Vegetation, Flora, Fauna and Environmental Considerations Report

Flinders Estate Fire Mitigation

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Acknowledgement of country

The Shire of Esperance acknowledges the Kepa 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 respects to 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 Stage 4 Flinders Estate Fire Mitigation project.

The proposed development involves the clearing (mulching) of a total of 2.808 ha of native vegetation. Clearing was being conducted for the purpose of fire mitigation activities to create a 100m buffer around the proposed Stage 4 Flinders Estate subdivision. Ideally this clearing should have been included in the subdivision proposal, however it needs to be retrospectively applied for to lower the Bushfire Assessment Level (BAL) of the subdivided blocks to BAL-LOW. It should be noted that eventually this 2.808 ha will be cleared as part of the future stages of the Flinders subdivision which extends to Bandy Creek.

Katherine Walkerden the Shire of Esperance's Environmental Officer completed the site assessment on Flinders Estate Fire Mitigation on the 30th of October 2023.

A total of 57 vascular plant taxa, representative of 52 genera and 33 families, were recorded within Flinders Estate Fire Mitigation survey area. Of these 34 were native species and 23 were introduced. Myrtaceae (5 taxa) and Poaceae (7 taxa) were the most common families (see Appendix 1 for the complete incidental species list).

No threatened and 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 Flinders Estate Fire Mitigation 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 Flinders Estate Fire Mitigation survey area.

No Threatened or Priority Ecological communities were located within the project area.

Overall, the vegetation communities mapped and species recorded in the Flinders Estate Fire Mitigation survey area were consistent with the historical mapping of Beard (1976). The vegetation community is well represented at a local and regional scale.

Should the development of Flinders Estate Fire Mitigation 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:

- All vehicles and construction equipment to be cleaned prior to start of the project
- Clearing debris within degraded areas that contains a large number of weeds to be contained within degraded areas.
- Follow up spraying of emergent weeds to prevent weeds coming into the weed free areas

These have been addressed in the attached Weed and Dieback plan, and provided these measures are implemented, there should be no impediments to the Flinders Estate Fire Mitigation project.

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 'Flinders Estate Fire Mitigation' project as a Purpose Permit' (Figure 1), for the purpose of fire risk reduction.

1.1 Location and Scope of Project

The proposed works are located within the Esperance townsite, within several Shire of Esperance managed lots and road reserves, these are:

- Lot 9003 on Plan 069443
- Lot 9002 on Plan 069443
- Westmacott Street Road isolation reserve
- Thistle Avenue Road isolation reserve
- Chappell Way Road isolation reserve
- Tribune Parade Road isolation reserve
- Easement – P&D 167 Reg 33(a)(9003-33ab-dp64773)
- Easement - P&D 167 Reg 33(a)(9003-33aa-dp64773)
- Easement - P&D 167 Reg 33(a)(9003-33a-dp64773)

A point within the proposed clearing permit area is 6255749 m N, 400279 m E (UTM Zone 51 H, GDA94).

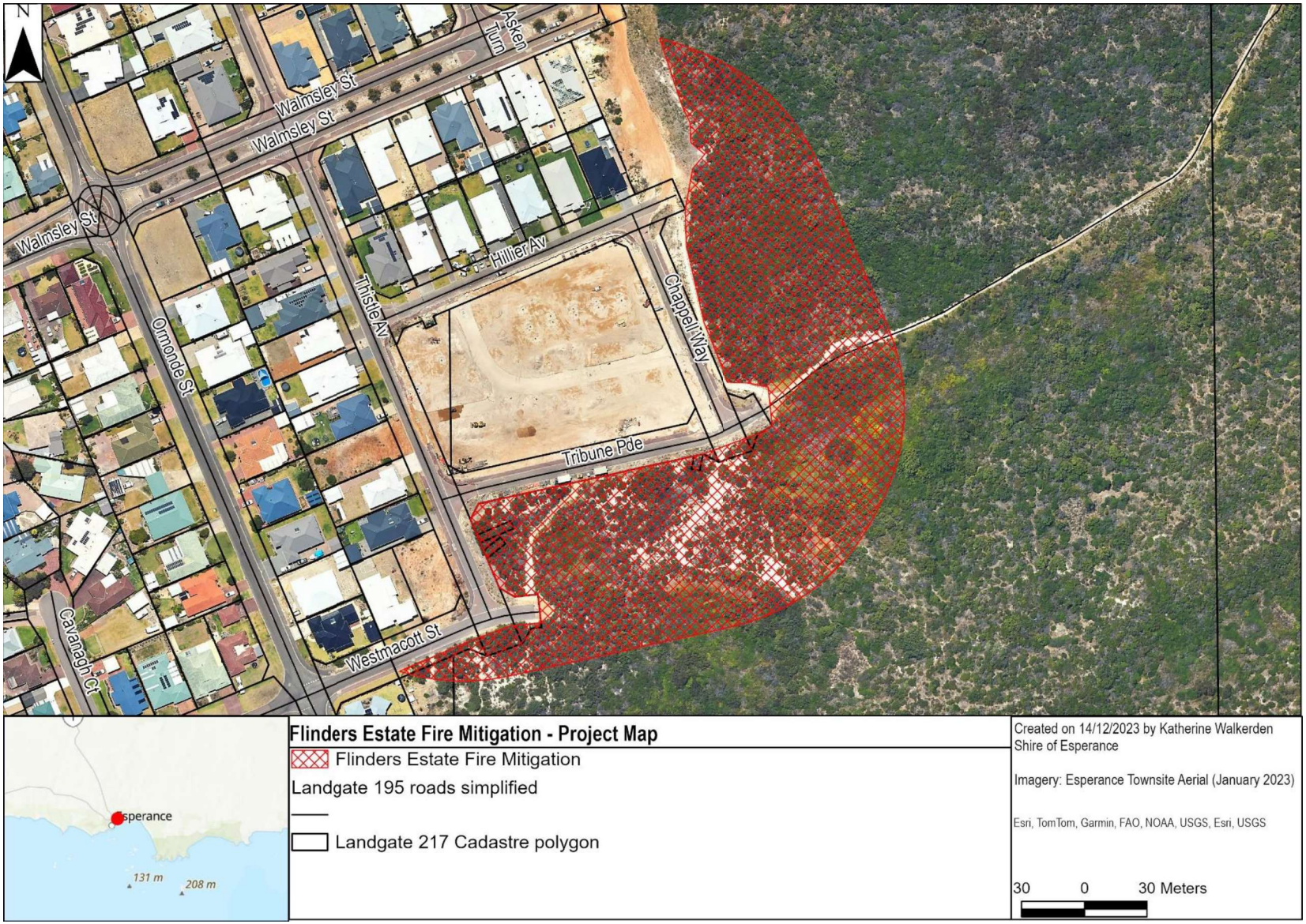

Figure 1. Location of Flinders Estate Fire Mitigation

1.2 Environmental Legislation and Guidelines

The Commonwealth (federal) legislation relevant to this survey:

