

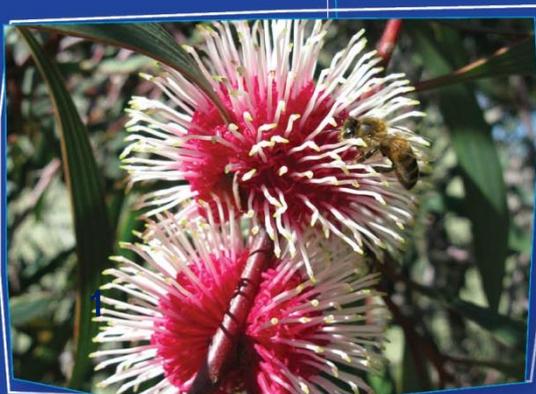
Vegetation, Flora, Fauna and Environmental Considerations Report

Shire of Esperance 2022-23 Strategic Purpose Permit
Site A – Cascade Road Dog Fence and Gravel Pit



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Acknowledgement of country

The Shire of Esperance acknowledges the Kapa Kurl Wudjari people of the Nyungar nation and Ngadju people who are the traditional custodians of this land and their continuing connection to land, waters and community. We pay our respect to their Elders past, present and emerging and we extend that respect to other Aboriginal Australians today.

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LIST OF ABBREVIATIONS

BAM Act: Biosecurity and Agriculture Management Act 2007 (WA)
BC Act: Biodiversity Conservation Act 2016 (WA)
BOM: Bureau of Meteorology
DBCA: Department of Biodiversity, Conservation and Attractions
EP Act: Environmental Protection Act 1986 (WA)
EPA: Environmental Protection Authority
EPBC Act: Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
IBRA: Interim Biogeographical Regionalisation for Australia
IUCN: International Union of Conservation Nature
LGA: Local Government Area
NVIS: National Vegetation Information System
PEC: Priority Ecological Community
PF: Priority Flora (Under BC Act)
SOE: Shire of Esperance
SLK: Straight Line Kilometres (Main Roads WA)
TEC: Threatened Ecological Community
TF: Threatened Flora (Under BC Act)
TPFL: Threatened and Priority Flora Database (DBCA)
TPRF: Threatened and Priority Flora Report Form
WAH: Western Australian Herbarium (PERTH)
WAOL: Western Australian Organism List

1 Executive Summary

The Shire of Esperance Environmental Team was commissioned by the Shire of Esperance Asset Management department to undertake a review of the flora, vegetation and fauna values on the proposed Cascade Road Dog Fence and Gravel Pit project in 2022-23 as part of their Strategic Purpose Permit application.

The proposed development involves the clearing of 3.251ha of native vegetation for the purposes of gravel extraction (2.894 ha) and protection of farming enterprises from wild dogs (0.357ha).

The Shire of Esperance's two Environmental Scientists completed the site assessment on Cascade Road Dog Fence and Gravel Pit between April and October 2022, with the spring flora surveys conducted on 14/9/2022 and 28/10/2022.

A total of 172 vascular plant taxa from 89 plant genera and 37 plant families were recorded within the Cascade Road Dog Fence and Gravel Pit survey area during the 2022 survey. The majority of taxa was recorded within the Myrtaceae (33 taxa), Proteaceae (20 taxa) and Fabaceae (15 taxa) families (Appendix 1). No introduced (weed) species were recorded however one specimen with a very immature flower spike, may have been Onion Weed (*Asphodelus fistulosus*).

No threatened species and four priority flora species pursuant to the Biodiversity Conservation Act (2016) and as listed by the Department of Biodiversity, Conservation and Attractions (DBCA) were recorded within the Cascade Road Dog Fence and Gravel Pit survey area. No plant taxa listed as Threatened pursuant to Schedule 1 of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 were recorded during the survey within the proposed Cascade Road Dog Fence and Gravel Pit survey area.

Table 1: Summary of Priority flora species recorded in Site A - Cascade Road Dog Fence and Gravel Pit project area.

Taxon	Conservation Code	Total Plants in population * includes CPS 9524/1 Site A and 'Site A - Cascade Road Dog Fence and Gravel Pit'	Plants to be cleared
<i>Guichenotia asteriskos</i>	P2	123	11
<i>Grevillea aneura</i>	P3	670	493
<i>Banksia cirsioides / xylothemelia</i>	P3	25	2
<i>Thysanotus parviflorus</i>	P4	1	0
<i>Goodenia laevis ssp. laevis</i>	P4	295	110

A total of 2.535 ha of the EBPC listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' Threatened Ecological Community (TEC) was present within Site A - Cascade Road Dog Fence and Gravel Pit. No other TECs or PECs were located within Site A - Cascade Road Dog Fence and Gravel Pit.

The site may contain low quality habitat for Malleefowl. No other threatened fauna species under either the BC Act or EPBC Act are likely to be impacted upon by this proposal.

Should the development of Cascade Road Dog Fence and Gravel Pit go ahead the following recommendations are made as a means of minimizing the impacts of infrastructure activities on the flora, vegetation and fauna values in the area:

- Minimise clearing to minimum amount required
- Maintain existing drainage systems, spoon drains and ensuring tracks and other infrastructure areas do not disrupt or divert historic water flow patterns;
- Remove and stockpile topsoil, log debris and leaf litter where possible for use in future rehabilitation programs. If possible, stockpiled topsoil should be directly replaced on disturbed areas;
- Minimise soil disturbance during clearing and practice standard vehicle hygiene to ensure introduced (exotic) species or dieback do not become established within the Cascade Road Dog Fence and Gravel Pit survey area; and
- Minimize all threatening processes to native vegetation.

These have been addressed in the attached Weed and Dieback Plan and/or Rehabilitation Plan, and provided these measures are implemented, there should be no impediments to implementing either the Cascade Road Dog Fence and/or Gravel Pit projects.

1 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 manages the largest road network of any local government in Western Australia, encompassing a total of 4,593 km of road. The Shire of Esperance is submitting 'Cascade Road Dog Fence and Gravel Pit' project as Site A under the '2022-23 Strategic Purpose Permit' (Figure 1), for the purposes of gravel extraction and to protect south-eastern agricultural enterprises from the impact of emus, wild dogs and kangaroos.

1.1 Location and Scope of Project

The proposed works are located ~110 km north west of Esperance, within the Shire of Esperance managed road reserves of Cascade and West Point roads. Specifically, it is located 400m NE and west of the intersection of West Point and Cascade roads, at straight line kilometre (SLK) 75.82 to 76.09 on Cascade road and (SLK) 0-0.39 on West Point road (Main Roads 2022). A point within the proposed clearing permit area is -33.345348 S, 120.874850 E or 302240 m E, 6308405 m N (UTM Zone 51 H, GDA94).

The State Barrier Fence Esperance Extension involves the building of a 660 km long, 1.35 m high barrier fence in the Goldfields-Esperance Region of Western Australia for the purpose of limiting impacts of wild dogs, dingos, emus and kangaroos on agriculture. The proposal was assessed by the EPA (Assessment Number 2088), and approved via Ministerial statement 1095 on 15/4/2019. This large project involved the clearing and disturbance of up to 816 ha of native vegetation within four separate development envelopes with a width of up to 200 m, totalling an area of up to 8,139 ha. As per condition 1-1 of the Ministerial Statement, "the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act". The 300m / 0.348ha wing extension proposed under Site A "Cascade Road Dog Fence and Gravel Pit" project, was not part of the original approved extent of the State Barrier Fence Esperance Extension. It was deemed by Department of Primary Industries and Regional Development, that due to this small extension being on Shire of Esperance managed road reserve that this small addition be applied for through the Clearing Permit system.

The second part of Site A "Cascade Road Dog Fence and Gravel Pit" project, involves 2.894 ha of clearing for gravel extraction site along West Point Road. This is adjacent to the pending CPS 9524 (Site A) application area. Significant improvements of the Lake King – Cascade road are planned in the coming decade and the Shire of Esperance has identified these gravel pit sites as last resorts after all private property landowners in the area refused to allow the Shire of Esperance to access gravel on cleared private property, an ongoing issue in the north west (Cascades area) of the Shire.

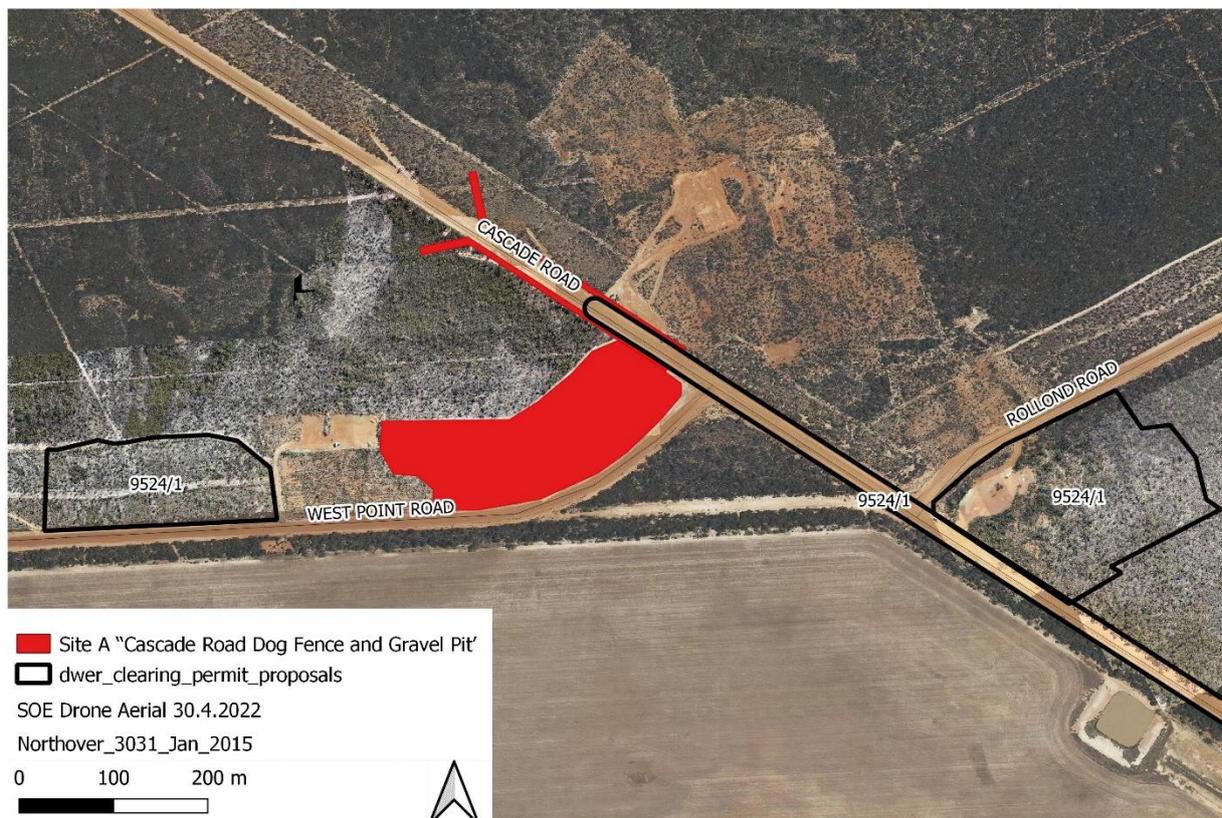


Figure 1. Location of the clearing permit Cascade Road Dog Fence and Gravel Pit survey area (in red), totalling 3.243 ha (Note CPS 9524/1 areas in black).

1.2 Environmental Legislation and Guidelines

The Commonwealth (federal) legislation relevant to this survey is the:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The following Western Australian (state) legislation relevant to this survey include the:

- Biodiversity Conservation Act 2016 (BC Act);
- Biodiversity Conservation Act 2016 Biodiversity Conservation (Listing of Native Species) (Flora) Order 2022;
- Biodiversity Conservation Act 2016 Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022;
- Biosecurity and Agriculture Management Act 2007 (BAM Act); and
- Environmental Protection Act 1986 (EP Act);

Western Australian guidelines relevant to this survey are the:

- Environmental Factor Guideline: Flora and Vegetation (Environmental Protection Authority [EPA] 2016);
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016);
- A guide to the assessment of applications to clear native vegetation, Under Part V Division 2 of the Environmental Protection Act 1986 (DWER, 2014)

- Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020)

International Agreements relevant to this survey are the:

- Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 (Japan-Australia Migratory Bird Agreement – JAMBA)
- Agreement between the Government of Australia and the Government of the People’s Republic of China for the Protection of Migratory Birds and their Environment 1986 (China-Australia Migratory Bird Agreement – CAMBA)
- Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds 2007 (Republic of Korea-Australia Migratory Bird Agreement – ROKAMBA)
- Convention on Wetlands of International Importance 1971 (Ramsar Convention)

2 OBJECTIVES

The objective of this survey was to undertake a flora, fauna and vegetation assessment of the Cascade Road Dog Fence and Gravel Pit survey area including:

- Undertake a desktop study of the flora, fauna and vegetation of the Cascade Road Dog Fence and Gravel Pit survey area, with an emphasis on threatened and priority flora, threatened and priority ecological communities (TECs and PECs) and Threatened and Priority fauna;
- Review the historical literature of the Cascade Road Dog Fence and Gravel Pit survey area;
- Undertake a detailed survey of the Cascade Road Dog Fence and Gravel Pit survey area, and collect and identify the vascular plant species present;
- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department of Biodiversity, Conservation and Attractions (DBCA) and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of Climate Change, Energy, the Environment and Water under the EPBC Act;
- Define and map the vegetation communities in the Cascade Road Dog Fence and Gravel Pit survey area;
- Define and map the location of any threatened and priority flora located within the Cascade Road Dog Fence and Gravel Pit survey area;
- Define any management issues related to flora, fauna and vegetation values;
- Provide recommendations on the local and regional significance of the vegetation communities; and
- Prepare a report summarising the findings.

3 METHODS

3.1 Desktop Assessment

A desktop assessment with a 20km buffer zone was conducted using DBCA datasets sourced under agreement for:

- WA Herbarium data (WAH)

- Threatened and Priority Flora Database (TPFL)
- DBCA's Esperance District Threatened Flora spatial dataset
- Threatened and Priority Ecological Communities
- Threatened, specially protected and priority fauna
- Black cockatoo roost and breeding sites

In addition, the EPBC Act Protected Matters Search Tool, was also checked to identify the possible occurrence of threatened and priority flora, fauna and threatened and priority ecological communities within the Cascade Road Dog Fence and Gravel Pit area. Search parameters were 'by polygon' and a 20 km buffer was applied to the search area; standard used in this IBRA subregion.

In addition, historical documentation and state datasets including:

- Vegetation mapping of the region, principally that of Beard (1976)
- 2020 Vegetation Extent by Statewide Pre-European mapping statistics
- Soil landscape mapping (DAFWA)
- Dieback Information Data Management System (DIDMS) (Gaia Resources)
- Shire of Esperance Weed Mapping Data
- Existing site digital orthophotos (Northover Jan 2015)
- Shire of Esperance Drone Orthomosaic Imagery (Captured April 2022)
- Atlas of Living Australia database
- Hydrographic Catchments (DWER)
- Crown Reserves (Landgate)

3.2 Field Survey

The gravel pit site was initially inspected on 20/4/2022 by Julie Waters and Katherine Walkerden the SOE's Environmental Coordinator and Environmental Officer (assisted by work placement student Tilly Fisher). A general assessment of possible ecological impacts included historical clearing, impact of fire regimes, regeneration from disturbance, waterlogging, senescence, weeds, erosion, sedimentation, invasive fauna, *Phytophthora* Dieback, and illegal dumping of rubbish. Collection of specimens, mapping of flora species of interest and an assessment of the flora and vegetation was also undertaken at this time.

On 29/4/2022 Shire Environmental Officers flew the Shires Drone to capture an aerial orthomosaic of the gravel pit area. This assisted greatly in determining boundaries in vegetation community mapping which was difficult on ground to due past chaining and burning of the area.

A detailed field assessment of the flora and vegetation of the Cascade Road Gravel Pit survey area was undertaken by Shire of Esperance's Environmental Officer Katherine Walkerden, assisted by Environmental Assistant Kelsie Foster on 14/9/2022 in accordance with methods outlined in

Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016).

A detailed field assessment of the flora and vegetation of the Cascade Road Dog Fence area survey area was undertaken by Shire of Esperance’s Environmental Officer, Katherine Walkerden, and Environmental Coordinator Julie Waters on 28/10/2022 in accordance with methods outlined in Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016). All botanists held valid collection licences to collect flora for scientific purposes, issued under the BC Act.

