy soils.	Yes
Thysanotus parviflorus	P4	Associated with grey sand.	Yes
Thysanotus volubilis	P2	Recorded on sandy soil.	Yes
Trachymene anisocarpa var. *trichocarpa*	P3	Associated with recently disturbed or burnt sites, across various habitat.	Yes
Utricularia helix	P2	Grows in swamps.	Yes
Utricularia westonii	P2	Grows in swamps.	Yes
Verticordia verticordina	P3	Associated with damp sand.	Yes

The targeted flora survey identified one PF species, priority two *Astartea eobalta* within the proposed clearing permit footprint (Section 5.3.1). Due to dry conditions at time of surveying, a known record within the area of priority two species *Aldrovandra vesiculosa* was not located, likely due to being present in the soil as a turion (Section 5.3.2). Numerous specimen's unknown to surveyors were collected and verified at the WA Herbarium as non-threatened species, such as *Leucopogon* sp. Coujinup (Accession #8334; KW058).

5.4.1 *Astartea eobalta,* Priority Two

A known record of *Astartea eobalta* was recorded adjacent to the clearing permit area, collected in 2003 (Specimen 06586228, DBCA 2019c; DBCA 2019b, DBCA 2019e, DBCA 2019g; Figure 10). The GPS coordinate and surrounding area was searched extensively, but the plant could not be located. Given that the description of the plant's location was at the edge of the road and Cape Le Grand Rd has been widened from single-width bitumen to double width since the collection, it is highly likely the population has been lost through incidental clearing.

PERTH 06586228

Astartea eobalta
Myrtaceae

Plant Description, Notes: Very spindly open shrub 0.4 m high, with a single basal stem 4 mm diameter; flowers 8 mm diameter, petals pale pink.
Vegetation: Eucalyptus occidentalis (Swamp Yate) trees over Melaleuca cuticularis and Acacia cyclops over sedgeland.
Site Description: Grey-brown sand on rise above swamp.
Frequency: only one Astartea shrub seen at edge of road directly under Swamp Yates.
Locality: On Cape Le Grand Road, 6.7 km N of National Park sign and xx km N of entry gate of Cape Le Grand National Park, 3.2 km S of Merivale Road
Location: -33.848°, 122.213° (GDA94)
Location (DMS): 33° 50' 51.0" S 122° 12' 45.1" E (GDA94)
State: WA
Collector: Rye, B.L.; Turley, C.D. **Coll No:** 231244
Collection Date: 11 December 2003
Conservation Code: 2

Cited by: B.L. Rye **Date:** *2013*
Origin: PERTH
Record Basis: PreservedSpecimen

Figure 10. Extract from Florabase (DBCA 2019c) of priority two species, *Astartea eobalta* record of Specimen 06586228 located directly within the proposed 'Site D – Cape Le Grand Rd seal widening' area.

A new population of *Astartea eobalta* was discovered at 4.4 km south of Merivale Rd (427116.3X, 6254100.4Y, UTM Zone 51H, GDA94), and ~1.2 km south of the recorded location of specimen 06586228 (DBCA 2019c; Figure 11; Figure 12). It is possible the GPS coordinate was slightly incorrect for specimen 06586228, and this is the population it refers too. However, associated vegetation and landform were not similar at the new population discovered. There was also a specimen of *A. eobalta* collected within 300 m of the new population (Specimen 06172601; DBCA 2019c), but information was not considered accurate, as was collected in 1983 and had no population data or descriptions attached. A specimen of *A. eobalta* was sent to WA Herbarium for identification confirmation (KW039; Accession #8281 with specimen not retained). It was confirmed as *A. eobalta* by Michael Hislop on 06/02/2020. A Threatened and Priority Reporting Form (TPFL) was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) district Flora Conservation Officer and Species and Communities Branch on 06/02/2020 (Appendix 8.2). If proposed works occur, three plants will be impacted upon, from a population total of 13.

