Biologic Environmental Survey Pty Ltd
24-26 Wickham Street, East Perth 6004

5 December 2022

Attn: Mark Csar

Chief Executive Officer

Bulletin Resources Limited

11/139 Newcastle Street

Perth, WA 6000

Dear Mark,

Tetris Environmental, on behalf of Bulletin Resources, commissioned Biologic Environmental Survey Pty Ltd to undertake a targeted flora and vegetation survey of the proposed drill line alignment and proposed drill pads at the Cocanarup Timber Reserve in Ravensthorpe. Subsequent broad vegetation mapping was also completed by Biologic across the greater Survey Area, representing that of a Reconnaissance flora and vegetation survey.

All suitable habitat for conservation significant flora identified by the desktop assessment occurring along the proposed drill line alignment and proposed drill pads was thoroughly searched. A total of 35 relevé sites were established across the greater Survey Area, with broad vegetation mapping subsequently completed, supported by an additional 50 vegetation mapping points.

Eighteen vegetation types were defined and delineated across the greater Survey Area, none of which are considered to be consistent with any known Threatened or Priority ecological communities. Vegetation condition ranged from excellent to completely degraded, with the majority considered to be in excellent condition.

This survey recorded three potentially conservation significant listed flora taxa:

- *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 20 individuals from one point location;
- *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) – approximately 30 individuals from one point location; and
- *Lepidosperma* ? sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 10 individuals from one point location;.

The three specimens representing the taxa above could not be formally identified or confirmed by the Western Herbarium due to the current state of the taxonomy for the genus *Lepidosperma*. However, this Survey Report considers these specimens to represent taxa listed as Priority 1 species as a precautionary approach.

Seventeen introduced flora taxa were recorded by this survey; two of which, **Lycium ferocissimum* and **Asparagus asparagoides*, are recognised as Weeds of National Significance (WoNS), while the latter of which is also a Declared Pest under Section 22 of the BAM Act.

Yours sincerely,

Samuel Coultas,

Senior Botanist
(08) 6142 7119 | 0400 507 407
sam@biologicenv.com.au

Cocanarup Timber Reserve

Targeted and Reconnaissance Flora and Vegetation Survey

Biologic Environmental Survey

Report to Tetris Environmental

December 2022

1 INTRODUCTION

1.1 Background and Objectives

Tetris Environmental (Tetris) required a targeted survey to delineate key flora and vegetation values and identify Threatened and Priority flora and ecological communities for the Cocanarup Timber Reserve exploration project (the Project), near Ravensthorpe, WA. The Project Survey Area (the Survey Area) is located approximately 14 kilometres (km) south-west of the established Mt Cattlin lithium mine (Galaxy Resources) and 15 km south-west of Ravensthorpe in the Fitzgerald subregion of the Esperance Plains Interim Biogeographic Regionalisation of Australia (IBRA) bioregion. The Survey Area covers a total area of 220.79 hectares (ha) with the proposed drill line alignment and proposed drill pads (collectively referred to as the Drill Lines) covering approximately 6.3 km in length (

Figure 1.1).

Tetris Environmental had previously completed a desktop assessment of the Survey Area to support a Purpose Permit Native Vegetation Clearing Permit (NVCP) application. It was determined, by the Department of Mines, Industry Regulation and Safety (DMIRS), that further biological surveying was to be conducted to support the NVCP application.

Tetris commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a targeted flora and vegetation survey for Threatened and Priority listed flora and ecological communities (see Appendix A for additional information on conservation status codes) along the Drill Lines. Subsequently, Biologic also completed a modified Reconnaissance flora and vegetation survey (EPA, 2016) of the Survey Area, to broadly map the vegetation types and their condition.

The objective of this survey was to assess the presence of significant flora and vegetation along the Drill Lines, and the potential presence of significant flora and vegetation within the Survey Area. In addition, the survey mapped the broad vegetation types and condition within the Survey Area.

The survey was completed in accordance with the EPA Technical Guidance (EPA, 2016) for targeted surveys, while the modified Reconnaissance survey was broadly in accordance with the Technical Guidance. The scope of works for the survey included:

- Targeted surveys for Threatened and Priority flora and ecological communities (TECs and PECs), identified in the desktop assessment, along the Drill Lines to determine occurrence. Where populations/occurrences were identified, the extent of populations were surveyed and mapped to determine number, boundary, and habitat area for each population;
    - Where populations/occurrences were large and/or extended beyond the Survey Area boundary, the edges of the population boundary / extent of the population were recorded and mapped.
- Broad vegetation types were mapped with the use relevé sites across the Survey Area (Reconnaissance flora and vegetation survey). Vegetation types that may align with State and Commonwealth listed PECs and TECs were assessed in the field, with TECs specifically

assessed against the key diagnostic characteristics and the condition thresholds as per their approved conservation advice.

- Any locations of observed weeds, particularly Weeds of National Significance or Declared Pests listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (Appendix B), were identified and recorded.

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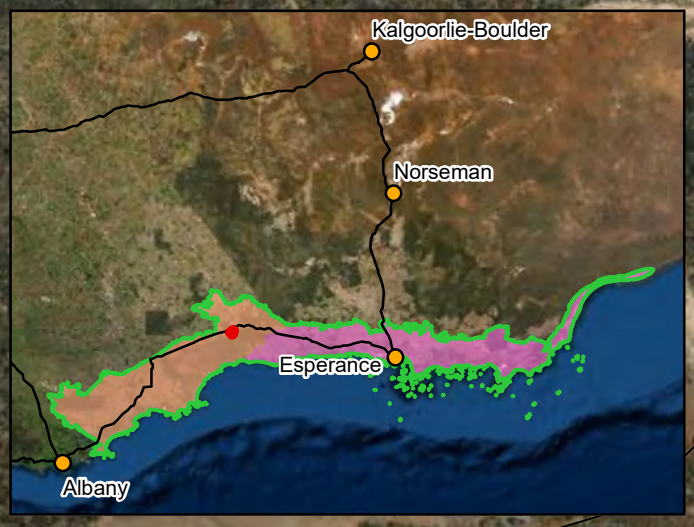


Cocanarup Rd

Cocanarup Mining Rd

Legend

- Survey Area
- Local Road
- Drill Line Alignment

IBRA Region

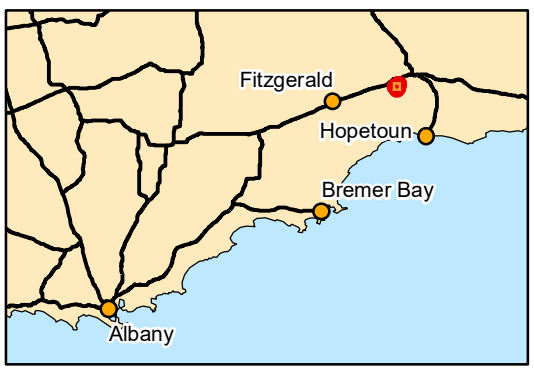
- Esperance Plains

IBRA Subregion

- Fitzgerald
- Recherche

0 200 400 600 Meters

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 08/11/2022



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Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 1.1: Survey Area and regional location

2 METHODS

2.1 Desktop Assessment

The desktop assessment aims to compile a list of vegetation types and flora species potentially occurring in the Survey Area. Tetris Environmental had previously completed database searches for the Survey Area to accompany a Purpose Permit Native Vegetation Clearing Permit (NVCP) application.

Five database searches were conducted in relation to flora and vegetation (Table 2.1). Eight reports documenting the results of previous surveys conducted in the vicinity (within 40 km) of the Survey Area were used in the literature review (Table 2.2). The full literature review findings are presented in Appendix C.

Table 2.1: Details of database searches conducted

Database	Source	Information	Search parameters
Atlas of Living Australia	(ALA, 2022)	Occurrence search of flora species	Survey Area with a 10 km buffer
NatureMap	(DBCA, 2022a)	List of vascular flora species known to occur	Survey Area with a 10 km buffer
Threatened and Priority Ecological Communities Database	(DBCA, 2022b)	Known records of ecological communities of conservation significance (TECs/ PECs)	Survey Area with a 10 km buffer
Threatened and Priority Flora Database	(DBCA, 2022c)	Known records of listed conservation significant flora taxa (Threatened and Priority)	Survey Area with a 10 km buffer
Protected Matters Search Tool	(DAWE, 2022)	List of Matters of Environmental Significance (MNES) known or likely to occur – vascular flora, ecological communities, weeds	Survey Area with a 10 km buffer
Declared Pests Database – Western Australian Organism List (WAOL).	(DPIRD, 2022)	Introduced flora listed under section 22 of the BAM Act	Search of the entire Shire of Ravensthorpe

Table 2.2: Previous surveys considered in the literature review

Survey Title	Reference	Survey Type	Distance from Survey Area (km)
Mt Cattlin Project Level 1 Flora and Vegetation Assessment	Woodman (2016)	Reconnaissance Flora and Vegetation Survey	Adjacent E
Flora and vegetation of greenstone formations of the Yilgarn Craton: south-west Ravensthorpe Greenstone Belt	Thompson *et al.* (2013)	Detailed Flora and Vegetation Survey	Adjacent W and SW
Floristic communities of the Ravensthorpe Range, Western Australia	Markey *et al.* (2012)	Detailed Flora and Vegetation Survey & Data Analysis	14 km NE

Survey Title	Reference	Survey Type	Distance from Survey Area (km)
Vegetation of the Ravensthorpe Range, Western Australia: Mt Short to Kundip	Craig *et al.* (2008)	Detailed Flora and Vegetation Survey	16.8 km NE
Rebuild South Country DX Telecoms Network – Stage 1 Replacement of Telecommunications Mast on Radio Hill Flora and Vegetation Survey	Woodman (2021)	Reconnaissance Flora & Vegetation Survey and Targeted Flora Survey	17.6 km NE
Ravensthorpe Gold Copper Project Biological Survey	APM (2016)	Reconnaissance Flora & Vegetation Survey	24.3 km E
Shoemaker-Levy Corridor Flora and Vegetation Assessment	Woodman (2015)	Detailed Flora and Vegetation Survey	38.7 km E
Targeted Flora Survey, Mallee Road – Shire of Ravensthorpe	Great Southern Bio Logic (2017)	Targeted Flora Survey	39.2 km NW

The conservation significant flora taxa identified from the desktop assessment were assessed and ranked on the likelihood of occurring within the Survey Area. The rankings were assigned using the following definitions presented in the decision matrix (Table 2.3).

Interpretation of likelihood criteria may vary between species due to several factors influencing species occurrence—known distribution, known range, optimal habitat, ecology, and/or dispersal capabilities. The assessment of occurrence also takes into consideration how well distributed a species is within known localities. Where necessary, justification for the likelihood ranking will be provided per species. Likelihood rankings were re-assessed post field survey and may change, taking ground truthing into consideration.

Table 2.3: Assessment of Occurrence decision matrix

		Habitat categories (within the Study Area)			
		Core/ critical habitat present	**Suitable habitat present/ within known distribution**	**Marginal habitat present/ adjacent to known distribution**	**No suitable habitat present/ outside of known distribution**
Species Records / Occurrence Categories	**Recorded in the Study Area**	Confirmed	Confirmed	Confirmed	Confirmed
	Recorded within <1 km	Highly Likely	Likely	Possible	Possible
	Recorded within 1-5 km	Likely	Possible	Possible	Unlikely
	Recorded within 5-15 km	Possible	Possible	Unlikely	Unlikely
	Recorded >15 km	Possible	Unlikely	Unlikely	Highly Unlikely
	Species considered locally/ regionally extinct	Unlikely	Unlikely	Highly Unlikely	Highly Unlikely

2.2 Survey Timing and Personnel

The survey was conducted between the 19th and the 23rd of September 2022 during a period of mild and fine weather to complete a survey of this nature. The field survey was undertaken by Senior Botanist Samuel Coultas, who has 8+ years of experience, including experience with surveys along the south coast of Western Australia. The survey was conducted under the Department of Biodiversity, Conservation, and Attractions (DBCA) Regulation 62 "Flora Taking (Biological Assessment)" licence, issued to Sam Coultas (licence numbers FB-62000017). Sam also holds a Permit to Take Threatened Flora for identification purposes, issued under the BC Act, Section 40 and (TFL 2223-0028).