The methodology for assessing threatened and priority flora consisted of traversing by foot the entire Cascade Road Dog Fence and Gravel Pit area survey areas. Botanists used handheld Garmin GPS units loaded with the Cascade Road Dog Fence and Gravel Pit areas. Botanists walked in a zig-zag fashion over the gravel pit site (at approximately at 30-50m intervals), and the dog fence was used as a transect recording all species, and collecting all but the very common, well known species.

For PF or TF species identified in the desktop survey as possible to occur, scans of pressed specimens from either the WAH or local Esperance District Herbarium were taken into the field. Suitable associated habitat for TF or PF identified in the desktop study were particularly focused on, and extensively searched. If suspected or known conservation significant flora species were encountered, a specimen was collected for subsequent identification with GPS coordinates and plant numbers recorded for the population. During the survey, the field herbarium for previously used for CPS 9524 Site A was consulted and added to.

All species unknown in the field were collected, pressed and dressed in accordance with WAH instructions, and later identified by SOE’s three Botanists, using keys, WA Herbarium’s Florabase, literature and Esperance District Herbarium. Any species that were unable to be identified were submitted to the WAH for identification (and NSW Herbarium for Lepidosperma). Nomenclature of the species recorded is in accordance with the WAH.

The vegetation communities of ‘Site A – Cascade Road Dog Fence and Gravel Pit area’ was assessed for the presence a TEC or PEC (DBCA 2022a) comparing that to descriptions in approved conservation advice for these communities.

Specifically, the site was assessed for 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 of 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 33 (DBCA 2022a)’ definitions.

As Site A - Cascade Road Dog Fence and Gravel Pit has been affected by previous firebreak chaining in the area, quadrant-based data was not used to determine if the site meet the TEC definitions. Instead the: “Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated” method was used.

Only a basic fauna survey was conducted as per EPA (2020) guidelines. Observations of fauna presence, such as call sounds, footprints and scats were noted, and the area assessed for suitability of habitat within ‘Site A – Cascade Road Dog Fence and Gravel Pit’ for fauna species identified in the desktop survey (ie: Malleefowl).

According to Table 3 in the Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016), the primary survey timing for the South-west and Interzone Botanical Province is Spring (September-November). The site was surveyed in April, however this was just a preliminary survey and mostly focused on mapping vegetation community boundaries. Both sites within Site A - Cascade Road Dog Fence and Gravel Pit site had surveyed conducted in Spring (September and October). The surveys were timed, where possible, to align with peak flowering periods of conservation significant flora with the potential to occur in Cascade Road Dog Fence and Gravel Pit survey area.

3.3 Vegetation Descriptions

Vegetation community was assessed during the field survey. Broad vegetation types defined by structure and composition were recorded and described using the National Vegetation Information System (NVIS) (ESCAVI 2003) classification system.

Condition of vegetation was assessed using Table 2 of the Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016) categories, as ‘Excellent’, ‘Very Good’, ‘Good’, ‘Degraded’ or ‘Completely Degraded’. This illustrates how healthy vegetation is, determined by vegetation structure, weed cover, presence of dieback, historical clearing, grazing and other signs of disturbance.

Additionally, possible environmentally sensitive areas, such as wetlands or granite, were noted. Overall, an assessment of environmental impacts to Department of Water and Environmental Regulation’s (DWER) biodiversity values were inspected and valued.

3.4 Survey Limitations

A general assessment was made of the survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 2). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

Table 2: Potential limitations affecting the conclusions made in this report

Potential Survey Limitation	Impact on Current Survey
Availability of contextual information at a regional and local scale	Not a limitation: Reference resources such as Beard’s mapping, together with online flora and vegetation information, have provided an appropriate level of

	information for the current survey. The vegetation of the Esperance shire has previously been mapped by Beard (1976).
Resources (i.e. were there adequate resources to complete the survey to the required standard).	Not a constraint: Adequate resources were made available by Shire of Esperance to complete the surveys.
Competency/experience of team carrying out survey; experience in the bioregion surveyed	Not a limitation: Botanists had extensive experience working within the Shire of Esperance and wider areas. Two of the botanists have consistently worked within this bioregion for more than 15 years. Botanists were familiar with flora in the area. Any unknown or potential threatened or priority flora species were collected and identified, utilising resources available at the Western Australian Herbarium and consultation with expert taxonomists. Previous surveys completed by Shire of Esperance in the CPS 9524 (Site A) adjacent to this site also assisted in flora familiarity.
Proportion of flora collected and identification issues	Potential limitation: While many plants were in flower during the survey, a proportion of plants encountered during the survey were sterile and may impact the chance of identification of some specimens to species level. Orchid species may not emerge each year if conditions are not favourable. Although these may affect the completeness of the species list, it is not expected to have a significant effect on mapping reliability, nor on the identification of threatened and priority species in the area as the majority were perennial species. Surveys were only undertaken in one year.
Effort and extent of survey	Potential limitation: The survey area was thoroughly covered. The threatened and priority flora search undertaken by two botanists by means of foot-traverse at approximately 30-50m intervals throughout the gravel pit area and along the edge of the road and into roadside vegetation at the dog fence site ensured thorough coverage of the survey area. Flora that was unknown or resembled threatened or priority flora were collected, the location and habitat noted, and the number of plants estimated.
Mapping reliability	Not a constraint. Handheld GPS units were used for the survey, which for a majority of field conditions have an accuracy level of ± 5 m. Drone imagery taken over the site also improved mapping vegetation and soil changes at a finer scale.
Survey timing, rainfall, season of survey	Not a limitation: The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). Surveys have been conducted in September and October (as well as April), which falls within this period. Rainfall in

	2022 was above average, and continued well into December.
Disturbances (fire/flood/clearing)	Not a limitation: The Cascade Road Dog Fence and Gravel Pit survey area exhibits minimal levels of disturbance, mainly from past fire and chaining events.

4 DESKTOP ASSESSMENT RESULTS

4.1 Climate

The Cascade climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2022). The closest weather station (Munglingup West) area receives an average annual rainfall of 449mm. The Shire of Esperance received an unusually high level of rainfall in 2022 resulting in an extended flowering period.

4.2 Catchment

Cascade Road Dog Fence and Gravel Pit is present within the Stokes Inlet (Lort / Young River) catchment area. It is located approximately 60km north of the Stokes Inlet and coastline.

4.3 Geology, Soils and Topography

A single geological unit was identified within 'Site A – Cascade Road Dog Fence and Gravel Pit, by Schoknecht et al. (2004). It is described as "Tertiary marine sediments with aeolian carbonate rich deposits in places". Within the area, there has been a single soil type recorded. This is described as: "Alkaline grey shallow sandy duplex soils associated calcareous loamy earths and grey non-cracking clays and minor deep sands and ironstone gravel".

During the field survey, topography was observed to be dominated by a level plain. Using Schnoknecht et al. (2004), the project topography is mapped at a fine scale, traversing a single topographic area described as "Level plain or plateau of low relief and poor drainage Gilgia microrelief is common".

4.4 Regional Vegetation

The site is located within the Eastern Mallee (MaL01) Interim Biogeographic Regionalisation of Australia (Thackway & Cresswell 1995) region. The MaL01 is described as "the south-eastern of Yilgarn Craton is gently undulating, with partially occluded drainage. Mainly Mallee over Myrtaceous-Proteaceous heaths on duplex (sand over clay) soils. Melaleuca shrublands characterize alluvia, and Halosarcia low shrublands occur on saline alluvium. A mosaic of mixed Eucalypt woodlands and Mallee occur on calcareous earth plans, and sandplains overlying the Eocene Limestone strata in the East. Semi-arid (dry) and warm Mediterranean".

Beard (1973) mapped a single vegetation associations (VA) within the 'Site A – Cascade Road Dog Fence and Gravel Pit' area (Table 3). VA 512 is poorly represented in IUCN system and has less than 30% remaining in both the Esperance Shire and Mallee IBRA region.

Since 2016, significant illegal clearing by private landowners has occurred in the Grass Patch-Scaddan area. It has been observed that VA 512 has been drastically cleared, and further reducing the pre-European vegetated extent.

Table 3. Vegetation associations mapped by Beard (1973) within the ‘Site A – Cascade Road Dog Fence and Gravel Pit’, and statistics on pre-European remaining areas.

Vegetation Association	
Name	VA 512
Description	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & Forrest's marlock (<i>E. forrestianna</i>)
Pre-European extent in IBRA region (MaL01) (%)	26.41%
Pre-European extent in LGA (%)	20.14%
Current extent conserved in IUCN area (%)	2.38

4.5 Surrounding Land Use

The area directly included in the clearing permit application ‘Site A – Cascade Road Dog Fence and Gravel Pit’ is currently intact and vegetated 200 m wide road reserve, managed by the Shire of Esperance. All apart from the southern side of the Dog Fence area is also part of the Shire of Esperance’s strategic chained firebreak, an approximately 100m wide firebreak chained and burnt at approximately 5-year intervals to provide strategic fire protection from large scale wildfires emerging from the Great Western Woodlands to the north. The surrounding land use is vegetated Unallocated Crown Land (UCL) to the north and broad-acre cropping paddocks to the south. The area is within rural zoning.

The site was 6.9km west from Reserve 30583, the closest conservation reserve.

4.6 Potential Threatened and Priority Flora

Three threatened flora (TF) and 29 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Appendix 3)). Of these, 2 TF species and 20 PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of ‘Site A – Cascade Road Dog Fence and Gravel Pit’ project. Confirmed records, indicating a known populations of *Grevillea aneura* (P3), and *Banksia cirsioides / xylothemelia* (P3) were directly located within the clearing permit area.

4.7 Potential 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 the 20km buffer of ‘Site A – Cascade Road Dog Fence and Gravel Pit’ project area. No other TEC’s or priority ecological communities (PEC) were identified by the desktop study as being within ‘Site A – Cascade Road Dog Fence and Gravel Pit’ or within a 20 km buffer of the site.

4.8 Potential Threatened and Priority Fauna

The Malleefowl (*Leipoa ocellata*) was the only species of threatened fauna recorded within a 20 km radius of the proposed impact site (DBCA 2022d). An additional 8 species were listed as occurring by the EPBC Protected Matters Tool.

4.9 *Phytophthora* Dieback

Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2022) data shows no positive *Phytophthora cinnamomi* or other *Phytophthora* sp. Dieback sample results in the area.

5 FIELD SURVEY RESULTS AND DISCUSSION

5.1 Flora

A total of 172 vascular plant taxa, representative of 89 plant genera and 37 plant families, were recorded within Cascade Road Dog Fence and Gravel Pit survey area. Of these 171 were native species and a single plant (which was identified as “most likely” Onion weed, *Asphodelus fistulosus*) which was not of sufficient quality to be accurately identified was the only introduced species. The majority of taxa recorded were representative of the Myrtaceae (33 taxa), Proteaceae (20 taxa) and Fabaceae (15 taxa) families (see Appendix 1 for the complete incidental species list). Numerous specimen’s unknown to surveyors that were collected and verified at the WAH as non-threatened species (Table 4).

Table 4: WAH Identifications of non-threatened species from ‘Site A - Cascade Road Dog Fence and Gravel Pit’.

Genus	Species	Accession Number	Collectors Number	Notes & Specimen retained/ not retained
<i>Lepidosperma</i>	<i>carphoides</i>	9857	KSW19522	Retained
<i>Lepidosperma</i>	<i>sp.</i>	9841	KSW15822	Unable to be identified by WAH. Retained
<i>Schoenus</i>	<i>sesquispiculus</i>	9857	KSW19422	Retained
<i>Schoenus</i>	<i>brevisetis s. lat</i>	9857	KSW19322	Retained
<i>Schoenus</i>	<i>racemosus</i>	9857	KSW19222	Retained
<i>Leucopogon</i>	<i>sp. Frank Hann (K.R. Newbey 11499)</i>	9841	KSW15322, KSW15422	Both Retained
<i>Cyathostemon</i>	<i>sp.</i>	9857	KSW17122	Not retained. From the <i>C. ambiguus/C. tenuifolius</i> complex. <i>C. sp.</i> Dowak has broader leaves, both in terms of measurement and relative to their lengths. It may be a long time before the taxonomy of this genus is satisfactorily resolved. Specialist Barbara Rye has shelved

				it indefinitely.
<i>Persoonia</i>	<i>striata</i>	9841	KSW15522	Retained
<i>Stylidium</i>	<i>zeicolor</i>	9857	KSW17222	Retained

The specimens of *Persoonia striata* and *Stylidium zeicolor* were range extensions to the east of their previously known distributions.

A number of *Lepidosperma* specimens were sent to Dr Russell Barret at The National Herbarium of NSW on the 23/11/2023, *Lepidosperma* cannot currently be identified at the WA Herbarium due to being in the early stages of revision by Dr Russel Barret. Due to the Sydney Herbarium moving locations over summer 2022/23 these specimens have not yet been identified.

Table 5: National Herbarium of NSW Identifications of species from 'Site A - Cascade Road Dog Fence and Gravel Pit'.

Genus	Species	Accession Number	Collectors Number
<i>Lepidosperma</i>	<i>sp.</i>	BIS22130	KSW17722
<i>Lepidosperma</i>	<i>sp.</i>	BIS22130	KSW17422
<i>Lepidosperma</i>	<i>sp.</i>	BIS22130	KSW17522
<i>Lepidosperma</i>	<i>sp.</i>	BIS22130	KSW17822

A number of plant specimens collected could not be identified accurately to species level due to the absence of sufficient taxonomic characters to enable accurate identification. The principal reasons for not being able to fully identify some of the collected specimens to species level were:

- Plant material was sterile or lacked sufficient taxonomic features to permit accurate identification to species level. In these cases, the species is identified as, for example, *Synaphea divaricata*? (which had no flowers); *Asphodelus fistulosus* (which had an immature flower spike); and *Pterostylis* sp. (Which is most likely *P. roensis* which was collected in April survey at site)
- The plant material collected could not be determined to a known taxon. For example, *Lepidosperma* sp. (as species are currently undergoing taxonomic revision) and *Cyathostemon* sp. (Taxonomic revision of *Cyathostemon*'s required).

5.2 Threatened and Priority Flora

No TF species, were identified within the clearing footprint. However, the targeted flora survey identified five PF species, *Guichenotia asteriskos* (P2), *Grevillea aneura* (P3), *Banksia cirsioides / xylothemelia* (P3), *Goodenia laevis* ssp. *laevis* (P4) and *Thysanotus parviflorus* (P4), within the proposed clearing permit footprint.

The *Banksia cirsioides / xylothemelia* (P3) the plants were identified in 2021 as being intermediary of *Banksia cirsioides* (NT) and *Banksia xylothemelia* (P3).

Queries of spatial datasets were requested specifically for these species, to interrogate impact of proposed works on species sustainability (DBCA, 2023a). *Grevillea aneura* and *Guichenotia asteriskos* have not been recorded on the TPFL database. DBCA do not actively manage or monitor the majority of low priority species, due to their prevalence in the landscape relative to TF. There are 137 species recorded as priority three or four conservation status within the Shire of Esperance boundaries (DBCA

2023b). It was noted that additional information on *Thysanotus parviflorus* was located on file.

5.2.1 *Guichenotia asteriskos*, Priority 2

A specimen of *Guichenotia asteriskos* was sent to the WA Herbarium for identification confirmation (KSW 12822; Accession 9740 with specimen retained by Herbarium). It was confirmed by Michael Hislop on 25/10/2022. This specimen was sent off after discovering that previous specimens sent by SOE from the site were not retained by WAH (KW139, Accession 8867 (Collected in 2020) and (KSW 12822, Accession 9116 (Collected in 2021)). A Threatened and Priority Reporting Form (TPRF) and updated shapefiles of population data was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 13/3/2023 (Appendix 2).

The previously submitted 9524/1 data and Cascade Road Dog Fence and Gravel Pit survey area data have been summarised to quantify impacts to this population (as it all the one population). An additional 18 plants were found in 2022 surveys, 11 of these will be taken under 'Site A - Cascade Road Dog Fence and Gravel Pit' project.

Table 6: Cumulative impacts to the Priority 2 species, *Guichenotia asteriskos* from previously submitted CPS 9524/1 and 'Site A - Cascade Road Dog Fence and Gravel Pit' projects.