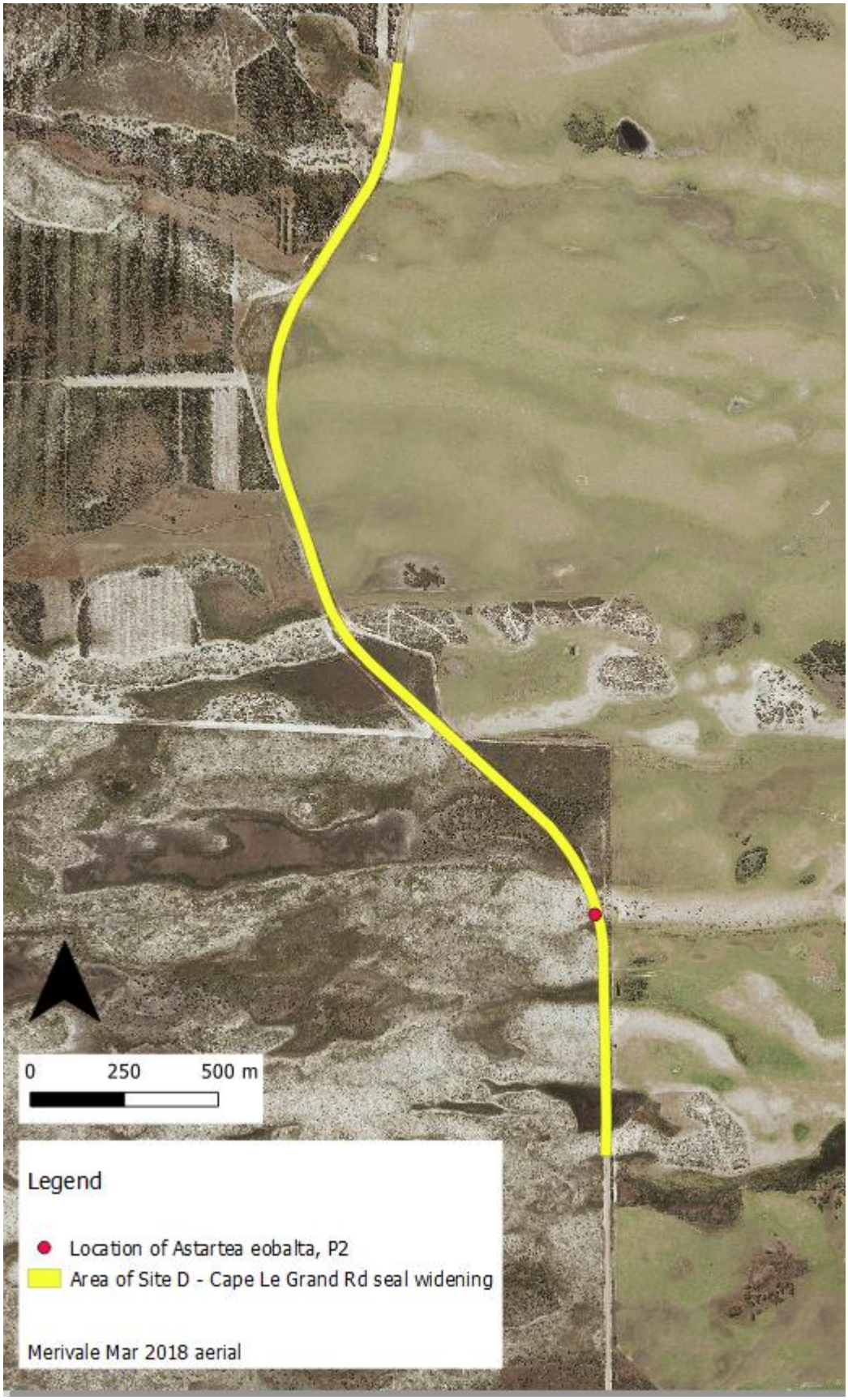

Figure 11. Location of priority two species *Astartea eobalta* within the 'Site D – Cape Le Grand Rd seal widening' project.

Figure 12. Priority two species *Astartea eobalta* within the 'Site D – Cape Le Grand Rd seal widening' project.

There is little population information on *A. eobalta* population dynamics available (DBCA 2019a). No data was available in the TPFL dataset, likely due to this species only recently being taxonomically delineated from other *Astartea* species. Therefore, all record relies on the WAHerb dataset, which has eight known records of *A. eobalta* (Table 3). Records span across a geographic range of 83 km (east-west distribution; Figure 13). Five populations are located within National Parks, as tenure that is secure within the conservation estate.

It is likely that known and recorded populations of *A. eobalta* are extremely under-representative of true population numbers and don't reflect the true conservation status of the species. Due to it being a recently formed new species, no monitoring by DBCA or other parties has been completed. *A. eobalta* also has a cryptic element to identification, with extremely similar physiological features as non-threatened *Astatea asteroides* and growing in close association. This was observed at the new population discovered along 'Site D – Cape Le Grand Rd seal widening' project, with clumps of *A. eobalta* and *A. asteroides* growing together, which during spring looked like one large clump of *A. asteroides* as it was flowering, and in summer looked like one large clump of *A. eobalta* as that was flowering then. Additionally, *A. eobalta* will always be under-represented in collections, flowering outside of spring when the vast majority of flora surveys are conducted. Lastly, observed suitable habitat of *A. eobalta* consisted of periphery of ephemeral swamps, of which there are large amounts of suitable habitat along the Esperance coastline.

Once aware of this species, the Shire of Esperance has discovered and verified an additional three populations during the 2019 wildflower season. Correspondence with DBCA's district flora officer regarding the Shire of Esperance's proposed impact to *A. eobalta* across numerous sites indicated that impact to this site is considered relatively low. If required, seed can be collected from plants prior to proposed works and re-introduced after works are complete. At a different site, incidental clearing of plants during routine maintenance within the current active road footprint were observed to be re-sprouting from stems. It is hoped that this will also occur along Cape Le Grand Rd once proposed works are complete.

Table 3. Compiled population data of priority two species *Astartea eobalta* and new populations discovered by the Shire of Esperance in the 2019 spring season (DBCA 2019a).

Site Description	New population	Population Count and date	Sheet no. / Specimen no.
Cape Le Grand Rd, located 4.4 km south of Merivale Rd intersection	X	13 - 3 will be taken as part of this project (2019).	KW039 Accession #8281. Specimen not retained by WA Herbarium.
Farm laneway on private property, located east of Duke of Orleans Bay Rd at ~8 km south of Merivale Rd intersection.		21 to 50 plants (2005). Site was revisited in 2019 to gain familiarity with species. Population remained undisturbed from original survey, and at least 8 plants were observed incidentally. A full survey was not conducted.	07484518
Cape Le Grand Rd, 6.7 km north of National Park sign, 3.2 km south of Merivale Rd intersection		1 plant (2003). 0 plants (2019).	06586228
Orleans Bay Rd, ~ 8.9 km south of Merivale Rd intersection. Located within approved CPS 7188/2 clearing permit area.	X	80 plants – 40 plants will be impacted by proposed impacts under CPS 7188/2 (2019).	KW040 Accession #8281
Wharton Rd, ~250 m west from the Duke of Orleans Bay Caravan Park.	X	17 plants (2019).	KW055 Accession #8281

Cape Le Grand National Park. Inland from western side of road to Le Grand beach, and 0.5 km south from its junction with the Frenchman's Peak turnoff.		No data on population (1994).	06172598
Dolphin Cove, Cape Arid National Park.		Common to dominant in area (1989).	03369714
Along Le Grand Rd, located 6 km north of border to Cape Le Grand National Park.		No data on population (1983).	06172601
8.6 miles from Cape Le Grand on Esperance Road.		No data on population (1966).	06172628
Cape Le Grand Rd, 25.5 miles from Esperance.		No data on population (1962).	06172636
New Orleans Bay		No data on population (1944).	03428451