2.3 Targeted Survey

Prior to the survey, the desktop assessment was reviewed to identify a list of significant flora and ecological community that may have potential to occur in the Survey Area. Field personnel familiarised themselves with photographs, reference samples and descriptions of the taxa and vegetation prior to mobilisation. The survey focused on targeting and thoroughly searching areas deemed as representative habitat along the Drill Lines (Figure 2.1).

If significant taxa were identified in the field, a GPS coordinate of the individual taxon was taken when occurring in isolation, or a central GPS coordinate was taken for a small population (central coordinate with an approximate 20 m radius). Information collected at each location comprised:

- Number of individuals, for a small population;
- Condition and reproductive status of the plants in each population;
- Photographs and description of vegetation habitat;
- Broad information on vegetation type and condition; and
- Coordinates of either each plant (if few) or the extent of the population (if many) using a GPS.

Threatened and Priority Flora Report Forms will be provided to the Parks and Wildlife Division (Parks and Wildlife) of DBCA, as required under the flora collecting permits. Significant flora specimens will be vouchered with the Western Australian Herbarium (WAH), where required and appropriate.

If significant ecological communities were identified in the field, detailed vegetation assessment site/s were established within vegetation best representing the community. Detailed descriptive information, similar to that recorded within detailed floristic sites (quadrats) in accordance with the EPA guidance, was recorded at each assessment site, while the community boundary was well defined and traversed using GPS track information and boundary points.

2.4 Reconnaissance Flora Survey

A modified reconnaissance survey was completed across the greater Survey Area, consisting of low intensity flora and vegetation sampling to describe the general vegetation characteristics and condition at the appropriate scale as defined by the EPA (2016).

Thirty-five (35) relevé sites were established within the Survey Area (Figure 2.1), to identify vegetation types and possible habitat for significant flora and ecological communities. The vegetation was

described as per NVIS Level V (Association) (NVIS Technical Working Group, 2017) (Appendix D), while the vegetation condition was based on the vegetation condition scale published in EPA Technical Guidance (EPA, 2016) Appendix E.

An additional 50 mapping notes and vegetation boundary points were sampled across the Survey Area to assist with the vegetation mapping.

2.5 Identification of Flora Specimens

Plant taxa that could not be identified during the field survey were collected, assigned a unique number for tracking purposes, and pressed for subsequent identification. Identifications were carried out by Biologic botanist Dr. Rachel Meissner, utilising the WAH reference collection, taxonomic keys and reference material. All taxa were checked against Florabase© (version 2.9.31; WAH, 1998-) to ensure their currency and validity. Any significant flora taxa, unusual/unique taxa, specimens of interest, range extensions and potential new taxa have been submitted for formal identification by WAH (Accession Number 9798).

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Cocanarup Rd

Cocanarup Mining Rd

COC-31 COC-01 SC-03 COC-34 COC-32 SC-01 COC-33 SC-02

COC-30 COC-02 SC-05 SC-15 SC-07 SC-06 SC-08 COC-03 COC-17 SC-36 SC-44 SC-35 SC-37 SC-45 SC-17 SC-16 COC-15 COC-04 SC-19 COC-16 COC-05 SC-18 SC-10 SC-09 SC-04 SC-11 SC-12 SC-13 SC-14 SC-38 COC-06 COC-14 SC-42 SC-43 SC-39 COC-25 SC-21 SC-22 SC-20 COC-12 COC-13 COC-19 SC-30 COC-07 SC-23 SC-25 SC-24 COC-18 SC-33 SC-27 SC-40 SC-34 COC-12 SC-31 SC-26 COC-20 SC-29 SC-28 SC-41 SC-46 SC-32 COC-08 COC-10 COC-27 COC-09 COC-11 COC-29 COC-21 COC-28 SC-47 COC-26 SC-48 SC-50 COC-22 COC-24 COC-23 SC-49

Legend

- Survey Area
- Local Road
- Drill Line Alignment

Sampling Type

- Mapping Note
- Relevé
- Traverse

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Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 08/11/2022

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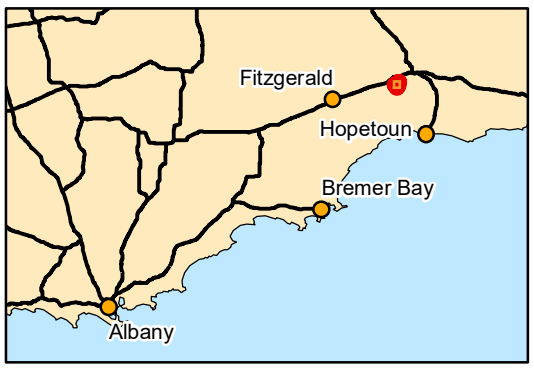

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Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 2.1: Flora sample sites and traverses

2.6 Limitations and Constraints

Several possible constraints and limitations can impinge on the adequacy of vegetation and flora and fauna surveys (EPA, 2016). Table 2.4 summarises these limitations in accordance with the Technical Guidance (EPA, 2016).

The survey was undertaken during a time considered to be optimal for the bioregion for flora and vegetation surveys. The on-ground conditions were observed to be favourable, with many annuals, ephemerals and geophytes flowering, despite slightly below-average rainfall for the three winter months preceding the survey (113.8 mm compared to the long term average of 135.7 mm) (BoM, 2022).

Table 2.4: Survey limitations and constraints

Limitation	Constraint	Comment
Availability of contextual information at a regional and local scale	Yes - minor	Limited contextual information is available for the Survey Area and surrounds with regard to flora and vegetation surveys, although there have been a significant number of biological surveys completed across the Fitzgerald subregion of the Esperance Plains bioregion, the data and reports for the majority of these surveys is not publicly available.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	No	The survey was conducted by a Senior Botanist with over 8 years' experience. The lead botanist met the minimum requirements to manage a field survey in the South-coast bioregion (EPA, 2016, 2020).
Proportion of flora recorded and/or collected, any identification issues	No	The survey intensity (targeted and reconnaissance) was designed to capture significant flora species and vegetation in specific habitat along the proposed Drill Line alignment, while completing broad vegetation mapping across the Survey Area focusing on dominant flora taxa and broad vegetation types. Therefore, this level of survey intensity captured an adequate proportion of flora taxa and vegetation. Furthermore, all collected specimens were able to be identifiable to species level.
Was the appropriate area fully surveyed (effort and extent)?	No	The proposed Drill Line alignment was thoroughly traversed on foot with all prospective habitat searched, while the broader Survey Area was traversed less intensely on foot, with all broad vegetation types visited and sampled. Any areas considered to contain habitat that could support significant flora were searched at greater intensity. The survey intensity and coverage match that of which is required for a targeted and reconnaissance survey and is not considered to be a constraint.
Access restrictions within the Survey Area	No	The Survey Area was accessed via tracks and public roads in good condition. Tracks were limited within the Survey Area and, as a result, was mostly completed on foot.
Survey timing, rainfall, season of survey	No	The survey was undertaken during a period which is considered to be optimal for flora and vegetation surveys in the region (EPA, 2016). Rainfall in the months preceding the survey was slightly below average, however this did not effect on-ground conditions.

Limitation	Constraint	Comment
Disturbance that may have affected the results of the survey such as fire, flood or clearing	No	No acute and/or large-scale disturbances occurred immediately prior to, or during, the survey. The Survey Area is located within a Timber Reserve. The vegetation was noted as being historically altered at localised places across the Survey Area, however, not to a point and frequency that limited the results of the flora and vegetation survey (most of the vegetation was considered to be in Excellent condition).

3 RESULTS

3.1 Desktop Assessment

3.1.1 Significant Flora

The desktop assessment identified a total of 49 flora taxa of significance (database searches and literature review) (Appendix F). Not all significant flora taxa from the literature were included in the desktop assessment findings due to the distance of records from the Survey Area. The 49 taxa were assessed and ranked with the assessment of occurrence matrix prior to mobilisation (Appendix F). Three taxa were assessed as Highly Likely to occur in the Survey Area, while a further five are Likely, and 18 were deemed as Possible to occur in the Survey Area. The remaining 23 taxa are Unlikely (18) or Highly Unlikely (5) to occur in the Survey Area. No significant flora have previously been identified as occurring in the Survey Area pre-survey.

3.1.2 Significant Ecological Communities

The desktop assessment identified one significant ecological community with potential to occur in the Survey Area; State-classified PEC (P3) and Commonwealth listed TEC (Endangered) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia'. However, only the buffer of this community overlaps the Survey Area. Review of the adjacent vegetation mapping completed by Woodman (2016) did not map any vegetation representative of this ecological community. Furthermore, review of the aerial imagery along with comparison of Woodman's adjacent vegetation mapping, suggests that it is unlikely that vegetation representing this significant ecological community occurs with the current Survey Area.

3.2 Field Survey

3.2.1 Flora Composition

A total of 129 vascular flora taxa (127 confirmed and two unconfirmed) from 33 families and 77 genera were recorded within the Survey Area (Appendix G). Of the 129 taxa, 112 were native and 17 were introduced.

The dominant families included Myrtaceae (21 taxa), Fabaceae (18 taxa) and Asteraceae (14 taxa), which when combined comprise 41.1 % of the total taxa recorded. Of the 33 families, 14 were represented by a single taxon, equating to 10.9 % of the total confirmed taxa recorded. The dominant genera make up 26.4 % of the total taxa recorded and comprised *Acacia*, *Lepidosperma* (both nine taxa), *Eucalyptus* and *Melaleuca* (both eight taxa). Of the 77 genera recorded, 60 were represented by a single taxon, which equates to 46.5 % of the total taxa recorded.

Of the two unconfirmed taxa recorded by this survey, one was tentatively identified to species level, *Lepidosperma* ? sp. Mt Chester (S. Kern et al. LCH 16596), while the other was identified to genus level, *Pterostylis* sp. indet. These specimens lacked sufficient reproductive material to enable a confident identification.

3.2.2 Significant Flora

Flora of Significance

Two flora taxa of significance and one taxon of potential significance were recorded in the Survey Area by this survey (Figure 3.1):

- *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 20 individuals from one point location;
- *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) – approximately 30 individuals from one point location; and
- *Lepidosperma* ? sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 10 individuals from one point location.

***Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1)**

This taxon is described as a small, tufted, caespitose sedge, reaching approximately 40 cm in height. The culms are stiff, biconvex with obtusely angular margins, between 1 and 1.5 mm wide, and have smooth margins (Botanic Gardens and Parks Authority, 2009). The inflorescences are narrow, with few short branchlets and few spikelets, while the sheath bases are dark brown, fibrous and not resinous. It is known to occur in low open mallee woodlands of the central areas of the Ravensthorpe Range, east to Bandalup Hill, and is also known from southeast of Lake King (Botanic Gardens and Parks Authority, 2009; WAH, 1998-). There are currently 19 known records of this taxon on Florabase (WAH, 1998-). Habitat supporting this taxon within the Survey Area is defined as *Eucalyptus extensa* mid closed mallee forest on basalt, granite and pegmatite brown clay loam soils on slopes of undulating low hills, with

exposed pegmatite outcropping and low breakaways. The record of this taxon within the Survey Area occurs relatively close to the Drill Line alignment (Figure 3.1).

