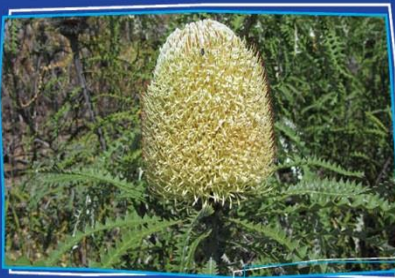


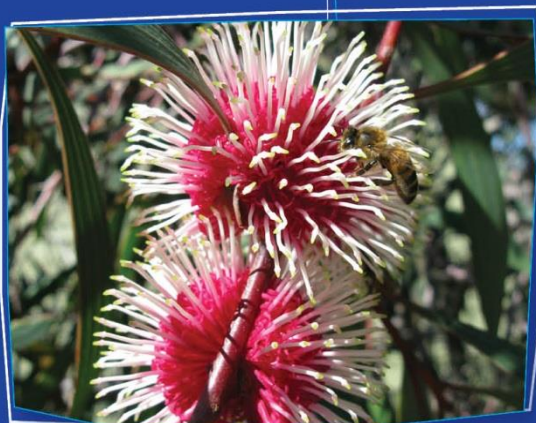
Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report



Site A – Fisheries Rd, near Daniels Rd, Sandpit

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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 0.82 ha of native vegetation, for the purpose of sand extraction that will be used in road building activities.

2 Introduction

The Shire of Esperance manages the largest road network of any local government in Western Australia, encompassing a total of 4 593 km of road. Of these, 830 km is sealed and 3 763 km remains unsealed. The Shire of Esperance has progressively been bitumising unsealed roads, to increase the overall longevity of the road network and increase safety standards. During road reconstruction, sand is required. The Shire of Esperance is submitting the site 'Fisheries Rd, near Daniels Rd, sandpit' as Site A under the '2020 Strategic Purpose Permit', for the purpose of extracting sand material (Figure 1). Previous clearing occurred at this site prior to 2003 and the now required clearing permit regulations, as determined by analysis of aerial photography (Figure 2).

'Site A – Fisheries Rd, near Daniels Rd, sandpit' is located ~70 km east of Esperance and 10.8 km east of the Condingup town-site, located within Shire of Esperance managed road reserve. Specifically, it is located on Fisheries Rd, 2.1 km west of Daniels Rd, at straight line kilometre (SLK) 75.40 (Main Roads 2020). A point within a clearing permit area is -33.747551 S, 122.641850 E (GDA94).



Figure 1. Location of the site 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' area, submitted under the '2020 Strategic Purpose Permit' application.



Figure 2. Historical clearing to complete sand extraction at the centre of the proposed 'Site A - Fisheries Rd, near Daniels Rd Sandpit' application area, as evident on the 2003 Howick aerial photography.

2.1 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.

2.2 Catchment

The 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' is located within the Munglignup creek catchment area.

2.3 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 500 mm.

2.4 Geology

The geology of the site is described Schnoknecht et al. (2004) as Quaternary Aeolian sands over Tertiary Sediments, of the Pallinup formation.

2.5 Soils and Topography

Topography of 'Site A – Fisheries Rd, near Daniels Rd, Sandpit' is described as gently undulating plains, with minor swales and wet depressions (Schnoknecht et al. 2004). The soil profile of the general area is described as grey deep sandy duplex soils (some gravelly), with associated pale deep sands (LGMap 2019). It was observed during field surveys the site is characterised by deep yellow sand.

2.6 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 plain. Eucalyptus woodlands occur in gullies and alluvial foot-slopes".

The site is mapped as Beard (1973) vegetation association (VA) 6048, as determined by WALGA's LGMap (2019). VA 6048 is described as 'shrublands; Banksia scrub-heath on sandplain in the Esperance Plains region'. Only 14.21% of pre-European extent remains within the Esp2 IBRA bioregion and 12.58% in the Shire of Esperance area (DPaW 2017). Less than 1% of its pre-European extent is formally conserved within International Union for Conservation of Nature (IUCN) reserves across Western Australia.

2.7 Land use

The area directly included in the clearing permit application 'Site A- Fisheries Rd, near Daniels Rd, Sandpit' is currently intact and vegetated 100 m wide road reserve managed by the Shire of Esperance, with past sand extraction on the eastern end of the permit area (Figure 2). Within the 100 m wide road reserve, 24 m is occupied by the current active road footprint of Fisheries Rd. The surrounding land use is predominately cleared private agricultural cropping and cattle grazing land.

3 Methodology

3.1 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 (Howick 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 20km 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; DBCA 2019d).
- NatureMap was used to assess fauna records within a 20km buffer from the centre of the site (122° 38'29" E, 33° 44' 50"S; DBCA & WAM 2020).

3.2 Field investigation: Ecological Impacts

The site was originally inspected on 03/01/2019, 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 Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*, feeding, roosting and nesting habitat.