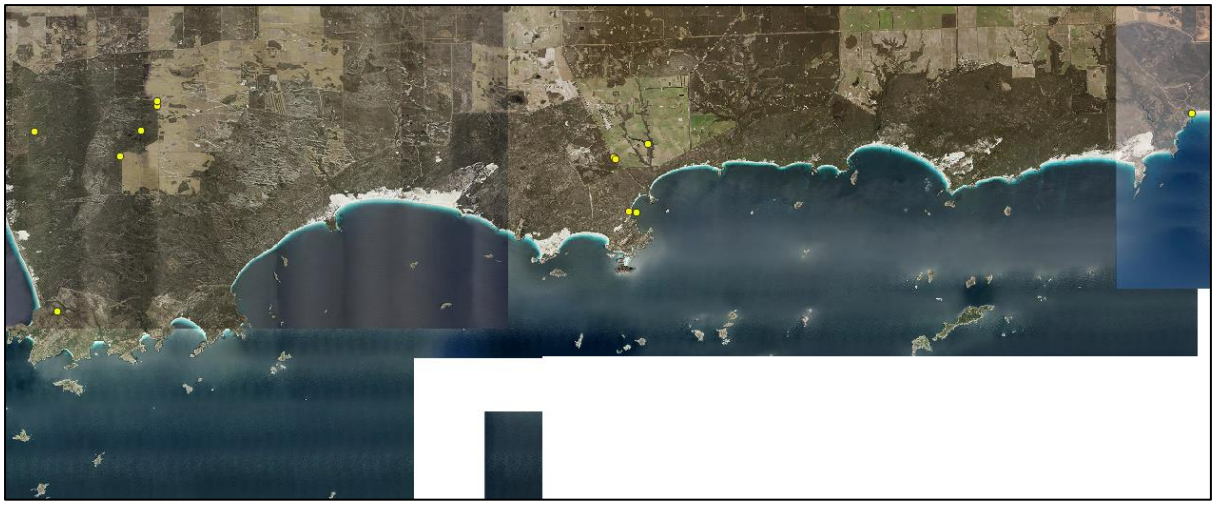

Figure 13. Known records of priority two species *Astartea eobalta* across an 83 km geographic range, spanning from Cape Le Grand National Park in the west, to Cape Arid National Park in the east (DBCA 2019a).

5.4.2 *Aldrovandra vesiculosa*, Priority Two

A known population of priority two species *Aldrovandra vesiculosa,* is present within the 'Site D – Cape Le Grand Rd seal widening' area (Specimen 07765037, DBCA 2019c; Figure 14). This site and surrounding suitable habitat was extensively searched during a targeted flora survey specific to *A. vesiculosa* on 15/01/2020*,* but alive plants were unable to be located. A second known population on Cape Le Grand was also surveyed and no plants were present. The ephemeral wetlands that *A. vesiculosa* grows did not have standing water, with muddy bottoms observed. During summer when no water is present *A. vesiculosa* exists as a turion, described as underground bud or modified shoot that allows wetland species to persist at the bottom of pools until it becomes wet again. Unfortunately, it is therefore unknown whether this

population has persisted and is still present within the area. The proposed impact of 'Site D – Cape Le Grand Rd seal widening project' on the *A. vesiculsoa* population was raised by the Shire of Esperance at the Esperance Wildflower Society meeting on 20/01/20, and it was requested the specific wetland the known record is present be avoided. Extensive road designs were investigated to mitigate and limit clearing within this area. Entire avoidance is not feasible to implement proposed safety standards, but in these areas clearing could be minimised one metre from the current road footprint (compared to 4 for the remainder of the project). In these areas, vegetation will be mulched, and not cleared, again to limit the impact of proposed works.

PERTH 07765037

Aldrovanda vesiculosa
Droseraceae

Plant Description, Notes: Aquatic herb 5-20 cm long, 1.5 cm wide. Flowers white. Adult population, percentage of population in bud 10%.
Vegetation: Wet reed bed in ca 15 cm water, very slightly saline. Utricularia sp. (yellow flowers), Baumea sp., Chara, Potamogeton drummondii.
Site Description: Paperbark swamp. Wet, grey sand. Road disturbance 2007.
Frequency: over 50 plants.
Locality: Cape Le Grand Road, ca 4 km S of junction Merivale Road, W verge
Location: -33.848°, 122.209° (GDA94)
Location (DMS): 33° 50' 52.0" S 122° 12' 34.0" E (GDA94)
State: WA
Collector: C.D. Turley et al. **Coll No:** 1/1 -08
Collection Date: 20 January 2008
Conservation Code: 2

Origin: ESP.
Duplicates to: ESP.
Record Basis: PreservedSpecimen

Figure 14. Extract from Florabase (DBCA 2019c) of priority two species, *Aldrovandra vesiculosa* record of Specimen 07765037 located directly within the proposed 'Site D – Cape Le Grand Rd seal widening' area.