It is likely that not all individuals and occurrences have been identified from the Survey Area due to the limited understanding and cryptic nature of this taxon within the genus of *Lepidosperma*. It is therefore Highly Likely (see section 3.2.3) that additional individuals occur within the greater Survey Area. However, the presence and understanding of this taxon along the Drill Lines is considered to be well understood as these areas were traversed at a higher intensity.

Plate 3.1: *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) dried and pressed individual (Biologic photo).

***Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1)**

This taxon is described as a caespitose sedge, reaching approximately 50 cm in height. The culms are flat, 2-3 mm wide, and have margins with a fine continuous band of short red hairs that appear smooth but slightly rough to the touch (Botanic Gardens and Parks Authority, 2009). The inflorescence is relatively narrow, but interrupted with small clusters of spikelets, while the sheath base is entire and not resinous (Botanic Gardens and Parks Authority, 2009). This lepidosperma species is known from low open mallee woodlands across the Ravensthorpe range and east to Bandalup Hill. There are currently 15 known records of *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) on Florabase (WAH, 1998-). The predominant vegetation supporting this taxon is described as *Allocasuarina huegeliana*, *Melaleuca uncinata* and *Calothamnus quadrifidus* subsp. *quadrifidus* tall open shrubland on shallow brown clay loam soils amongst granite and quartz outcropping with lateritic pebbles on the surface on

undulating low hills. The record of this taxon within the Survey Area occurs close to the Survey Area boundary away from the Drill Line alignment (Figure 3.1).

Plate 3.2: *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) dried and pressed individual (Biologic photo).

Western Australian Herbarium Formal Identification and Confirmation

The three specimens above were identified by Biologic senior taxonomic botanist Dr. Rachel Meissner as representing taxa of significance utilising WAH reference collection, taxonomic keys and reference material. Following Biologic's procedure, these specimens were forwarded to the WAH for formal identification and confirmation by an expert taxonomist (Accession Number ACC9798). Due to the current state of the taxonomy and revision for the genus *Lepidosperma*, there is an absence of detailed documentation of the character differences to assist in the differentiation of many taxa (particularly phrase-named taxa) within the genus. Therefore, the WAH is not always in the position of providing authoritative identifications in the genus, including the three submitted specimens mentioned above.

With this in mind, these specimens, and their associated locations, are to be treated based on Biologic's identifications provided by senior taxonomic botanist Dr Rachel Meissner. They are: (*Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1), *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) and *Lepidosperma* ? sp. Mt Chester (S. Kern et al. LCH 16596) (P1). As such, this Report considers these specimens to represent taxa listed as Priority 1 species as a precautionary approach.

Flora of Other Significance

The EPA (2016) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority flora taxa. These reasons may include, but is not limited to, range extensions, new locations, potentially undescribed taxa, keystone species, relic status, local endemism and anomalous features. Based on these features, eight flora taxa recorded from the Survey Area are flora of "other" significance (Table 3.1).

Table 3.1: Flora taxa of other significance

Taxon	Significance of taxon recorded by this survey
Caladenia polychroma	Record represents a range extension of approximately 25 km to the East
**Carrichtera annua*	Record represents a range extension of approximately 20 km to the South-West
**Cotula bipinnata*	Record fills a significant gap in known distribution
Eremophila psilocalyx	Record represents a range extension of approximately 20 km to the South-West
Eremophila subfloccosa subsp. *glandulosa*	Record fills a gap in known distribution
Nicotiana rotundifolia	Record fills a gap in known distribution
Tecticornia halocnemoides	Record fills a gap in known distribution
Trifolium cernuum	Record fills a gap in known distribution

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Cocanarup Rd

Cocanarup Mining Rd

Legend

- Survey Area
- Local Road
- Drill Line Alignment

Significant Species

- *Lepidosperma* ? sp. Mt Chester (S. Kern *et al*. LCH 16596) - P1
- *Lepidosperma* sp. Mt Chester (S. Kern *et al*. LCH 16596) - P1
- *Lepidosperma* sp. Mt Short (S. Kern *et al*. LCH 17510) - P1

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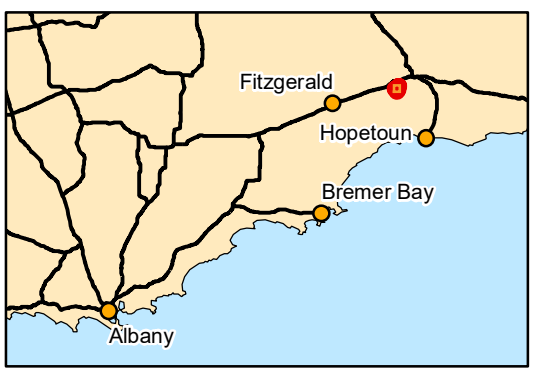

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Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 3.1: Conservation Significant flora recorded in the Survey Area

3.2.3 Review of Occurrence Assessment

Post-survey, a review of the occurrence assessment for flora taxa was undertaken. Table 3.2 provides a detailed summary of the revised likelihood ratings and the rationale for their amendment. All remaining taxa considered Possible were downgraded to Unlikely, while all remaining taxa considered Unlikely and Highly Unlikely pre-survey were either downgraded or remained so post-survey. This is due to distances from the Survey Area and marginal or unsuitable habitat observed (Appendix F).

Table 3.2: Post-survey likelihood of occurrence for significant flora

Taxon	Post-survey likelihood		Reasoning
	Drill Lines/ Pads	Survey Area	
Pre-survey likelihood – Highly Likely			
Acacia bifaria (P3)	Unlikely	Possible	Limited suitable habitat observed along the thoroughly searched Drill Lines; potential to occur across broader, less intensely searched Survey Area
Austrostipa turbinata (P3)			
Notisia intonsa (P3)			
Pre-survey likelihood – Likely			
Acacia besleyi (P1)	Unlikely	Possible	Limited suitable habitat observed along the thoroughly searched Drill Lines; Potential to occur across broader, less intensely searched Survey Area
Cassinia arcuate (P2)			
Levenhookia pulcherrima (P3)			
Eucalyptus desmondensis (P4)			
Melaleuca penicula (P4)			
Pre-survey likelihood – Possible			
Lepidosperma sp. Mt Chester (S. Kern et al. LCH 16596) (P1)	Confirmed	Highly Likely	Confirmed along the proposed Drill Lines. As targeted searches were not employed to the same intensity in the surrounding greater Survey Area and because this taxon is extremely cryptic, additional individuals of this taxon likely occur in the surrounding greater Survey Area
Lepidosperma sp. Mt Short (S. Kern et al. LCH 17510) (P1)	Unlikely	Confirmed	Confirmed within the greater Survey Area away from the proposed Drill Lines. Habitat supporting this taxon was not observed along the proposed Drill Lines and is thus Unlikely to occur along the Drill Lines post-survey

3.2.4 Introduced Flora

A total of 17 introduced taxa were recorded from the Survey Area (Table 3.3, Figure 3.2). Please see Appendix B for background information and definitions on Declared Pests, WoNS and Weed Prioritisation (ecological and invasiveness).

Of the introduced taxa recorded, two are listed as WoNS, **Asparagus asparagoides* (bridal creeper) (also a Declared Pest under Section 22 of the BAM Act) and **Lycium ferocissimum* (African boxthorn). The survey recorded one individual of Bridal Creeper, while a total of 48 African Boxthorn (**Lycium ferocissimum*) individuals from 14 point-locations were recorded by this survey (Figure 3.2). These two taxa, along with **Centaurea melitensis*, **Carrichtera annua* and **Ehrharta calycina*, are also priority alert weeds for the South Coast, with high Ecological Impact and rapid Invasiveness categorisation.

Table 3.3: Introduced flora recorded from the Survey Area

Family	Taxon	DP	WoNS	DBCA (South Coast)		Number of Records	Number of Individuals
				Ecological Impact	Invasiveness		
Aizoaceae	**Carpobrotus modestus*	No	No	Unknown	Unknown	1	10
Asparagaceae	**Asparagus asparagoides*	Yes	Yes	High	Rapid	1	1
Asteraceae	**Arctotheca calendula*	No	No	Unknown	Moderate	1	50
	**Centaurea melitensis*	No	No	High	Rapid	2	700
	**Cotula bipinnata*	No	No	Unknown	Unknown	1	100
	**Cotula coronopifolia*	No	No	Unknown	Rapid	1	100
	**Hypochaeris glabra*	No	No	Unknown	Rapid	1	500
	Sonchus oleraceus	No	No	Unknown	Rapid	1	5
	**Ursinia anthemoides* subsp. *anthemoides*	No	No	Unknown	Rapid	2	200
Brassicaceae	**Carrichtera annua*	No	No	High	Moderate	1	50
Fabaceae	**Trifolium cernuum*	No	No	Unknown	Moderate	1	100
Poaceae	**Ehrharta calycina*	No	No	High	Moderate	1	100
	**Ehrharta longiflora*	No	No	Medium	Rapid	1	100
	**Pentameris airoides*	No	No	Unknown	Rapid	1	100
	**Schismus barbatus*	No	No	Unknown	Rapid	2	150
Primulaceae	**Lysimachia arvensis*	No	No	Unknown	Rapid	1	20
Solanaceae	**Lycium ferocissimum*	No	Yes	High	Rapid	14	48

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6275000 6274000 6273000 6272000 6271000

Cocanarup Mining Rd

Cocanarup Rd

Cocanarup Mining Rd

Introduced Species

- **Arctotheca calendula*
- **Asparagus asparagoides*
- **Carpobrotus modestus*
- **Carrichtera annua*
- **Centaurea melitensis*
- **Cotula bipinnata*
- **Cotula coronopifolia*
- **Ehrharta calycina*
- **Ehrharta longiflora*
- **Hypochaeris glabra*
- **Lycium ferocissimum*
- **Lysimachia arvensis*
- **Pentameris airoides*
- **Schismus barbatus*
- **Sonchus oleraceus*
- **Trifolium cernuum*
- **Ursinia anthemoides* subsp. *anthemoides*

Legend

- Survey Area
- Local Road
- Drill Line Alignment

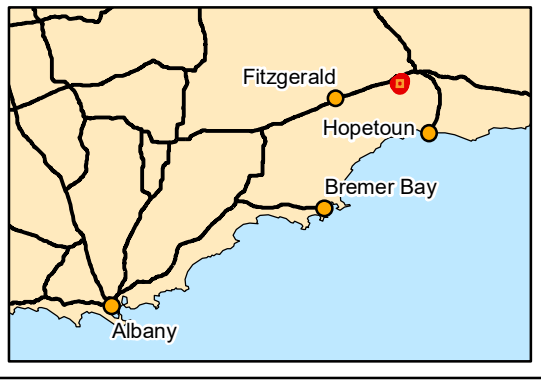
0 200 400 600 Meters

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 08/11/2022

N

biologic Environmental Survey

Scale: 1:14,000



TETRIS ENVIRONMENTAL

Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 3.2: Introduced flora recorded in the Survey Area

3.2.5 Vegetation Types

Eighteen vegetation types were described and delineated from the Survey Area (Figure 3.3, Table 3.5). These vegetation types were aligned, where possible, with mapping completed adjacent to the Survey Area by Woodman (2016), so there is continuity across the two projects to provide further context on occurrence and extent. One additional mapping unit, 'cleared', was delineated in the Survey Area in addition to the vegetation types. The 'Cleared' unit was associated with roads, tracks and fire breaks that had been cleared of native vegetation.