3.3 Field Investigation: Targeted flora survey

A targeted flora survey was conducted in mid-spring on 01/10/2019 by Shire of Esperance's Environmental Officers Julie Waters and Katie White. The entire 0.82 ha area was extensively searched in a traverse (Figure 3), guided by accessibility on foot through thick vegetation. "Sufficiently covered" was guided by the proportion of even coverage of the area. Aerial photography was used as a guide to indicate possible differences in habitat and vegetation types. Due to the timing, majority of flora species were flowering, decreasing the likelihood of overlooking species.

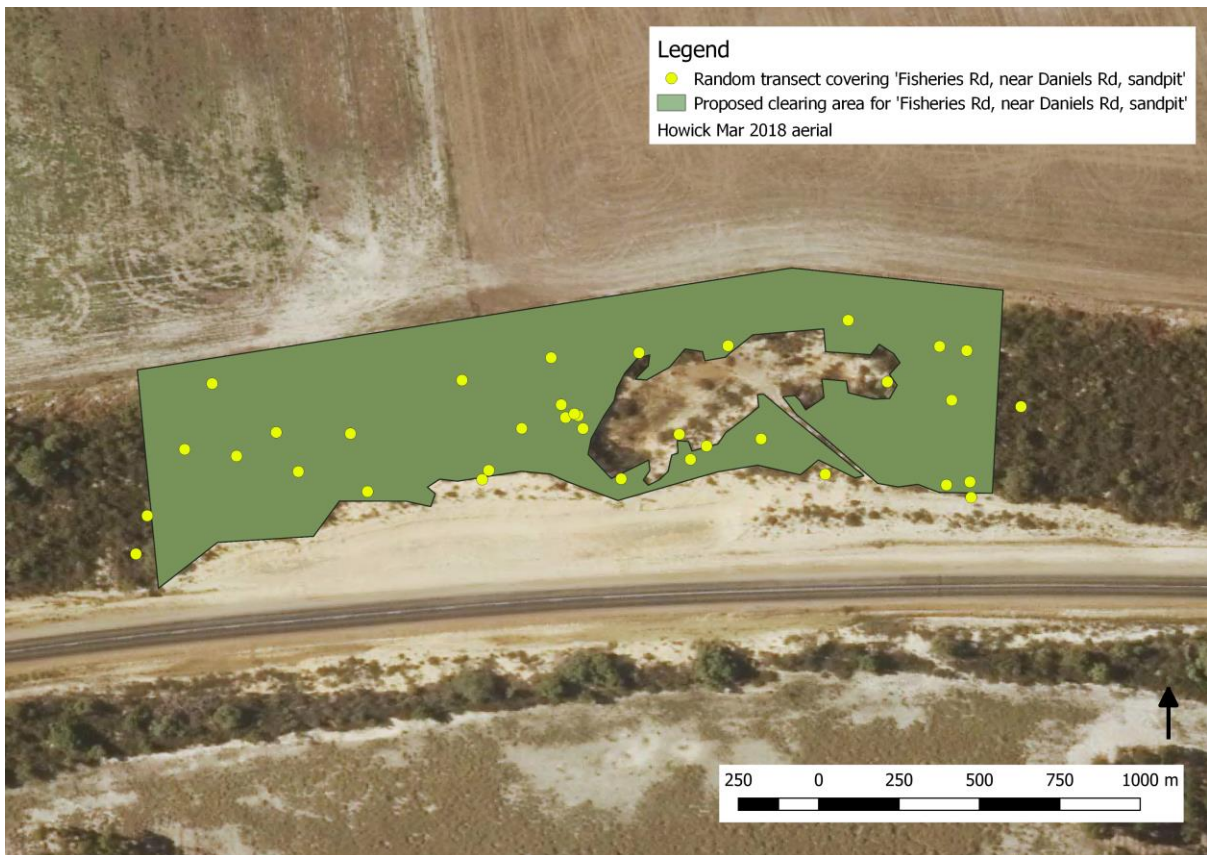


Figure 3. Random points along the traverse completed to conduct the targeted flora survey at 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' application area.

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 7.1). Species not identifiable in the field were collected under 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 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 *Daviesia pauciflora* (P3), *Astartea eobalta* (P2) and *Verticordia verticordina* (P3), as PF species identified in the desktop survey as present 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.

3.4 Field investigation: Assessing Threatened and Priority Ecological Communities

The vegetation community of 'Site A – Fisheries Rd, near Daniels Rd, Sandpit' 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 Results and Discussion

4.1 Ecological Impact

Vegetation structure and composition was described during the field survey as *Nuytsia floribunda* and *Banksia speciosa* dominated over-story, *Melaleuca striata*, *Allocasuarina humilis* and *Adenanthos cuneatus* dominated mid-story, and *Caustis dioica* and *Anarthria scabra* dominated under-story (Figure 4). It is believed that the Beard (1973) vegetation association 6048 is an appropriate match for the observed vegetation community (Section 2.6). The targeted flora survey recorded a total of 83 species (Appendix 7.1). This shows the site and vegetation community is characterized by high diversity.