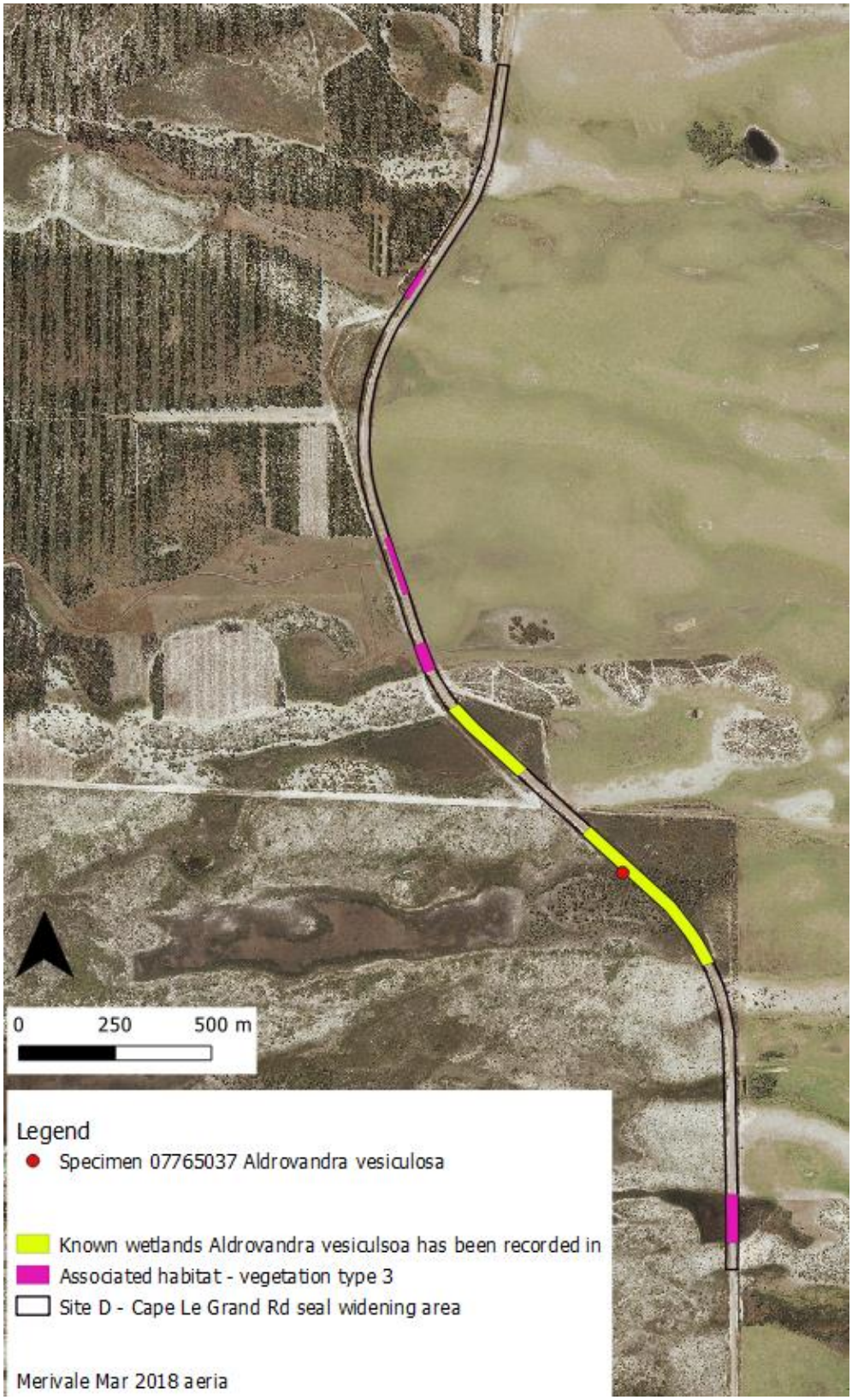

Figure 15. Suitable habitat and known locations of priority two species, *Aldrovandra vesiculosa,* within 'Site D – Cape Le Grand Rd seal widening' area.

Peculiar circumstances surround the discovery of *A. vesiculosa* in Esperance, and the biological implications. Two populations were discovered along Cape Le Grand Rd by EWS after large amounts of correspondence with a botanist from overseas that kept hinting and taunting members with the presence of an unusual species directly within this area (EWS 2020). The species was first discovered in 2007, and a specimen was formally collected and verified in 2008. It was believed unusual at the time, as the road dissected the swamp wetland network and plants were only found on one side of the road. Additionally, the plants were only found at an easily accessible location directly adjacent to the road, when the vast majority of wetlands along Cape Le Grand were surrounding by dense vegetation and difficult to access. There is therefore a lot of conjecture amongst the local scientific community whether this species is naturally occurring or has been purposefully translocated. Without genetic testing it is unlikely this mystery will ever by accurately solved. Regardless, the nearest record of *A. vesiculosa* is more than 2000 km away in ephemeral pools in the northern Kimberley.

Following the discovery of *A. vesiculosa* along Cape Le Grand Rd, Droseraceae expert Alan Lowrie translocated the plant into Cape Le Grand National Park into suitable habitat. These populations are regularly monitored by EWS and have been confirmed to be actively growing in 2013 and 2018 (EWS 2020). Beyond Esperance, the nearest record of *A. vesiculosa* is in the Kimberley. It is widely distributed across northern Australia and on the eastern states (Figure 16). It's native population also extends to Europe, Asia and Africa.

Figure 16. Disjointed geographic range of priority two species, *Aldrovandra vesiculosa* across Australia (ALA 2020).

5.4.3 *Utricularia westonii* and *Utricularia helix*, priority two species

Utricularia westonii and *Utricularia helix* are bladderwort species that also inhabit ephemeral ponds, similar to *Aldrovandra vesiculosa*. *U. westonii* is only recorded from five other locations, all in the directly adjacent Cape Le Grand National Park (DBCA 2019b; DBCA 2019e; DBCA 2019g). *U. helix* is only known from three other locations, all of which are also within Cape Le Grand National Park. There are no direct records of these species within the proposed 'Site D – Cape Le Grand Rd seal widening' footprint, but ephemeral wetlands within vegetation type three are almost exactly the same conditions as where they are recorded within Cape Le Grand National Park. Due to the seasonal conditions resulting in dry wetlands when the targeted survey for *A. vesiculosa* was conducted, the presence of these species could not be adequately surveyed.

5.5 Fauna

Within a 20 km radius of the 'Site D – Cape Le Grand Rd seal widening area', 193 fauna have previously been recorded (DBCA & WAM 2020). Of these, 19 species are threatened fauna, priority fauna and fauna protected under international agreement have been recorded (Table 4). Five species have suitable habitat within the proposed clearing permit area, including Carnaby's Black Cockatoo, Australasian Bittern, Australasian Little Bittern, Western Ground Parrot and Glossy Ibis.