Total population counted at site (2021 and 2022 surveys)	123
Total plants taking under 'Site A Cascade Road Dog Fence and Gravel Pit' project	11
Total plants taking 'Site A - Cascade Road Dog Fence and Gravel Pit' and CPS9524/1	66

The species has a distribution over 200km east to west and 112km north to south when including this new population. There is total of 21 herbarium records and 4 TPFL records, many of these are recollections of the type population and in total there is 14 unique records. Several of these records are in disturbed areas, other described the vegetation as shrubland or heath each matching the current location well. There is likely to be significantly more of this species along the chained areas due to the high suitability. 4 of the 14 unique records were within 3 different Nature Reserves. The species was described in Wilkins and Chappill (2003).

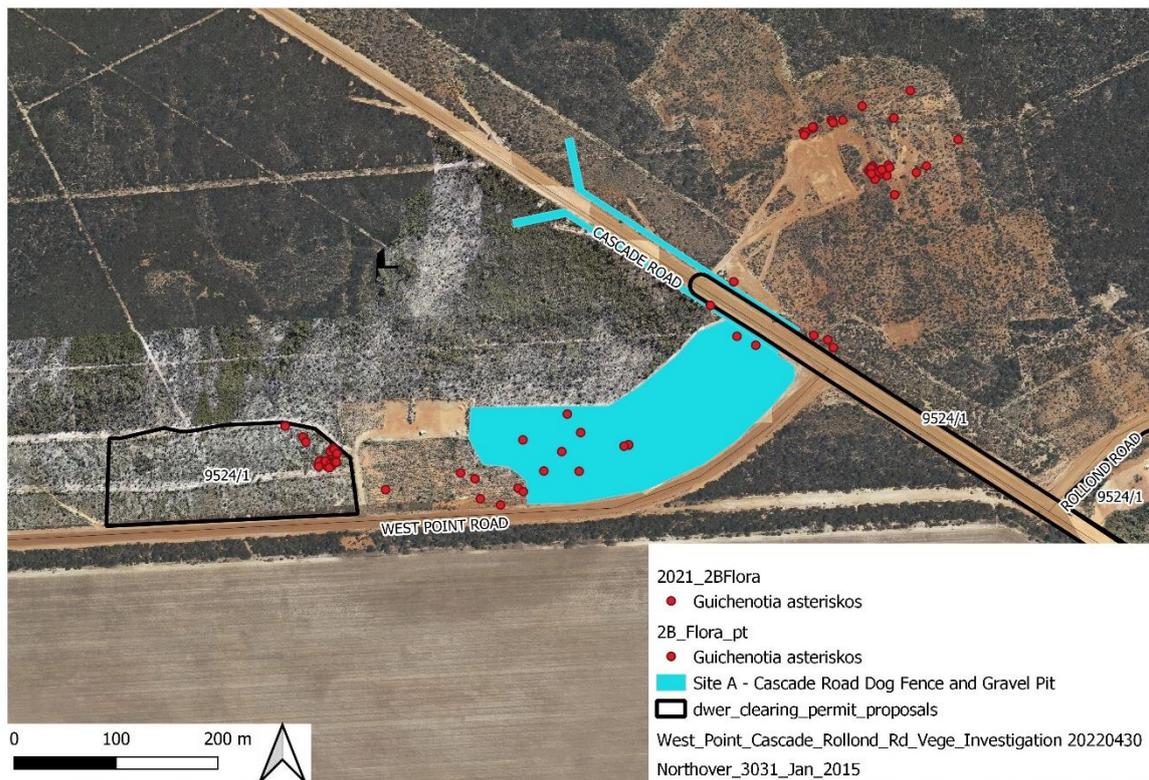


Figure 2. Location of Priority 2 *Guichenotia asteriskos* within the 'Site A – Cascade Road Dog Fence and Gravel Pits' and CPS 9524/1 projects.



Figure 3. Flower and leaves of P2, *Guichenotia asteriskos* found within 'Site A – Cascade Road Dog Fence and Gravel Pits', taken by Katherine Walkerden on 28/09/2021.

Table 7. Compiled population data of Priority 2 *Guichenotia asteriskos*

Site Description	Tenure	Population Count	Date	Sheet no. / Specimen no.
Gravel pit 7 km E from Lake King on the Lake King to Norseman Road	Road reserve	1 plant.	29/08/2016	8934843
Located <1 km (exact distance not recorded) W of Newdegate on the NE and SE corner of crossroads of Lake Grace - Newdegate Road and a gravel road	Road reserve	10-12 plants seen.	2/09/2007	8151849
Pingaring - Varley Road North, just W of intersection with Hollands Track	Road reserve		30/09/2004	6996604
Disused gravel pit off Floater Road 22 km N from Highway 1, Ravensthorpe	Road reserve	occasional.	2/09/2004	7113587
S Buniche Reserve	Nature reserve		15/10/2003	7701713
W of Lake King, S of the Newdegate - Lake King Road	Road reserve	occasional.	20/09/1999	5593808 / TPFL Pop 3
Dunn Rock Nature Reserve, 26.2 km W along Old Newdegate Road from Ravensthorpe - Newdegate Road	Nature reserve		26/09/1997	6018750
Dragon Rocks Nature Reserve, 31.5 km E from Pingaring - Pederah Road along Pingaring - Varley Road, S side of road	Nature reserve		20/09/1997	5912423
Hyden to Norseman Road, 7.6 km W of Flying Fox Mine Road	Road reserve		13/09/1997	7897111
SE corner Loc 2621, Bidy Camm Road Reserve	Road reserve	common.	18/09/1996	5362792/ TPFL Pop 4
2 km W of Newdegate	Road reserve	frequent.	19/10/1995	4413970/ TPFL Pop 1
1.7 km W of Newdegate	Road reserve		17/09/1995	6114563
1.7 km W of Newdegate	Road reserve		17/09/1995	6230962
1.7 km W of Newdegate, gravel track crossroad on both sides of the road	Road reserve		9/09/1994	6018696

1.7 km W of Newdegate, gravel track crossroad on both side of the road,	Road reserve		9/09/1994	5912350
1.7 km W of Newdegate - gravel track crossroads	Road reserve		9/09/1994	7972172
Western edge of township of Newdegate	Road reserve		28/09/1993	5912431
Dunn Rock Nature Reserve No. 36445. Internal firebreak No. 5.	Nature reserve		7/10/1984	1078534/ TPFL Pop 2
At intersection of Lake King and Lake Varley roads, 270 miles from Perth	Road reserve		11/10/1965	2696835
2 miles W of Newdegate	Road reserve		12/10/1963	2696827
2 miles W of Newdegate	Road reserve		12/09/1963	3250253

5.2.2 *Grevillea aneura*, Priority 4

No specimen of *Grevillea aneura* was sent to the WA Herbarium for identification given the distinctiveness of the species, the botanists familiarity with the species, and the fact that the Shire of Esperance had previous specimens from adjacent to this site (same population) confirmed in 2020 (PERTH 09375406) and KW80 Accession 8652. A Threatened and Priority Reporting Form (TPRF) and updated shapefiles of population data was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 13/3/2023 (Appendix 2).

The previously submitted 9524/1 data and Cascade Road Dog Fence and Gravel Pit survey area data have been summarised to quantify impacts to this population (as it all the one population). An additional 524 plants were found in 2022 surveys, 493 of these will be taken under 'Site A - Cascade Road Dog Fence and Gravel Pit' project.

Table 8: Cumulative impacts to the Priority 2 species, *Grevillea aneura* from previously submitted CPS 9524/1 and 'Site A - Cascade Road Dog Fence and Gravel Pit' projects.

Total population counted at site (2021 and 2022 surveys)	670
Total plants taking under 'Site A Cascade Road Dog Fence and Gravel Pit' project	493
Total plants taking 'Site A - Cascade Road Dog Fence and Gravel Pit' and CPS9524/1	575

The surrounding vegetation was not surveyed to determine the extent of the population. There is a

confirmed specimen 1km west of the site (PERTH 09062246). It was noted that the population continues well beyond the clearing permit footprints of CPS 9524/1 and 'Site A - Cascade Road Dog Fence and Gravel Pit' projects.

Grevillea aneura has a range spanning 330km west to east and 84km north to south with known populations in the Shire of Esperance, Lake Grace, Kondinin and Ravensthorpe (Figure 7). There was a total of 51 known records of *Grevillea aneura* however DBCA was not actively monitoring this species, with no TPRF forms being entered into the TPFL database. Many of the Florabase records refer to rehabilitated gravel pits in the habitat description and it is highly likely that this species will return once revegetation is completed.

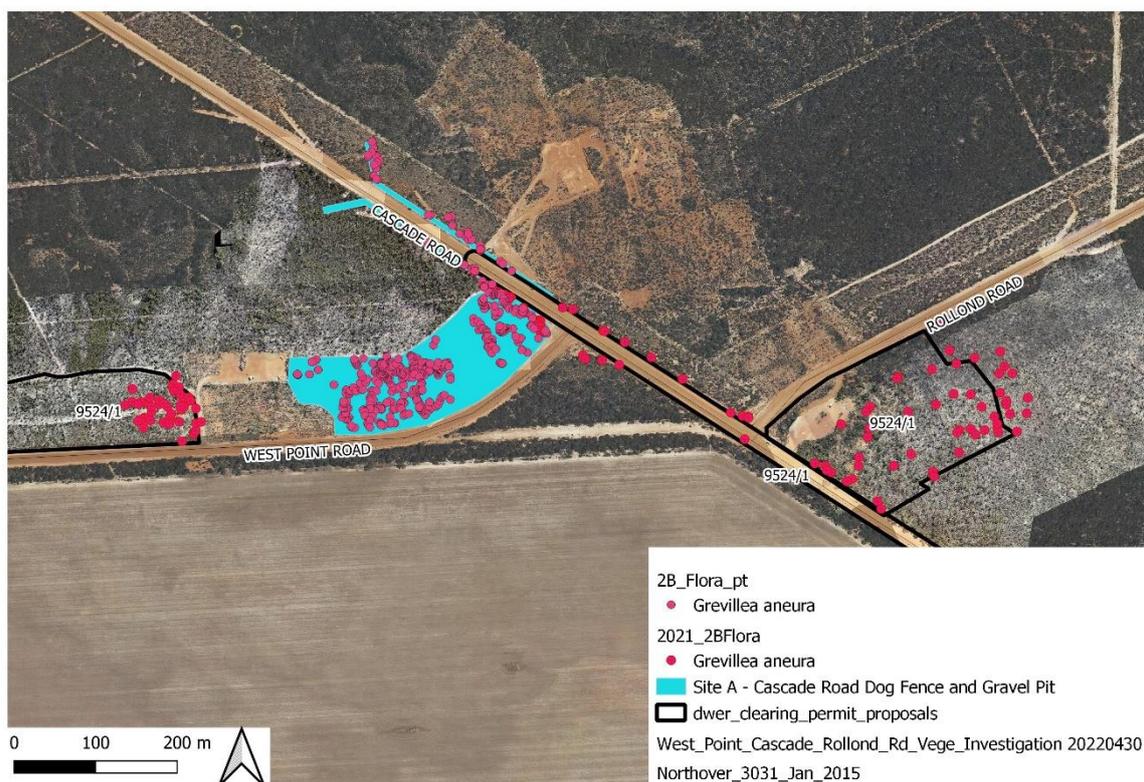


Figure 4. Location of Priority 4 *Grevillea aneura* within the 'Site A – Cascade Road Dog Fence and Gravel Pits' and CPS 9524/1 projects.

PERTH O9375406[*Grevillea aneura*](#)

Proteaceae

Plant Description, Notes: Large shrub <2 m high x <3 m wide with spiky, dense foliage that looks like a puzzle. Flowers large, bright red, flowering profusely.

Vegetation: Scattered *Hakea laurina* and mallee woodland with dense *Beyeria sulcata* shrubland and mixed highly diverse shrubland with scattered to no understorey. Associated species: *Hakea laurina*, *Gastrolobium* sp., *Rinzia* sp., *Beyeria sulcata*, *Daviesia teretifolia*.

Site Description: Historical gravel pit that had been rehabilitated via seed in soil burden. Flat, brown-red gravel.

Frequency: c. 102 plants.

Nearest Named Place: North Cascade

State: WA

Collector: Meiklejohn, R. **Coll No:** KW 073

Collection Date: 2 September 2020

Conservation Code: 4

Origin: PERTH

Record Basis: PreservedSpecimen

Figure 5. Extract from Florabase (DBCA 2023b) of *Grevillea aneura*, record of Specimen KW073, located directly within the proposed 'Site A – Cascade Road Dog Fence and Gravel Pits' area.



Figure 6. Priority 4 species, *Grevillea aneura* found in the immediate vicinity of 'Site A – Cascade Road Dog Fence and Gravel Pit'. Photo taken by Katherine Walkerden on 31/08/2021.

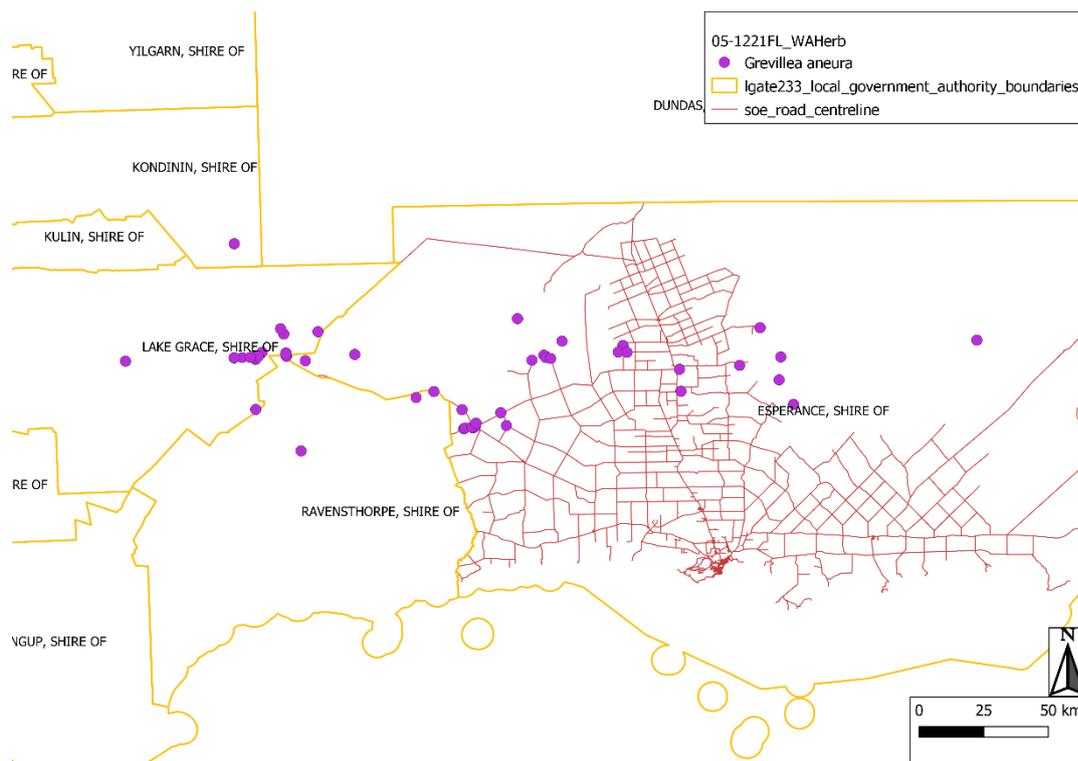


Figure 7. Known records of Priority 4 species *Grevillea aneura* across a 330 km geographic range, spanning from the Shire of Lake Grace in the west, to the Shire of Esperance in the east (DBCA 2022c).

5.2.3 *Banksia cirsioides* / *xylothemelia*, Priority 3

In 2021, as part of the CPS 9524/1 surveys, a specimen of *Banksia cirsioides* / *xylothemelia* was sent to the WA Herbarium for identification after the plant could not be identified as either *Banksia cirsioides* or *B. xylothemelia* (KSW1521; Accession #9116 with specimen retained). It was described as an intermediary of *Banksia cirsioides* (NT) and *Banksia xylothemelia* (P3). A Threatened and Priority Reporting Form (TPRF) was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 28/01/2022 (Appendix 2). The WA Herbarium requested additional plant material and specimens were collected on the 28/09/2021 (KSW2621, KSW2721 Accession# 9190, KSW2621 retained). Both additional specimens were also identified as *Banksia cirsioides* / *xylothemelia*. It is worth noting that in 2021 one plant to be impacted upon was graded during routine maintenance in September and had begun to resprout.

