City of Albany

Albany Heritage Park Trails Link Project

Rehabilitation Management Plan

16 January 2023

63719-149202 (Rev 0)

JBS&G Australia Pty Ltd

www.jbsg.com.au

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1. Introduction

This Rehabilitation Management Plan (RMP) identifies management measures, monitoring actions, contingencies and reporting to be undertaken by the City of Albany as part of the Albany Heritage Park Trail Network Project rehabilitation commitments.

1.1 Project background

The Albany Heritage Park (AHP; comprising Mount Clarence and Mount Adelaide) is located in the City of Albany (CoA), on the south coast of Western Australia approximately 390 km southeast of Perth (Figure 1.1). In 2015, the CoA Council adopted the 'City of Albany Trails Hub Strategy' to provide strategic guidance to assist the City of Albany to become a World Class Trail Tourism Hub. The Vision for the Trails Hub Strategy is described as:

> *'A World Class Trail Tourism Hub situated around high-quality trail systems, supported by a complete package of hospitality and visitor services set within our unique natural landscapes.'*

The priority project identified from the Strategy was the AHP Link Trail Network Project (the Project). The Project aims to provide a network of world class walking, mountain biking and interpretive trails that will provide sustainable benefits to the Albany community. The consolidation and rationalisation of existing trails, creation of new high-quality trails and links, and the closure and rehabilitation of unsustainable trails, will result in better accessibility and utilisation of the trail network. Common Ground Trails were engaged in 2015 to prepare the Concept Design for the AHP Link Trails. The Concept Design identified a 30m corridor in which the final trail alignment was to be located within. The Concept Design is based on the following design principles:

- Trails to be site responsive, i.e., minimise damage and protect significant character;
- Separate user groups (particularly walkers and riders) to improve the visitor experience and address safety issues;
- Maximise experience and respect natural systems;
- Rationalise and consolidate current trails as much as possible;
- Provide multiple access points to the trail system;
- Build trails to current best practice standards; and
- Develop a Code of Conduct and yield hierarchy for the site.

The proposed new trails will involve clearing of native vegetation by hand or with small machines. Clearing activities will involve the removal of all vegetation (including most roots) and the topsoil from trail alignments, and relocation of granite boulders (Common Ground Trails 2015).

In 2022, Common Ground Trails were engaged to further develop the design and document the final trail alignment (i.e. reduction of the 30m buffer to 1-5m). The final trail alignment and total area impact for proposed trails within the 30m buffer will be up to 3.16 ha (31,564 m^2) as described in Table 1.1 and depicted in Figure 1.2.

Table 1.1: Proposed link trail impact area

Trail type	Total trail (length m)	Existing trail (length m)	Proposed trail (length m)	Proposed clearing 2m average width (area m^2)	Proposed clearing 2.8 average width (area m^2)	Total area of disturbance (area m^2)	Total area of disturbance (area ha)
Walk trail	7,557	4,160	3,397	6,794		6,764	0.68
Mountain bike trail easy (green)	5,340	253	5,087		14,244	14,244	1.42
Mountain bike trail intermediate (blue)	5,166	1,244	3,922	7,844		7,844	0.7
Dual use sealed trail	4,971	4,013	958		2,682	2,682	0.27
Total	**23,034**	**9,670**	**13,364**			**31,564**	**3.16**

1.1.1 Legislative and approvals context

The City of Albany submitted a Purpose Permit application to the Department of Water and Environmental Regulation (DWER) to facilitate the clearing of 3.16 ha of native vegetation at the AHP (Figure 1.2). This application was submitted in accordance with the bilateral agreement made under section 45 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) as potential impacts to Matters of National Environmental Significance (MNES) were evidence, including:

- Western Ringtail Possum (*Pseudocheirus occidentalis*);
- Carnabys Black Cockatoo (*Calyptorhynchus latirostris*);
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*);
- Forest Red Tailed Black *(Cockatoo Calyptorhynchus banksii naso);*
- Pink Spider Orchid (*Caladenia harringtoniae*); and
- Dwarf Hammer Orchid (*Drakaea micrantha*).

The application was received by the DWER on 13 January 2021 and given the reference 'CPS 9182/1.' Included within this application was a commitment that the CoA would progressively rehabilitate areas within AHP to offset potential impacts on Threatened fauna species, namely Western Ringtail Possum and Carnaby's and Forest Red Tailed Black Cockatoo habitat (referred to collectively as 'Black Cockatoos').

1.2 Purpose and scope

This RMP has been prepared to support the rehabilitation commitment made in the CPS 9182/1 application and in accordance with DWER's *A Guide to Preparing Revegetation Plans for Clearing Permits.* The activities described in this RMP are relevant to the following rehabilitation areas within the AHP (depicted in Appendix A):

- 0.94 ha of unrequired trails within the vicinity of the Link Trail; and
- Approximately 7.22ha of degraded areas within AHP.