Table 4. Potential threatened, priority and protected under international agreement fauna recorded within a 20 km radius of the proposed 'Site D – Cape Le Grand Rd seal widening' project, using NatureMap (DBCA & WAM 2020).
Nt. Acronyms used include priority (P), threatened (T), and protected under international agreement (IA).

Scientific Name	Common Name	Conservation Status	Likelihood of occurring	Associated habitat
Actitis hypoleucos	Common Sandpiper	IA	No	Shorebird.
Atelomastix brennani	Brennan's *atelomastix* millipede	T	No	Granite.
Botaurus poiciloptilus	Australasian Bittern	T	Yes	Ephemeral wetlands with thick cover of reeds.
Calidris acuminata	Sharp-tailed Sandpiper	IA	No	Shorebird.
Calidris alba	Sanderling	IA	No	Shorebird.
Calidris ruficollis	Red-necked Stint	IA	No	Shorebird.
Calidris tenuirostris	Great Knot	T	No	Lives in coastal mudflats
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	T	Yes	Kwongkan shrub or heathland.
Caretta caretta,	Loggerhead Turtle	T	No	Lives in the ocean
Hydroprogne caspia,	Caspian Tern	IA	No	Shorebird.
Ixobrychus dubius,	Australian Little Bittern	P4	Yes	Ephemeral wetlands with thick cover of reeds.
Petrogale lateralis subsp. lateralis	Black-flanked Rock-wallaby	T	No	Needs lots of rocky outcrops.
Pezoporus flaviventris	Western Ground Parrot	T	Yes	Requires thick, dense unburnt coastal shrubland.
Plegadis falcinellus	Glossy Ibis	IA	Yes	Associated with wetlands or water bodies of any form.
Thalasseus bergii	Crested Tern	IA	No	Coastal and offshore waters
Thinornis rubricollis	Hooded Plover, Hooded Dotterel	P4	No	Shorebird.
Tringa brevipes	Grey-tailed Tattler	P4	No	Shorebird.

Tringa glareola	Wood Sandpiper	IA	No	Shorebird.
Tringa nebularia	Common Greenshank	IA	No	Shorebird.

5.5.1 Australasian Bittern, *Botaurus poiciloptilus,* threatened fauna and Australasian Little Bittern, *Ixobrychus dubius,* priority four fauna

The Australasian Bittern is ranked as endangered in Western Australia (DotEE 2014). The most recent surveys were conducted in 2009/2010, with population estimates ranging from 38 to 154 birds. The wetland system surrounding and extending into Cape Le Grand National Park is one of three wetlands suites critical most important for the species survival (DotEE 2014). Australasian Bitterns are known to nest in densely vegetated swamps, typically consisting of *Baumea*, *Gahnia*, and *Typha* species, and low bushy *Melaleuca* shrubs. Nests are built ~5 -10 cm above the water, forming a flat platform of ~30-40 cm in diameter. If environmental conditions are suitable for mating the male Australasian Bittern makes a booming call to attract a mate from September through to December, in the Esperance region. Peak calling occurs in October and November, which coincided with times surveys were conducted at 'Site D – Cape Le Grand Rd seal widening' project. Australasian Little Bittern has very similar behavioural patterns and habitat requirements as the Australasian Bittern.

Vegetation type three, described as low lying semi-permanent wetlands, dominated by wetland vegetation, such as *Taxandria callistachys* and sedges, is considered suitable habitat within the 'Site D – Cape Le Grand Rd seal widening' area. One of the surveyors, Julie Waters has one to two years of experience in conducting Australasian Bittern surveys. No nests and no calling of Australasian Bittern and Australasian Little Bittern's ("the Bitterns") were heard or observed over the six days flora surveys were conducted. It is highly likely that the Bitterns are not actively using the specific wetland suite intersecting with 'Site D – Cape Le Grand Rd seal widening' project, as the 2015 Merivale fires significantly reduced required vegetation cover. Over time as vegetation regenerates, cover will return and it is possible that the Bitterns will return within the area.

5.5.2 Glossy Ibis, *Plegadis falcinellus,* protected under international agreement

The Glossy Ibis feeds in very shallow water, preferring freshwater or brackish wetlands with tall dense stands or emergent vegetation, such as reeds or rushes. It is a visitor to the Esperance region that does not breed in this area. Vegetation type three, described as low lying semi-permanent wetlands, dominated by wetland vegetation, such as *Taxandria callistachys* and sedges, is considered suitable habitat within the 'Site D – Cape Le Grand Rd seal widening' area. However, as the Glossy Ibis does not have a restricted geographic range, there are large areas of suitable habitat in the surrounding area and works are considered to unlikely have a significant impact on the species sustainability.

5.5.3 Western Ground Parrot, *Pezoporus flaviventris*, threatened fauna

The Western Ground Parrot is associated with dense shrublands, typically formed by Proteaceae dominated Kwongkan coastal shrubland communities. Vegetation type one, described as '*Nuytsia floribunda* and *Acacia cyclops* over low heathland' and vegetation type two, described as 'Dune crests dominated by *Banksia speciosa* woodland' could therefore be considered suitable habitat. However, the Western Ground Parrot requires long unburnt vegetation, and this site was recently burnt in 2015. Additionally, it is locally known that all remnant populations of the Western Ground Parrot are in Cape Arid National Park.

5.5.4 Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*, threatened fauna

Carnaby's Black Cockatoo's are unlikely to nest within the 'Site D – Cape Le Grand Rd, seal widening' project area, as no large trees are present with hollows. Large Blue Gum and Tuart trees are present in the surrounding area, which means Carnaby's Black Cockatoo are likely to frequent the area by

roosting in these trees. However, there are no large trees present within each of the vegetation types of the proposed site. Carnaby's Black Cockatoos forage on Proteaceae species nuts, such as Hakea or Banksia species. Vegetation type two, described as dune crests dominated by *Banksia speciosa* woodland would likely provide foraging grounds. However, this area is relatively small and due to the 2015 Merivale bushfire would not be providing foraging material currently. As vegetation regenerates however, it is a possibility it will be used by passing Cockatoo's.