The previously submitted 9524/1 data and Cascade Road Dog Fence and Gravel Pit survey area data have been summarised to quantify impacts to this population (as it all the one population). An additional 4 plants were found in 2022 surveys, 2 of these, plus 1 additional 2021 surveyed plant (3 plants total) will be taken under 'Site A - Cascade Road Dog Fence and Gravel Pit' project.

Table 9: Cumulative impacts to the Priority 3 species, *Banksia cirsioides / xylothemelia* from previously submitted CPS 9524/1 and 'Site A - Cascade Road Dog Fence and Gravel Pit' projects.

Total population counted at site (2021 and 2022 surveys)	25
Total plants taking under 'Site A Cascade Road Dog Fence and Gravel Pit' project	2
Total plants taking 'Site A - Cascade Road Dog Fence and Gravel Pit' and CPS9524/1	4

Banksia xylothemelia, P3, is a fairly widespread species with its distribution centered on the Shire of Lake Grace (Figure 14.), the species has a west to east range of over 250km and north to south range of 210km. There was a single prior specimen in the Shire of Esperance 8km to the north-west of the Shire. There was a total of 51 unique WA Herbarium and TPFL records. Descriptions of herbarium records frequently described a heath/ low shrubland vegetation and regenerating shrubland, matching that seen in the site which is regularly chained.

PERTH O9431063

Banksia cirsioides / xylothemelia
Proteaceae

Plant Description, Notes: Prickly 0.8 m tall x 0.4 m shrub. Apparently resprouting from rootstock.

Vegetation: Heath with sparse *Eucalyptus pleurocarpa*, open mallee woodland over diverse *Acacia* and *Myrtaceae* understorey.

Site Description: Road reserve.

Frequency: 6 plants.

Nearest Named Place: North Cascade

State: WA

Collector: Waters, J.; Walkerden, K. **Coll No:** KSW2621

Collection Date: 28 September 2021

Determinavit: M. Hislop **Date:** 3 November 2021

Origin: PERTH

Record Basis: PreservedSpecimen

Figure 8. Extract from Florabase (DBCA, 2023b) of *Banksia cirsioides / xylothemelia*, record of Specimen KSW2621, located directly within the proposed 'Site A – Cascade Road Dog Fence and Gravel Pits' area.

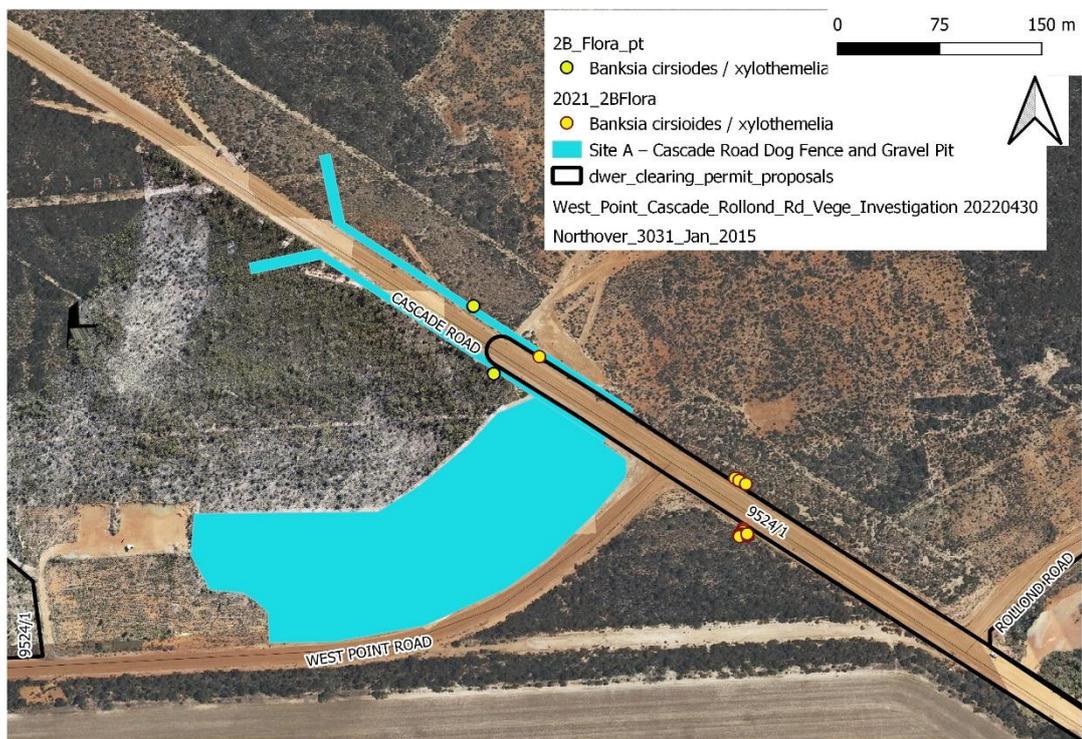


Figure 9. Location of *Banksia cirsioides / xylothemelia* within the 'Site A – Cascade Road Dog Fence and Gravel Pits' and CPS 9524/1 projects.

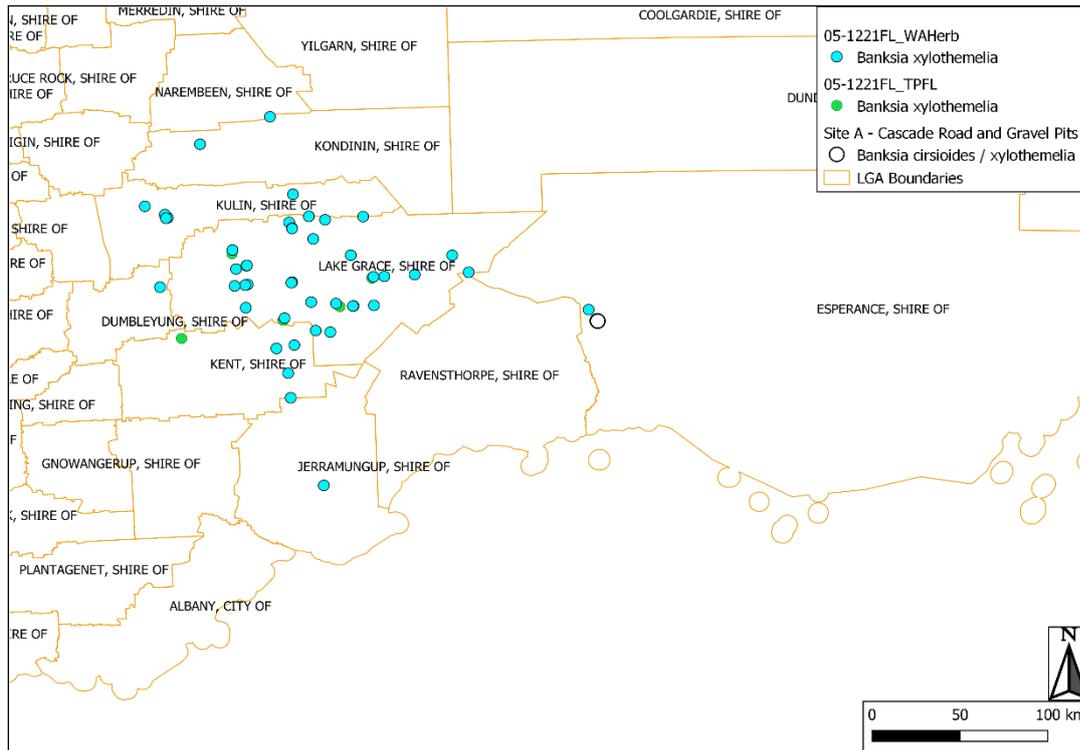


Figure 10. Map of known records of Priority 3 *Banksia xylothemelia* across a 250 km geographic range, (DBCAs 2022c) including the recently discovered *Banksia cirsioides / xylothemelia*.



Figure 11. Photo of *Banksia cirsioides / xylothemelia*, located directly within the proposed 'Site A – Cascade Road Dog Fence and Gravel Pits' area. Photo taken by Katherine Walkerden on 31/08/2021.

5.2.4 *Goodenia laevis* subsp. *laevis*, Priority 3

No specimen of *Goodenia laevis* subsp. *laevis* was sent to the WA Herbarium for identification given the botanists familiarity with the species, and the fact that the Shire of Esperance had previous specimens from adjacent to this site (same population) confirmed in 2020 (PERTH 09375384). A Threatened and Priority Reporting Form (TPRF) and updated shapefiles of population data was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 13/3/2023 (Appendix 2).

The previously submitted 9524/1 data and Cascade Road Dog Fence and Gravel Pit survey area data have been summarised to quantify impacts to this population (as it all the one population). An additional 121 plants were found in 2022 surveys, 110 of these will be taken under 'Site A - Cascade Road Dog Fence and Gravel Pit' project.

Table 10: Cumulative impacts to the Priority 3 species, *Goodenia laevis* subsp. *laevis* from previously submitted CPS 9524/1 and 'Site A - Cascade Road Dog Fence and Gravel Pit' projects.

Total population counted at site (2021 and 2022 surveys)	295
Total plants taking under 'Site A Cascade Road Dog Fence and Gravel Pit' project	110
Total plants taking 'Site A - Cascade Road Dog Fence and Gravel Pit' and CPS9524/1	282

The Shire of Esperance has discovered numerous new populations of *Goodenia laevis* ssp. *laevis* in since 2019 (Table 10). Herbarium specimens and Threatened and Priority Reporting Forms (TPRF) have been completed for confirmed populations. Only one of these had been entered into TPFL at 07/02/2023.

At all sites, the plants were present in the road active footprint that is regularly graded or in dam catchments – all sites with a high level of disturbance. These are specifically outlined below. It can be inferred that the abundance of *Goodenia laevis* ssp. *laevis* at the site is partially due to the disturbance caused by mechanical grading of the road shoulders and chaining operations.

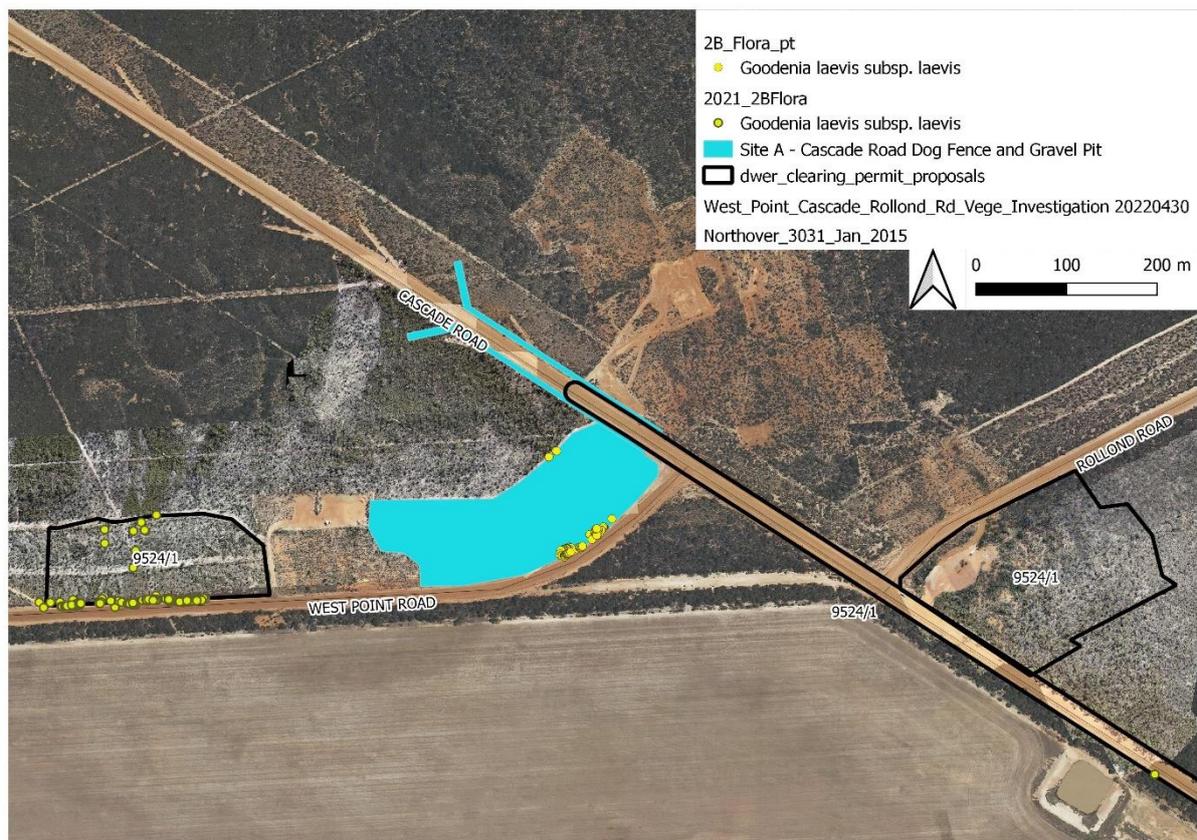


Figure 12. Location of *Goodenia laevis* ssp. *laevis* within the 'Site A – Cascade Road and Gravel Pits' and CPS 9524/1 projects.

Using the WA Herbarium spatial data, the below inferences can be discussed:

- *G. laevis* ssp. *laevis* is geographically restricted to the Esperance Mallee area, extending from Scaddan to Norseman, and the Cascade region to the edge of Cape Arid. In total this covers 18,000 km².
- Almost all associated vegetation is described as a variation of mixed *Melaleuca* shrubland with *Eucalyptus* woodland over-storey. Extensive areas of this vegetation type remain, providing likely habitat, with similar soil type and associated vegetation.
- 27 records of populations are recorded on the WA Herbarium databases, two records are on the TPFL database. 14 new populations discovered by Shire of Esperance in recent years have not added to DBCA data.
- Of the 27 recorded specimens, seven records are directly described as being within a previously disturbed site, such as old limestone pits, along firebreaks or road shoulders. An additional specimen was listed as growing in a fire scar.

Additionally, Ecoscape had reported finding 58 new populations of *Goodenia laevis* ssp. *laevis* containing a total population of 12,000 plants during the State Barrier Fence Biological surveys (Ecoscape, 2015). There was no record of these collections on DBCA databases.

Goodenia laevis ssp. *laevis* is a common species within Mallee habitat and has been historically been under surveyed. The species has had 22 new confirmed populations since 2020 that the Shire of

Esperance is aware of, as a result the species has been nominated for delisting by the DBCA Esperance District Flora Conservation Officer.

Table 11. Confirmed records of Priority 3 species, *Goodenia laevis* ssp. *laevis* found by Shire of Esperance staff since 2019.