Figure 4. Vegetation community and structure forming a highly diverse shrubland, within the 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' area.

The vegetation across the entire 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' is in excellent condition, with no signs of degradation or disturbance from anthropogenic processes. It is long unburnt, with some very large *Banksia speciosa* plants observed to be senescing, likely from old age. Intact vegetation is weed free, but African Lovegrass (*Eragrostis curvula*), Fleabane (*Conyza* sp.), *Acacia pycnantha* and Victorian Tea Tree (*Leptospermum laevigatum*) are observed on peripheries of the disturbed historical sandpit and agricultural boundary. It is highly likely that weeds will be introduced during the proposed clearing activity, due to the surrounding vectors of the adjacent busy Fisheries Rd and neighboring pastoral land. Large fox holes were observed in the previously excavated sand hill. No other signs of feral animals were observed.

Very limited data collection on the presence of *Phytophthora cinnamomi* Dieback has been conducted on roadsides in Western Australia. No positive or negative sample points are collated on the Dieback Information Delivery and Management System (DIDMS; GAIA Resources, State NRM & SCNRM 2020). Vegetation is largely *P. cinnamomi* Dieback susceptible, dominated by Proteaceae species. All susceptible species were extremely healthy, showing no signs of stress or key Dieback infection indicators. It is therefore probable the site remains un-infected by *P. cinnamomi*. Appropriate hygiene measures will be employed to limit introduction of infection, including clearing in dry conditions and clean down of vehicles and machinery before entering the site. However, there is always a possibility that introduction will occur during proposed activities.

Whilst rehabilitation will occur in a timely manner, erosion is always a possibility during excavation activities or while rehabilitating vegetation is extremely small seedlings. Following Shire of Esperance's standard rehabilitation procedures, the vegetative material spread across the cleared area to prevent erosion occurring. Acid sulphate soils are unlikely to develop, as extractive processes will not penetrate

the groundwater table. No indicator wetland species or observed water bodies were present within the 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' area. It is highly unlikely that clearing vegetation will result in a significant change to the water table or natural hydrological regimes.

4.2 Threatened and Priority Ecological Communities

The desktop study identifies the site is mapped as 'likely to occur' for the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 listed endangered threatened ecological community (TEC; DBCA 2019f). This TEC is known as 'Proteaceae Dominated Kwongkan Shrubland of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)'. This was confirmed by the field survey, with dominance of Proteaceae species over the entire 0.82 ha site meeting criteria for the Kwongkan TEC (Figure 5). The Kwongkan TEC is identified as a priority three community listed under the Biodiversity Conservation (BC) Act 2016 (DBCA 2019d).



Figure 5. Vegetation within the 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' meeting the threatened ecological community, 'Proteaceae Dominated Kwongkan Shrubland of the Southeast Coastal Floristic Province of Western Australia' thresholds. Evident in the image is thick Proteaceae species *Banksia speciosa* and *Adenanthos cuneatus*.

4.3 Threatened and Priority Flora

No records of threatened (TF) or priority (PF) flora have been previously directly recorded within the proposed 'Site A – Fisheries Rd, near Daniels Rd, Sandpit'. Three TF and 24 PF species were recorded within a 20 km radius of the site (Table 1; DBCA 2019b, DBCA 2019e, DBCA 2019g). An assessment on the likelihood to occur based on habitat was completed, with only six of these species assessed to be likely or possible to occur.

Table 1. Desktop study identifying priority flora and threatened flora recorded within a 20 km radius of the clearing permit application 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' survey results, 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 2016, Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, vulnerable (VU), endangered (EN), and critically endangered (CR).

Species	Conservation status	Likelihood to occur	Habitat description
<i>Acacia euthyphylla</i>	3	No	Grows in sand or clay loam, in seasonal swamps or around periphery of salt lakes and marshes. Associated with Myrtaceous shrubland and Mallee woodland.
<i>Acacia nitidula</i>	1	No	Grows in association with granite boulders and granitic gravel.
<i>Acrotriche parviflora</i>	4	No	Grows on rocky grey loam, white-grey sandy or sandy clay loam, red loam over spongolite, brown sandy loam or clay, and sandstone. Associated topography includes upland flats and slopes, hillcrests, near creek-lines, adjacent to salt lakes, and at the base of breakaways.
<i>Alyogyne</i> sp. Great Victoria Desert	3	Possible	This species has minimal collections. It has been recorded across a variety of habitats, including recently burnt red sand in Great Victoria Desert, black soil fresh-water swamp at Condingup, and gravel at Tarrin Rock.
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	TF – VU under BC Act 2016 and EN under EPBC Act 1999	Unlikely	Associated with moist sandy soils in heath, and shallow soils. Strongly associated with granite outcrops.
<i>Astartea eobalta</i>	2	No	Associated with winter wet seasonal swamps and peaty soil.
<i>Caladenia longicauda</i> subsp. <i>insularis</i>	1	Unlikely	Associated with coastal heath and sand over granite.
<i>Calectasia jubilaea</i>	2	Yes	Associated with open low diverse Proteaceous heathland.
<i>Comesperma lanceolatum</i>	2	Yes	Grows in white sand, marine plains, sand dunes, and quartzite ridges.
<i>Daviesia pauciflora</i>	3	Yes	Associated with white or grey sand over laterite or limestone.
<i>Eucalyptus famelica</i>	3	No	Associated with coastal dunes on low ground, saline waterlogged soils. Associated vegetation is open Mallee community.
<i>Eucalyptus sweetmaniana</i>	2	No	Grows in association with granite boulders and granitic gravel. Only records known from Cape Arid area.
<i>Eucalyptus x missilis</i>	4	No	Associated with sand over limestone or granite. Recorded on coastal sites.
<i>Grevillea baxteri</i>	4	Yes	Suitable habitat is known as shrubland or heathland, with an acid sandy soil, usually overlying heavier soils,