6 Conclusion; assessment of Department of Water and Environmental Regulations clearing principles

The 'Site D – Cape Le Grand Rd seal widening' project may be at variance to some of the clearing principles that the Department of Water and Environmental Regulations (DWER) assess applications, as listed under Schedule 5 of the Environmental Protection Act 1986 (DWER 2019). There is the high potential that works will spread weed and *Phytothphora cinnamomia* Dieback from the highly disturbed northern area of Cape Le Grand Rd towards the south, where condition is currently very good. Overall, works could result in degradation and reduce the condition of roadside vegetation.

Works are proposed to impact priority two species *Astartea eobalta,* with three plants in total likely to be cleared. Impact to the specific area that priority two species, *Aldrovandra vesiculosa* has previously been recorded will be minimized, by limiting clearing to one metre from the edge of the current road footprint and mulching vegetation opposed to clearing. Vegetation type three forms an ephemeral wetland or swamp and is considered an environmentally sensitive area. It is associated habitat with priority two species *Utricularia westonii* and *Utricularia helix*, which were unable to be adequately surveyed due to the dry condition of the wetlands. Additionally, no direct evidence was observed, likely due to the lack of cover form vegetation regenerating from the 2015 Merivale fires, of Australasian Bitterns (threatened fauna), Australasian Little Bittern (threatened fauna), and Glossy Ibis (protected under international agreement). However, as vegetation becomes mature, this area will possibly be used as habitat.

As vegetation type three is characterized by wetland systems, proposed works will likely alter existing hydrological regimes to some extent. Due to the road intersecting wetland systems, the current hydrological system has already been greatly disturbed.

Lastly, proposed works impact the threatened ecological community (TEC), 'Proteaceae Dominated Kwongkan Shrubland of the South-East Coastal Floristic Province of Western Australia'.

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8 Appendix

8.1 Incidental species list

Family	Genus	Species	Common Name	Weed	Cons Stat	Vegetation Type		
						3	1	2
Alliaceae	*Ipheion*	*uniflorum*	Springstar	X			X	
Anarthriaceae	*Anarthria*	*prolifera*					X	X
Anarthriaceae	*Anarthria*	*scabra*					X	X
Anarthriaceae	*Lyginia*	*imberbis*						X
Apiaceae	*Xanthosia*	*tasmanica*					X	
Araliaceae	*Trachymene*	*pilosa*	Native Parsnip				X	
Asparagaceae	*Lomandra*	*hastilis*					X	
Asparagaceae	*Lomandra*	*micrantha*						X
Asteraceae	*Arctotheca*	*calendula*	Cape Weed	X			X	
Asteraceae	*Carduus*	*pycnocephalus*	Slender Thistle	X			X	
Asteraceae	*Conyza*	sp.	Fleabane	X			X	X
Asteraceae	*Podotheca*	*angustifolia*	Sticky Longheads				X	
Asteraceae	*Pseudognaphalium*	*luteoalbum*	Jersey Cudweed				X	
Asteraceae	*Ursinia*	*anthemoides*	Ursinia	X			X	X
Brassicaceae	*Raphanus*	*raphanistrum*	Wild Raddish	X			X	
Campanulaceae	*Monopsis*	*debilis*		X			X	
Campanulaceae	*Wahlenbergia*	*capensis*	Cape Bluebell	X			X	
Casuarinaceae	*Allocasuarina*	*humilis*	Dwarf Sheoak				X	X
Celastraceae	*Stackhousia*	*monogyna*	Creamy Candles				X	
Cucurbitaceae	*Cucumis*	*myriocarpus*	Paddy Melon	X			X	
Cyperaceae	*Baumea*	*juncea*	Bare Twigrush				X	
Cyperaceae	*Caustis*	*dioica*	Puzzle Grass				X	
Cyperaceae	*Ficinia*	*nodosa*	Knotted Club Rush				X	
Cyperaceae	*Gahnia*	*trifida*	Saw Sedge Grass				X	
Cyperaceae	*Lepidosperma*	*longitudinale*	Pithy Sword-Sedge				X	
Cyperaceae	*Lepidosperma*	*sanguinolentum*					X	
Cyperaceae	*Lepidosperma*	*squamatum*						
Cyperaceae	*Lepidosperma*	*striatum*				X		
Cyperaceae	*Mesomelaena*	*stygia*	Mini Semaphore Sedge				X	
Cyperaceae	*Mesomelaena*	*tetragona*	Semaphore Sedge			X	X	
Cyperaceae	*Schoenus*	*curvifolius*					X	
Cyperaceae	sp.						X	
Cyperaceae	*Tricostularia*	*aphylla*	Curled Sedge			X	X	X
Dilleniaceae	*Hibbertia*	*andrewsiana*	Australian Butter Cup				X	