Herbarium reference	Location	Site description	Frequency	Tenure	Record date	Confirmative
KW041, Accession 8281, Specimen not retained	Located in historical footprint of Norwood Rd, at intersection of Norwood and Dempster Rd. Road before stagger was put in	Slope, limestone, 30-50% loose rock, sandy loam, white soil, well drained, dry	100-150 plants in road area	Road Reserve.	10/12/2019	M. Hislop
KW043 Accession 8281, Specimen not retained	2.86 to 3.5 km north of Cascade Rd, on Neds Corner Rd	Slope, limestone, 30-50% loose material, clay loam, white, well drained, dry soil	82 plants present	Road Reserve.	25/10/2019 - mapped 09/12/2019	M. Hislop
KW059, Accession 8334, Specimen not retained	On Grass Patch Rd, 2.2 km west of Bishops Rd.	Flat, well drained. White/grey clay loam. Limestone base	50+	Road Reserve.		M. Hislop
KW061, Accession 8334, Specimen not retained	Grass Patch townsite - R19624. north-west corner of intersection of grass patch Rd and Coolgardie-Esperance Hwy	Flat, loose material with large amounts of leaf litter. White soil - clay loam, likely limestone base	3 plants	Road Reserve.	22/01/20	M. Hislop
KW062, Accession 8334, Specimen not retained	On north-east intersection of Dalyup and Rasyk Rd.	Gentle slope (heading towards constructed dam), white/grey soil, clay loam, limestone bed rock	200-250 plants	Road Reserve.		M. Hislop
KW076, Specimen not retained	On Holt Rd from 2.4 km to intersection of Burnside Rd. On road reserve	Gently undulating plains, yellow-white sandy loam	Scattered along entire transect - total of 83 plants	Road Reserve.	08/09/20	M. Hislop

KW098	~47 km north of Esperance townsite. ~19 km east of Scaddan townsite. On Styles Rd, from 1.5 to 2 km south of Norwood Rd and Styles Rd intersection. On both sides of road reserve	Closed Mallee Woodland with dense Melaleuca shrubland, distinguished from the surrounding	70-90	Road reserve	14/10/2020	M. Hislop
KSW2021, Accession 9133, Specimen not retained	Holt Rd SLK 6.4-11.61	Narrow Road reserve in mostly excellent condition	24	Road reserve	6/09/2021	M. Hislop
KSW2821, Accession 9190, Specimen not retained	Neds Corner Rd, near Grass Patch Rd intersection	Road Reserve	100s	Road Reserve	29/09/2021	M. Hislop
KSW5421, Accession 9361, Specimen not retained	R37505, Cascade Rd, Cascade	Historic landfill site	100+ scattered throughout R37505, estimate only	Shire reserve	13/12/2021	M. Hislop
KSW2722, Accession 9405, Specimen not retained	Cascade road SLK 94.17	Road shoulder in Shire Road Reserve	4 plants seen, area not surveyed	Road Reserve	25/01/2022	M. Hislop
KSW3122, Accession 9441, Specimen not retained	Reserve 19965, Neighbouring Hawkey rd & Dalyup rd T junction	formerly used for limestone extraction, burned in 2015 Scaddan/ Grasspatch bushfires	Around 100 older plants growing along access track, 200+ younger plants in burned area, 300+ in rehabilitated limestone pit	Shire reserve	5/02/2022	M. Hislop
KSW032-p, Accession 9604	Dempster Road SLK 41.58. Eastern side of road.	Limestone road shoulder.	6	Road Reserve	15/05/2022	R. Davis

KSW12922, Accession 9740, Specimen retained	Coolinup road at SLK 38.95	Road shoulder.	26 plants GPS'd, 300 metres of road was surveyed	Road Reserve	13/09/2022	M. Hislop
KSW16222, Accession 9841, Specimen not retained	Heywood road at SLK 5.58. Western side of road.	Plants just off road. No signs of fire.	7 plants found during survey.	Road Reserve	12/10/2022	M. Hislop

Table 12. Known Herbarium and TPFL records of Priority 3 species *Goodenia laevis* ssp. *laevis*, detailing location details, frequency, tenure and collection date.

Sheet number/ TPFL population	Location	Frequency	Record date
2607786	Kumarl		Apr-38
2607719	8 km SE of Mount Beaumont, ca 90 km NE of Esperance	rare.	10/11/1980
2607689	35 km N of Gibson on Esperance - Coolgardie highway		9/11/1982
2607697	20 km E of Scaddan on Styles Road		2/12/1982
2607700	3.4 km S of Mount Ney		Aug-83
4111648	Oldfield 1343 [This location is 28 km NW of Cascade as advised by collector 23/8/2001]		7/12/1993
4256131	Scaddan Road between Norseman-Esperance Highway and rail crossing	abundant locally.	24/12/1995
5083575	28 km NNW of Condingup, Kay Rock Road, NE of Esperance,		31/12/1995
6374417	Grass Patch, 3.9 km S of Grass Patch Track near railway line, E side of Coolgardie Esperance Highway. 5.9 km N of Sime Road. Roe District	moderately common.	15/01/1998
5645115	W side Kau Rock Road ca 300 m N of Mount Ney Road, NE of Esperance,	occasional.	20/11/1998
5400562	New Hyden/Norseman track, ca 17 km W of Great Eastern Highway,	occasional.	13/04/1999
7400330	Norseman, Coolgardie region		20/09/2001
7400403	Norseman, Coolgardie Region		20/09/2001
7184859	1.5 km W of Fields Road on Grass Patch West Road	100+ plants.	16/01/2004
7218923	Bremer Range; c. 50 km S of Hyden-Norseman Road on Maggie Hayes Ninety Mile Tanks track, then E on track to Lake Medcalf for 5-8 km then N on 4WD track for 1.5 km then W along gridline at AGD84 6400000 mN	occasional.	16/03/2005
8111928	N side of Heywood Road ca 4 km N of Karl Berg junction in old limestone pit, Condingup	2-5 plants.	29/11/2008
9062238	N boundary of Beaumont Nature Reserve. c. 1.5 km E of Mt Beaumont	200+ plants.	23/10/2013
9062203	On agricultural boundary firebreak, c. 39 km E of Salmon Gums	50+ plants.	5/11/2013

9062211	On the boundary of Beaumont Nature Reserve, c. 1 km S of Mt Beaumont	30+ plants.	25/11/2013
9139338	Speddingup Reserve, NE boundary on Belgian Road, 60 m W of Robins Road	uncommon; 2 plants per 100 sq m.	22/11/2016
9196420	In the Cascade townsite, on Wilaust Street, c. 60 m N of Asha Court, c. 80 km NW of Esperance townsite	> 15 plants.	9/12/2019
9375384 TPFL Pop. 1	C. 112 km NW of Esperance, c. 25 km NW of Cascade townsite. On West Point Road c. 300 m from the intersection of West Point Road and Cascade Road	25 plants.	17/09/2020
9475788 TPFL Pop. 2	Griggs Road SLK 4.65 Shire Road Reserve, along Styles Rd. Ca 1.5-2.0km S from Norwood Rd and Styles Rd intersection. On both sides of road reserve		18/09/2020 14/10/2020
9365362	Parmango Road SLK 21.89 - 22.7	100+	18/01/2022
9475850	Swan Lagoon Road at SLK 20.93, E of Scaddan	24+	5/02/2022
9475893	Dalyup Road SLK 14.43, E of Gibson	300+ plants	16/02/2022
9475885	Norwood Road SLK 1.49, E of Scaddan	100+	27/02/2022



Figure 13. Priority 3 species *Goodenia laevis* ssp. *laevis*, Photo taken Julie Waters on 28/10/2022

5.2.5 *Thysanotus parviflorus*, Priority 4

A specimen of *Thysanotus parviflorus* was sent to the WA Herbarium for identification confirmation (KSW17322; Accession 9857 with specimen retained by Herbarium). It was confirmed by Michael Hislop on 10/1/2023.

Only a single plant of *Thysanotus parviflorus* was recorded just outside the northern dog fence area. This plant will not be impacted upon by the proposed Cascade Road Dog Fence and Gravel Pits project.

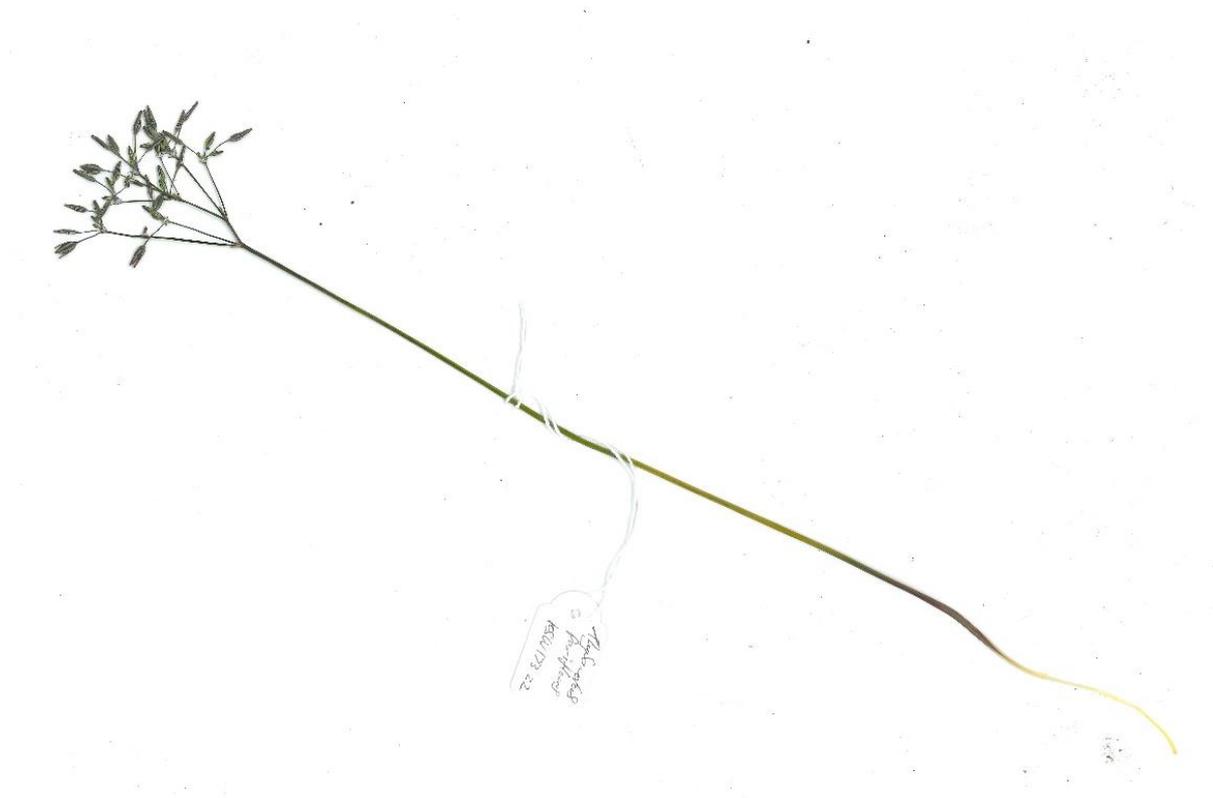


Figure 14. Scan of specimen KSW17322 determined as Priority 4 species *Thysanotus parviflorus* collected just outside the proposed 'Site A – Cascade Road Dog Fence and Gravel Pits' project area. and CPS 9524/1 projects.

5.3 Flora Range Extensions

Specimen's that resulted in a range extension were also sent to WAH. Two species were collected that resulted in range extensions, these were *Persoonia striata* and *Stylidium zeicolor* which were range extensions to the east of their previously known distributions.

Table 13: WAH identifications of range extensions from 'Site A - Cascade Road Dog Fence and Gravel Pit'.

Genus	Species	Accession Number	Collectors Number	Specimen retained/ not retained
<i>Persoonia</i>	<i>striata</i>	9841	KSW15522	Retained
<i>Stylidium</i>	<i>zeicolor</i>	9857	KSW17222	Retained



Figure 15: One of the range extensions recorded during the 'Site A - Cascade Road Dog Fence and Gravel Pit' surveys, *Persoonia striata*.



Figure 16: This specimen of *Styliidium zeicolor* sent off by Shire of Esperance increased the known range of the species.

5.4 Weeds

Weed invasion at the site was minimal, and there may have only been a single weed species found at the site. A single not confidently identified *Asphodelus fistulosus*. As a result, hygiene prior to and during operations are of utmost importance. Regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species needs to occur.

5.5 Dieback

No signs of dieback were observed at the site. The vegetation is high in Ericaceae and Proteaceae species and would all be susceptible to dieback disease. 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.

5.7 Vegetation Communities

Two vegetation communities were identified within the 'Site A – Cascade Road Dog Fence and Gravel Pit' as defined by structure and composition (Table 14). It is believed that the Beard (1973) vegetation associations identified in Section 4.4 are an appropriate match for Vegetation Type B. VA 47 is the closest match for Vegetation Type A this VA is mapped by Beard as occurring 3.3km west of the project area.

Table 14. Vegetation communities identified within proposed 'Site A – Cascade Road Dog Fence and Gravel Pit' project area.

Type	Description	Figure	Closest Matching Beard Vegetation Association	Area (ha)
A	Open <i>Eucalyptus pleurocarpa</i> and <i>Banksia media</i> dominated mallee woodland with <i>Acacia</i> , Proteaceae and Goodeniaceae understorey	18	VA 47	2.535
B	Mixed Mallee over Mixed <i>Melaleuca</i> shrubland with <i>Acacia</i> and Goodeniaceae understory	19	VA 512	0.707



Figure 17. Vegetation types within the 'Site A – Cascade Road Dog Fence and Gravel Pit' area.



Figure 18. Vegetation type A identified in 'Site A – Cascade Road Dog Fence and Gravel Pit' project, described as 'Open *Eucalyptus pleurocarpa* and *Banksia media* dominated mallee woodland with *Acacia*, *Proteaceae* and *Goodeniaceae* understorey'.



Figure 19. Vegetation type B identified in 'Site A – Cascade Road Dog Fence and Gravel Pit' project,

described as 'Mixed Mallee over Mixed *Melaleuca* shrubland with *Acacia* and Goodeniaceae understory'.

5.8 Vegetation Condition

Vegetation condition across the whole 3.243 ha site can be classified as Excellent. Whilst there is some noticeable impacts to species composition from previous chaining and road maintenance operations, these effects are minimal.

5.9 Threatened Ecological Communities

One vegetation community (Vegetation type A), described as 'Open *Eucalyptus pleurocarpa* and *Banksia media* dominated mallee woodland with *Acacia*, Proteaceae and Goodeniaceae understorey' met the criteria to be considered as Kwongan TEC. Whilst it only contained four diagnostic species, the dominance of Proteaceous species was noticeable. The species composition differed from those in the published Conservation Advice for this TEC, due to how far north it is located. In total 2.535 ha of excellent condition Kwongan TEC is proposed to be cleared as part of this project.

5.10 Fauna

Of the species identified within the desktop survey (Appendix 4), only the Malleefowl, Carnaby's Cockatoo, Chuditch and Grey Falcon could have suitable habitat within the proposed clearing permit area.

5.10.1 Malleefowl, *Leipoa ocellata*, VU

There was a "moderately certain" opportunistic day sighting in 2006 from the intersection of Cascade Rd/Westpoint Rd/Rolland Rd intersection. Malleefowls are predominantly found within shrublands and low woodlands dominated by mallee and are associated with Broombush, *Melaleuca uncinata*. The entire 'Site A – Cascade Dog Fence and Gravel Pit' would be suitable habitat, due to its sandy substrate and high leaf litter levels. However, Malleefowls are particularly susceptible to fires, and some areas within and much of the area adjacent to 'Site A – Cascade Road Dog Fence and Gravel Pit' has been recently burnt. No Malleefowls or evidence of Malleefowl activity (eg mounds or scratching) was encountered during the flora survey or field work.

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

Carnaby's Black Cockatoo's are unlikely to nest within the 'Site A – Cascade Road Dog Fence and Gravel Pit' project area, as no large trees are present with hollows. There was also a lack of large Eucalypts that could be used as roosts in the 'Site A – Cascade Road Dog Fence and Gravel Pit' proposed clearing permit area. Carnaby's Black Cockatoos forage on Proteaceae species nuts, such as *Hakea* or *Banksia* species. Vegetation type A defined as "Open *Eucalyptus pleurocarpa* and *Banksia media* dominated mallee woodland with *Acacia*, Proteaceae and Goodeniaceae understorey" would likely provide foraging grounds but is not be directly linked to nesting or foraging habitat.

The Shire of Esperance Black Cockatoo assessment was conducted in accordance with the EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo *Calyptorhynchus latirostris* (Endangered), Baudin's Cockatoo *Calyptorhynchus baudinii* (Endangered) and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Vulnerable) (Department of Agriculture, Water

and the Environment, 2022). As vegetation type A contained a potential foraging habitat, the foraging quality scoring tool was undertaken within vegetation type A or 'Site A – Cascade Road Dog Fence and Gravel Pit' (Appendix 12).

Given that the site did not:

- contain any nesting sites or large trees with hollows;
- contain night roosting areas;
- the amount of high-quality foraging habitat being cleared was less than 1 ha;

a referral for assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is unlikely to be required.

5.10.3 Chuditch, *Dasyurus geoffroii*, VU

The Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive. They are capable of travelling long distances and have large home ranges, and even at their most abundant, Chuditch are generally present in low numbers. They require habitats that are of a suitable size and not excessively fragmented. 'Site A – Cascade Road Dog Fence and Gravel Pit' is on the edge of the large "Great Western Woodlands" area, which is known to contain Chuditch.

5.10.4 Grey Falcon, *Falco hypoleucos*,

The Grey Falcon occurs at low densities across inland Australia, whilst it may visit the area, 'Site A – Cascade Road Dog Fence and Gravel Pit' does not contain suitable nesting habitat and there is unlikely to be any measurable effects on the species as a result of this project.