The location of the rehabilitation areas was identified by the CoA's 'Reserves' department with whom have a working knowledge of the AHP landscape as they are responsible for the ongoing management of public open spaces and reserves across the local government area.

Legend

- Albany heritage park
- Cadastre Address (LGATE-002)
- Major road
- Minor road
- Tracks

Scale: 1:17,500 at A4 (0 100 200 metres)		**Albany heritage park trail** **City of Albany**
Coord. Sys. GDA 1994 MGA Zone 50		**ALBANY HERITAGE PARK**
Job Number: 63719		
Client: City of Albany		**FIGURE 1.1**
Version: A	Date: 16-Dec-2022	strategen JBS&G
Drawn By: ianandagoda	Checked By: CT	

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Image Reference: WMS: www.nearmap.com© - Imagery Date: 16 November 2022.

Legend

- Albany heritage park
- Cadastre Address (LGATE-002)
- Trails clearing alignment
- Major road
- Minor road
- Tracks

Scale: 1:17,500 at A4 (0 100 200 metres)		**Albany heritage park trail** **City of Albany**
Coord. Sys. GDA 1994 MGA Zone 50		**CLEARING ALIGNMENT**
Job Number: 63719		
Client: City of Albany		**FIGURE 1.2**
Version: A	Date: 22-Dec-2022	strategen JBS&G
Drawn By: jcrute	Checked By: CT	

File Name: W:\Projects\1)Open\City of Albany\63719 Revegetation Management Plan Albany Heritage Park Trails\GIS\02_MapProjects\63719_AlbanyHP_R01_v1\63719_AlbanyHP_R01_v1.aprx
Image Reference: WMS: www.nearmap.com© - Imagery Date: 16 November 2022.

2. Albany Heritage Park Existing Environment

The rehabilitation sites are located within the AHP. The AHP encompasses a total area of approximately 257 hectares (ha), bound by the town centre of Albany, Princess Royal Harbour and Middleton Beach.

2.1 Land use

The AHP comprises a number of reserves on Crown land, with management responsibilities held primarily by the CoA and a number of key stakeholders. Water storage, reticulation and power supply infrastructure and easements all occur within the AHP, furthermore a number of Aboriginal Heritage sites have been identified within the AHP and are protected under the *Aboriginal Heritage Act 1972* (AHP Link Trails V2, 2020). AHP is also home to a number of military heritage sites of national significance, including the National Anzac Centre, Desert Mounted Corps Memorial, Avenue of Honour, Padre White Lookout and Princess Royal Fortress.

2.2 Soils and Landscapes

The topography of the AHP is dominated by the two prominent granite/gneiss headlands of Mt Clarence and Mt Adelaide, connected by a relatively flat saddle which slightly falls along its axis to the southeast. The southern faces of the reserve are quite different from the northern faces. While the southern faces are characterised by dry, rugged, steeper terrain, the northern faces host dense scrub and woodland. Mt Clarence is a prominent peak characterised by massive, exposed granite outcrops, and rising sharply over the City Centre. The south-easterly face of Mt Clarence slopes to a wide ridge line saddle expanse, which then rises gradually to the lower summit of Mt Adelaide approximately 3km in the south-easterly direction. The vertical relief of the AHP is approximately 185m; the highest point on Mt Clarence reaches an elevation of 185m, while the foot of Mt Adelaide reaches sea level on the shores of King George Sound (AHP Link Trails V2, 2020).

2.3 Vegetation and flora

The AHP occurs within the Jarrah Forest Interim Biogeographic Regionalisation of Australia (IBRA) Region (DAWE 2021). Broad scale pre-European vegetation mapping (DPIRD 2019) describes the AHP as a Forest of *Eucalyptus marginata/Corymbia calophylla* (Association: Albany_3) or Rock (Association: Albany_128).

2.3.1 Broad Vegetation

Detailed flora vegetation mapping has been undertaken previously by Sandiford and Barrett (2010) across the Albany region of which included the AHP, referred to as the Albany Regional Vegetation Survey (ARVS). The ARVS provides a local and regional overview of the native vegetation of the area to assist land use and conservation planning in the region by describing, mapping and assessing the conservation status of the vegetation within the ARVS area. The ARVS area encompasses 124,415 ha that extends some 30 km east and west of Albany and 20 km north. It is situated at the junction of three IBRA biogeographic regions - the Warren, Jarrah Forest and Esperance Plains Regions - and includes a variety of landforms from coastal dunes, granitic hills, gently undulating plains, lowland flats, rivers and drainage lines to estuarine fringes and lakes (Sandiford and Barrett 2010).