Dilleniaceae	*Hibbertia*	*gracilipes*	Australian Butter Cup				X	
Dilleniaceae	*Hibbertia*	*hibbertioides* var. *meridionalis*	Australian Butter Cup					X
Dilleniaceae	*Hibbertia*	*racemosa*	Stalked Guinea Flower				X	X
Droseraceae	*Drosera*	*australis*	Southern Sundew				X	X
Droseraceae	*Drosera*	*glanduligera*	Pimpernel Sundew			X	X	
Droseraceae	*Drosera*	*menziesii*	Pink Rainbow			X	X	
Ericaceae	*Leucopogon*	sp. Coujinup			Verified by WA Herbarium. KW058; Accession #8334.			X
Ericaceae	*Lysinema*	*ciliatum*	Curry flower				X	X
Ericaceae	*Needhamiella*	*pumilio*					X	
Ericaceae	*Oligarrhena*	*micrantha*					X	X
Ericaceae	*Sphenotoma*	*parviflora*					X	X
Fabaceae	*Acacia*	*aemula*				X		X
Fabaceae	*Acacia*	*cyclops*	Coastal Wattle			X	X	X
Fabaceae	*Acacia*	*myrtifolia*	Myrtle Wattle				X	X
Fabaceae	*Acacia*	*saligna*	Orange Wattle				X	
Fabaceae	*Bossiaea*	*praetermissa*					X	
Fabaceae	*Chamaecytsus*	*palmensis*	Tagaste	X				X
Fabaceae	*Gompholobium*	*baxteri*	Baxter's Wedge Pea			X	X	
Fabaceae	*Gompholobium*	*knightianum*					X	X
Fabaceae	*Hovea*	*pungens*	Devil's Pins					X
Fabaceae	*Jacksonia*	*spinosa*				X	X	X
Fabaceae	*Ornithopus*	*sativus*	Seradella	X			X	
Fabaceae	*Pultenaea*	*strobilifera*					X	
Fabaceae	*Sphaerolobium*	*medium*					X	
Geraniaceae	*Erodium*	*cicutarium*	Common Storksbill	X			X	
Geraniaceae	*Pelargonium*	*capitatum*	Rose Pelargonium	X			X	
Goodeniaceae	*Dampiera*	*parvifolia*	Many-bracted Dampiera				X	
Goodeniaceae	*Goodenia*	*pterigosperma*					X	
Goodeniaceae	*Lechenaultia*	*formosa*	Cranberry Heath				X	
Goodeniaceae	*Lechenaultia*	*tubiflora*	Heath Lechenaultia				X	X
Goodeniaceae	*Velleia*	*trinervis*					X	
Haemodoraceae	*Anigozanthus*	*rufus*	Esperance Kangaroo Paw					X
Halogoraceae	*Glischrocaryon*	sp.	Globular Pop Flower				X	
Hemerocallidaceae	*Johnsonia*	*acaulis*	Hooded Lilly				X	X

Iridaceae	*Moraea*	*miniata*	Cape Tulip	X			X	X
Iridaceae	*Patersonia*	*lanata*	Wooly Purple Flag			X	X	
Iridaceae	*Patersonia*	*occidentalis*	Smooth Purple Flag			X	X	
Iridaceae	*Patersonia*	*juncea*				X	X	X
Juncaceae	*Juncus*	*pallidus*	Pale Rush				X	
Lauraceae	*Cassytha*	*sp.*	Dodder Laurel				X	
Loranthaceae	*Nuytsia*	*floribunda*	Monji, Christmas Tree, Cabbage Tree			X	X	X
Menyanthaceae	*Ornduffia*	*parnassifolia*					X	
Myrtaceae	*Agonis*	*baxteri*					X	
Myrtaceae	*Agonis*	*flexuosa*	Peppermint Tree	X			X	
Myrtaceae	*Astartea*	*astarteoides*	False Baeckea			X		
Myrtaceae	*Astartea*	*eobalta*			P2; Verified by WA Herbarium. KW039; Accession 8281.		X	
Myrtaceae	*Beaufortia*	*empetrifolia*	South Coast Beaufortia				X	
Myrtaceae	*Calothamnus*	*gracilis*	One-sided Bottle brush				X	
Myrtaceae	*Calothamnus*	*quadrifidus*	One-sided Bottle brush			X	X	
Myrtaceae	*Conothamnus*	*aureus*					X	X
Myrtaceae	*Darwinia*	*vestita*	Pom-pom Darwinia					X
Myrtaceae	*Eucalyptus*	*occidentalis*	Swamp Yate, Flat Topped Yate				X	
Myrtaceae	*Leptospermum*	*laevigatum*	Victorian Tea Tree	X			X	X
Myrtaceae	*Melaleuca*	*brevifolia*	Mallee Honey Myrtle				X	
Myrtaceae	*Melaleuca*	*cuticularis*	Salt-water Paper Bark			X	X	
Myrtaceae	*Melaleuca*	*incana* subsp. *tenella*				X	X	
Myrtaceae	*Melaleuca*	*pulchella*	Claw Flower				X	
Myrtaceae	*Melaleuca*	*rigidifolia*	Soccer Ball Melaleuca				X	
Myrtaceae	*Melaleuca*	*striata*					X	X
Myrtaceae	*Melaleuca*	*thymoides*					X	
Myrtaceae	*Phymatocarpus*	*maxwellii*					X	
Myrtaceae	*Taxandria*	*callistachys*				X	X	X
Myrtaceae	*Taxandria*	*spathulata*					X	
Myrtaceae	*Verticordia*	*minutiflora*					X	X
Onagraceae	*Oenothera*	*biennis*	Evening Primrose	X			X	
Orchidaceae	*Disa*	*bracteata*	South African Weed	X			X	
Orchidaceae	*Diuris*	*laxiflora*	Bee Orchid				X	