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

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

- 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:

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

International Agreements relevant to this survey are:

- 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); and
- 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 Flinders Estate Fire Mitigation survey area. This is inclusive of the following:

- Undertake a desktop study of the flora, fauna and vegetation of the Flinders Estate Fire Mitigation 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 Flinders Estate Fire Mitigation survey area;
- Undertake a detailed survey of the Flinders Estate Fire Mitigation 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 Flinders Estate Fire Mitigation survey area;
- Define and map the location of any threatened and priority flora located within the Flinders Estate Fire Mitigation 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

Desktop information was collated for all areas within a 20 km buffer zone of the site using DBCA datasets sourced under agreement. These data sources are listed below:

- Western Australian Herbarium data (WAH);
- Threatened and Priority Flora Database (TPFL);
- DBCA's Esperance District Threatened Flora spatial dataset;
- Threatened and Priority Ecological Communities (TECs & PECs);
- Threatened, Specially Protected and Priority fauna; and
- Black cockatoo roost and breeding sites.

Additionally, the EPBC Act Protected Matters Search Tool (PMST), was also checked to identify the possible occurrence of Threatened and Priority flora, fauna and ecological communities within the Flinders Estate Fire Mitigation area. Search parameters were 'by polygon' and a 20 km buffer was applied to the search area; standard used in this IBRA subregion. Historical and State documentation and datasets consulted include:

- Vegetation mapping of the region, principally the coarse-scale vegetation associations of Beard (1976);
- Vegetation Extent by Statewide Pre-European mapping statistics (GoWA, 2020);
- Soil landscape mapping (DAFWA);
- Dieback Information Data Management System (DIDMS; Gaia Resources);
- Shire of Esperance Weed Mapping Data;
- Existing site digital orthophotos (Esperance Townsite 2023; Esperance Townsite 2022; Esperance Townsite 2014);
- Atlas of Living Australia (ALA) database;
- Hydrographic Catchments (DWER); and
- Crown Reserves (Landgate).

3.2 Field Survey

The site was initially inspected on 30th of October 2023, by Katherine Walkerden (SOE Environmental Officer). 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.

A detailed field assessment of the flora and vegetation of the Flinders Estate Fire Mitigation survey area was undertaken by Shire of Esperance botanists from 30th of October 2023 in accordance with methods outlined in Technical Guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016).

The methodology for assessing threatened and priority flora consisted of traversing by foot the Flinders Estate Fire Mitigation survey area. 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.

All species unknown in the field were collected, pressed and dressed in accordance with WAH instructions, and later identified 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. Nomenclature of the species recorded is in accordance with the WAH.

The vegetation communities of Flinders Estate Fire Mitigation was assessed for the presence a TEC or PEC (DBCA 2018, 2023a) comparing that to descriptions in approved conservation advice for these communities.

Specifically, the site was assessed for the 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC, which is listed as 'Endangered' under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999). 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 2023c)' definitions.

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 'Flinders Estate Fire Mitigation' for fauna species identified in the desktop survey. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris)* feeding, roosting and nesting habitat was also assessed using EPBC Act referral guidelines (2022).

3.3 Survey Timing

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 surveys at Flinders Estate Fire Mitigation were conducted in October.

3.4 Vegetation Descriptions

Vegetation communities present within the survey area were 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.

3.5 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 1: 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:** Staff 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.
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:** Most of the survey area was thoroughly covered, some areas were too dense to be covered. The threatened and priority flora search undertaken by botanists

	by means of foot-traverse between vegetation 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.
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). All surveys have been conducted in October which falls within this period. Rainfall in 2022 was above average, and continued well into December.
Disturbances (fire/flood/clearing)	**Not a limitation**: A large section of the estate had been previously cleared, sufficient time for recovery had occurred since the clearing.

4 DESKTOP ASSESSMENT RESULTS

4.1 Climate

The Esperance climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2022). The area receives an average annual rainfall of 618 mm.

4.2 Catchment

The project is present within the Esperance Coast Basin. It is located approximately 200m from the coast.

4.3 Geology, Soils and Topography

A single unit was identified within 'Flinders Estate Fire Mitigation', by Schoknecht et al. (2004). It is described as "Quaternary coastal sands mostly calcareous and unconsolidated". Within the area soil was described as "Calcareous deep sands associated pale deep sands and minor calcareous shallow sands". Using Schnoknect et al. (2004), the project topography is listed as "Level plain with moderately inclined dune ridges and associated swales with occasional swamps"

4.4 Regional Vegetation

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

Beard (1973) mapped the Fanny cove 42 vegetation association (VA) within the 'Flinders Estate Fire Mitigation' (Table 2). Fanny cove 42 has over 90% of its pre-European vegetation remaining at all levels and 46% of its current extent conserved in IUCN areas.

Table 2. Vegetation association mapped by Beard (1973) within Flinders Estate Fire Mitigation, and statistics on pre-European remaining areas.

Vegetation Association	
Name	Fanny Cove 42
Description	Shrublands; mallee & acacia scrub on south coastal dunes
Pre-European extent in IBRA sub-region ESP2 (%)	95.56
Pre-European extent in LGA (%)	94.87
Current extent conserved in IUCN area (%)	46.12

4.5 Surrounding Land Use

The area directly included in the clearing permit application Flinders Estate Fire Mitigation is currently intact and vegetated Freehold land, managed by the Shire of Esperance though this remnant vegetation is currently zoned for residential (R15), public open space and tourism purposes and is planned to be cleared for future subdivisions. The land use to the west of the site is residential.

The site was 2.7km from Reserve 23825 'Mullet Lake Nature Reserve' the closest conservation reserve, this reserve is also Ramsar listed. Several other conservation vested reserves were within 5km of the site, several of these are also Ramsar listed.