<i>Hibbertia hamata</i>	3	No	Grows in association with granite boulders and granitic gravel.
<i>Kennedia beckxiana</i>	4	No	Grows in association with granite boulders and granitic gravel.
<i>Lambertia echinata</i> subsp. <i>echinata</i>	TF – CR under BC Act 2018 and EN under EPBC Act 1999	No	Grows in gravelly sandy loam, brown sandy loam, white-grey sand, granite, and laterite. Recorded below and between rock outcrops, slopes, and hill crests.
<i>Lasiopetalum maxwellii</i>	2	No	Grows in association with granite boulders and granitic gravel.
<i>Lasiopetalum parvuliflorum</i>	3	No	Recorded along creeks and seasonal swamps.
<i>Lepidium pseudotasmanicum</i>	4	Possible	Wide distribution, including eastern Australia and New Zealand.
<i>Leucopogon apiculatus</i>	3	No	Grows on skeletal sandy or stony soils over quartzite or granite.
<i>Leucopogon florulentus</i>	3	Unlikely	Thought to be an error on the database, as no confirmed specimens near Esperance.
<i>Leucopogon rotundifolius</i>	3	No	Grows on skeletal soils, granite outcrops, and steep hillslopes.
<i>Myoporum velutinum</i>	TF – EN under BC Act 2016 and not listed under EPBC Act 1999	No	Recorded on creek-lines.
<i>Rumic astrum chamaecladum</i>	2	No	Recorded on clay loam and winter-wet creek edges.
<i>Stylidium roseonantum</i>	3	No	Associated with winter wet areas and swamps.
<i>Verticordia verticordina</i>	3	Unlikely	Recorded as growing on granite, or limestone soils in low heathlands.

4.4 *Daviesia pauciflora*, priority three species

Priority three species, *Daviesia pauciflora*, was the only PF species identified within the proposed clearing permit area during the targeted flora survey (Figure 6). No TF species were identified. *D. pauciflora* was confirmed by Michael Hislop from the WA Herbarium on 13/11/2019 (Accession number 8178; Collectors number KW028). The specimen was not retained by the WA Herbarium. A Threatened and Priority Flora Reporting Form (TPFL) was submitted to Department of Biodiversity Conservation and Attraction's (DBCA) Esperance District Flora Conservation Officer on 14/11/2019 (Appendix 7.2). No previous spatial record was present on the WAHerb, Esperance District Threatened Flora or TPFL databases (DBCA 2019a), indicating it was a new population discovered. In total 10 plants will be cleared during the proposed sand extraction activities.

No survey was conducted outside the proposed permit boundary for surrounding plants or populations, and hence it is unknown if the population continues on the sand dune crest on the southern side of the road reserve. Beyond the 100 m wide vegetated road reserve of Fisheries Rd, there is minimal large intact bushland reserves immediately surrounding the 'Site A – Fisheries Rd, near Daniels Rd, Sandpit'. The aerial photography is misleading as large Blue Gum plantations are present directly nearby. Within a 2.5 km radius, there are three patches of intact bushland of 40 to 130 ha in size.

An extract on population dynamics of *D. pauciflora* from TPFL and WA Herbarium spatial databases were requested from DBCA in November 2019 and used to determine impact of proposed activities across the entire population of *D. pauciflora* (DBCA 2019a). It was noted in correspondence with DBCA that additional information was on file, that had not been entered into databases. Information is therefore likely to be under-representative and not comprehensive. DBCA does not prioritise monitoring or management of species with low priority rankings due to their prevalence in the landscape relative to TF or priority one's and two's. There are 145 species recorded as priority three or four within the Shire of Esperance's boundaries. Using the TPFL and WAHerb data, *D. pauciflora* was recorded 31 times across 18 locations. The below statistics can be compiled;

- The vast majority of these records have poor descriptions of tenure, with 5 locations having unknown tenure. Of the remaining locations recorded, 2 locations were on private property and 6 locations on Unallocated Crown Land or Nature Reserves. All of which are likely to be secure from development or adverse impacts. 5 locations were on road reserves and may have been lost through road developments or maintenance.
- 17 records from 10 sites were prior to 2000 and have not been reported or known to be monitored since. It is unknown whether these populations remain.
- Population numbers are not well recorded in the spatial database, ranging from descriptions of 2-5 plants, to likely to be 100s present. A total of 243 plants were listed across all records. It was noted to be frequently present for many records.