6 REVIEW OF 10 CLEARING PRINCIPLES FOR NATIVE VEGETATION

The 'Site A – Cascade Road Dog Fence and Gravel Pit' 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).

6.1 Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Biodiversity at this site is very high with 172 native species recorded over two vegetation communities.

6.2 Principle (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

The site may contain suitable habitat for Malleefowl, Chuditch, and Grey Falcon and suitable foraging habitat for Carnaby's Black Cockatoo. The clearing of 3.243 ha (of which only 0.348ha is permanent as gravel pit site will be rehabilitated at the completion of gravel extraction) is unlikely to be significant given the large home ranges of Chuditch and Grey Falcon.

6.3 Principle (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Four priority species were observed in the area. However, these species all have wide distributions and the removal of these plants is unlikely to affect the existence of these species.

6.4 Principle (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

2.53549 hectares of vegetation met the definition of Kwongkan TEC, other areas within the site failed to meet the definition of Kwongkan TEC, no other TEC's or PEC's were relevant to the study area.

6.5 Principle (e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The area is on the edge of very large areas of pristine vegetation completely lacking any clearing.

6.6 Principle (f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

No riparian vegetation was recorded from the application area. The closest recorded watercourse was 1.3km from the project site.

6.7 Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

The area is not susceptible to acid sulphate soils and there will be significant areas of vegetation surrounding the gravel pits which will reduce risk of erosion.

6.8 Principle (h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Clearing of the vegetation is unlikely to have an impact on the environmental values of any nearby conservation reserves as the closest nearby conservation area is the Griffiths nature reserve 6.9km from the project.

6.9 Principle (i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There is unlikely to be any impacts to surface or groundwater due to groundwater depths in the area and flat terrain and due to the closest recorded watercourse being 1.3km from the project.

6.10 Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

There is unlikely to be any flooding in this area.

7 RECOMMENDATIONS

As Shire Environmental Coordinator signs off on project work packs the following recommendation will be included within the internal SOE approval process for the road project.

- All vehicles and construction equipment to be cleaned prior to start of the project
- Works to be carried out in the dry(summer) months to minimise spread of dieback
- Follow up spraying and/or hand pulling of any emergent weeds to prevent weeds establishing in the weed free area.

8 LIST OF PERSONNEL

The following Shire of Esperance Staff were involved in this project.

Name	Julie Waters
Position	Environmental Coordinator
Project Involvement	Desktop and Field Survey, Specimen Identification, GIS Mapping Data Interpretation and Report writing
Qualifications	BEnvSc (Hons)
Experience	20 years working in environmental field including Flora Conservation Officer for previous DBCA, and 15 years' experience as a botanist in the region.
Scientific Licence	FT61000787

Name	Katherine Walkerden
Position	Environmental Officer
Project Involvement	Desktop and Field Survey, Specimen Identification, GIS Mapping, Data Interpretation and Report writing.
Qualifications	BSc, MEnvSc
Experience	Two years' experience as a Botanist in the region (as of April 2023)
Scientific Licence	FT61000788

Name	Rosamund Mary Hoggart
Position	Environmental Assistant
Project Involvement	Specimen Identification
Qualifications and Experience	BSc (Hons)Ag
	15 years' experience as a botanist in the region and is highly regarded by Esperance Wildflower Society and her peers in Esperance as one of the best botanists in Esperance.
Scientific Licence	N/A

Name	Kelsie Foster
Position	Environmental Assistant
Project Involvement	Field Assistant
Qualifications and Experience	Cert IV Land Management
	National Park Ranger
Scientific Licence	N/A

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10 APPENDICES

Appendix 1: Incidental species list

Family	Genus	Species	Weed	WA Cons Status	Herbarium Reference	Dog Fence	Gravel Pit
Anarthriaceae	<i>Anarthria</i>	<i>laevis</i>					x
Apiaceae	<i>Platysace</i>	<i>effusa</i>				x	x
Asparagaceae	<i>Laxmannia</i>	<i>omnifertilis</i>				x	x
Asparagaceae	<i>Lomandra</i>	<i>hastilis</i>					x
Asparagaceae	<i>Lomandra</i>	<i>mucronata</i>				x	x
Asparagaceae	<i>Thysanotus</i>	<i>parviflorus</i>		P4	KSW17322 ACC9857	x	
Asparagaceae	<i>Thysanotus</i>	<i>patersonii</i>				x	x
Asphodelaceae	<i>Asphodelus</i>	<i>fistulosus</i>	X			x	
Asteraceae	<i>Argentipallium</i>	<i>niveum</i>				x	x
Asteraceae	<i>Brachyscome</i>	<i>ciliaris</i>					x
Asteraceae	<i>Dittrichia</i>	<i>graveolens</i>					x
Asteraceae	<i>Pterochaeta</i>	<i>paniculata</i>				x	
Brassicaceae	<i>Lepidium</i>	<i>africanum</i>					x
Casuarinaceae	<i>Allocasuarina</i>	<i>acutivalvis</i> ssp. <i>acutivalvis</i>					x
Casuarinaceae	<i>Allocasuarina</i>	<i>microstachya</i>				x	
Celastraceae	<i>Stackhousia</i>	<i>scoparia</i>				x	
Cupressaceae	<i>Callitris</i>	<i>roei</i>				x	x
Cyperaceae	<i>Caustis</i>	<i>dioica</i>					x
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW17622 - BIS22130	x	
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW17522 - BIS22130	x	
Cyperaceae	<i>Gahnia</i>	<i>ancistrophylla</i>				x	x
Cyperaceae	<i>Lepidosperma</i>	<i>carphoides</i>			KSW19522 ACC9857	x	x
Cyperaceae	<i>Lepidosperma</i>	<i>pruinatum</i>					x
Cyperaceae	<i>Lepidosperma</i>	<i>sanguinolenta</i>				x	
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW15822 ACC 9841		x
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW17722 - BIS22130	x	
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW17422 - BIS22130	x	
Cyperaceae	<i>Lepidosperma</i>	<i>sp.</i>			KSW17822 BIS22130	x	
Cyperaceae	<i>Mesomelaena</i>	<i>stygia</i>					x
Cyperaceae	<i>Schoenus</i>	<i>sesquispiculus</i>			KSW19422 ACC 9857	x	
Cyperaceae	<i>Schoenus</i>	<i>submicrostachyus</i>				x	
Cyperaceae	<i>Schoenus</i>	<i>brevisetis</i> s. <i>lat</i>			KSW19322 ACC9857	x	

Cyperaceae	<i>Schoenus</i>	<i>racemosus</i>			KSW19222 ACC9857	x	
Dilleniaceae	<i>Hibbertia</i>	<i>exasperata</i>				x	x
Dilleniaceae	<i>Hibbertia</i>	<i>gracilipes</i>				x	x
Ericaceae	<i>Leucopogon</i>	<i>obtusatus</i>				x	
Ericaceae	<i>Leucopogon</i>	sp. Coujinup				x	
Ericaceae	<i>Leucopogon</i>	sp. Frank Hann			KSW15322, KSW15422 ACC 9841	x	
Ericaceae	<i>Lissanthe</i>	<i>rubicunda</i>					x
Ericaceae	<i>Lysinema</i>	<i>pentapetalum</i>				x	x
Ericaceae	<i>Lysinema</i>	<i>rubicunda</i>				x	
Ericaceae	<i>Styphelia</i>	<i>breviflora</i>					x
Ericaceae	<i>Styphelia</i>	<i>exserta</i>				x	x
Ericaceae	<i>Styphelia</i>	<i>lissanthoides</i>					x
Euphorbiaceae	<i>Beyeria</i>	<i>sulcata</i>				x	x
Euphorbiaceae	<i>Stachystemon</i>	<i>brachyphyllus</i>				x	x
Fabaceae	<i>Acacia</i>	<i>fragilis</i>				x	x
Fabaceae	<i>Acacia</i>	<i>gonophylla</i>				x	x
Fabaceae	<i>Acacia</i>	<i>octonervia</i>				x	x
Fabaceae	<i>Acacia</i>	<i>pravifolia</i>				x	
Fabaceae	<i>Acacia</i>	<i>dermatophylla</i>					x
Fabaceae	<i>Chorizema</i>	<i>aciculare</i>					x
Fabaceae	<i>Daviesia</i>	<i>aphylla</i>					x
Fabaceae	<i>Daviesia</i>	<i>lancifolia</i>				x	x
Fabaceae	<i>Daviesia</i>	<i>teretifolia</i>				x	x
Fabaceae	<i>Dillwynia</i>	<i>divaricata</i>					x
Fabaceae	<i>Gastrolobium</i>	<i>nutans</i>				x	x
Fabaceae	<i>Isotropis</i>	<i>cuneifolia</i>					x
Fabaceae	<i>Isotropis</i>	<i>drummondii</i>				x	
Fabaceae	<i>Pultenaea</i>	<i>indira ssp. indira</i>				x	x
Fabaceae	<i>Templetonia</i>	<i>sulcata</i>				x	x
Goodeniaceae	<i>Anthotium</i>	<i>humile</i>					x
Goodeniaceae	<i>Dampiera</i>	<i>lavandulacea</i>				x	x
Goodeniaceae	<i>Goodenia</i>	<i>incana</i>				x	
Goodeniaceae	<i>Goodenia</i>	<i>laevis</i>		P4			x
Goodeniaceae	<i>Goodenia</i>	<i>pterigosperma</i>				x	
Goodeniaceae	<i>Goodenia</i>	<i>scapigera</i>				x	x
Goodeniaceae	<i>Lechenaultia</i>	<i>formosa</i>				x	
Haloragaceae	<i>Glischrocaryon</i>	<i>angustifolia</i>					x
Hemerocallidaceae	<i>Dianella</i>	<i>brevicaulis</i>				x	
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>					x
Lamiaceae	<i>Hemigenia</i>	<i>teretiuscula</i>				x	x
Lauraceae	<i>Cassytha</i>	<i>glabella</i>					x
Lauraceae	<i>Cassytha</i>	<i>racemosa</i>				x	

Loganiaceae	<i>Logania</i>	<i>micranthera</i>				x	
Loganiaceae	<i>Logania</i>	<i>stenophylla</i>					x
Loganiaceae	<i>Orianthera</i>	<i>tortuosa</i>				x	x
Malvaceae	<i>Androcalva</i>	<i>cuneata</i>					x
Malvaceae	<i>Guichenotia</i>	<i>asteriskos</i>		P2			x
Malvaceae	<i>Lasiopetalum</i>	<i>compactum</i>				x	x
Malvaceae	<i>Lasiopetalum</i>	<i>indutum</i>					x
Myrtaceae	<i>Astus</i>	<i>tetragonus</i>					x
Myrtaceae	<i>Austrobaeckea</i>	<i>latens</i>				x	
Myrtaceae	<i>Beaufortia</i>	<i>micrantha</i>				x	x
Myrtaceae	<i>Beaufortia</i>	<i>schaueri</i>				x	x
Myrtaceae	<i>Calothamnus</i>	<i>gibbosus</i>				x	x
Myrtaceae	<i>Calothamnus</i>	<i>gracilis</i>					x
Myrtaceae	<i>Calytrix</i>	<i>leschenaultii</i>					x
Myrtaceae	<i>Chamelaucium</i>	<i>ciliatum</i>				x	x
Myrtaceae	<i>Cyathostemon</i>	<i>ambiguus</i>					x
Myrtaceae	<i>Cyathostemon</i>	sp.			KSW17122 ACC9857	x	
Myrtaceae	<i>Eucalyptus</i>	<i>eremophila</i>				x	x
Myrtaceae	<i>Eucalyptus</i>	<i>flocktoniae</i> subsp. <i>hebes</i>					x
Myrtaceae	<i>Eucalyptus</i>	<i>incrassata</i>				x	x
Myrtaceae	<i>Eucalyptus</i>	<i>kessellii</i> subsp. <i>kessellii</i>				x	x
Myrtaceae	<i>Eucalyptus</i>	<i>pleurocarpa</i>				x	x
Myrtaceae	<i>Eucalyptus</i>	<i>tumida</i>				x	x
Myrtaceae	<i>Hypocalymma</i>	<i>stricta</i>					x
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>				x	x
Myrtaceae	<i>Leptospermum</i>	<i>maxwellii</i>				x	
Myrtaceae	<i>Leptospermum</i>	<i>spinescens</i>					x
Myrtaceae	<i>Melaleuca</i>	<i>glaberrima</i>				x	x
Myrtaceae	<i>Melaleuca</i>	<i>lateriflora</i>				x	x
Myrtaceae	<i>Melaleuca</i>	<i>plumea</i>					x
Myrtaceae	<i>Melaleuca</i>	<i>plumosa</i>				x	
Myrtaceae	<i>Melaleuca</i>	<i>rigidifolia</i>				x	x
Myrtaceae	<i>Melaleuca</i>	<i>societatis</i>				x	x
Myrtaceae	<i>Melaleuca</i>	<i>subfalcata</i>				x	x
Myrtaceae	<i>Melaleuca</i>	<i>tuberculata</i> subsp. <i>macrophylla</i>				x	
Myrtaceae	<i>Melaleuca</i>	<i>uncinata</i>				x	x
Myrtaceae	<i>Micromyrtus</i>	<i>imbricata</i>				x	
Myrtaceae	<i>Rinzia</i>	<i>icosandra</i>					x
Myrtaceae	<i>Tetrapora</i>	<i>preissiana</i>				x	x

Myrtaceae	<i>Verticordia</i>	<i>acerosa</i> var. <i>preissii</i>				X	X
Olacaceae	<i>Olax</i>	<i>benthamiana</i>				X	
Orchidaceae	<i>Pterostylis</i>	<i>roensis</i>					X
Orchidaceae	<i>Pterostylis</i>	sp.				X	
Pittosporaceae	<i>Cheiranthra</i>	<i>filifolia</i>				X	
Poaceae	<i>Austrostipa</i>	<i>hemipogon</i>				X	
Poaceae	<i>Neurachne</i>	<i>alopeкуроidea</i>				X	X
Poaceae	<i>Rytidosperma</i>	<i>setacea</i>				X	
Polygalaceae	<i>Comesperma</i>	<i>calymega</i>				X	
Polygalaceae	<i>Comesperma</i>	<i>drummondii</i>				X	X
Polygalaceae	<i>Comesperma</i>	<i>spinosum</i>					X
Proteaceae	<i>Banksia</i>	<i>cirsioides-xylothemelia</i>		P3		X	
Proteaceae	<i>Banksia</i>	<i>media</i>					X
Proteaceae	<i>Grevillea</i>	<i>aneura</i>		P3		X	X
Proteaceae	<i>Grevillea</i>	<i>nudiflora</i>				X	X
Proteaceae	<i>Grevillea</i>	<i>oligantha</i>					X
Proteaceae	<i>Grevillea</i>	<i>pectinata</i>					X
Proteaceae	<i>Grevillea</i>	<i>teretifolia</i>				X	
Proteaceae	<i>Grevillea</i>	<i>acuaria</i>					X
Proteaceae	<i>Hakea</i>	<i>corymbosa</i>					X
Proteaceae	<i>Hakea</i>	<i>cygna</i>				X	X
Proteaceae	<i>Hakea</i>	<i>ilicifolia</i>				X	X
Proteaceae	<i>Hakea</i>	<i>laurina</i>					X
Proteaceae	<i>Hakea</i>	<i>lissocarpha</i>					X
Proteaceae	<i>Hakea</i>	<i>marginata</i>				X	
Proteaceae	<i>Isopogon</i>	<i>formosus</i>				X	X
Proteaceae	<i>Isopogon</i>	sp. Fitzgerald River				X	X
Proteaceae	<i>Persoonia</i>	<i>helix</i>				X	X
Proteaceae	<i>Persoonia</i>	<i>striata</i>			KSW15522 ACC 9841	X	X
Proteaceae	<i>Synaphea</i>	<i>divaricata</i>				X	
Proteaceae	<i>Synaphea</i>	<i>favosa</i>					X
Proteaceae	<i>Hakea</i>	<i>newbeyana</i>				X	
Restionaceae	<i>Desmocladius</i>	<i>myriocladus</i>				X	X
Rhamnaceae	<i>Cryptandra</i>	<i>nutans</i>					X
Rhamnaceae	<i>Cryptandra</i>	<i>recurva</i>					X
Rhamnaceae	<i>Pomaderris</i>	<i>brevifolia</i>					X
Rhamnaceae	<i>Spyridium</i>	<i>microcephalum</i>					X
Rhamnaceae	<i>Stenanthemum</i>	<i>notiale</i> subsp. <i>notiale</i>				X	
Rutaceae	<i>Boronia</i>	<i>crassifolia</i>				X	X
Rutaceae	<i>Cyanothamnus</i>	<i>baeckeaceus</i>					X