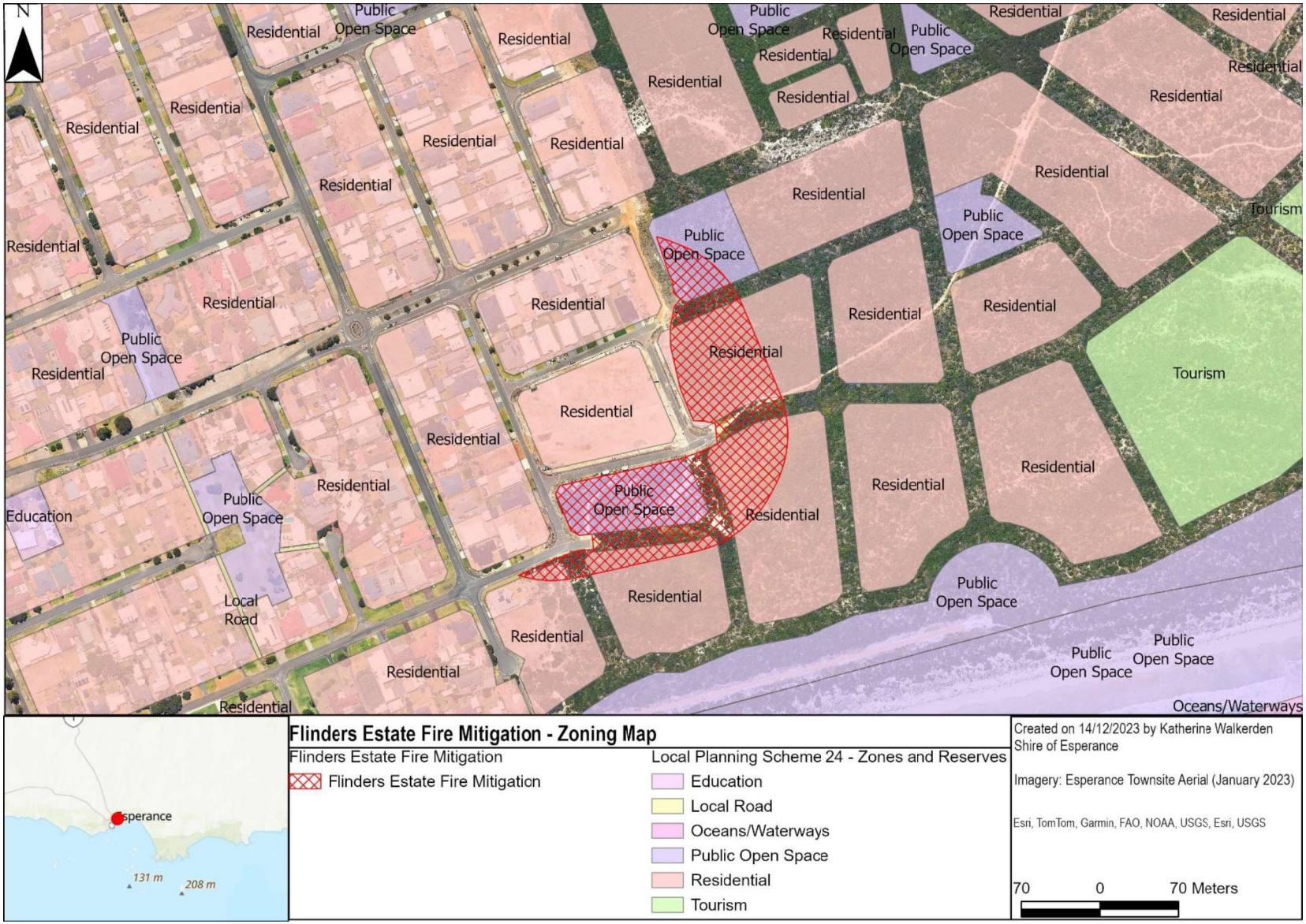

Figure 2. Map of Flinders Estate Fire Mitigation project area with current zoning scheme.

4.6 Potential Threatened and Priority Flora

No threatened flora (TF) and 42 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Appendix 2)). Of these, no PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of Flinders Estate Fire Mitigation project.

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)' 1.2km for the project area. The EPBC Act 1999 listed TEC 'Subtropical and Temperate Coastal Saltmarsh' was 1km from the project area.

No other TEC's or priority ecological communities (PEC) were identified by the desktop study as being within a 20 km buffer of the site.

4.8 Potential Threatened and Priority Fauna

76 conservation listed fauna were recorded within a 20 km radius of the proposed impact site (Appendix 3)). A majority of these species were marine or wetland associated fauna, registering due to the projects short distance from the coast and the Esperance lake system.

4.9 *Phytophthora* Dieback

Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2022) data shows a positive *Phytophthora cinnamomi* Dieback sample results in 2km from the project area. Portions of the project area are mapped as a 'dispersal risk area' in the DIDMS Phytophthora dieback dispersion model.

5 FIELD SURVEY RESULTS AND DISCUSSION

5.1 Flora

A total of 57 vascular plant taxa, representative of 52 genera and 33 families, were recorded within Flinders Estate Fire Mitigation survey area. Of these 34 were native species and 23 were introduced. Myrtaceae (5 taxa) and Poaceae (7 taxa) were the most common families (see Appendix 1 for the complete incidental species list).

No Threatened or Priority flora species were identified within the clearing footprint.

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, *Austrostipa sp.*

5.2 Weeds

There was significant weed invasion across portions of the proposed Flinders Estate Fire Mitigation area. Overall, 23 non-native species were identified within the project area (Appendix 1). Of these, the most extensive and of serious concern was *Gaudium laevigatum*, which had formed dense thickets in the degraded sections of the site, crowding out native vegetation. This is a priority environmental weed in the Shire of Esperance's Environmental Weed Strategy 2009-2018. Various grass weeds had a significant distribution on the vegetations edges and in the historically cleared sections of the site. Two weeds of National Significance were present within the site these were *Lycium ferocissimum* and *Asparagus asparagoides*. Two mature *Lycium ferocissimum* plants were present within the project area and posed a significant dispersal risk to nearby areas. *Asparagus asparagoides* was prevalent throughout most of the project area except the Excellent condition vegetation.

It is highly likely that proposed works will increase the distribution of weeds, particularly of *Gaudium laevigatum*. Ideally, regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species needs to occur.

Several non-native species had been planted by neighboring landowners, these included *Grevillea olivacea* and an immature non-native Eucalyptus. However, these species were not naturalizing and are unlikely to pose any serious risk of spread.

Weed specimen's that resulted in a range extension were sent to the WAH. One species was collected that resulted in range extensions, this was *Diplotaxis muralis* (Accession #10518; KSW08923, Specimen retained). Taxon was new to the Recherche IBRA subregion.

Figure 3. Example of dense thicket of *Gaudium laevigatum* within the project area. Photo taken by Katherine Walkerden on the 30/10/2023.

5.3 Phytophthora Dieback

Vegetation within the project area was not vulnerable to phytophthora dieback infection, as a result there was no clear evidence of dieback infection within the project area.

5.7 Vegetation Communities

Vegetation within the project area was an *Acacia cyclops* and *Spyridium globulosum* dominated closed tall shrubland with dense a *Lepidosperma gladiatum* dominated sedge layer. It is believed that the Beard Vegetation Association, Fanny Cove 42 was a suitable vegetation association for the project's vegetation.

Figure 4. *Acacia cyclops* and *Spyridium globulosum* dominated closed tall shrubland with dense a *Lepidosperma gladiatum* dominated sedge layer. Photo taken by Katherine Walkerden on the 30/10/2023.

Figure 5. *Acacia cyclops* and *Spyridium globulosum* dominated closed tall shrubland with dense a *Lepidosperma gladiatum* dominated sedge layer. Photo taken by Katherine Walkerden on the 30/10/2023.