It is believed that this species is under-represented in total known populations in the spatial databases. As DBCA does not actively manage low priority species, it is highly likely many records have not been prioritized being entered into the database or have simply never been reported. Additionally, *D. pauciflora* is cryptic in identification, looking extremely non-descript and similar to many other non-threatened species outside of flowering time in spring. It is therefore likely that many populations remain undiscovered due to being unidentifiable for 11 months of the year. It is described as growing over a vast array of sandplain habitats and vegetation communities. This is supported by personal experience of surveyors, where plants have been observed in Mallee shrub-land to thick Banksia coastal shrub-land. Lastly, it covers a large distribution, that is not geographically restricted. It has been recorded across 230 km (east-west distribution) and 70 km (north-west distribution) area (Figure 7).



Figure 6. Ten individual plants of *Daviesia pauciflora* (P3) were located within the 'Site A - Fisheries Rd, near Daniels Rd Sandpit' application area.

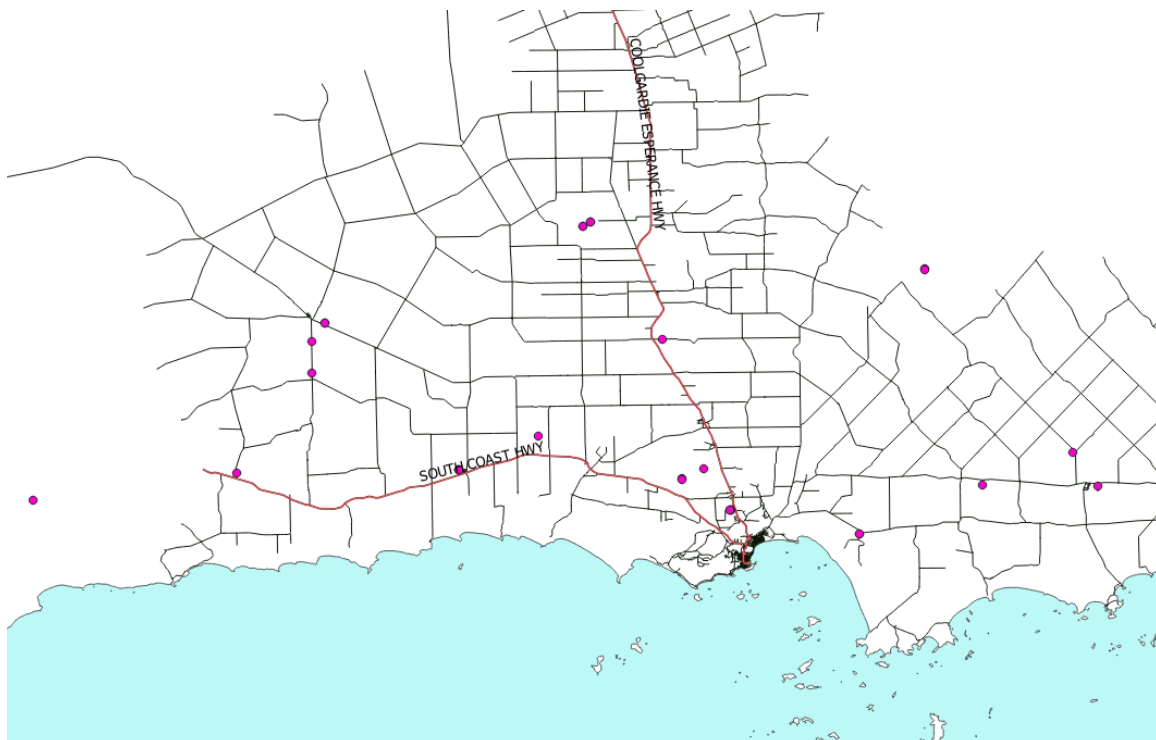


Figure 6. Map of all recorded locations of priority three species, *Daviesia pauciflora*, across the Esperance Shire (DBCA 2019a).