Orchidaceae	*Elythranthera*	*brunonis*	Purple Enamel Orchid				X	
Orchidaceae	*Lyperanthus*	*serratus*	Rattle Beak Orchid				X	
Orchidaceae	*Microtis*	*media*	Tall Mignonette Orchid				X	
Orchidaceae	*Thelymitra*	*flexuosa*	Twisted Sun Orchid				X	
Oxalidaceae	*Oxalis*	*pes-caprae*	Soursob	X			X	
Pinaceae	*Pinus*	*pinaster*	Maritime Pine	X		X		
Pittosporaceae	*Billardiera*	*fusiformis*	Cummuk; Australian Blue Bell				X	X
Poaceae	*Briza*	sp.	Blowfly Grass	X		X	X	
Poaceae	*Eragrostis*	*curvula*	African Love Grass	X				
Poaceae	*Neurachne*	*alopecuroidea*	Foxtail Mulga Grass				X	
Poaceae	*Pennisetum*	*clandestinum*	Kikuya	X		X		
Polygalaceae	*Comesperma*	*virgatum*	Twining Lovers				X	
Polygonaceae	*Acetosa*	*vesicaria*	Ruby Dock	X			X	
Primulaceae	*Lysimachia*	*arvensis*	Pimpernel	X			X	
Proteaceae	*Adenanthos*	*cuneatus*	Coastal Jug Flower; Coral Flower				X	X
Proteaceae	*Banksia*	*nivea*	Hone pot Dryandra				X	
Proteaceae	*Banksia*	*obovata*	Wedge-leaved Dryandra				X	
Proteaceae	*Banksia*	*speciosa*	Showy Banksia				X	X
Proteaceae	*Hakea*	*cinerea*	Ashy Hakea				X	
Proteaceae	*Hakea*	*sulcata*	Furrowed Hakea				X	
Proteaceae	*Hakea*	*trifurcata*	Two leaf Hakea				X	
Proteaceae	*Hakea*	*varia*				X		
Proteaceae	*Isopogon*	*trilobus*	Barrel Coneflower				X	
Proteaceae	*Lambertia*	*inermis*	Chittick; Native Honeysuckle				X	
Proteaceae	*Synaphea*	*media*					X	
Proteaceae	*Synaphea*	*oligantha*					X	X
Proteaceae	*Synaphea*	*petiolaris*					X	
Proteaceae	*Synaphea*	*spinulosa* subsp. *spinulosa*					X	
Restionaceae	*Chordifex*	*sphacelatus*					X	
Restionaceae	*Desmocladus*	*flexuosus*						X
Restionaceae	*Hypolaena*	*exsulca*				X	X	X
Restionaceae	*Lepyrodia*	sp. 1					X	
Rubiaceae	*Opercularia*	*vaginata*	Dog Weed					X

Rutaceae	*Boronia*	*denticulata*					X	
Rutaceae	*Boronia*	*ramosa* subsp. *anethifolia*						X
Rutaceae	*Boronia*	*spathulata*					X	
Solanaceae	*Solanum*	*nigrum*	Deadly night shade	X			X	X
Stylidiaceae	*Stylidium*	*macranthum*	Crab Claw				X	
Xanthorrhoeaceae	*Chamaescilla*	*corymbosa*	Blue Squill				X	
Xanthorrhoeaceae	*Xanthorrhoea*	*platyphylla*	Grass Tree				X	

8.2 Threatened and Priority Report Forms

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at http://dpaw.wa.gov.au/ under *Standard Report Forms*

TAXON: Astartea cobatha — TPFL Pop. No:

OBSERVATION DATE: 10 / 12 / 2019 — CONSERVATION STATUS: P2 — New population ☒

OBSERVER/S: Katie White + Julie Waters — PHONE: 90831518

ROLE: Environmental Officers — ORGANISATION: Shire of Esperance

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): 30 km East of Esperance townsite. 4-5 km South of Merivale Rd, on Cape Le Grande Rd. On western side of road reserve.

Reserve No:

DBCA DISTRICT: South Coast — LGA: Esperance — Land manager present: ☐

DATUM: GDA94 / MGA94 ☑ ; AGD84 / AMG84 ☐ ; WGS84 ☐ ; Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required) DecDegrees ☐ DegMinSec ☐ UTMs ☑

Lat / Northing: 427116.3 — Long / Easting: 625400.4 — ZONE: 51H

METHOD USED: GPS ☐ Differential GPS ☐ Map ☑ — No. satellites: ___ — Map used: QGIS — Boundary polygon captured: ☐ — Map scale: 1:875

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☑
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 4451 to ___	Specify other: ___

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☑ Area observed (m²): ___

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

POP'N COUNT ACCURACY: Actual ☑ Extrapolation ☐ Estimate ☐ Count method: ___ (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	13			
Dead				

Area of pop (m²): ___

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

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

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☑ Flower ☑ Immature fruit ☐ Fruit ☑ Dehisced fruit ☐ Percentage in flower: 100 %

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

COMMENT: Regenerating post fire.

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme. Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Road widening or similar activities. Planning will impact 3 plants	L	L-M	S
•			
•			

Please return completed form to **Species And Communities Branch** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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

Record entered by: Sheet No: Record Entered in Database ☐

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.3 August 2017

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK: (on soil surface; eg gravel, quartz fields)	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest ☐	Granite ☐	0-10% ☑	Sand ☐	Red ☐	Well drained ☐
Hill ☐	Dolerite ☐	10-30% ☐	Sandy loam ☐	Brown ☐	Seasonally inundated ☑
Ridge ☐	Laterite ☐	30-50% ☐	Loam ☐	Yellow ☐	Permanently inundated ☐
Outcrop ☐	Ironstone ☐	50-100% ☐	Clay loam ☑	White ☐	Tidal ☐
Slope ☐	Limestone ☐		Light clay ☐	Grey ☑	
Flat ☐	Quartz ☐		Peat ☐	Black ☐	
Open depression ☑	Specify other:		Specify other:	Specify other:	
Drainage line ☐					
Closed depression ☐					
Wetland ☑					

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

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

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

1. Seasonally inundated wetland on sandplain, with mixed
2. Melaleuca and herb heathland.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

Anarthria scabra, Melaleuca thiata, Taxandria callistachya, Stylidium macranthum, Hakea sulcata

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

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

COMMENT: Extensive Victorian Tea Tree infestation in area

FIRE HISTORY: Last Fire: Season/Month: _____ Year: 2015 Fire Intensity: High ☑ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: ____

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: ____

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

plants w flowers were much smaller than reference verified population at Mary Hoggarts property. were also slightly pink - possible hybrid w A. asteroides

Confirmed by Mike Hislop 06/02/20. Accession # 8281. Specimen not retained by WA Herb.

DRF PERMIT/ LICENCE No: FTB0029 Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licensing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW039 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

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

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

Submitter of Record: Katie White Role: Environmental other Signed: _____ Date: 13/12/2019

Please return completed form to **Species And Communities Branch** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au
RECORDS: Please forward to Flora **Administrative Officer**, Species and Communities Branch.
Record entered by: Sheet No: Record Entered in Database ☐