5.8 Vegetation Condition

Vegetation condition varied dramatically throughout the site varying from Excellent condition to Completely degraded condition. A majority of the vegetation on the eastern side of the project was in Excellent condition having no historical disturbances and some minor weed invasion, this area was part of a large area of remnant vegetation. Within these areas the edges of the vegetation patches were in a lower condition with moderate weed invasion, rubbish dumping and historical clearing present.

The western portion of the site had experienced significant past disturbance events with a 0.8ha area being historically cleared, sand extraction, rubbish dumping, garden waste dumping and several walking trails were evident within the western portion of the site. The areas with significant disturbance have been heavily invaded by various weeds, with dense thickets of *Gaudium laevigatum* present in some areas.

In addition, Lot 9002 on Plan 069443 has been heavily used by the neighbouring landholder with vegetable patches, woodpiles and ornamental trees present within the lot.

Quantifying vegetation condition, there is:

- 0.970 ha of vegetation within is in an excellent condition,
- 0.481 ha of vegetation within is in a very good condition,
- 0.608 ha of vegetation within is in a good condition,
- 0.578 ha of vegetation within is in a degraded condition,
- 0.170 ha of vegetation within is in a completely degraded

Figure 6. Rubbish dumping present within Flinders Estate Fire Mitigation.

Figure 7. Rubbish dumping present within Flinders Estate Fire Mitigation.

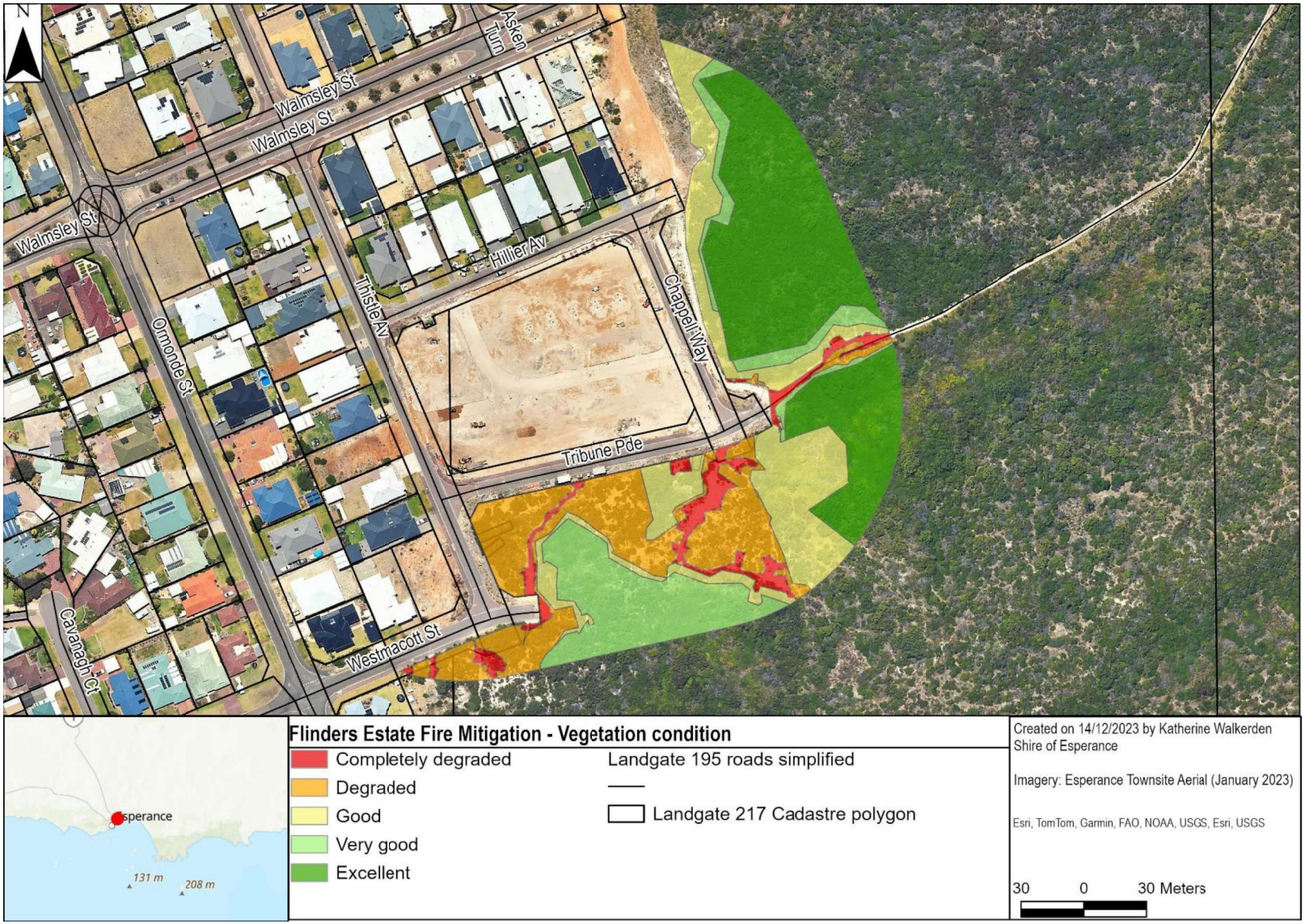

Figure 8. Vegetation condition across Flinders Estate Fire Mitigation project, ranging from Excellent to Completely degraded condition.

5.9 Threatened Ecological Communities

The EPBC listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia' TEC was listed as occurring 1.2km form the project area. The TEC is characterised by Proteaceous species having 30% or greater cover of Proteaceous species across all layers where these shrubs occur, there was a complete lack of native proteaceous species within the project area and therefore cannot be considered Kwongan TEC.

The EBC listed 'Subtropical and Temperate Coastal Saltmarsh' TEC was recorded as occurring 1km form the project area, the vegetation within the project area was not associated with any saltmarsh and the TEC was not considered relevant to the site.

5.10 Fauna

Of the species identified within the desktop survey, only the Southern Death Adder (*Acanthophis antarcticus*) and Quenda (*Isoodon fusciventer*) have potentially suitable habitat within the proposed clearing permit area.

During the field survey the evidence of European rabbits was seen. No evidence of other invasive fauna, such as scats or digging, were observed. However, it is highly likely that foxes and free roaming domestic cats are extensive throughout the area.

5.10.1 Quenda, *Isoodon fusciventer,* P4

A confirmed record of the Quenda was 7.06km from the project area.

Quenda otherwise known as Southwestern Brown Bandicoots are known to inhabit a range of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland and are usually associated with infertile, sandy and well drained soils, but can be found in a range of soil types. The sandy soil within the site was suitable for the species.

Quenda prefer native or exotic vegetation, within their distribution, which contains understorey dense vegetation within the 0.2–1 m height range, the contained suitable habitat for this species with dense sedge layers found within portions of the site. No signs of quenda such as runs were seen during the surveys.

5.10.2 Southern death adder, *Acanthophis antarcticus,* P4

A confirmed record of the Southern death adder was 4.91 km from the project area.