3.2.6 Vegetation of Significance

The desktop assessment for the project determined that no Threatened or Priority Ecological Communities were known to, or expected to, occur within the Survey Area. Following the completion of the survey, the vegetation is not considered to represent a TEC or a PEC. The buffer for the State-classified PEC (P3) and Commonwealth listed TEC (Endangered) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia' overlapped the Survey Area, however, the review of the key diagnostic features indicated that the vegetation in the Survey Area is not represented of the TEC. The key reasoning is the lack of proteaceous flora species that are a dominant and key feature of the TEC.

In addition to representing a TEC or a PEC, the vegetation can be significant for other reasons, including local or regional significance, refugial habitat or supporting habitat for significant flora or fauna, and vegetation associated with novel or significant landforms (e.g., landforms associated with important heritage sites) (EPA 2016). Vegetation types AhMuCqq and Ee have a low local significance as they provide habitat for, and support populations of two potential conservation significant flora taxa recorded from the Survey Area (see section 3.2.2). Furthermore, vegetation MvMhMi has a low local significance rating as it is associated with Phillips River, a medium drainage feature in the local landscape (Table 3.5).

3.2.7 Vegetation Condition

Vegetation condition within the Survey Area ranged from excellent to completely degraded, with the majority (91.2 %) considered to be in excellent condition (Table 3.4, Figure 3.4). Cleared areas with no vegetation (e.g., tracks) were mapped as "cleared". The main disturbances observed were associated with historically cleared areas and wetter locations (e.g., Phillips River) which supported higher covers and diversity of weeds. However, these disturbances were mainly restricted in their occurrences and location, with the remaining vegetation in excellent condition.

Table 3.4: Vegetation condition extent in the Survey Area

Condition	Survey Area extent (ha / %)	Comment
Excellent	201.40 / 91.22	Located across the majority of the Survey Area where vegetation has remained intact. Low weed cover (<1%).
Very Good	16.66 / 7.55	Located in areas with minor historical disturbances and wetter areas supporting weeds. More noticeable weed presence (1-5%).
Good	0.31 / 0.14	Localised in close proximity to historical clearing in the northern portion of the Survey Area. High weed diversity and cover (5-10%) but vegetation structure still intact.
Degraded	0.58 / 0.26	Mostly localised in close proximity to historical clearing in the northern portion of the Survey Area. Significant weed cover (10-50%) and diversity which has displaced the lower vegetation stratum and significantly reduced native mid shrub layer cover.
Completely Degraded	1.30 / 0.59	Localised within vegetation which has been historically cleared in the northern portion of the Survey Area. No intact vegetation structure present. Mostly introduced grass and herb cover.
Cleared	0.53 / 0.24	Tracks, roads and firebreaks.
TOTAL	220.79/ 100	-

768000 769000 770000 771000

6275000 6274000 6273000 6272000 6271000

Cocanarup Rd

Cocanarup Mining Rd

Cocanarup Mining Rd

Legend

Survey Area

Local Road

Vegetation Type

ID - Vegetation Code

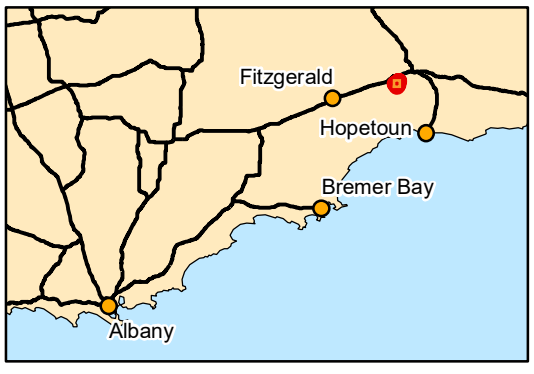
- 0 - Cl
- 1 - AbEdLf
- 2 - EsAa
- 3 - EsEcvEoc
- 8 - EsEb
- 9 - EsEbAa
- 10 - AaDp
- 11 - MvMhMi
- 14 - EsEoc
- 16 - EeDp
- 18 - Ee
- 19 - EeEcv
- 22 - EcEce
- 24 - Eoc
- 28 - EbEcv
- 29 - AhMuCqq
- 30 - Eca
- 31 - EeMuHpCqq
- 32 - Eo

0 200 400 600 Meters

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 08/11/2022

N

Scale: 1:14,000



TETRIS ENVIRONMENTAL

Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 3.3: Vegetation types in the Survey Area

768000 769000 770000 771000

6275000 6274000 6273000 6272000 6271000

Cocanarup Rd

Cocanarup Mining Rd

Cocanarup Mining Rd

Legend

Survey Area

Local Road

Vegetation Condition

- Excellent
- Very Good
- Good
- Degraded
- Completely Degraded
- Cleared

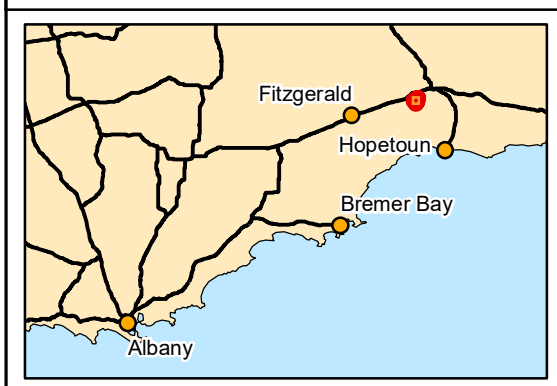
0 200 400 600 Meters

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 08/11/2022

N

biologic Environmental Survey

Scale: 1:14,000



TETRIS ENVIRONMENTAL

Cocanarup Timber Reserve Targeted and Reconnaissance Flora and Vegetation Survey

Figure 3.4: Vegetation condition in the Survey Area

Table 3.5: Vegetation type and extent recorded from the Study Area

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
AaDp *Acacia acuminata* and *Dodonaea ptarmicaefolia* tall closed shrubland over *Eremophila decipiens* subsp. *decipiens*, *Rhagodia crassifolia* and *Senna artemisioides* subsp. *filifolia* low sparse shrubland over **Ursinia anthemoides* subsp. *anthemoides*, *Waitzia suaveolens* var. *flava* and *Cheilanthes sieberi* subsp. *sieberi* low sparse herbland on basalt, granite and pegmatite shallow brown clay loam soils on hillslopes and crests of undulating low hills	COC-04, COC-07, COC-13, COC-16, COC-18, COC-20, COC-28	26.53 / 12.02	-	Excellent to Very Good	
AbEdLf *Acacia binata*, *Eremophila decipiens* subsp. *decipiens* and **Lycium ferocissimum* mid to low isolated shrubs over **Arctotheca calendula*, **Centaurea melitensis*, **Lysimachia arvensis* low closed herbland. on historically cleared areas	COC-01	1.30 / 0.59	Weed of National Significance **Lycium ferocissimum* recorded	Completely Degraded	
AhMuCqq *Allocasuarina huegeliana*, *Melaleuca uncinata* and *Calothamnus quadrifidus* subsp. *quadrifidus* tall open shrubland over *Calytrix leschenaultii* mid isolated shrubs over *Spartochloa scirpoidea*, *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) and *Lepidosperma rigidulum* tall open sedgeland on shallow brown clay loam soils amongst granite and quartz outcropping with some lateritic pebbles on the surface on undulating low hills	COC-11	3.50 / 1.59	Supports habitat for *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) – vegetation type is likely to support a greater number of individuals for this taxon.	Excellent	

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
EbEcv *Eucalyptus brachycalyx* and *Eucalyptus oleosa* subsp. *corvina* mid open mallee forest over *Templetonia retusa*, *Dodonaea ptarmicaefolia* and *Santalum acuminatum* tall open shrubland over *Senna artemisioides* subsp. *filifolia* and *Acacia binata* mid sparse shrubland over *Eremophila decipiens* subsp. *decipiens*, *Olearia muelleri* and *Acacia erinacea* low sparse shrubland on basalt grey clay loam soils on slopes of undulating low hills	COC-05, COC-19	31.65 / 14.33	-	Excellent	
Eca *Eucalyptus calycogona* mid open mallee woodland over *Allocasuarina huegeliana* and *Allocasuarina campestris* tall isolated shrubs over *Melaleuca cliffortioides*, *Beyeria sulcata* var. *gracilis* and *Calytrix tetragona* mid closed shrubland over *Acacia erinacea*, *Acacia glaucoptera* and *Cryptandra nutans* low open shrubland over *Lepidosperma diurnum* mid sparse sedgeland on shallow brown clay loam soils amongst granite outcropping with lateritic pebbles on surface on lower slopes of undulating low hills	COC-22	2.14 / 0.97	-	Excellent	
EcEce *Eucalyptus cernua* and *Eucalyptus virella* mid open mallee woodland over *Acacia acuminata*, *Templetonia retusa* and *Dodonaea ptarmicaefolia* tall shrubland over *Acacia binata* and *Daviesia nematophylla* mid sparse shrubland over *Phyllanthus calycinus* and *Senna artemisioides* subsp. ×*artemisioides* low sparse shrubland over *Cheilanthes sieberi* subsp. *sieberi* and *Trachymene ornata* low herbland. on basalt brown clay loam soils on lower slopes of undulating low hills	COC-09, COC-26	21.18 / 9.59	-	Excellent	

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
EeDp *Eucalyptus extensa* mid closed mallee forest over *Dodonaea ptarmicaefolia* and *Templetonia retusa* tall isolated shrubs over *Enchylaena tomentosa* var. *tomentosa*, *Hydrocotyle rugulosa* and **Lysimachia arvensis* low isolated herbs and forbs on basalt brown clay loam soils on upper slopes and hillcrests of undulating low hills	COC-14, mapping notes	25.50 / 11.55	-	Excellent	
Ee *Eucalyptus extensa* mid closed mallee forest over *Acacia binata* and *Daviesia nematophylla* tall open shrubland over *Enchylaena tomentosa* var. *tomentosa* and *Rhagodia preissii* subsp. *preissii* mid isolated shrubs over *Acacia erinacea*, *Acacia glaucoptera* and *Senna artemisioides* subsp. ×*artemisioides* low sparse shrubland on basalt, granite and pegmatite brown clay loam soils on slopes of undulating low hills	COC-08, COC-10, COC-21, COC-27, COC-29,	28.53 / 12.92	Supports habitat for *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – vegetation type is likely to support a greater number of individuals for this taxon.	Excellent	
EeEcv *Eucalyptus extensa* and *Eucalyptus virella* mid open mallee forest over *Acacia acuminata*, *Dodonaea ptarmicaefolia* and *Templetonia retusa* tall open shrubland over *Acacia glaucoptera* and *Daviesia nematophylla* mid sparse shrubland over *Lepidosperma diurnum* low isolated sedges over *Waitzia suaveolens* var. *flava*, *Hydrocotyle rugulosa* and **Lysimachia arvensis* low isolated herbs on quartz and basalt brown clay loam soils on upper slopes and hillcrests of undulating low hills	COC-12a, COC-12b	11.84 / 5.36	Weed of National Significance **Asparagus asparagoides* recorded	Excellent	