Rutaceae	<i>Microcybe</i>	<i>pauciflora</i> subsp. <i>pauciflora</i>				x	
Rutaceae	<i>Phebalium</i>	<i>lepidotum</i>				x	x
Santalaceae	<i>Exocarpos</i>	<i>sparteus</i>				x	
Sapindaceae	<i>Dodonaea</i>	<i>bursariifolia</i> , <i>female</i>				x	
Sapindaceae	<i>Dodonaea</i>	<i>divaricata</i>				x	x
Sapindaceae	<i>Exocarpos</i>	<i>sparteus</i>					x
Solanaceae	<i>Solanum</i>	<i>hoplopetalum</i>				x	
Stylidiaceae	<i>Stylidium</i>	<i>turleyae</i>				x	
Stylidiaceae	<i>Stylidium</i>	<i>breviscapum</i>				x	x
Stylidiaceae	<i>Stylidium</i>	<i>involucratum</i>				x	
Stylidiaceae	<i>Stylidium</i>	<i>piliferum</i>				x	
Stylidiaceae	<i>Stylidium</i>	<i>zeicolor</i>			KSW17222 ACC 9857	x	
Thymelaeaceae	<i>Pimelea</i>	<i>imbricata</i> var <i>piligera</i>				x	
Thymelaeaceae	<i>Pimelea</i>	<i>sulphurea</i>				x	
Thymelaeaceae	<i>Pimelea</i>	<i>aeruginosa</i>					x
Thymelaeaceae	<i>Pimelea</i>	<i>brevifolia</i>					x

Appendix 2: TPRF 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://dcpaw.wa.gov.au> under Standard Report Forms

TAXON: <u>Guichenotia asteriskos</u>		TPFL Pop. No: _____	
OBSERVATION DATE: <u>13/09/2022</u>		CONSERVATION STATUS: <u>P2</u>	New population <input checked="" type="checkbox"/>
OBSERVER/S: <u>Julie Waters and Katherine Walkerden</u>		PHONE: <u>9083 1518</u>	
ROLE: <u>Environmental Officers</u>		ORGANISATION: <u>Shire of Esperance</u>	
DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): <u>110 km north-west of Esperance townsite. Both sides of cascade Road immediately north of West Point road population extends 600m.</u>			
DBCA DISTRICT: <u>South Coast</u>		LGA: <u>Esperance</u>	Reserve No: _____
DATUM: <u>GDA94 / MGA94 <input checked="" type="checkbox"/></u> <u>AGD84 / AMG84 <input type="checkbox"/></u> <u>WGS84 <input type="checkbox"/></u> <u>Unknown <input type="checkbox"/></u>		COORDINATES: (If UTM coords provided, Zone is also required) DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM's <input checked="" type="checkbox"/> Lat / Northing: <u>301818 m E</u> Long / Easting: <u>6308086 m N</u> ZONE: <u>51 H</u>	METHOD USED: GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/> No. satellites: _____ Map used: _____ Boundary polygon captured: <input type="checkbox"/> Map scale: _____
LAND TENURE: Nature reserve <input type="checkbox"/> Timber reserve <input type="checkbox"/> Private property <input type="checkbox"/> Rall reserve <input type="checkbox"/> Shire road reserve <input checked="" type="checkbox"/> National park <input type="checkbox"/> State forest <input type="checkbox"/> Pastoral lease <input type="checkbox"/> MRWA road reserve <input type="checkbox"/> Other Crown reserve <input type="checkbox"/> Conservation park <input type="checkbox"/> Water reserve <input type="checkbox"/> UCL <input type="checkbox"/> SLK/Pole _____ to _____ Specify other: _____			
AREA ASSESSMENT: Edge survey <input type="checkbox"/> Partial survey <input checked="" type="checkbox"/> Full survey <input type="checkbox"/> Area observed (m ²): _____			
EFFORT: Time spent surveying (minutes): <u>3 hr</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 list)			
WHAT COUNTED: Plants <input checked="" type="checkbox"/> Clumps <input type="checkbox"/> Clonal stems <input type="checkbox"/>			
TOTAL POP'N STRUCTURE:			
	Mature:	Juveniles:	Seedlings:
Alive	<u>123</u>		
Dead			
			Area of pop (m ²): _____
Note: Pls record count as numbers (not percentages) for database.			
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 type="checkbox"/> Flower <input checked="" type="checkbox"/> Immature fruit <input type="checkbox"/> Fruit <input type="checkbox"/> Dehisced fruit <input type="checkbox"/> Percentage in flower: <u>80%</u>			
CONDITION OF PLANTS: Healthy <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Poor <input type="checkbox"/> Senescent <input type="checkbox"/>			
COMMENT: _____			
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+)			
• Gravel pits in the road reserve	L	M-H	S
• Construction of State Barrier Fence	L	H	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



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 type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input 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 checked="" type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input checked="" type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input 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"/>	Gravel _____				
Closed depression <input type="checkbox"/>	Specific Landform Element: _____				
Wetland <input type="checkbox"/>	(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*: 1. Open Eucalyptus pleurocarpa and Banksia media dominated mallee woodland with Acacia, Proteaceae and Goodeniaceae understorey

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

2. _____

3. _____

4. _____

ASSOCIATED SPECIES: Eucalyptus pleurocarpa, Gastrolobium sp., Acacia gonophylla, Grevillea pectinata, Leschenaultia sp.

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:

FIRE HISTORY: Last Fire: Season/Month: Recent - last 18 mths Fire Intensity: High Medium Low No signs of fire
Year: _____

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.)

Likely to be significantly more plants in surrounding area.

Old gravel pit within site, many plants observed respouting here.

KSW 12822; Accession 9740 (with specimen retained by Herbarium). It was confirmed by Michael Hislop on 25/10/2022

KW139, Accession 8867 (Collected in 2020) and (KSW 12822, Accession 9116 (Collected in 2021)(with specimens not retained by Herbarium).

DRF PERMIT/ LICENCE No: FT61000788 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: _____ 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: Julie Waters Role: Environmental Coordinator Signed: JW Date: 13/3/2023

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

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://dcpw.wa.gov.au> under Standard Report Forms

TAXON: <u>Grevillea aneura</u>		TPFL Pop. No: <u>WAherb</u>		
OBSERVATION DATE: <u>15/09/2022</u>		CONSERVATION STATUS: <u>P4</u> New population <input type="checkbox"/>		
OBSERVER/S: <u>Julie Waters and Katherine Walkerden</u>		PHONE: <u>9083 1518</u>		
ROLE: <u>Environmental Officers</u>		ORGANISATION: <u>Shire of Esperance</u>		
DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): <u>110 km north-west of Esperance townsite. Intersection of Cascades rd, West point Road and Rollond Roads.</u>				
Reserve No: _____				
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:				
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM's <input checked="" type="checkbox"/>		
AGD84 / AMG84 <input type="checkbox"/>		GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>		
WGS84 <input type="checkbox"/>		No. satellites: _____ Map used: _____		
Unknown <input type="checkbox"/>		Boundary polygon captured: <input type="checkbox"/> Map scale: _____		
Lat / Northing: <u>302252 m E</u>		Long / Easting: <u>6308308 m N</u>		
ZONE: <u>51 H</u>				
LAND TENURE:				
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/> Private property <input type="checkbox"/> Rail reserve <input type="checkbox"/> Shire road reserve <input checked="" type="checkbox"/>		
National park <input type="checkbox"/>		State forest <input type="checkbox"/> Pastoral lease <input type="checkbox"/> MRWA road reserve <input type="checkbox"/> Other Crown reserve <input type="checkbox"/>		
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/> UCL <input type="checkbox"/> SLK/Pole _____ to _____ Specify other: _____		
AREA ASSESSMENT: Edge survey <input type="checkbox"/> Partial survey <input checked="" type="checkbox"/> Full survey <input type="checkbox"/> Area observed (m ²): _____				
EFFORT: Time spent surveying (minutes): <u>3 hr</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 list)				
WHAT COUNTED: Plants <input checked="" type="checkbox"/> Clumps <input type="checkbox"/> Clonal stems <input type="checkbox"/>				
TOTAL POP'N STRUCTURE:				
Mature: <u>670</u>		Juveniles: _____		
Seedlings: _____		Totals: _____		
Area of pop (m ²): _____		Note: Pls record count as numbers (not percentages) for database.		
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 type="checkbox"/> Flower <input checked="" type="checkbox"/>				
Immature fruit <input type="checkbox"/> Fruit <input type="checkbox"/> Dehisced fruit <input type="checkbox"/> Percentage in flower: <u>100%</u>				
CONDITION OF PLANTS: Healthy <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Poor <input type="checkbox"/> Senescent <input type="checkbox"/>				
COMMENT: _____				
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+)				
• Gravel pits in the road reserve		L	M-H	S
• Maintenance grading		L	L	S
• Construction of State Barrier Fence		L	H	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:	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 type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input 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 checked="" type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input checked="" type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input 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"/>	Gravel _____				
Closed depression <input type="checkbox"/>	Specific Landform Element: (Refer to field manual for additional values)				
Wetland <input type="checkbox"/>					
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. Open Eucalyptus pleurocarpa and Banksia media dominated mallee woodland with Acacia,
Proteaceae and Goodeniaceae understorey

2.

3.

4.

ASSOCIATED

SPECIES:

Other (non-dominant) spp

Eucalyptus pleurocarpa, Gastrolobium sp., Acacia gonophylla, Grevillea pectinata, Leschenaultia sp.

* 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:

FIRE HISTORY: Last Fire: Season/Month: Recent - last 18 mths Fire Intensity: High Medium Low No signs of fire
Year: _____

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.)	
Previous population record on WAHerb extract - PERTH 08885519. Within 250 m of site	
Only surveyed within proposed clearing area, likely to be significantly more plants in surrounding area.	
Old gravel pit within site, many plants observed respouting here.	
Collector # KW080, confirmed by Michael Hislop at WA herbarium 10/12/20. Accession 8652. Specimen not retained by WA herbarium.	
PERTH 09375406	
575 of the 670 plants counted to be taken. population is significantly larger than this.	
DRF PERMIT/ LICENCE No: FT61000788 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: _____ WA Herb. <input checked="" type="checkbox"/> Regional Herb. <input type="checkbox"/> District Herb. <input type="checkbox"/> Other: _____
ATTACHED:	Map <input type="checkbox"/> Mudmap <input type="checkbox"/> Photo <input type="checkbox"/> GIS data <input checked="" type="checkbox"/> Field notes <input type="checkbox"/> Other: _____
COPY SENT TO:	Regional Office <input checked="" type="checkbox"/> District Office <input checked="" type="checkbox"/> Other: _____

Submitter of Record: Julie Waters Role: Environmental Coordinator Signed: JW Date: 13/3/2023

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

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://dpcw.wa.gov.au/> under Standard Report Forms

TAXON: <u>Banksia cinisoides/xylothemelia</u>	TPFL Pop. No: _____
OBSERVATION DATE: <u>25 10 12</u>	CONSERVATION STATUS: <u>New population</u> <input checked="" type="checkbox"/>
OBSERVERS: <u>Julie waters, Katherine Walkroten</u>	PHONE: _____
ROLE: <u>Environmental officers</u>	ORGANISATION: <u>Shire of Esperance</u>

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
Cascade rd near intersections of west point rd

DBCA DISTRICT: _____	LGA: <u>Esperance</u>	Land manager present: <input type="checkbox"/>
DATUM: <input checked="" type="checkbox"/> GDA94 / MGA94 <input checked="" type="checkbox"/> AGD84 / AMG84 <input type="checkbox"/> WGS84 <input type="checkbox"/> Unknown	COORDINATES: (If UTM coords provided, Zone is also required) DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input type="checkbox"/> Lat / Northing: <u>302390</u> Long / Easting: <u>6308306</u> ZONE: <u>51</u>	METHOD USED: GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/> No. satellites: _____ Map used: _____ Boundary polygon captured: <input type="checkbox"/> Map scale: _____
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): _____
EFFORT: Time spent surveying (minutes): <u>20</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 list)
WHAT COUNTED: Plants <input type="checkbox"/> Clumps <input type="checkbox"/> Clonal stems <input type="checkbox"/>	
TOTAL POP'N STRUCTURE:	
Alive	Mature: <u>4</u> Juveniles: <u>17</u> Seedlings: _____ Totals: _____
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 type="checkbox"/> Flower <input checked="" type="checkbox"/>	Percentage in flower: _____ %
Immature fruit <input type="checkbox"/> Fruit <input type="checkbox"/> Dehiscent fruit <input type="checkbox"/>	

CONDITION OF PLANTS: Healthy Moderate Poor Senescent

COMMENT: 2 dead seedlings

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential impact (L-E)	Potential Threat Onset (S-L)
• <u>sand widening</u>	<u>N</u>	<u>M</u>	<u>M</u>
• _____	_____	_____	_____
• _____	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA,**

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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:	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input 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 type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input checked="" type="checkbox"/>	Clay loam <input checked="" 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 checked="" type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input 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"/>					
CONDITION OF SOIL:	Dry <input type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

VEGETATION CLASSIFICATION*:

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

1. *Open tallgrass + mixed mallee woodland*
 2. *with She-oak + vegetation Sulcata*
 3. *chained heath with tallgrass, mallee*
regrowth

ASSOCIATED SPECIES:

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:

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.)

Plant is capable of surviving road grading, mature plant re-sprouting after recent grading

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: *RSW1521* 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: _____ Role: _____ Signed: _____ Date: / /

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 1.4 March 2021

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 www.dbca.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: <u>Goodenia laevis ssp laevis</u>	TPFL Pop. No: _____
OBSERVATION DATES: <u>2021-2022</u>	CONSERVATION STATUS: <u>P3</u> New population <input checked="" type="checkbox"/>
OBSERVER/S: <u>Julie Waters, Katherine Walkerden</u>	PHONE <u>0418558774</u>
ROLE: <u>Environmental Officers</u>	ORGANISATION: <u>Shire of Esperance</u>
EMAIL: <u>Katherine.Walkerden@esperance.wa.gov.au</u>	

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

North side of West Point road immediately west of Cascade road intersection.

Reserve No: _____	
DBC DISTRICT: <u>Esperance</u>	LGA: <u>Esperance</u> Land manager present: <input type="checkbox"/>
DATUM: <u>GDA94 / MGA94</u> <input checked="" type="checkbox"/>	COORDINATES: (if UTM coords provided, Zone is also required)
<u>AGD84 / AMG84</u> <input type="checkbox"/>	DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM's <input type="checkbox"/>
<u>WGS84</u> <input type="checkbox"/>	METHOD USED: GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
<u>Unknown</u> <input type="checkbox"/>	Lat / Northing: <u>6308216</u> No. satellites: _____ Map used: _____
	Long / Easting: <u>302125</u> Boundary polygon captured: <input type="checkbox"/> Map scale: _____
	ZONE: <u>51</u>
LAND TENURE:	
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/> Private property <input type="checkbox"/> Rail reserve <input type="checkbox"/> Shire road reserve <input checked="" type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/> Pastoral lease <input type="checkbox"/> MRWA road reserve <input type="checkbox"/> Other Crown reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/> UCL <input type="checkbox"/> SLK/Pole _____ to _____ Specify other: _____

AREA ASSESSMENT: <u>Edge survey</u> <input type="checkbox"/> <u>Partial survey</u> <input checked="" type="checkbox"/> <u>Full survey</u> <input type="checkbox"/>	Area observed (m ²): _____
EFFORT: Time spent surveying (minutes): _____	No. of minutes spent / 100 m ² : _____
POP'N COUNT ACCURACY: <u>Actual</u> <input type="checkbox"/> <u>Extrapolation</u> <input type="checkbox"/> <u>Estimate</u> <input type="checkbox"/> <u>Count method</u> : _____	(Refer to field manual for list)
WHAT COUNTED: <u>Plants</u> <input checked="" type="checkbox"/> <u>Clumps</u> <input type="checkbox"/> <u>Clonal stems</u> <input type="checkbox"/>	
TOTAL POP'N STRUCTURE:	
Alive	Mature: <u>295</u> Juveniles: _____ Seedlings: _____ Totals: _____
Dead	_____
	Area of pop (m ²): _____
	Note: Pls record count as numbers (not percentages) for database.
QUADRATS PRESENT: No. _____ Size _____ Data attached <input type="checkbox"/>	Total area of quadrats (m ²): _____
Summary Quad. Totals: Alive	_____
REPRODUCTIVE STATE: <u>Clonal</u> <input type="checkbox"/> <u>Vegetative</u> <input type="checkbox"/> <u>Flowerbud</u> <input type="checkbox"/> <u>Flower</u> <input checked="" type="checkbox"/>	
<u>Immature fruit</u> <input type="checkbox"/> <u>Fruit</u> <input type="checkbox"/> <u>Dehiscent fruit</u> <input type="checkbox"/>	Percentage in flower: <u>70%</u>
CONDITION OF PLANTS: <u>Healthy</u> <input checked="" type="checkbox"/> <u>Moderate</u> <input type="checkbox"/> <u>Poor</u> <input type="checkbox"/> <u>Senescent</u> <input type="checkbox"/>	
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=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
Shire gravel pit extraction	<u>N</u>	<u>E</u>	<u>S</u>
Strategic firebreak maintenance	<u>N</u>	<u>E</u>	<u>M</u>
Shire road grading	<u>N</u>	<u>M</u>	<u>S</u>

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

Record entered by: _____ Sheet No.: _____ Record Entered in Database



Department of Biodiversity,
Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

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 type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input checked="" type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input checked="" 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 checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input 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"/>	Specific Landform Element: (Refer to field manual for additional values)				
Wetland <input type="checkbox"/>					
CONDITION OF SOIL:	Dry <input 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 (*M.tetragona*)

1. Mixed Mallee over Mixed *Melaleuca* shrubland with *Acacia* and Goodeniaceae understory

2.