This species is found in a wide variety of well-drained habitats, including rainforests and wet sclerophyll forests, woodland, shrublands, grasslands and coastal heathlands, preferring sites with deep fixed leaf litter. The snake is an ambush predator which hides under leaf litter or burrows in sand while waiting for prey. The site lacked dense leaf litter for this species. The sandy soil at the site is potentially suitable for burrowing. The site also contained a range of suitable prey items including small birds. The project may contain suitable habitat for this species. No evidence of the species was seen during the survey.

6 REVIEW OF 10 CLEARING PRINCIPLES FOR NATIVE VEGETATION

The 'Flinders Estate Fire Mitigation' 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).

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

Biodiversity at this site was low with only 34 native species recorded over one vegetation community.

7.2 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.

Vegetation within the project area contained suitable habitat for the Quenda and potentially suitable habitat for the Southern death adder.

The vegetation contained no suitable roosting or foraging habitat for the Carnaby's black cockatoo.

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

No priority or threatened flora were found during the flora survey.

7.4 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.

There was no TECs or PECs present within the project area.

7.5 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 immediate surroundings of the site were highly residential land to the south and remnant vegetation to the north of the site. However, all remnant vegetation to the north of the site has been zoned for future residential subdivisions. Intact vegetation within the site is contributing to ecological linkages in the area.

7.6 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.

Vegetation in this area was not growing in association with watercourses or wetlands.

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

Vegetation within this area will be providing wind protection and erosion control for nearby coastal and residential areas. Vegetation within the project will be mulched in order to reduce erosion impacts. Wind erosion will likely be worsened due to the project.

7.8 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.

The site was 2.7km from Reserve 23825 'Mullet Lake Nature Reserve' the closest conservation reserve, this reserve was also Ramsar listed. Several other conservation vested reserves were within 5km of the site, several of these were also Ramsar listed. Given the relatively small amount of vegetation being cleared and that the vegetation is downstream of these Ramsar reserves there is unlikely to be any measurable impact.

7.9 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.

The project is unlikely to have any significant impacts on water quality.

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

The project is not in a flood risk area and given that this is a near coastal project clearing of this vegetation is unlikely to have any impact on flood risk in downstream areas.

7 RECOMMENDATIONS

The following recommendation will be included within the internal SOE approval process for project.

- All vehicles and construction equipment to be cleaned prior to start of the project.
- Clearing debris within degraded areas that contains a large number of weeds to be contained within degraded areas.
- Follow up spraying of emergent weeds to prevent weeds coming into the weed free areas.

8 LIST OF PERSONNEL

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

Name	Julie Waters
Position	Environmental Coordinator
Project Involvement	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	2.5 years' experience as a botanist in the region
Scientific Licence	FT61000788

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10 APPENDICES

Appendix 1: Incidental species list

Family	Genus	Species	Weed	Herbarium Reference
Aizoaceae	*Carpobrotus*	*virescens*		
Aizoaceae	*Tetragonia*	*implexicoma*		
Asparagaceae	*Asparagus*	*asparagoides*		
Asparagaceae	*Thysanotus*	*dichotomus*		
Asphodelaceae	*Asphodelus*	*fistulosus*	x	
Asteraceae	*Gazania*	*linearis*	x	
Asteraceae	*Osteospermum*	*ecklonis*	x	
Asteraceae	*Pseudognaphalium*	*luteoalbum*	x	
Asteraceae	*Sonchus*	*oleraceus*	x	
Brassicaceae	*Brassica*	*sp.*	x	
Brassicaceae	*Diplotaxis*	*muralis*	x	KSW08923 ACC10518
Chenopodiaceae	*Rhagodia*	*baccata*		
Cyperaceae	*Ammothryon*	*grandiflorum*		
Cyperaceae	*Ficinia*	*nodosa*		
Cyperaceae	*Lepidosperma*	*gladiatum*		
Cyperaceae	*Lepidosperma*	*squamata*		
Ericaceae	*Acrotriche*	*cordata*		
Ericaceae	*Leucopogon*	*parviflorus*		
Euphorbiaceae	*Euphorbia*	*paralias*	x	
Fabaceae	*Acacia*	*cochlearis*		
Fabaceae	*Acacia*	*cyclops*		
Fabaceae	*Acacia*	*saligna*		
Fabaceae	*Templetonia*	*retusa*		
Geraniaceae	*Pelargonium*	*capitatum*	x	
Goodeniaceae	*Scaevola*	*crassifolia*		
Goodeniaceae	*Scaevola*	*globulifera*		
Haloragaceae	*Haloragis*	*hamata*		
Hemerocallidaceae	*Dianella*	*brevicaulis*		
Juncaceae	*Juncus*	*kraussii*	x	
Lauraceae	*Cassytha*	*sp.*		
Malvaceae	*Lasiopetalum*	*discolor*		
Myrtaceae	*Agonis*	*flexuosa*	x	
Myrtaceae	*Eucalyptus*	*sp. Planted*	x	
Myrtaceae	*Eucalyptus*	*utilis*		
Myrtaceae	*Gaudium*	*laevigatum*	x	
Myrtaceae	*Melaleuca*	*pentagona*		
Olacaceae	*Olax*	*phyllanthi*		

Orchidaceae	*Microtis*	*media*		
Orobanchaceae	*Orobanche*	*minor*	x	
Phyllanthaceae	*Lysiandra*	*calycinus*		
Pittosporaceae	*Billardiera*	*fusiformis*		
Poaceae	*Austrostipa*	*sp.*		
Poaceae	*Avena*	*barbata*	x	
Poaceae	*Briza*	*maxima*	x	
Poaceae	*Cynodon*	*dactylon*	x	
Poaceae	*Eragrostis*	*curvula*	x	
Poaceae	*Lagurus*	*ovatus*	x	
Poaceae	*Poa*	*poiformis*		
Poaceae	*Stenotaphrum*	*secundatum*	x	
Polygalaceae	*Comesperma*	*volubile*		
Primulaceae	*Lysimachia*	*arvensis*	x	
Proteaceae	*Grevillea*	*olivacea*	x	
Ranunculaceae	*Clematis*	*pubescens*		
Rhamnaceae	*Spyridium*	*globulosum*		
Santalaceae	*Exocarpos*	*sparteus*		
Solanaceae	*Lycium*	*ferocissimum*	x	
Zygophyllaceae	*Roepera*	*billardierei*		

Appendix 2: Description of Threatened and Priority Flora Species with the Potential to occur within the Flinders Estate Fire Mitigation Survey Area

Threatened or priority flora identified by the desktop study to be present within a 20 km radius of Flinders Estate Fire Mitigation project area, using Threatened and Priority Flora Reporting (TPFL; DBCA 2023d), WA Herbarium (DBCA 2023e) and Esperance District Threatened Flora (DBCA 2021).
Nt. Acronyms used in the table include priority flora (P), threatened flora (TF), Biodiversity Conservation (BC) Act 2018, Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, critically endangered (CN) and endangered (EN).