The survey involved a review of existing vegetation information, extensive field work including the recording of 785 floristic relevés and statistical analysis of data that were used along with field observations to define 67 native vegetation units. Extensive field work was essential in defining and mapping the vegetation due to high vegetation and landform diversity, low aerial photography interpretability and the absence of other data sets at a fine enough scale to reflect the vegetation patterning (Sandiford and Barrett 2010).

Vegetation units mapped across the AHP according to the ARVS are described below and depicted in Appendix B.

Table 2.1: ARVS vegetation units described at AHP (Source: Sandiford and Barrett 2010)

Vegetation unit	Unit Number	Description
Granite outcrops		
Hakea spp Transitional Shrubland	22	Hakea spp Transitional Shrubland is a restricted to colluvial gravelly/sandy soil overlying or around granitic pans and exposures. A tall shrub layer dominated by one of three Hakea species - *Hakea trifurcata, H. prostrata or H. undulata,* often in association with *Agonis theiformis*, is characteristic of this unit which may have an emergent or very open canopy of *Eucalyptus marginata* and *Corymbia calophylla*. The structure of this unit varies with areas dominated by *Hakea trifurcata* tending to be denser than those dominated by either *Hakea prostrata* or *Hakea undulata.* Lower shrub strata are open, typically an open low shrubland occurs over an open to very open sedgeland. Understorey species are often those indicative of gravelly soils including *Agonis theiformis, Bossiaea ornata, Banksia dallanneyi, Hovea trisperma, Astroloma pallidum, Calectasia grandiflora, Mesomelaena tetragona* and *Mesomelaena stygia subsp. stygia*. This unit often grades into adjacent vegetation, usually Marri/Jarrah Coastal Hills Forestor Marri/Jarrah Forest/Peppermint Woodland and compared to other granitic shrublands appears restricted to deeper sandier soil overlying or surrounding granitic pans.
Acacia sulcata/Leucopogon assimilis Granite Shrubland	25	*Acacia sulcata/Leucopogon assimilis* Granite Shrubland is found on and around broken granite exposures on skeletal loam or gravelly loam soil which appear to have some clay content. The structure is usually an open shrubland over low shrubland over an open sedgeland and very open grassland of *Neurachne alopecuroidea*. Common species include those typical of either granite outcrops or gravelly clay soil including *Acacia sulcata subsp sulcata, Leucopogon aff assimilis, Hemigenia podalyrina, Dodonaea ceratocarpa, Leucopogon pendulus, Allocasuarina humilis, Leucopogon sp. Coujinup, Andersonia sprengelioides, Hibbertia microphylla, , Boronia subsessilis, Calytrix sp Esperance, Anarthria gracilis, Mesomelaena stygia, Desmocladus fasciculatus, Lepidosperma angustatum, Conostylis setigera subsp setigera and Goodenia caerulea.* Shrublands dominated *by Calytrix sp Esperance* are described as a sub-unit but may represent a separate unit.
Gastrolobium bilobum/Hakea elliptica Granite Shrubland/ Yate Woodland	23	*Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/Yate Woodland is found scattered throughout the survey area fringing granite outcrops with most occurrences on upper slopes and hill crests. Soils are typically well drained orange brown or brown sandy loams. Dense stands of *Gastrolobium bilobum* are the distinctive feature of this unit with a sparse overstorey of *Eucalyptus cornuta* often present. In eastern areas, *Corymbia calophylla* is often the dominant tree species. This unit is not very diverse with the understorey often reduced to a very open sedgeland *with Lepidosperma gracile* and *Cyathochaeta avenacea* usually the dominant species. In some areas Hakea elliptica is the dominant shrub forming thickets (23b). These areas often grade into Marri/Jarrah Coastal Hills Forest (17) and Marri/Jarrah Forest/Peppermint Woodland (10) units that occur down slope.
Taxandria marginata Granite Shrubland	24	*Taxandria marginata* Granite Shrubland is restricted to granite outcrops where it occurs on skeletal grey/brown or dark brown gravelly loam. *Taxandria marginata* is the dominant shrub with *Hakea drupacea* and/or *Anthocercis viscosa* sometimes forming a taller shrub stratum. *Lepidosperma angustatum* is the dominant sedge with *L drummondii* co-dominant in some areas and a very open shrubland or low shrubland including *Dodonaea ceratocarpa, Eutaxia myrtifolia Verticordia plumosa, Andersonia sprengelioides* and *Pimelea imbricata subsp imbricata* is often present. *Borya nitida, Borya sphaerocephala, Stypandra glauca* and *Cheilanthes austrotenuifolia* are the dominant perennial herbs. Moss beds may occur on the broad granite sheets between the shrublands, supporting a very diverse geophyte and annual flora. This unit is frequently surrounded by *Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/Yate Woodland (23)
Wetlands		
Callistachys spp Thicket	36	*Callistachys spp* Thicket was not well sampled as patches were usually very small and often disturbed. It occurs where local soaks or seepages occur on minor drainage lines, flats, gullies and slopes, on sandy to peaty soil. This unit is dominated by a canopy of *Callistachys lanceolata*, either as shrubs or trees. The understorey is heterogeneous reflecting both small patch size and soil moisture. Species diversity and density appears to