4.5 Fauna

Within a 20 km radius of the 'Site A - Fisheries Rd, near Daniels Rd, Sandpit', 15 threatened, priority and protected under international agreement fauna have been recorded (Table 2; DBCA & WAM 2020). Of these, only two species were assessed to be likely to use the site as potential habitat. Vegetation community is suitable as a possible feeding site for the Southern Death Adder, *Acanthophis antarcticus*, with many small nectarivorous birds observed. The high Proteaceae cover and prevalence of Hakea and Banksia species also suggests this site is a potential Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*, feeding habitat. Due to the presence of Pine plantations, (*Pinus pinaster*), only 2.5 km east, which contain feeding and roosting habitat, it is highly likely the immediate area is frequented by passing Cockatoo's.

Table 2. Potential threatened, priority and protected under international agreement fauna recorded within a 20 km radius of the proposed 'Site A – Fisheries Rd, near Daniels Rd, Sandpit', using NatureMap (DBCA & WAM 2020).

Nt. Acronyms used include priority (P), threatened (T), and protected under international agreement (IA).

Species	Common Name	Ranking	Likelihood to occur	Possible to occur
<i>Acanthophis antarcticus</i>	Southern Death Adder	P3	Yes	Suitable vegetation association and prey.
<i>Actitis hypoleucos</i>	Common Sandpiper	IA	No	Shorebird
<i>Callidris acuminata</i>	Sharp-tailed Sandpiper	IA	No	Shorebird
<i>Callidris alba</i>	Sanderling	IA	No	Shorebird
<i>Callidris furriginea</i>	Curlew Sandpiper	T	No	Shorebird
<i>Callidris ruficollis</i>	Red-necked Stint	IA	No	Shorebird
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	T	Yes	Presence of Hakea and Banksia species indicate potential feeding habitat.
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	T	No	Associated with offshore islands, improved pastures or clovers, salty ground with native succulents, camps on margins of dams, fresh or brackish swamps and lakes.
<i>Eubalaena australias</i>	Southern Right Whale	T	No	Lives in the ocean.
<i>Hydroprogne caspia</i>	Caspian Tern	IA	No	Shorebird
<i>Pezoporus flaviventris</i>	Western Ground Parrot	T	Highly Unlikely	Associated with low heathland. Local knowledge is that only surviving populations are located in Cape Arid.
<i>Pluvialis fulva</i>	Pacific Golden Plover	IA	No	Shorebird
<i>Puffinus tenuirostris</i>	Short-tailed Shearwater	IA	No	Associated with coastal and offshore waters.
<i>Thalasseus bergii</i>	Crested Tern	IA	No	Associated with coastal and offshore waters.

<i>Thinornis rubricollis</i>	Hooded Plover	P4	No	Shorebird
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5 Conclusion: assessment of Department of Water and Environmental Regulations clearing principles

The 'Site A - Fisheries Rd, near Daniels Rd, Sandpit' 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). Vegetation proposed to be cleared is in excellent condition, with very small areas remaining of its pre-European distribution in the Interim Biogeographical Regionalisation of Australia (IBRA) Esperance Plains bioregion and the Shire of Esperance local government area. Vegetation meets criteria as the threatened ecological community (TEC), 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coast Floristic Province of Western Australia (Kwongkan)'. Vegetation is highly diverse, with a large number of flora species present within a small area of less than one hectare. Ten plants of priority three species, *Daviesia pauciflora* were present. Due to the cryptic nature of identification, diversity of associated habitat and numerous records, it is believed that removal of the ten plants will not have a significant impact on *D. pauciflora*'s overall sustainability. Lastly, the site is likely to be a feeding site for Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*.

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7 Appendix

7.1 Incidental species list

Table 3. Flora species recorded within the 'Site A - Fisheries Rd, near Daniels Rd, sandpit' application area.

Nt. Acronyms included in the table are priority flora (P).

Family	Species	Common name	Invasive	Conservation Status
Anarthriaceae	<i>Anarthria scabra</i>			
Anarthriaceae	<i>Lyginia imberbis</i>			
Asparagaceae	<i>Laxmannia brachyphylla</i>	Stilted Paper Lilly		
Asparagaceae	<i>Lomandra hastilis</i>	Mat-rush		
Asteraceae	<i>Arctotheca calendula</i>	Cape weed	*	
Asteraceae	<i>Asteridea nivea</i>			
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	*	
Asteraceae	<i>Conyza sp.</i>	Fleabane	*	
Asteraceae	<i>Pseudognaphalium luteoalbum</i>	Jersey cudweed		
Asteraceae	<i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Ursinia Daisy	*	
Casuarinaceae	<i>Allocasuarina humilis</i>	Dwarf Sheok		
Casuarinaceae	<i>Allocasuarina lehmanniana</i> subsp. <i>ecarinata</i>	Dune Sheoak		
Cyperaceae	<i>Caustis dioica</i>	Puzzle grass		
Cyperaceae	<i>Cyathochaeta equitans</i>	Tibetan Prayer Flag		
Cyperaceae	<i>Ficinia nodosa</i>	Knotted Club Rush		
Cyperaceae	<i>Lepidosperma sp.</i>			
Cyperaceae	<i>Lepidosperma squamatum</i>	Saw Sedge		
Cyperaceae	<i>Mesomelaena stygia</i>			
Cyperaceae	<i>Tricostularia aphylla</i>	Curled Sedge		
Dilleniaceae	<i>Hibbertia andrewsiana</i>			
Dilleniaceae	<i>Hibbertia gracilipes</i>	Australian Butter Cup		
Droseraceae	<i>Drosera sargentii</i>	Pygmy sundew		
Droseraceae	<i>Drosera zonaria</i>	Painted Sundew		
Ericaceae	<i>Andersonia macranthera</i>			
Ericaceae	<i>Lysinema pentapetalum</i>	Curry Flower		
Fabaceae	<i>Acacia cyclops</i>	Coastal Wattle		
Fabaceae	<i>Acacia pycnantha</i>	Golden Wattle	*	
Fabaceae	<i>Aotus sp.</i> Esperance			
Fabaceae	<i>Daviesia articulata</i>	Bitter Pea		
Fabaceae	<i>Daviesia pauciflora</i>			P2; Verified by WA Herbarium. Accession #8178, collector #KW028.
Fabaceae	<i>Daviesia teretifolia</i>			
Fabaceae	<i>Gastrolobium musaceum</i>			
Fabaceae	<i>Gompholobium tomentosum</i>	Hairy Yellow Pea		