Species	Conservation Status	Associated Habitat	Likely to occur	Distance from site (km)
Cyathostemon sp. Esperance (A. Fairall 2431)	P1	Only two records – salt lake and sandy gravel.	No	4.17
Eucalyptus foliosa	P1	Small area in Gibson/Scaddan. Grey/white sandy clay flats adjacent to salt lakes	No	15.12
Hibbertia carinata	P1	Well drained gravelly sand, yellow sand with gravel.	No	7.39
Lobelia archeri	P1	Upper slopes of tall non-calcereous sand hills (some found lower after fire). Requires open spaces to survive, quickly displaced by other vegetation.	No	16.63
Schoenus sp. Grey Rhizome (K.L. Wilson 2922)	P1	Sandy clay, sand. Kwongkan shrubland.	No	16.27
Comesperma griffinii	P2	Plain. Grey sand. Burned areas. Low shrubland.	No	16.64
Dampiera decurrens	P2	Sandy soils. Granite rocks. Only known from Cape Le Grand and Recherche Archipelago.	No	16.54
Goodenia exigua	P2	Plain. Grey clay. Associated with Melaleuca cuticularis.	No	16.76
Goodenia quadrilocularis	P2	Sand dunes, and granite slope & outcrops. Known from Cape Le Grand & Cape Arid.	No	16.31
Hibbertia turleyana	P2	Gibson area. Long skinny leaves. Sandy soils that may be seasonally inundated. Banksia heath or Mallee shrubland	No	7.77
Leucopogon corymbiformis	P2	Deep sand. Kwongkan shrubland.	No	3.81

Myriophyllum muelleri	P2	Ephemeral rock pools	No	8.18
Paracaleana parvula	P2	Deep white sands in mallee heath with Banksia media	No	14.98
Tecticornia indefessa	P2	White to brown-grey sand near the edge of a salt lake.	No	4.89
Adelphacme minima	P3	Open woodland with scattered Nuytsia, Eucalyptus and Banksia. Common sandplain Kwongkan. Banksia speciosa with Anarthria. Well drained pale grey sands	No	11.66
Astartea reticulata	P3	Various wetlands.	No	18.93
Austrobaeckea uncinella	P3	Yellow or white sand, clay loam. Edges of salt lakes, salt creeks, sandplains.	No	4.41
Austrostipa mundula	P3	Sand over limestone.	No	15.19
Brachyloma mogin	P3	Various soil types including brown sandy loam, grey clayey sand and salt lakes.	No	19.59
Comesperma calcicola	P3	Calcareous or semi-saline clay loams, limestone. Areas around saline water.	No	6.04
Dampiera sericantha	P3	Sand sometimes with gravel. Plains.	No	8.85
Dampiera triloba	P3	Low woodlands with Banksia and Melaleuca. Mixed shrublands	No	16.38
Daviesia pauciflora	P3	Various habitats including flats. Associated with deep sands, white or grey sand over laterite or limestone. Proteaceous rich heathlands	No	7.62
Eucalyptus semiglobosa	P3	Grows on white sand over laterite, silty sand on edge of granite shelf, limestone. Associated with various topography, including hillslopes, gullies, cliffs.	No	6.57
Galium leptogonium	P3	Only Esperance record is on Middle Island.	No	14.76
Gonocarpus pycnostachyus	P3	Sand or clay soils. Wet depressions, granite rocks.	No	17.05
Hopkinsia adscendens	P3	Dry or seasonally damp habitats along streams.	No	4.17

Kunzea salina	P3	Scaddan area and east to Mt Heywood. White sand over clay at margins of salt lakes on sand dune rises.	No	16.13
Lepidium fasciculatum	P3	Open Mallee with mid-dense heath. Undulating sandplains. Wide and scattered distribution.	No	4.17
Leucopogon apiculatus	P3	Skeletal sandy or stony soils over quartzite or granite. Granite outcrops and hills, quartzite ridges, rocky slopes.	No	16.27
Leucopogon interruptus	P3	Grey sand over granite	No	17.03
Persoonia scabra	P3	White sand or sandy loam. Widespread from coastal to inland Mallee. Sandy heathland environment over gravel, granite or limestone.	No	16.65
Pityrodia chrysocalyx	P3	Salmon Gums area. Sandplains with yellow sands. Nearby record is geographically inaccurate.	No	4.00
Pterostylis faceta	P3	Melaleuca Mallee scrubland, Granite, sandy loam	No	19.13
Styphelia rotundifolia	P3	Eucalyptus mallee with mixed shrubland. Wide variety of habitats. Often associated with gravel.	No	7.46
Banksia prolata subsp. calcicola	P4	White sand over limestone. Coastal areas.	No	4.00
Corysanthes limpida	P4	Growing in moss with Melaleuca overstory.	No	5.58
Eucalyptus insularis subsp. insularis	P4	Only known populations occur on islands in Recherche Archipelago and in Cape Le Grand National Park.	No	16.56
Eucalyptus preissiana subsp. lobata	P4	Coastal limestone rises and sand dunes	No	17.25
Eucalyptus x missilis	P4	Coastal distribution, across all of Esperance. Sand over limestone.	No	3.56
Grevillea baxteri	P4	Prefers shrubby heathland with an acid sandy soil usually overlaying heavier soils. Associated with	No	3.41

		highly diverse Proteaceous shrublands.		
Kennedia beckxiana	P4	Grows in sand and loam on granite hills and outcrops. Previously recorded in the area.	No	14.75

Appendix 3: Description of Threatened and Priority Fauna Species with the Potential to occur within the Flinders Estate Fire Mitigation Survey Area

Scientific Name	Common Name	WA Cons Status	EPBC Status	Distance (km)	EPBC protected matters tool	Habitat	Likely to occur
Acanthophis antarcticus	Southern death adder	P3		4.91		Open woodland, scrub and heathland areas.	Potentially
Actitis hypoleucos	Common Sandpiper	MI	MI	1.80		Coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats	No
Aphelocephala leucopsis	Southern Whiteface		VU		X	Marine	No
Apus pacificus	Fork-tailed swift	MI	MI	1.56		Mostly occur over inland plains but sometimes above foothills or in coastal areas. Also, over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh.	No
Arctocephalus forsteri	New Zealand fur-seal, long-nosed fur-seal	OS		4.92		Marine	No
Ardenna carneipes	Flesh-footed Shearwater	VU	MI	3.81		Marine and occasionally inshore waters	No
Ardenna tenuirostris	Short-tailed shearwater	MI	MI	8.94		Marine	No