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
EeMuHpCqq *Eucalyptus extensa* mid mallee woodland over *Melaleuca uncinata*, *Hakea preissii* and *Calothamnus quadrifidus* subsp. *quadrifidus* tall shrubland over *Acacia glaucoptera*, *Acacia erinacea* and *Dodonaea pinifolia* low open shrubland over *Lepidosperma diurnum* and *Lepidosperma* sp. Saltbush Hill (K.R. Newbey 4118) mid to low open sedgeland on granite and basalt brown clay loam soils on slopes of undulating low hills with granite outcropping	COC-23, COC-24	12.11 / 5.48	-	Excellent	
Eo *Eucalyptus occidentalis* mid open woodland over *Melaleuca viminea* subsp. *viminea*, *Melaleuca cuticularis*, *Callitris roei* and *Callistemon phoeniceus* tall shrubland over *Gahnia ancistrophylla* tall sparse sedgeland over *Tecticornia halocnemoides* low isolated samphire shrubs over low mixed weedy grasses and herbs on mixed stones with granite outcropping surrounding on black and brown sandy clay loam in minor creeklines	COC-02, COC-06	9.13 / 4.14	Associated with minor drainage line ephemeral creek system	Very Good	
Eoc *Eucalyptus oleosa* subsp. *corvina* mid mallee woodland over *Daviesia nematophylla*, *Templetonia retusa* and *Santalum acuminatum* tall open shrubland over *Rhagodia preissii* and *Senna artemisioides* subsp. ×*artemisioides* mid isolated shrubs over *Acacia glaucoptera* and *Sclerolaena diacantha* low sparse shrubland on quartz and basalt brown clay loam soils on slopes undulating low hills	Mapping Notes	1.02 / 0.46	-	Excellent	

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
EsAa *Eucalyptus salmonophloia* mid isolated trees over *Acacia acuminata*, *Dodonaea ptarmicaefolia* and *Santalum spicatum* tall shrubland over *Eremophila decipiens* subsp. *decipiens* and *Rhagodia crassifolia* low open shrubland over *Cheilanthes sieberi* subsp. *sieberi*, *Gonocarpus nodulosus* and *Waitzia suaveolens* var. *flava* low open herbland on basalt, granite and pegmatite brown clay loam soils on slopes of undulating low hills	COC-32, COC-34	2.15 / 0.97	-	Excellent to Good	
EsEbAa *Eucalyptus salmonophloia* mid woodland over *Eucalyptus brachycalyx* mid open mallee woodland over *Acacia acuminata* and *Alyxia buxifolia* tall shrubland over *Daviesia nematophylla*, *Dodonaea ptarmicaefolia* and *Acacia binata* tall open shrubland over *Eremophila decipiens* subsp. *decipiens*, *Grevillea oligantha* and *Olearia muelleri* low open shrubland over *Waitzia suaveolens* var. *flava* and *Cheilanthes sieberi* subsp. *sieberi* low sparse herbland on basalt brown clay loam soils on slopes of undulating low hills	Mapping Notes	6.36 / 2.88	-	Very Good	
EsEb *Eucalyptus salmonophloia* mid woodland over *Eucalyptus brachycalyx* mid isolated mallee trees over *Acacia binata* and *Senna artemisioides* subsp. *filifolia* mid shrubland over *Eremophila decipiens* subsp. *decipiens*, *Olearia muelleri*, *Rhagodia crassifolia* and *Acacia erinacea* low open shrubland on basalt brown clay loam soils on flats, valley slopes and lower slopes of undulating low hills	COC-03, COC-17	27.11 / 12.28	-	Excellent	

Code and Description	Sample sites	Extent (ha / %)	Significant Features	Condition	Photo
EsEcvEoc *Eucalyptus salmonophloia* mid woodland over *Eucalyptus virella* and *Eucalyptus oleosa* subsp. *corvina* mid isolated mallee trees over *Acacia binata* and *Dodonaea ptarmicaefolia* tall open shrubland over *Enchylaena tomentosa* var. *tomentosa*, *Eremophila decipiens* subsp. *decipiens*, *Maireana trichoptera*, *Olearia muelleri* and *Rhagodia crassifolia* low open shrubland on basalt brown clay loam soils on slopes of undulating low hills	COC-31, COC-33	2.82 / 1.28	-	Excellent to Degraded	
EsEoc *Eucalyptus salmonophloia* and *Eucalyptus oleosa* subsp. *corvina* mid woodland over *Dodonaea concinna*, *Dodonaea ptarmicaefolia* and *Senna artemisioides* subsp. *filifolia* mid open shrubland over *Eremophila decipiens* subsp. *decipiens* and *Rhagodia crassifolia* low isolated shrubs on basalt brown clay loam soils on flats, valley slopes and lower slopes of undulating low hills	COC-15, COC-25	6.96 / 3.15	-	Excellent to Degraded	
MvMhMi *Melaleuca viminea*, *Melaleuca hamulosa* and *Melaleuca incana* subsp. *incana* tall sparse shrubland over **Lycium ferocissimum*, *Acacia patagia* and *Acacia cyclops* mid sparse shrubland over *Gahnia ancistrophylla* tall sparse sedgeland over *Tecticornia indica* subsp. *bidens*, *Disphyma crassifolium* and **Lysimachia arvensis* mixed sparse herbland and forbland on sandy soils with mixed stones and boulders (mainly basalt and granite) with exposed granite outcropping associated with Phillips River	COC-30	0.40 / 0.18	Associated with medium drainage line ephemeral creek system (Phillips River)	Very Good	
Cl Cleared	n/a	0.53 / 0.24	Tracks, bare areas	Cleared	
Totals		220.79 / 100			

4 CONCLUSION

A targeted flora and vegetation survey of the Drill Lines and Pads and a reconnaissance flora and vegetation survey of the Survey Area was completed over a total of five days (including mobilisation and demobilisation), with all conducive habitat along the Drill Lines/Pads thoroughly searched and all major vegetation types visited and sampled. A total of 85 sample sites (35 relevés and 50 mapping notes) were sampled to record the vegetation communities and their condition and collect an inventory of flora species present.

Significant results from the field survey recorded:

- Two significant flora taxa:
    - *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 20 individuals from one point location.
    - *Lepidosperma* sp. Mt Short (S. Kern et al. LCH 17510) (P1) – approximately 30 individuals from one point location.
- One taxon of potential significance:
    - *Lepidosperma* ? sp. Mt Chester (S. Kern et al. LCH 16596) (P1) – approximately 10 individuals from one point location.
- No Threatened flora taxa.
- Seventeen introduced flora taxa, including two WoNS and one declared pest:
    - **Asparagus asparagoides* – one individual from one point location (WoNS and Declared Pest).
    - **Lycium ferocissimum* – 48 individuals from 14 point locations (WoNS).
- Eighteen vegetation types and one additional mapping unit (cleared) were described and delineated from the Study Area.
- No vegetation of significance (including PECs and TECs).
- Vegetation condition ranged from excellent to completely degraded, with the majority (>90 %) considered to be excellent.

The three specimens representing flora taxa of significance could not be formally identified and/or confirmed by the Western Australian Herbarium due to the current state of the taxonomy and revision for the genus *Lepidosperma*. However, these specimens, and their associated locations, are to be treated based on Biologic's identifications as a precautionary approach. As such, this assessment considers these specimens to represent taxa listed as Priority 1 species.

5 REFERENCES

ALA, Atlas of Living Australia. (2022). Species Records (various).

APM. (2016). *Ravensthorpe gold copper project biological survey*. Unpublished report for ACH Minerals Pty Ltd.

BoM, Bureau of Meteorology. (2022). Climate Data Online. Retrieved 2022 http://www.bom.gov.au./climate/data/index.shtml

Botanic Gardens and Parks Authority. (2009). *Preliminary assessment of taxonomic and conservation status of Lepidosperma species (Cyperaceae) from the greater Ravensthorpe Range*. Unpublished report prepared for Department of Environment and Conservation.

Craig, G. F., Hickman, E. J., McQuoid, N., Newell, J., Rick, A. M., & Sandiford, E. M. (2008). *Vegetation of the Ravensthorpe Range, Western Australia: Mt Short to Kundip 1:10 000 scale*. Albany, WA:

DAWE, Department of Agriculture, Water and the Environment. (2022). Protected Matters Search Tool (custom search). Retrieved 2022 www.environment.gov.au/erin/ert/epbc/index.html

DBCA, Department of Biodiversity, Conservation and Attractions. (2022a). NatureMap (custom search). Retrieved 2022 http://naturemap.dec.wa.gov.au./default.aspx

DBCA, Department of Biodiversity, Conservation and Attractions. (2022b). Threatened and Priority ecological communities database (custom search). https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities

DBCA, D. o. B. C. a. A. (2022c). Threatened and Priority Flora Database (custom search). Retrieved 2022 http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals

DPIRD, Department of Primary Industries and Regional Development. (2022). Western Australian Organism List (custom search). Retrieved 2022 https://www.agric.wa.gov.au/organisms

EPA, Environmental Protection Authority. (2016). *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment*. Perth, Western Australia: Environmental Protection Authority.

Great Southern Bio Logic. (2017). *Targeted Flora Survey, Mallee Road - Shire of Ravensthorpe*. Albany, WA:

Markey, A., Kern, S., & Gibson, N. (2012). Floristic communites of the Ravensthorpe Range, Western Australia. *Conservation Science Western Australia, 8*(2), 187-239.

NVIS Technical Working Group. (2017). *Australian Vegetation Attribute Manual: National Vegetation Information System, Version 7.0* (Department of the Environment and Energy Ed.). Canberra: Department of the Environment and Energy.

Thompson, W. A., Allen, J., & Jasper, R. (2013). Flora and vegetation of greenstone formations of the Yilgarn Craton: south-west Ravensthorpe Greenstone Belt. *Conservation Science, 8*(3), 313-332.

WAH, Western Australian Herbarium. (1998-). Florabase—the Western Australian Flora. Retrieved 17 Aug 2022, from Department of Biodiversity, Conservation and Attractions https://florabase.dpaw.wa.gov.au/

Walker, J., & Hopkins, M. S. (1990). Vegetation. In R. C. McDonald (Ed.), *Australian soil and land survey*. Melbourne, Victoria: Inkata Press.

Woodman. (2015). *Shoemaker-levy corridor flora and vegetation assessment*. Applecross, WA:

Woodman. (2016). *Mt Cattlin Project Level 1 Flora and Vegetation Assessment*. Applecross, WA:

Woodman. (2021). *Rebuild South Country DX Telecoms Network – Stage 1 Replacement of Telecommunications Mast on Ravio Hill Flora and Vegetation Survey*. Applecross, WA:

6 APPENDICES

Appendix A: State and Federal Conservation Codes

International Union for Conservation of Nature

Category	Definition
Extinct (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LTC	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.
Not Evaluated (NE)	A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

Environment Protection and Biodiversity Conservation Act 1999

Category	Definition
Threatened Flora Species	
Extinct (EX)	A native species is eligible to be included in the Extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	A native species is eligible to be included in the Extinct in the Wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) 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.
Critically Endangered (CR)	A native species is eligible to be included in the critically endangered category 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.
Endangered (EN)	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (VU)	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation Dependent (CD)	A native species is eligible to be included in the Conservation Dependent category at a particular time if, at that time: (a) 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; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised; or (iii) the plan of management is in force under a law of the Commonwealth of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Category	Definition
Threatened Ecological Communities	
Critically Endangered	An ecological community is eligible to be included in the critically endangered category 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.
Endangered	An ecological community is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered nor endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Biodiversity Conservation Act 2016

Category	Definition
Threatened Flora Species	
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Published under schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Published under schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Published under schedule 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct (EX)	Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.