3.

4.

ASSOCIATED SPECIES:

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:

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.)

Grading appears to stimulate germination

FLORA AUTHORISATION / LICENCE No: FT1000788, FT1000787 Note if only observing plants (i.e. no specimens or plant material is taken) then no authorisation/licence is required. For further information on authorisation and licensing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: WA Herb. Regional Herb. District Herb. Other: _____

LODGE: WA Herb
Lodgement No: PERTH
9375384

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

COPY SENT TO: Regional Office District Office Other: _____

Submitter of Record: Julie Waters Role: Environmental Coordinator Signed: JW Date: 13/3/2023

Please return completed form to **Species And Communities Program 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 Program.

Record entered by: _____ Sheet No.: _____ Record Entered In Database

Appendix 3: Description of Threatened and Priority Flora Species with the Potential to occur within the Cascade Road Dog Fence and Gravel Pit Survey Area

Species	Cons Status	Associated Habitat	Likely to occur	Distance from site (km)
<i>Acacia amyctica</i>	P2	Salmon Gums area on well-drained loams and sandy clay plains with <i>Eucalyptus flocktoniae</i> low woodland.	Unlikely – incorrect vegetation type association.	4.156
<i>Acacia bartlei</i>	P3	Salmon Gums area, waterlogged depressions in brown/grey sandy clay. Tolerates low level salinity.	Possible – indication in burnt area of vegetation type with waterlogged clays.	6.984
<i>Acacia diminuta</i>	P1	Sandy loam. Mallee, recently burnt	Possible	0.6486
<i>Acacia singula</i>	P3	Gravelly sand over laterite, white or yellow sand. Rises abd hilltops. Present in heath, scrub and Mallee shrubland. Occurs from Lake Grace to Hatter Hill.	Possible	3.633
<i>Banksia cirsioides</i> / <i>xylothemelia</i>	P3	Sandy loam, usually over laterite. Sandplains. Shrubland with <i>Allocasuarina</i> , <i>Callitris</i> , <i>Melaleuca</i> and <i>Hakea</i> sp..	Possible	0.02969
<i>Banksia xylothemelia</i>	P3	Disturbed gravel areas. Low shrubland with <i>Melaleuca</i> and Mallee woodland. 200 metres from project.	Possible	8.125
<i>Bentleya diminuta</i>	P2	Open mallee woodland and mallee scrub flat plains. White to brown sandy clay, shallow sandy loam.	Possible	2.435
<i>Brachyloma nguba</i>	P1	Areas around saline water. Calcareous or semi-saline clay loams, limestone.	No	3.4
<i>Comesperma calcicola</i>	P3	<i>Eucalyptus platypus</i> woodland over <i>Acacia</i> shrubland. Clay Loam Soil. Esperance region specimens are geographically inaccurate	No	11.469
<i>Commersonia rotundifolia</i>	P3	<i>Eucalyptus pleurocarpa</i> woodlands. Associated with sand. Originally only known in Frank Hann, but recently found in Cascade area. Has been recorded in burnt areas.	Possible	9.945
<i>Conospermum sigmoideum</i>	P2	Sandy loam, usually over laterite. Sandplains. Shrubland with <i>Allocasuarina</i> , <i>Callitris</i> , <i>Melaleuca</i> and <i>Hakea</i> sp..	Possible	18.931
<i>Conostylis lepidospermoides</i>	T	Highly diverse dense shrubland. Recorded in the direct adjacent area.	Possible	9.208

<i>Cryptandra polyclada</i> subsp. <i>polyclada</i>	P3	Associated with sandplains. Mallee with shrubland-heath species. Recorded in disturbed areas.	Possible – <i>Banksia media</i> sandplain area.	0.212
<i>Dampiera orchardii</i>	P2	Sand, Nearby salt lakes, embankment of saline playa.	Unlikely	7.944
<i>Eremophila chamaephila</i>	P3	Open mallee woodland with limestone.	Unlikely – due to lack of limestone.	11.958
<i>Eremophila subteretifolia</i>	T	Sand, loam. Edges of salt lakes, sub-saline flats	Unlikely	19.257
<i>Eucalyptus famelica</i>	P3	Calcareous sand, sandy clay loam & stones. Leeward of primary dunes, around salt lakes.	Possible	4.156
<i>Eucalyptus stoatei</i>	P4	Associated with gravelly sand or clay and sandy loam. Flats and rises.	Possible	9.470
<i>Frankenia glomerata</i>	P4	White sand	Unlikely	11.539
<i>Goodenia laevis</i> subsp. <i>laevis</i>	P3	Sandy loam or laterite.	Possible	0.1964
<i>Grevillea aneura</i>	P4	Associated with sand, sandy clay, gravel.	Possible	0.02503
<i>Guichenotia asteriskos</i>	P2	Gravelly soils with overlying sand	Possible	0.01995
<i>Gyrostemon ditrigynus</i>	P4	After fire. Sand, sandy clay, loam. Plains, low ironstone ridges.	Possible	1.909
<i>Hibbertia carinata</i>	P1	Well drained gravelly sand, yellow sand with gravel.	Possible	16.749
<i>Hypocalymma</i> sp. Cascade (R. Bruhn 20896)	T	Associated with sandy loam.	Possible	11.666
<i>Levenhookia pulcherrima</i>	P3	Associated with sand.	Possible	4.156
<i>Melaleuca similis</i>	P1	Grows on margins of saline drainage lines in grey sand.	No	4.156
<i>Mirbelia densiflora</i>	P3	Stony loam and loamy sand. Small ridges, breakaways and undulating plains.	Unlikely	10.071
<i>Persoonia scabra</i>	P3	Associated with granite, limestone, white sand and sandy loam. Associated species include: <i>Melaleuca striata</i> , <i>Anarthria scabra</i> , <i>Conothamnus aureus</i> and <i>Adenanthos cuneatus</i> .	No	12.043
<i>Philotheca gardneri</i> subsp. <i>globosa</i>	P1	Associated with heathland and sandy soils.	Possible	6.657

<i>Spyridium mucronatum</i> subsp. <i>recurvum</i>	P3	Mallee heath, sandy clay loam	Possible	18.982
<i>Streptoglossa</i> sp. South Coast (R.M. Hoggart 16/1113)	P2	Sandy loam, recently burnt	Possible	3.947

Appendix 4: Description of Threatened and Priority Fauna Species with the Potential to occur within the Cascade Road Dog Fence and Gravel Pit Survey Area

Threatened or priority Fauna identified by the desktop study to be present within a 20 km radius of 'Site A – Cascade Road Dog Fence and Gravel Pit' project area using the DBCA Threatened and Priority Fauna dataset (DBCA, 2022d) and the EPBC Act Protected Matters Report.

Nt. Acronyms used in the table include critically endangered (CR) and endangered (EN), Vulnerable (VU), other specially protected (OS), Priority (P).

Taxon	Common name	WA Cons. Status	Habitat Description	Likely to occur
<i>Leipoa ocellata</i>	Malleefowl	VU	Malleefowl are found in arid and semi-arid areas dominated by mallee eucalypts on sandy soils. They are known to also occur in Mulga (<i>Acacia aneura</i>), Broombush (<i>Melaleuca uncinata</i>), Scrub Pine (<i>Callitris verrucosa</i>), Eucalyptus woodlands and coastal heathlands. Malleefowl require abundant leaf litter and a sandy substrate for the successful construction of nest mounds.	Yes
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	Densely vegetated wetlands.	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	Intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	No
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	EN	Uncleared and remnant areas of woodland, shrubland and kwonkgan heath dominated by proteaceous species. They breed in the semiarid and subhumid interior eucalypt woodlands, principally dominated by Salmon Gum <i>Eucalyptus salmonophloia</i> or Wandoo <i>Eucalyptus wandoo</i> .	Potentially

<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	VU	Historically inhabited a wide range of habitats, but today it survives mostly in Jarrah Eucalyptus marginata forests and woodlands, mallee shrublands and heathlands.	Potentially
<i>Falco hypoleucos</i>	Grey Falcon	VU	The distribution of this species is restricted largely to areas of the highest annual average temperatures where there is an average annual rainfall of less than 500 mm. It favours lightly timbered and untimbered lowland plains that are crossed by tree-lined watercourses. It uses the abandoned nests of other bird species, particularly corvids.	Potentially
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	CR	Coastal mudflats and estuaries.	No
<i>Pezoporus occidentalis</i>	Night Parrot	CR	Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt.	No
<i>Parantechinus apicalis</i>	Dibbler	EN	Dibblers seem to prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more. In some locations, the presence of Proteaceous and Myrtaceous flowering shrubs may also be important.	No

Appendix 5: State Threatened and Priority Flora and Fauna Definitions

Category	Definition
T – Threatened	<p>Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedules 1 to 4 of the Wildlife Conservation (Rare Flora) Notice under the WC Act). Threatened flora are further ranked by the DBCA to align with IUCN Red List categories and criteria:</p> <p>CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild (Schedule 1);</p> <p>EN: Endangered – considered to be facing a very high risk of extinction in the wild (Schedule 2); or</p> <p>VU: Vulnerable – considered to be facing a high risk of extinction in the wild (Schedule 3).</p> <p>EX: Presumed Extinct – taxa that have been adequately searched for and there is no reasonable doubt that the last individual has died (Schedule 4)</p>
P1 – Priority 1 (Poorly known taxa)	<p>Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation.</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.</p>
P2 – Priority 2 (Poorly known taxa)	<p>Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc.</p> <p>Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.</p>
P3 – Priority 3 (Poorly known taxa)	<p>Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.</p> <p>Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>
P4 – Priority 4 (Rare, Near Threatened and other taxa in need of monitoring)	<p>1. Rare - Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>2. Near Threatened - Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>3. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy</p>

Appendix 6: Commonwealth Definition of Threatened Flora and Fauna Species (Environment Protection and Biodiversity Conservation, EPBC Act 1999)

Category Code	Category
Ex	Extinct Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Appendix 7: State Definition of Threatened Ecological Communities

Category Code	Category
PTD	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:</p> <ul style="list-style-type: none"> (i) records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; (ii) all occurrences recorded within the last 50 years have since been destroyed.
CE	<p>Critically Endangered</p> <p>An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the short term future.
V	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; (ii) The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; (iii) The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Appendix 8: State Definition of Priority Ecological Communities

Category Code	Category
P1	Poorly-known ecological communities Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	Poorly-known ecological communities Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	Poorly known ecological communities (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) Communities known from a few widespread occurrences, which are either large or within Significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	Conservation Dependent ecological communities Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix 9: Commonwealth Definition of Threatened Ecological Communities

Three categories exist for listing threatened ecological communities under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Listing Category Code	Explanation of Category
Critically endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium term future.

Appendix 10: Categories and Control of Declared (Plant) Pests in Western Australia

Control Category	Control Measures
<p>C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.</p>	<p>In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.</p>
<p>C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible'. Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.</p>	<p>In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.</p>
<p>C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to — (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.</p>	<p>In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to — (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.</p>

Appendix 11: Definition of Vegetation Condition Scale

For the south west and interzone botanical provinces

Condition Rating	Description
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance
Excellent (2)	Vegetation structure intact; disturbance affecting individual species; weeds are non-aggressive species.
Very Good (3)	Vegetation structure altered; obvious signs of disturbance For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging; & grazing.
Good (4)	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires; the presence of some very aggressive weeds at high density; partial clearing; dieback; & grazing
Degraded (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires; the presence of very aggressive weeds; partial clearing; dieback; & grazing.
Completely Degraded (6)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 12: Carnaby's Cockatoo foraging habitat scoring template

Adapted from Tables A1 and A2 of Department of Agriculture, Water and the Environment (2022)

Starting score	Carnaby's Cockatoo	
10	<p>Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as <i>Banksia</i> spp. (including <i>Dryandra</i> spp.), <i>Hakea</i> spp. and <i>Grevillea</i> spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation.</p> <p>*This tool only applies to sites equal to or larger than 1 hectare in size.</p>	
Attribute	Subtractions	Context adjustor (attributes reducing functionality of foraging habitat)
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.
Connectivity	-2	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 1km of your site.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12km from breeding habitat.
Proximity to roosting	-1	Subtract 1 if you have evidence to conclude that your site is more than 20km from a known night roosting habitat.
Impact from significant plant disease	-1	Subtract 1 if your site has disease present (e.g. <i>Phytophthora</i> spp. or Marii canker) and the disease is preferred food plants present.
Total score	Enter score	
Other considerations for assessment of foraging habitat	<ul style="list-style-type: none"> - The presence, extent and density (including foliage cover and flowering density) of all plant species that provide foraging, including non-native food sources used - The distribution and size of foraging habitat in proximity (e.g. up to 12 km) to the impact site. - Site degradation (such as cleared, disturbed or degraded areas). - The fire history of the impact site. - Landscape characteristics around the impact site, including details of roosting and breeding habitat in proximity (e.g. up to 20km for roosting and 12km for breeding); and - The location and details of watering points that could support the use of the foraging habitat. 	
Appraisal	<p>To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.</p>	

Appendix 13: EPBC Act Protected Matters Report

Listed Threatened Ecological Communities:

Community Name	Threatened Category	Rank	Presence	
			Text	Buffer Status
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Likely	Community likely to occur within area	In feature area

Listed Threatened Species:

Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status
<i>Hypocalymma</i> sp. Cascade (R. Bruhn 20896)		Plant	Known	Species or species habitat known to occur within area	Endangered	
<i>Conostylis lepidospermoides</i>	Sedge Conostylis	Plant	Known	Species or species habitat known to occur within area	Endangered	
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	Small Two-colour Kangaroo Paw	Plant	Likely	Species or species habitat likely to occur within area	Endangered	
<i>Ricinocarpus trichophorus</i>	Barrens Wedding Bush	Plant	May	Species or species habitat may occur within area	Endangered	
<i>Parantechinus apicalis</i>	Dibbler	Mammal	Likely	Species or species habitat likely to occur within area	Endangered	
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Mammal	Likely	Species or species habitat likely to occur within area	Vulnerable	
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	Bird	May	Species or species habitat may occur within area	Critically Endangered	Migratory

<i>Calidris ferruginea</i>	Curlew Sandpiper	Bird	May	Species or species habitat may occur within area	Critically Endangered	Migratory
<i>Pezoporus occidentalis</i>	Night Parrot	Bird	May	Species or species habitat may occur within area	Endangered	
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Bird	May	Species or species habitat may occur within area	Endangered	
<i>Zanda latirostris</i>	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Bird	Likely	Species or species habitat likely to occur within area	Endangered (listed as <i>Calyptorhynchus latirostris</i>)	
<i>Leipoa ocellata</i>	Malleefowl	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	
<i>Falco hypoleucos</i>	Grey Falcon	Bird	May	Species or species habitat may occur within area	Vulnerable	