Arenaria interpres	Ruddy turnstone	MI	MI	7.50		Coastal regions with exposed rock coast lines or coral reefs. They also live near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches	No
Atelomastix dendritica	Recherche atelomastix millipede	VU		14.01		The species is only known from two collections in damp leaf litter on Woody Island.	No
Balaenoptera musculus	Blue Whale	EN	EN		X	Marine	No
Botaurus poiciloptilus	Australasian Bittern	EN	EN		X	Shallow vegetated freshwater or brackish swamps	No
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	2.10		Grassy edges of shallow inland freshwater wetlands. They are also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches.	No
Calidris alba	sanderling	MI	MI	4.33		Forages at sandy beaches at the edge of the waves, on sandbars and spits. They roost on bare sand in the dunes or behind piles of kelp.	No
Calidris canutus	Red knot	EN	EN	3.85	X	On the coast in sandy estuaries with tidal mudflats.	No
Calidris ferruginea	Curlew Sandpiper	EN	MI	2.51	X	Intertidal mudflats of estuaries, lagoons, mangroves, beaches, rocky shores and around lakes, dams and floodwaters.	No
Calidris melanotos	Pectoral Sandpiper	MI	MI	2.69		Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire.	No
Calidris ruficollis	Red-necked stint	MI	MI	1.73		Coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores.	No
Calidris tenuirostris	Great knot	EN	MI	7.50	X	Intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries	No
Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN	0.95	X	Kwongkan shrub or heathland. Presence of Hakea, Banksia and Pine species indicate potential feeding habitat.	No

Carcharias taurus	grey nurse shark	VU	VU	19.62	X	Marine	No
Carcharodon carcharias	Great White Shark	VU	VU		X	Marine	No
Caretta caretta	Loggerhead Turtle	EN	EN		X	Marine	No
Cereopsis novaehollandiae grisea	Recherche Cape Barren goose	VU	VU	1.27	X	During breeding season (May-June), found in grassy areas, tussock grass of bushes. During rest of year, found on beaches, coastal pastures and on the shores of brackish lakes.	No
Charadrius bicinctus	Double-banded Plover	MI	MI	13.16		Littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture	No
Charadrius leschenaultii	Greater sand plover, large sand plover	VU	MI	2.10	X	Intertidal flats of sheltered embayment's, lagoons or estuaries.	No
Charadrius mongolus	Lesser Sand Plover	EN	MI	13.41		Intertidal sandflats and mudflats in estuaries or beaches, or in shallow ponds in saltworks	No
Chelonia mydas	Green Turtle	VU	Vu		X	Marine	No
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU		X	Open forest, low open forest, woodland, and open shrub	No
Dermochelys coriacea	leatherback turtle	VU	EN	0.31	X	Marine	No
Diomedea antipodensis	Antipodean Albatross	MI	VU		X	Marine. They breed on the Auckland Islands, Antipodes Islands, and Campbell Island.	No
Diomedea dabbenena	Tristan Albatross	CR	EN		X	Marine. They breed on islands of the Tristan da Cunha group.	No
Diomedea epomophora	Southern Royal Albatross	VU	VU		X	Marine. They breed on Campbell Island.	No
Diomedea exulans	wandering albatross	VU	VU	8.72	X	Marine. Breeds on Macquarie Island.	No
Diomedea sanfordi	Northern Royal Albatross	EN	EN		X	Marine breeds on various Islands Zealand.	No

Elanus scriptus	Letter-winged kite	P4		9.24		Arid and semi-arid open, shrubby or grassy country	No
Eubalaena australis	southern right whale	VU	EN	2.10	X	Marine	No
Falco hypoleucos	Grey Falcon	VU	VU		X	Arid and semi-arid zones where rainfall is less than 500mm. Timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses	No
Falco peregrinus	Peregrine falcon	OS		2.52		Most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water	No
Hydroprogne caspia	Caspian Tern	MI	MI	0.97		Usually forages in open wetlands, including lakes and rivers.	No
Isoodon fusciventer	quenda, southwestern brown bandicoot	P4		7.06		Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover	Yes
Leipoa ocellata	malleefowl	VU	VU	1.76	X	Semi-arid shrub lands and low woodlands dominated by mallee and/or acacia.	No
Limosa lapponica	Bar-tailed godwit	MI	MI	2.69		Coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays	No
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	MI	CR		X	occurs in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	No
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	MI	EN		X	Marine. Breeds in Antarctic and subantarctic islands and peninsulas.	No
Macronectes halli	Northern Giant Petrel	MI	VU		X	Marine. Breeds in subantarctic islands and South Georgia.	No
Neophoca cinerea	Australian sea-lion	EN	EN	3.81	X	Marine	No

Notamacropus irma	western brush wallaby	P4		3.79		Areas of Mallee and heathland and are uncommon in wet sclerophyll forests. They prefer tall open forests that supply good grazing. They particularly favour open, seasonally damp flat areas with low grasses and open scrubby brushes	No
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	CR	CR		X	Intertidal mudflats.	No
Numenius phaeopus	Whimbrel	MI	MI	8.94		Intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms.	No
Oceanites oceanicus	Wilson's storm-petrel	MI	MI	8.94		Marine	No
Oxyura australis	Blue-billed duck	P4		1.73		Prefers freshwater swamps, with dense vegetation including Typha; although it has appeared in lignum swamps in more coastal areas	No
Pachyptila turtur subantarctica	Fairy Prion (southern)		VU		X	Marine. Breeds on small islands.	No
Pandion haliaetus	Osprey	MI	MI	16.69		Occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers. They require extensive areas of open fresh, brackish or saline water for foraging. They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging sites.	No
Parantechinus apicalis	Dibbler	EN	EN	18.16		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. There was a single record for this species on Gunton island within the Recherche Archipelago Nature Reserve. The single record is	No

						the result of a translocation, there is no naturally occurring records of this species within the Shire of Esperance.	
Plegadis falcinellus	Glossy ibis	MI	MI	2.19		Feeds in very shallow water and nest in freshwater or brackish wetlands with tall dense stands of emergent vegetation such as reeds, papyrus or rushes) and low trees or bushes.	No
Pluvialis fulva	Pacific golden plover	MI	MI	13.41		Beaches, mudflats and sandflats and in sheltered areas including harbours, estuaries and lagoons.	No
Pluvialis squatarola	Grey plover	MI	MI	3.85		Inhabit sheltered embayment's, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons.	No
Puffinus huttoni	Hutton's shearwater	EN		8.94		Marine	No
Rhincodon typus	Whale Shark	MI	VU		X	Marine	No
Stercorarius antarcticus lonnbergi	Brown Skua, Subantarctic skua	P4		3.81		Marine	No
Stercorarius parasiticus	Arctic jaeger, Arctic skua	MI	MI	17.50		Marine. Breeds in Eurasia and North America.	No
Sternula nereis nereis	Australian Fairy Tern	VU	VU		X	Nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayment's of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night.	No
Thalassarche carteri	Indian Yellow-nosed Albatross	EN	VU		X	Marine. Breeds on islands in the Indian Ocean.	
Thalassarche cauta cauta	Shy albatross	VU	EN	8.94	X	Marine	No
Thalassarche chlororhynchos	Atlantic yellow-nosed albatross	VU	MI	2.59		Marine	No
Thalassarche impavida	Campbell Albatross,	VU	VU		X	Marine, Breeds at Campbell Island in New Zealand.	No