Category	Definition
Extinct in the Wild (EW)	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened flora species listed as extinct in the wild.
Threatened Ecological Communities	
Critically Endangered (CR)	An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time — (a) it is facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines; and (b) listing in that category is otherwise in accordance with the ministerial guidelines.
Endangered (EN)	An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time — (a) it is not a critically endangered ecological community; and (b) it is facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines; and (c) listing in that category is otherwise in accordance with the ministerial guidelines.
Vulnerable (VU)	An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time — (a) it is not a critically endangered ecological community or an endangered ecological community; and (b) it is facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines; and (c) listing in that category is otherwise in accordance with the ministerial guidelines.
Collapsed	An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time — (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover — (i) its species composition or structure; or (ii) its species composition and structure.

Department of Biodiversity, Conservation and Attractions Priority Definitions

Category	Definition
Threatened Flora Species	
Priority 1 (P1)	**Poorly-known Species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2 (P2)	**Poorly-known Species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3 (P3)	**Poorly-known Species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4 (P4)	**Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species 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. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Category	Definition
Threatened Ecological Communities	
Priority 1 (P1)	**Poorly-known ecological communities** Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2 (P2)	**Poorly-known Ecological Communities** Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority 3 (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 with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Category	Definition
Priority 4 (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.** (i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority 5 (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 B: Background to Introduced Flora

Weeds of National Significance

The Commonwealth of Australia, in collaboration with the states and territories, has identified 32 Weeds of National Significance (WoNS) based on an assessment process that prioritises these weeds according to their invasiveness, potential for spread and environmental, social and economic impacts. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

Landowners and land managers at all levels are responsible for managing WoNS. State and territory governments are responsible for legislation, regulation, and administration of weeds. The WoNS were selected as they require coordination among all levels of government, organisations, and individuals with weed management responsibilities.

Declared Pests

To protect Western Australian agriculture the Department of Primary Industries and Regional Development (DPIRD) (formerly the Department of Agriculture and Food Western Australia, DAFWA) regulates harmful plants under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Plants that are prevented entry into the state or have control or keeping requirements within the state are known as Declared Pests (DP). The main purposes of the BAM Act and its regulations related to declared pests are to prevent new plant pests from entering Western Australia, manage the impact and spread of those pests already present in the state and safely manage the use of agricultural chemicals.

The BAM Act has categorised the weeds of Western Australia into four main classifications:

- Declared Pests (under Section 22 of the Act);
- Permitted (under Section 11 of the Act);
- Prohibited (under Section 12 of the Act); and
- Permitted requiring a permit (Section 73, BAM Regulations 2013).

Under the BAM Act all declared plant pests are placed in one of three categories:

- C1 (Exclusion) — 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;
- C2 (Eradication) — 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 feasible; and
- C3 (Management) — 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 that currently is free of that pest.

Weed Prioritisation

In 2008, DBCA (as the Department of Parks and Wildlife; DPaW) developed and implemented an integrated approach to weed management on DBCA-managed lands in WA, the Weed Prioritisation Process. It was updated in 2013 and further revised in 2016, with the weeds in each region prioritised based on:

- Invasiveness;
- Ecological impact;
- Potential and current distribution; and
- Feasibility of control.

The resulting priorities focus on weeds considered to be high impact, rapidly invasive and still at a population size that can feasibly be eradicated or contained to a manageable size. This means that weed species that are already widespread may not be ranked as a high priority. The weed prioritisation for IBRA bioregions has recently been revised by Parks and Wildlife. The key priorities are now centred on 'Priority Alert' weeds and weeds that receive a rating for 'Ecological Impact' and 'Invasiveness'.

Appendix C: Literature Review Key Findings

		Rebuild South Country DX Telecoms Network – Stage 1 Replacement of Telecommunications Mast on Radio Hill Flora and Vegetation Survey	Floristic communities of the Ravensthorpe Range, Western Australia	Mt Cattlin Project Level 1 Flora and Vegetation Assessment	Flora and vegetation of greenstone formations of the Yilgarn Craton: south-west Ravensthorpe Greenstone Belt	Shoemaker-Levy Access Corridor Flora and Vegetation Assessment
Survey Details	**Reference**	Woodman (2021)	Markey *et al.* (2012)	Woodman (2016)	Thompson *et al.* (2013)	Woodman (2015)
	Type	Reconnaissance Flora & Vegetation Survey and Targeted Flora Survey	Detailed Flora and Vegetation Survey	Reconnaissance Flora & Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey
	Client	Western Power	n/a	Kingston Resources	n/a	FQM Australia Nickel Pty Ltd
	Location	Radio Hill, 8.5 km north of Ravensthorpe	Ravensthorpe Range	Mt Cattlin	Ravensthorpe Greenstone Belt	Shoemaker-Levy Access Road
	Size (ha)	2.033	n/a	169.76	n/a	222
	Timing	November 2020	2007, late spring/ summer of 2008/ 2009	Spring 2016	October & November 2009	September and October 2014
Methods	**Desktop Assessment (Yes/No)**	Yes	No	Yes	No	Yes
	Quadrat #	8	266	n/a	50	63
	Relevé #	6	n/a	31	n/a	n/a
	Targeted Searching (Yes/No)	Yes	Yes	Yes	Yes	Yes
	Other Methods	Opportunistic collections	n/a	Opportunistic collections	n/a	Opportunistic collections
Results	**Taxa**	90	697	120	313 (eight extra taxa from adjacent areas)	530
	Families	23	56	37	49	59
	Genera	56	n/a	76	131	203
	Vegetation Types	2	21	27	6	18
	Vegetation Condition	Majority Excellent or Very Good	n/a	Majority Excellent	n/a	Majority Pristine
	Weeds #	5	6	16	5	16
Significant Findings	**Threatened/ Priority Flora**	Seven significant flora taxa recorded: • *Daviesia megacalyx* (T) • *Drosera grievei* (P1) • *Guichenotia anota* (P1) • *Banksia corvijuga* (P3) • *Grevillea fulgens* (P3) • *Banksia foliosissima* (P4) • *Banksia laevigata* subsp. *laevigata* (P4)	Five Threatened and 36 Priority flora taxa recorded (8 P1, 1 P2, 9 P3, 18 P4). The five Threatened flora include: • *Acrotriche orbicularis* • *Beyeria cockertonii* • *Hibbertia abyssus* • *Daviesia megacalyx* • *Eucalyptus purpurata* • *Kunzea similis* subsp. *mediterranea*	None recorded	Six Priority flora taxa recorded: • *Austrostipa heteranthera* (P2) • *Cassinia arcuata* (P2) • *Acacia bifaria* (P3) • *Austrostipa turbinata* (P3) • *Eucalyptus desmondensis* (P4) • *Melaleuca penicula* (P4)	Ten conservation significant flora taxa recorded (One threatened and nine priority): • *Conostylis lepidospermoides* (T) • *Drosera grievei* (P1) • *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) • *Tricostularia lepschii* (P2) • *Dampiera* sp. Ravensthorpe (G.F. Craig 8277) (P3) • *Micromyrtus navicularis* (P3) • *Synaphea platyphylla* (P3) • *Allocasuarina* ?*hystricosa* (P4) • *Pultenaea calycina* subsp. *proxena* (P4) • *Thysanotus parviflorus* (P4)
	Threatened/ Priority Ecological Communities	Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (TEC – EN, PEC – P3)	Five Priority Ecological Communities listed (all Priority 1): • *Melaleuca* sp. Kundip (now M. sophisma) Heath • *Banksia laevigata – Banksia lemanniana* proteaceous thicket (TEC – EN) • *Eucalyptus megacornuta* mallet woodland • Heath on Komatiite of the Ravensthorpe area • *Eucalyptus purpurata* woodlands (Bandalup Hill)	None recorded	None recorded	• Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (TEC – EN, PEC – P3) • Swamp Yate (*Eucalyptus occidentalis*) woodlands in seasonally inundated clay basins (South Coast) (PEC – P3)
	WoNS and DP Weeds	None recorded	**Asparagus asparagoides* (WoNS & DP)	**Lycium ferocissimum* (WoNS)	**Asparagus asparagoides* (WoNS & DP)	None recorded
	Range Extensions/ Locality Holes	None recorded	None recorded	None recorded	Three range extensions recorded: • *Acacia brumalis* (100km SE) • *Schoenus* sp. Cape Riche Cushion (G.J. Keighery 9922) (40 km E) • *Melaleuca sparsiflora* (50 km S)	43 recorded taxa that represent significant range extensions or fill distribution gaps.
	Other	Putative taxon, Lepidosperma sp. 'Clathrate (R.L. Barrett & G.F. Craig RLB 3570)' was recorded at six locations. This taxon is of taxonomic interest.	55 taxa believed to be endemic	None recorded	None recorded	Three potentially undescribed taxa recorded: • *Eremophila glabra* s. lat. • *Lepidosperma* sp. 'Fitzgerald Tuberculate' • *Synaphea* aff. *petiolaris*
Other	**Limitations**	No substantial limitations	None recorded	No substantial limitations	No substantial limitations	No substantial limitations

		Targeted Flora Survey, Mallee Road – Shire of Ravensthorpe	Ravensthorpe Gold Copper Project Biological Survey	Vegetation of the Ravensthorpe Range, Western Australia: Mt Short to Kundip
Survey Details	**Reference**	Great Southern Bio Logic (2017)	APM (2016)	Craig *et al.* (2008)
	Type	Targeted Flora Survey	Reconnaissance Flora & Vegetation Survey	Detailed Flora and Vegetation Survey
	Client	Shire of Ravensthorpe	ACH Minerals Pty Ltd	n/a
	Location	Mallee Road	Ravensthorpe Gold Copper Project	Ravensthorpe Range: Mt Short to Kundip
	Size (ha)	~12	1,573.05	~ 10,200
	Timing	August 2017	August 2016	2007 and 2008
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	n/a
	Quadrat #	2	n/a	n/a
	Relevé #	n/a	n/a	Yes (number not provided)
	Targeted Searching (Yes/No)	Yes	Yes	Yes
	Other Methods	Opportunistic sampling	Transects	Veg units traversed
Results	**Taxa**	91 (48 – Area 1, 63 – Area 2)	n/a	500
	Families	n/a	n/a	n/a
	Genera	n/a	n/a	n/a
	Vegetation Types	2	26 (Kundip mine)	70
	Vegetation Condition	Pristine	Majority Excellent or Very Good	Excellent
	Weeds #	0 (weeds noted in text but no number given)	7	0 (weeds noted in text but no number given)
Significant Findings	**Threatened/ Priority Flora**	Six priority flora taxa recorded: • *Hakea cygnus* subsp. *needlei* (P2) • *Synaphea canaliculata* (P2) • *Banksia rufa* subsp. *chelomacarpa* (P3) • *Bossiaea spinosa* (P3) • *Pultenaea indira* subsp. *monstrosita* (P3) • *Chorizema ulotropis* (P4)	One priority listed taxa recorded: • *Marianthus mollis* (P4)	• One Threatened flora taxon (*Daviesia megacalyx*) and 17 Priority flora taxa (3x P1, 6x P3, 8x P4) recorded.
	Threatened/ Priority Ecological Communities	Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (TEC – EN, PEC – P3)	Three TECs/PECs represented: • Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (TEC – EN, PEC – P3) • *Banksia laevigata – Banksia lemanniana* proteaceous thicket (TEC – EN, PEC – P1) • *Melaleuca* sp. Kundip (now M. sophisma) Heath (P1)	Four PECs (all P1) represented: • *Banksia laevigata – Banksia lemanniana* proteaceous thicket (TEC – EN) • Heath on Komatiite of the Ravensthorpe area • *Eucalyptus megacornuta* mallet woodland • *Melaleuca* sp. Kundip (now M. sophisma) Heath
	WoNS and DP Weeds	None recorded	**Asparagus asparagoides* (WoNS & DP)	**Asparagus asparagoides* (WoNS & DP)
	Range Extensions/ Locality Holes	None recorded	None recorded	None recorded
	Other	None recorded	None recorded	Potential new taxon recorded: • *Melaleuca* aff. *coccinea*
Other	**Limitations**	No substantial limitations	No substantial limitations	No substantial limitations