Fabaceae	<i>Jacksonia capitata</i>			
Fabaceae	<i>Jacksonia viscosa</i>			
Goodeniaceae	<i>Lechenaultia tubiflora</i>	Heath Leschenaultia		
Haemodoraceae	<i>Conostylis bealiana</i>	Angel trumpets		
Haemodoraceae	<i>Conostylis phathyrantha</i>			
Hemerocallidaceae	<i>Johnsonia acaulis</i>	Hooded Lily		
Hemerocallidaceae	<i>Tricoryne elatior</i>	Yellow Autumn Lily		
Iridaceae	<i>Patersonia lanata</i>	Woolly Patersonia		
Iridaceae	<i>Patersonia occidentalis</i>	Purple Flag		
Juncaceae	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Snogerup		
Juncaceae	<i>Juncus pallidus</i>	Pale Rush		
Lamiaceae	<i>Microcorys barbata</i>			
Loranthaceae	<i>Nuytsia floribunda</i>	Christmas tree, Monji		
Myrtaceae	<i>Beaufortia empetrifolia</i>	South Coast Beaufortia		
Myrtaceae	<i>Calothamnus gracilis</i>	One-sided Bottle Brush		
Myrtaceae	<i>Calytrix decrandra</i>	Pink Starflower		
Myrtaceae	<i>Chamelaucium megalopetalum</i>	Large Wax flower		
Myrtaceae	<i>Conothamnus aureus</i>			
Myrtaceae	<i>Eucalyptus angulosa</i>	Ridge fruited Mallee		
Myrtaceae	<i>Eucalyptus pileata</i>	Capped Mallee		
Myrtaceae	<i>Eucalyptus quadrans</i>			
Myrtaceae	<i>Leptospermum laevigatum</i>	Victorian Tae Tree	*	
Myrtaceae	<i>Leptospermum spinescens</i>			
Myrtaceae	<i>Melaleuca striata</i>			
Myrtaceae	<i>Melaleuca thymoides</i>			
Myrtaceae	<i>Meleleuca fulgens</i>	Scarlet Honeymyrtle		
Myrtaceae	<i>Micromyrtus elobata</i>			
Myrtaceae	<i>Phymatocarpus maxwellii</i>			
Myrtaceae	<i>Rinzia dimorphandra</i>	Esperance Rinzia		
Myrtaceae	<i>Taxandria spathulata</i>			
Myrtaceae	<i>Verticordia densiflora</i>	Compacted Feather Flower		
Orchidaceae	<i>Caladenia heberleana</i>	Esperance King Spider		
Orchidaceae	<i>Diuris laxiflora</i>	Bee orchid		
Orchidaceae	<i>Elythranthera brunonis</i>	Purple Enamel Orchid		
Orchidaceae	<i>Microtis media</i> subsp. <i>media</i>	Mignonette Orchid		
Poaceae	<i>Amphipogon turbinatus</i>	Mulga Fox Tail		
Poaceae	<i>Briza maxima</i>	Blowfly grass	*	
Proteaceae	<i>Adenanthos cuneatus</i>	Coastal jugflower		

Proteaceae	<i>Banksia obovata</i>	Wedge-leaved Dryandra		
Proteaceae	<i>Banksia pulchella</i>	Teasel Banksia		
Proteaceae	<i>Banksia speciosa</i>	Showy Banksia		
Proteaceae	<i>Hakea nitida</i>	Frog Hakea		
Proteaceae	<i>Isopogon polycephalus</i>	Clustered Coneflower		
Proteaceae	<i>Synaphea favosa</i>			
Proteaceae	<i>Synaphea oligantha</i>			
Restionaceae	<i>Chordifex crispatus</i>			
Restionaceae	<i>Desmocladius flexuosus</i>			
Restionaceae	<i>Hypolaena fastigiata</i>			
Rutaceae	<i>Boronia ramosa</i> subsp. <i>anethifolia</i>			
Stylidiaceae	<i>Stylidium macranthum</i>	Crab claws		