	Campbell Black-browed Albatross						
Thalassarche melanophris	Black-browed Albatross	EN	VU		X	Marine. Breeds on islands in the Atlantic Ocean.	No
Thalassarche steadi	White-capped Albatross		VU		X	Marine. Breeds on Islands off the coast of New Zealand.	No
Thalasseus bergii	Crested tern	MI	MI	0.55		Marine	No
Thinornis rubricollis	Hooded plover, hooded dotterel	P4		2.07		Inhabits ocean beaches and the edges of near-coastal and inland salt-lakes.	No
Thunnus maccoyii	Southern Bluefin Tuna		CD		X	Marine	No
Tringa brevipes	Grey-tailed tattler	MI	MI	4.82		Common in large tidal flat systems.	No
Tringa glareola	Wood sandpiper	MI	MI	2.37		Inland shallow freshwater wetlands	No
Tringa nebularia	Common greenshank	MI	MI	1.80		Coastal and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	No
Tringa stagnatilis	Marsh sandpiper	MI	MI	4.55		Commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands.	No
Westralunio carteri	Carter's freshwater mussel	VU	VU	3.81		Found in slower flowing fresh water where sediments are stable and soft enough to allow the species to burrow	No

Appendix 4: State Threatened and Priority Flora and Fauna Definitions

Category	Definition
T – Threatened	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: **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild (Schedule 1); **EN:** Endangered – considered to be facing a very high risk of extinction in the wild (Schedule 2); or **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild (Schedule 3). **EX:** Presumed Extinct – taxa that have been adequately searched for and there is no reasonable doubt that the last individual has died (Schedule 4)
P1 – Priority 1 (Poorly known taxa)	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2 – Priority 2 (Poorly known taxa)	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3 – Priority 3 (Poorly known taxa)	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

P4 – Priority 4 (Rare, Near Threatened and other taxa in need of monitoring)	**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. **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. **3.** Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy

Appendix 5: 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 6: State Definition of Threatened Ecological Communities

Category Code	Category
PTD	**Presumed Totally Destroyed** 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: (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	**Critically Endangered** 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: (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	**Endangered** 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: (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	**Vulnerable**

	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: (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 7: 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 8: 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 9: Categories and Control of Declared (Plant) Pests in Western Australia

Control Category	Control Measures
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.	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.
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'.	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.

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.	
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.	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.

Appendix 10: Definition of Vegetation Condition Scale

For the south west and interzone botanical provinces

Condition Rating Description	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 11: 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	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* 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. ***This tool only applies to sites equal to or larger than 1 hectare in size.**	
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. *Phytophthora* spp. or Marri canker) and the disease is preferred food plants present.
Total score	**Enter score**	

Other considerations for assessment of foraging habitat	- 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	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.

Appendix 12: EPBC Act Protected Matters Report

Listed Threatened Ecological Communities

				Presence	
Community ID	**Community Name**	**Threatened Category**	**Website**	**Rank**	**Text**
126	Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Species Profile and Threat Database (SPRAT)	Likely	Community likely to occur within area

Listed Threatened Species

Scientific Name	Common Name	Class	Threatened Category	Migratory Status	Migratory Category	Marine Status
Thunnus maccoyii	Southern Bluefin Tuna	Fish	Conservation Dependent			
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	Bird	Critically Endangered			
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Bird	Critically Endangered	Migratory	Migratory Wetlands Species	Listed
Calidris tenuirostris	Great Knot	Bird	Critically Endangered	Migratory	Migratory Wetlands Species	Listed - overfly marine area
Calidris ferruginea	Curlew Sandpiper	Bird	Critically Endangered	Migratory	Migratory Wetlands Species	Listed - overfly marine area
Balaenoptera musculus	Blue Whale	Mammal	Endangered	Migratory	Migratory Marine Species	
Diomedea sanfordi	Northern Royal Albatross	Bird	Endangered	Migratory	Migratory Marine Birds	Listed

Botaurus poiciloptilus	Australasian Bittern	Bird	Endangered			
Eubalaena australis	Southern Right Whale	Mammal	Endangered	Migratory (as Balaena glacialis australis)	Migratory Marine Species	
Neophoca cinerea	Australian Sea-lion, Australian Sea Lion	Mammal	Endangered			Listed
Diomedea dabbenena	Tristan Albatross	Bird	Endangered	Migratory	Migratory Marine Birds	Listed
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	Bird	Endangered	Migratory	Migratory Marine Birds	Listed
Caretta caretta	Loggerhead Turtle	Reptile	Endangered	Migratory	Migratory Marine Species	Listed
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth	Reptile	Endangered	Migratory	Migratory Marine Species	Listed
Anigozanthos bicolor subsp. minor	Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw	Plant	Endangered			
Ricinocarpos trichophorus	Barrens Wedding Bush	Plant	Endangered			
Thalassarche cauta	Shy Albatross	Bird	Endangered	Migratory	Migratory Marine Birds	Listed
Calidris canutus	Red Knot, Knot	Bird	Endangered	Migratory	Migratory Wetlands Species	Listed - overfly marine area
Zanda latirostris	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Bird	Endangered (listed as Calyptorhynchus latirostris)			
Cereopsis novaehollandiae grisea	Cape Barren Goose (south-western), Recherche Cape Barren Goose	Bird	Vulnerable			Listed - overfly marine area

Diomedea antipodensis	Antipodean Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Pachyptila turtur subantarctica	Fairy Prion (southern)	Bird	Vulnerable			
Aphelocephala leucopsis	Southern Whiteface	Bird	Vulnerable			
Carcharodon carcharias	White Shark, Great White Shark	Shark	Vulnerable	Migratory	Migratory Marine Species	
Leipoa ocellata	Malleefowl	Bird	Vulnerable			
Falco hypoleucos	Grey Falcon	Bird	Vulnerable			
Macronectes halli	Northern Giant Petrel	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Thalassarche melanophris	Black-browed Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Chelonia mydas	Green Turtle	Reptile	Vulnerable	Migratory	Migratory Marine Species	Listed
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Shark	Vulnerable			
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Bird	Vulnerable	Migratory	Migratory Wetlands Species	Listed
Thalassarche steadi	White-capped Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Thalassarche carteri	Indian Yellow-nosed Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Diomedea exulans	Wandering Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed

Diomedea epomophora	Southern Royal Albatross	Bird	Vulnerable	Migratory	Migratory Marine Birds	Listed
Rhincodon typus	Whale Shark	Shark	Vulnerable	Migratory	Migratory Marine Species	
Dasyurus geoffroii	Chuditch, Western Quoll	Mammal	Vulnerable			
Sternula nereis nereis	Australian Fairy Tern	Bird	Vulnerable			