Appendix D: Vegetation Structural Definitions

NVIS Vegetation Structural Classifications

Cover Characteristics							
Foliage cover *	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover **	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% Crown cover ***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

Growth Form	Height ranges (m)	Structural Formation Classes						
tree, palm	>30 Tall 10-30 Mid <10 Low	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	10-30 Tall <10 Mid <3 Low	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, fern	>2 Tall 1-2 Mid <1 Low	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	10-30 Tall <10 Mid <3 Low	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	>2 Tall 1-2 Mid <1 Low	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	>2 Tall 1-2 Mid <1 Low	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	>0.5 Low <0.5 Low	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs

Growth Form	Height ranges (m)	Structural Formation Classes						
hummock grass	>2 Tall <2 Tall	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	>0.5 Mid <0.5 Low	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses
other grass	>0.5 Mid <0.5 Low	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	>0.5 Mid <0.5 Low	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	>0.5 Mid <0.5 Low	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	>0.5 Mid <0.5 Low	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	>2 Tall 1-2 Tall <1 Low	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumpsof ferns	ferns
bryophyte	<0.5	closed bryophyte land	bryophyte land	open bryophyte land	sparse bryophyte land	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	>30 Tall 10-30 Med <10 Low	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	<1 Tall 0-0.5 Low	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	<1 Tall 0-0.5 Low	closed seagrass bed	seagrass bed	open seagrass bed	sparse seagrass bed	isolated seagrasses	isolated clumps of seagrasses	seagrasses

From: NVIS Structural Formation Terminology (Australian Vegetation Attribute Manual Version 6.0 August 2003 http://www.environment.gov.au/erin/nvis/publications/avam/pubs/vegetation-attribute-manual-6.pdf)

* Foliage Cover is defined for each stratum as 'the proportion of the ground, which would be shaded if sunshine came from directly overhead'. It includes branches and leaves and is similar to the Crown type of Walker and Hopkins (1990) but is applied to a stratum or plot rather than an individual crown. It is generally not directly measured in the field for the upper stratum, although it can be measured by various line interception methods for ground layer vegetation. For the attribute COVER CODE in the Stratum table, the ground cover category refers to ground foliage cover not percentage cover.

** Crown Cover (canopy cover) as per Walker and Hopkins (1990). Although relationships between the two are dependent on season, species, species age etc. (Walker & Hopkins, 1990), the crown cover category classes have been adopted as the defining measure.

*** The percentage cover is defined as the percentage of a strictly defined plot area, covered by vegetation. This can be an estimate and is a less precise measure than using, for example, a point intercept transect methods on ground layer, or overstorey vegetative cover. That is for precisely measured values (e.g. crown densitometer or point intercept transects) the value measured would be 'foliage' cover. Where less precise or qualitative measures are used these will most probably be recorded as 'percentage' cover.

Appendix E: Vegetation Condition Rating Scale

Sourced from EPA (2016)

Code	Description
E = Excellent	=Pristine of Bush Forever Pristine or nearly so; no obvious signs of damage caused by the activities of European man.
VG = Very Good	=Excellent of Bush Forever Some relatively slight damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as **Bidens bipinnata* or **Malvastrum americanum*, or occasional vehicle tracks.
G = Good	=Very Good of Bush Forever More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as **Cenchrus* spp.
P = Poor	= Good of Bush Forever Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as **Cenchrus* spp.
VP = Very Poor	= Degraded of Bush Forever Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not without intensive management. Usually with a number of weed species including very aggressive species.
D = Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix F: Assessment of Occurrence

Taxon	Conservation Status			Habit and Habitat	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Known Record	Assessment of Occurrence	
	DBCA	BC Act	EPBC Act					Pre-Survey	Post-Survey
Acacia bifaria	P3			Prostrate or semi-prostrate, commonly domed shrub, 0.3-0.6(-0.8) m high, to 2 m wide. Fl. yellow, Aug to Oct or Dec. Clay, rocky loam, sandy soils. Undulating plains, roadsides, low-lying areas.	Yes	Yes	0.5 km N	Highly Likely	Possible
Austrostipa turbinata	P3			Perennial tussock grass to 0.4 m tall. Fl. Sep-Oct. Rocky loam over laterite, sandy loam/sandy clay, cracking clays, quartz/basalt/greenstone/calcrete. Hills, flats, granite dome, gilgai.	Yes	Yes	0.1 km S	Highly Likely	Possible
Notisia intonsa	P3			Prostrate to ascending annual, herb, 0.01-0.04 m high. Fl. yellow-brown, Sep to Oct. Red/brown clay, stony saline loam. Plains, damplands, floodplains, gentle slopes.	Yes	Yes	0.5 km S	Highly Likely	Possible
Acacia besleyi	P1			Upright rounded shrub up to 3 m tall. Fl. bright yellow, Sept. Clay loam, rocky loam, granite, quartz. Slopes, creeklines, gully. Eucalyptus woodland, mallee scrub.	Yes	Yes	2.5 km E	Likely	Possible
Cassinia arcuata	P2			Erect multi-stemmed aromatic (like honey) shrub, to 2 m high. Fl. brown, mainly Jan to Apr. Loam, clay loam. Ridge, adjacent to creeklines, slopes, flats.	Yes	Yes	0.9 km NNW	Likely	Possible
Levenhookia pulcherrima	P3			Annual (likely fire ephemeral), herb, 0.03-0.7 m high. Fl. pink-red, Oct to Nov. Sand, loam, clayey sand, granite/quartz/laterite. Slopes, plains.	Yes	Yes	1.2 km N	Likely	Possible
Eucalyptus desmondensis	P4			Mallee (slender, willowy), 1-4.5 m high, bark smooth. Fl. yellow, Jan to Jun or Aug to Dec. Stony loam or sand, clay, granitic soils. Rocky hillsides, sandplains.	Yes	Yes	1.2 km N	Likely	Possible
Melaleuca penicula	P4			Spreading shrub, 1.8-3 m high, leaf blade narrowly ovate, 2.7-3.8 times as long as wide. Fl. red, Jan to Feb. Red/brown loamy sand or red sandy clay. Granite outcrops, valley slopes.	Yes	Yes	2.2 km W	Likely	Possible
Eremophila denticulata subsp. *denticulata*	T	VU	VU	Erect, open shrub, 0.5-2.5 m high. Fl. pink-orange/yellow-orange-red, Aug to Dec or Jan to Feb. Alluvium, sand, sandy clay loam. River beds & plains, laterite breakaways.	Possible	Yes	8.5 km SSE	Possible	Unlikely
Grevillea maxwellii	T	CR	EN	Prostrate to spreading shrub, 0.2-1.2 m high, up to 2 m wide. Fl. red, May or Aug to Sep. Sandy clay or clay loam over granite. Hilltop.	Yes	No	4.5 km S	Possible	Unlikely
Verticordia helichrysantha	T	VU	VU	Sprawling shrub, 0.1-0.3(-0.6) m high. Fl. green-yellow, May or Jul to Nov. Sandy soils over spongolite. Coastal plains & cliffs.	Yes	No	4.6 km S	Possible	Unlikely
Grevillea sulcata	P1			Spreading or upright bushy shrub, ca 0.3 m high (up to 0.65 m). Fl. red, Apr-Jul. Clay loam, quartz, greenstone, granite or laterite. Gentle slopes.	Yes	Adjacent	3.9 km NNE	Possible	Unlikely
Lepidosperma sp. Mt Chester (S. Kern et al. LCH 16596)	P1			Caespitose sedge to 0.4 m tall, compressed culms. Fl. grey-brown, Sept-Nov. Clay loam, ironstone, sandstone, quartz. Slopes, undulating plains, slightly rocky outcrops, hillcrests.	Possible	Yes	5.3 km SW	Possible	Confirmed
Lepidosperma sp. Mt Short (S. Kern et al. LCH 17510)	P1			Sedge to 0.5 m tall. Fl. Oct-Nov. Shallow loamy sand, quartz, ironstone, laterite. Slopes, hillcrests, slight rock outcropping.	Yes	Yes	7.1 km SW	Possible	Confirmed
Austrostipa heteranthera	P2			Grass to 0.5 m tall. Fl. Oct-Nov. Shallow sandy clay loam, greenstone/granite/calcrete/quartz. Gently slopes and crests. Shrub or tree mallee.	Possible	Yes	1.3 km W	Possible	Unlikely
Boronia denticulata subsp. *whoogarupensis*	P2			Slender upright shrub to 1.5 m. Fl. pink, Apr, Aug, Nov-Dec. Loamy sand. Creekline.	Possible	Adjacent	4.4 km NW	Possible	Unlikely
Grevillea nivea	P2			Bushy shrub to 1.5m. Fl. red, Nov. Coarse sand over granite. Slopes. Heath.	Yes	No	4.5 km S	Possible	Unlikely
Acacia errabunda	P3			Dense, bushy, spreading shrub, 1-2.5 m high. Fl. yellow, Aug. Clay, loam, gravelly loam, sand. Undulating plains, clay flats.	Possible	Yes	9.5 km E	Possible	Unlikely
Daviesia newbeyi	P3			Bushy, multi-stemmed, broom-like shrub, 0.25-1.5 m high. Fl. orange/yellow & red, Aug to Oct. Sand or sandy clay over granite. Rocky slopes.	Yes	Yes	4.7 km NW	Possible	Unlikely
Gastrolobium stenophyllum	P3			Bushy, erect shrub, to 3 m high. Fl. orange/ pink/red, Sep to Dec or Jan to Feb. Sandy soils over granite. Base of rock outcrops, along rivers, in woodland, shrubland or heath.	Possible	Yes	7.3 km N	Possible	Unlikely
Grevillea punctata	P3			Upright shrub, 0.5-2 m high. Fl. red, Apr to May or Nov. Stony red loam, red clay, greenstone, rocky soils. Undulating hills.	Yes	Yes	5 km SSW	Possible	Unlikely
Lechenaultia acutiloba	P3			Hemispherical, ascending, much-branched shrub, 0.15-0.4 m high. Fl. green-yellow, Sep to Dec. Sand or sandy gravel. Near river banks or swamps.	Yes	Yes	11.9 km SE	Possible	Unlikely
Lepidosperma sp. Shoemaker Levy (L. Ang & O. Davies 10815)	P3			Tufted sedge to 0.35 m tall, stems compressed. Fl. Oct-Nov. Sandy clay, loamy sand. Gentle slopes with minor outcropping (ironstone, greenstone, quartz).	Possible	Adjacent	7.1 km SW	Possible	Unlikely
Spyridium mucronatum subsp. *recurvum*	P3			Erect or spreading shrub, 0.15-0.6 m high. Fl. white-cream-yellow, Oct to Nov. Sandy & clayey soils. Plains.	Yes	Yes	2.9 km S	Possible	Unlikely
Grevillea fastigiata	P4			Upright single-stemmed shrub, 0.9-2 m high. Fl. red, Sep-Oct, Jan, May. Red clay, granite. Slopes.	Yes	Adjacent	1.2 km N	Possible	Unlikely
Leucopogon compactus	P4			Much-branched shrub, 0.3-1 m high. Fl. white, Jun to Aug or Dec. Yellow sand with lateritic gravel, stony clay, loam over granite. Plains, hillslopes.	Yes	Yes	12.3 km NE	Possible	Unlikely
Acacia rhamphophylla	T	CR	EN	Low spreading shrub, 0.2-0.4 m high. Fl. yellow, Aug to Sep. Rocky or sandy clay. Upper slopes of low ranges.	Possible	No	16.9 km NE	Unlikely	Highly Unlikely
Anigozanthos bicolor subsp. *minor*	T	VU	EN	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green&red, Aug to Oct. Sand. Well-watered sites.	No	Adjacent	27.8 km NNW	Unlikely	Highly Unlikely
Coopernookia georgei	T	EN	EN	Slender shrub, 0.6-1.7 m high. Fl. pink-blue-purple, Jul to Nov. Stony gullies.	Possible	No	22 km SSE	Unlikely	Highly Unlikely
Daviesia megacalyx	T	EN	EN	Erect shrub, 0.7-1.6 m high. Fl. yellow/orange & red/brown/pink, Aug to Sep. Gravelly laterite. Ridges, hillslopes.	Possible	No	17.6 km NE	Unlikely	Highly Unlikely