7.2 TPFL 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://dpcaw.wa.gov.au> under Standard Report Forms

TAXON: <u>Daviesia pauciflora</u>	TPFL Pop. No: _____
OBSERVATION DATE: <u>01/10/2019</u>	CONSERVATION STATUS: <u>P3</u> New population <input checked="" type="checkbox"/>
OBSERVERS: <u>Julie Waters + Katie White</u>	PHONE: <u>9083 1515</u>
ROLE: <u>Environmental Officers</u>	ORGANISATION: <u>State of Esperance</u>

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): 10.8 km E of Landingup townsite. 2 km W of Daniels Rd, on Fisheries Rd North road reserve only.

DBC DISTRICT: <u>South Coast</u>	LGA: <u>Esperance</u>	Land manager present: <input type="checkbox"/>
DATUM: _____	COORDINATES: (If UTM coords provided, Zone is also required)	METHOD USED:
GDA84 / MGA84 <input checked="" type="checkbox"/>	DecDegrees <input checked="" type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input type="checkbox"/>	GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input checked="" type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	Lat / Northing: <u>122.84148995</u>	No. satellites: _____ Map used: <u>OGIS</u>
WGS84 <input type="checkbox"/>	Long / Easting: <u>-33-7472377 E</u>	Boundary polygon captured: <input type="checkbox"/> Map scale: <u>1:76</u>
Unknown <input type="checkbox"/>	ZONE: _____	
LAND TENURE:		
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/> SLK/Pole _____ to _____
		Rail reserve <input type="checkbox"/> Shire road reserve <input checked="" type="checkbox"/>
		MRWA road reserve <input type="checkbox"/> Other Crown reserve <input type="checkbox"/>
		Specify other: _____

AREA ASSESSMENT: Edge survey <input type="checkbox"/> Partial survey <input type="checkbox"/> Full survey <input checked="" type="checkbox"/>	Area observed (m ²): <u>1.5ha surveyed</u>
EFFORT: Time spent surveying (minutes): <u>1hr</u>	No. of minutes spent / 100 m ² : _____
POP'N COUNT ACCURACY: Actual <input checked="" type="checkbox"/> Extrapolation <input type="checkbox"/> Estimate <input type="checkbox"/>	Count method: _____
(Refer to field manual for full)	
WHAT COUNTED: Plants <input checked="" type="checkbox"/> Clumps <input type="checkbox"/> Clonal stems <input type="checkbox"/>	
TOTAL POP'N STRUCTURE:	
Alive	Mature: <u>10</u> Juveniles: _____ Seedlings: _____ Totals: <u>10</u>
Dead	
QUADRATS PRESENT: No. _____ Size _____ Data attached <input type="checkbox"/>	Total area of quadrats (m ²): _____
Summary Quad. Totals: Alive	
REPRODUCTIVE STATE: Clonal <input type="checkbox"/> Vegetative <input type="checkbox"/> Flowerbud <input checked="" type="checkbox"/> Flower <input checked="" type="checkbox"/>	Percentage in flower: <u>100%</u>
Immature fruit <input type="checkbox"/> Fruit <input type="checkbox"/> Dehiscid fruit <input type="checkbox"/>	

CONDITION OF PLANTS: Healthy Moderate Poor Senescent

COMMENT: _____

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
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=None, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• <u>Vegetation clearing for purpose of sand extraction & remove 10 plants. Historic</u>	<u>N</u>	<u>H</u>	<u>?</u>
• <u>Historic clearing of sand</u>	<u>M-H</u>	<u>H</u>	<u>L</u>
• _____	_____	_____	_____

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



Threatened and Priority Flora Report Form

Version 1.3 August 2017

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK:	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input checked="" type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input checked="" type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input checked="" type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific Landform Element:				
	(Refer to field manual for additional values)				
CONDITION OF SOIL:	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

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. Dense Banksia speciosa overstorey, w. Mixed
 2. Melaleuca midstorey + dense Acacia scrub
 3. Understorey
 4.

ASSOCIATED SPECIES:

Banksia speciosa, Acacia striata, Allocasuarina humilis, Adenanthos curvatus, Caustis dioica

Other (non-dominant) spp

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

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

COMMENT: Previous sand extraction

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

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

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

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

Did not survey southern road reserve - likely plants present at large sandhill outside clearing peridot area

Confirmed by Michael Hislop at WA Herbarium 13/11/19

DRF PERMIT/ LICENCE No: 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: RWD28 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: Kate White Role: Environmental Officer Signed: [Signature] Date: 10/10/2019

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