Taxon	Conservation Status			Habit and Habitat	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Known Record	Assessment of Occurrence	
	DBCA	BC Act	EPBC Act					Pre-Survey	Post-Survey
Guichenotia apetala	P1			Compact, much-branched shrub, 0.15-0.4 m high. Fl. blue-pink/pink, May or Sep to Dec. Gravel, laterite.	Possible	No	9.4 km WSW	Unlikely	Highly Unlikely
Eucalyptus sinuosa	P2			Mallee, to 4 m high, bark smooth, ribbony-rough on lower surface. Fl. green, Jan to Mar. Grey-white gravelly sand, orange-brown clay over granite. Ridges, exposed rocky slopes, hillslopes, gully headwaters, near creeks.	Possible	No	15 km SW	Unlikely	Highly Unlikely
Hakea acuminata	P2			Shrub, 0.5-1.8 m high. Deep white sand, grey sand over granite, loam. Undulating plain.	Possible	Yes	18.2 km SE	Unlikely	Highly Unlikely
Acacia improcera	P3			Spreading, spiny shrub, 0.15-0.4 m high. Fl. yellow, Aug. Sand, loamy clay, clay. Undulating plains, flats.	Possible	Adjacent	15 km WSW	Unlikely	Highly Unlikely
Dampiera sericantha	P3			Erect, slender perennial, herb, 0.05-0.3(-0.6) m high, stems with blunt angles. Fl. blue, May or Aug to Dec. Sand, sometimes with gravel. Plains.	Possible	Adjacent	9 km NE	Unlikely	Highly Unlikely
Eucalyptus quaerenda	P3			Mallee, 1-4 m high, bark smooth, adult leaves more than 4 mm wide. Fl. white, Sep. White sand, clay loam, somewhat saline. Sandhills, flats.	Possible	No	16.5 km N	Unlikely	Highly Unlikely
Eutaxia acanthoclada	P3			Compact, mat-forming, prostrate shrub, to 0.3 m high. Fl. yellow/orange/red, Oct to Nov. Light brown sandy clay, shallow sandy loam, red clay over banded ironstone, gravel. Gently undulating plains.	Possible	No	10.3 km NNW	Unlikely	Highly Unlikely
Gonocarpus trichostachyus	P3			Erect to spreading perennial, herb, 0.05-0.17 m high. Fl. red-purple, Sep to Oct. Sandy soils over granite, clay-loam, gravelly. Slopes, flats, granite crevices.	Possible	Adjacent	5.7 km W	Unlikely	Highly Unlikely
Pultenaea indira subsp. *monstrosita*	P3			Procumbent or erect, sparse or bushy shrub, 0.1-0.6 m high. Fl. orange/red, yellow and black, Sep-Oct. Sand, sandy clay or loamy sand, gravel. Gentle slopes, flat to undulating plains, adjacent to salt lake.	Yes	No	6.3 km W	Unlikely	Highly Unlikely
Acacia argutifolia	P4			Low spreading, intricate shrub, 0.2-0.7 m high. Fl. yellow/cream, Jul to Dec or Jan. Shallow sand over quartzite. Rocky hills & ridges.	Possible	No	14.8 km SSE	Unlikely	Highly Unlikely
Anthocercis fasciculata	P4			Erect, viscid shrub, 0.8-3.5 m high. Fl. white, Jul to Dec. Sandy soils. Rocky quartzitic ranges.	Possible	No	11.4 km SSE	Unlikely	Highly Unlikely
Chorizema ulotropis	P4			Sprawling, open, semi-prostrate shrub, to 0.45 m high. Fl. orange-yellow, Jul to Sep. Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats.	Possible	Adjacent	18.5 km W	Unlikely	Highly Unlikely
Goodenia phillipsiae	P4			Shrub or herb, ca 0.3 m high. Fl. yellow, Jan-Jun, Sep, Nov. Sandy clay loam, gravelly. Flats, slopes.	Yes	No	20.4 km E	Unlikely	Highly Unlikely
Lechenaultia superba	P4			Erect, spreading shrub, (0.15-)0.3-0.7 m high. Fl. yellow-orange/orange-red, May or Aug to Nov or Jan. Quartzite soils. Rocky hillsides.	Possible	No	16.8 km SE	Unlikely	Highly Unlikely
Ricinocarpos trichophorus	T	VU	EN	Erect, openly branching shrub, 0.3-1 m high. Fl. white, May or Aug to Sep. Sandy clay, loam. Breakaways, among sandstone rocks.	No	Adjacent	55.3 km ESE	Highly Unlikely	Highly Unlikely
Roycea pycnophylloides	T	VU	EN	Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep. Sandy soils, clay. Saline flats.	No	No	139 km WNW	Highly Unlikely	Highly Unlikely
Thelymitra psammophila	T	VU	VU	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow, Sep to Oct. Sandy clay, loam.	Possible	No	77.5 km SW	Highly Unlikely	Highly Unlikely
Drosera bicolor	P1			Tuberous, perennial, herb. Fl. white, Sep. White silica sand. Floodplains.	No	No	32.5 km NNW	Highly Unlikely	Highly Unlikely
Pterostylis zebrina	P2			Herb, to 0.08 m high. Fl. brown-white/red-brown (striped), Sep-Oct. Clay loam, ironstone, granite. At the base of boulders, broken outcrops.	No	No	56.7 km WSW	Highly Unlikely	Highly Unlikely

Appendix G: Flora Composition

52 Cupressaceae

Callitris roei

115 Orchidaceae

Caladenia attingens subsp. *gracillima*
Caladenia barbarossa
Caladenia hirta subsp. *rosea*
Caladenia microchila
Caladenia polychroma
Pterostylis sp. indet

128 Asparagaceae

**Asparagus asparagoides* (WoNS & DP)
Thysanotus patersonii

129 Asphodelaceae

Bulbine semibarbata

156 Cyperaceae

Gahnia ancistrophylla
Lepidosperma diurnum
Lepidosperma fimbriatum
Lepidosperma rigidulum
Lepidosperma sanguinolentum
Lepidosperma ?sp. Mt Chester (S. Kern et al. LCH 16596) (?P1)
Lepidosperma sp. Mt Chester (S. Kern et al. LCH 16596) (P1)
Lepidosperma sp. Mt Short (S. Kern et al. LCH 17510) (P1)
Lepidosperma sp. Ravensthorpe (G.F. Craig 5188)
Lepidosperma sp. Saltbush Hill (K.R. Newbey 4118)

163 Poaceae

Austrostipa acrociliata
Austrostipa juncifolia
Austrostipa puberula
Austrostipa scabra
**Ehrharta calycina*
**Ehrharta longiflora*
**Pentameris airoides*
Rytidosperma setaceum
**Schismus barbatus*
Spartochloa scirpoidea

175 Proteaceae

Grevillea anethifolia
Grevillea huegelii
Grevillea oligantha
Hakea preissii
Hakea verrucosa

199 Zygophyllaceae

Roepera glauca

201 Fabaceae

Acacia acuminata
Acacia binata

201 Fabaceae (cont'd)

Acacia cyclops
Acacia erinacea
Acacia glaucoptera
Acacia lachnophylla
Acacia mimica var. *angusta*
Acacia patagiata
Acacia saligna
Daviesia nematophylla
Eutaxia cuneata
Gastrolobium musaceum
Glycine peratosa
Mirbelia ramulosa
Senna artemisioides subsp. ×*artemisioides*
Senna artemisioides subsp. *filifolia*
Templetonia retusa
**Trifolium cernuum*

208 Rhamnaceae

Cryptandra nutans

217 Casuarinaceae

Allocasuarina campestris
Allocasuarina huegeliana

229 Celastraceae

Stackhousia sp. Hairy fruited (E.N.S. Jackson 1387)

242 Euphorbiaceae

Beyeria sulcata var. *gracilis*

281 Myrtaceae

Callistemon phoeniceus
Calothamnus quadrifidus subsp. *quadrifidus*
Calytrix leschenaultii
Calytrix tetragona
Ericomyrtus serpyllifolia
Eucalyptus austrina
Eucalyptus brachycalyx
Eucalyptus calycogona
Eucalyptus extensa
Eucalyptus myriadena
Eucalyptus occidentalis
Eucalyptus oleosa subsp. *corvina*
Eucalyptus salmonophloia
Melaleuca acuminata subsp. *acuminata*
Melaleuca cliffortioides
Melaleuca cucullata
Melaleuca cuticularis
Melaleuca hamulosa
Melaleuca lateriflora
Melaleuca uncinata
Melaleuca viminea subsp. *viminea*

299 Sapindaceae

Dodonaea concinna
Dodonaea pinifolia
Dodonaea ptarmicifolia

300 Rutaceae

Boronia inornata subsp. *inornata*
Phebalium tuberculosum
Philotheca gardneri subsp. *gardneri*

309 Malvaceae

Guichenotia ledifolia
Sida petrophila

311 Thymelaeaceae

Pimelea argentea

332 Brassicaceae

**Carrichtera annua*

338 Santalaceae

Santalum acuminatum
Santalum spicatum

358 Chenopodiaceae

Chenopodium desertorum subsp. *microphyllum*
Enchylaena tomentosa
Rhagodia preissii
Tecticornia halocnemoides

364 Aizoaceae

**Carpobrotus modestus*

392 Primulaceae

**Lysimachia arvensis*

403 Ericaceae

Styphelia exserta

415 Boraginaceae

Halgania andromedifolia
Heliotropium asperrimum

416 Convolvulaceae

Wilsonia humilis

417 Solanaceae

**Lycium ferocissimum* (WoNS)
Nicotiana rotundifolia
Solanum symonii

428 Scrophulariaceae

Eremophila decipiens subsp. *decipiens*
Eremophila dichroantha
Eremophila psilocalyx
Eremophila subfloccosa subsp. *glandulosa*

432 Lamiaceae

Teucrium sessiliflorum
Westringia rigida

458 Goodeniaceae

Goodenia affinis
Scaevola spinescens

460 Asteraceae

**Arctotheca calendula*
Brachyscome ciliaris
**Centaurea melitensis*
**Cotula bipinnata*
**Cotula coronopifolia*
**Hypochaeris glabra*
Lawrencella rosea
Millotia myosotidifolia
Millotia tenuifolia var. *tenuifolia*
Olearia muelleri
Podolepis rugata subsp. *rugata*
**Sonchus oleraceus*
**Ursinia anthemoides* subsp. *anthemoides*
Waitzia suaveolens var. *flava*

472 Araliaceae

Trachymene ornata

474 Apiaceae

Daucus glochidiatus