		thin as the canopy closes over. Commonly recorded species include *Pteridium esculentum, Leptocarpus tenax, Baumea juncea, Lepidosperma striatum, Leucopogon obovatus, Hibbertia cuneiformis, Homalospermum firmum, Aotus intermedia, Gahnia decomposita* and *Anarthria prolifera. Callistachys lanceolata* appears to intergrade with *Callistachys sp* South Coast which has a coastal distribution and it is often difficult to differentiate between the two. Small *Callistachys sp* South Coast thickets are restricted to the coastal fringe, near coastal gullies and seepages and are mapped as *Callistachys lanceolata* thickets as none were sampled.
Homalospermum firmum/Callistemon glaucus Peat Thicket	47	*Homalospermum firmum/Callistemon glaucus* Peat Thicket occurs in drainage depressions below the seepage zone on dark brown peat or sandy peat that is waterlogged in winter and moist in summer. This unit has a distinctive dense sedgeland characterized by the presence and dominance of *Empodisma gracillimum*. Other co- or sub-dominant sedges include L*epidosperma striatum, Leptocarpus tenax, Schoenus multiglumis, Gymnoschoenus anceps, Gahnia decomposita and Baumea rubiginosa.* The upper stratum is dominated by tall shrubs and varies from a closed tall scrub or closed heathland to a shrubland, a lower secondary shrub stratum may be present. Common shrub species include *Callistemon glaucus, Homalospermum firmum, Hakea linearis, Aotus intermedia, Acacia hastulata, Sphaerolobium fornicatum* and *Dampiera leptoclada.* The drainage channel is often marked by a line of *Taxandria linearifolia and Gahnia decomposita with Rhadinothamnus anceps* and *Callistachys lanceolata* also occasionally present. This unit typically lacks a tree layer though Eucalyptus megacarpa is a frequent overstorey species in some areas of Angove Water Reserve where *Boronia stricta* and *Hypocalymma cordatum* are common in the understorey. Elsewhere emergent *Taxandria juniperina* and *Melaleuca preissiana* are occasionally present. Along valleys, this unit often occurs down slope from *Evandra aristata* Sedgeland (46) with the boundary between the units marked by a seepage zone and sub-unit 47b. On broader flats, this unit frequently borders *Taxandria juniperina* Closed Forest (59) and it may grade into *Melaleuca preissiana* Low Woodland (49) which occurs on better drained sandier soil.
Melaleuca preissiana Low Woodland	49	*Melaleuca preissiana* Low Woodland is found throughout the survey area along drainage lines on dark grey sandy loam and occasionally on sandy peat soil. The overstorey is sparse with *Melaleuca preissiana* an emergent or low open woodland with *Banksia littoralis* occasionally sub dominant. Along creek lines and wetter areas the understorey is a mixed tall open scrub *of Aotus intermedia, Homalospermum firmum, Callistemon glaucus, Hakea ceratophylla,* and *Taxandria parviceps* over a low shrubland and mixed sedgeland usually codominated by several species including *Leptocarpus tenax, Evandra aristata, Schoenus efoliatus, Anarthria prolifera and Cyathochaeta avenacea.* On drier sites *Taxandria parviceps, Aotus* intermedia and *Hakea ceratophylla* dominate the shrub strata with *Cyathochaeta avenacea, Leptocarpus tenax*, and *Lepidosperma sp* Down Rd Fan dominant sedges. This unit often grades into *Homalospermum firmum/Callistemon glaucus* Swamp Thicket (47) but occurs on better drained soils either upslope or where water flow is more defined. It differs from unit 47 in its more open structure, dominance of *Melaleuca preissiana* and *Aotus intermedia*, presence of *Sphenotoma gracilis, Evandra aristata, Anarthria prolifera, Taxandria parviceps* and absence of *Empodisma gracillimum, Schoenus multiglumis, Gymnoschoenus anceps* and *Gahnia decomposita*
Miscellaneous Drainage Woodland/Shrubland	50	Miscellaneous Drainage Shrubland/Woodland is a mapping unit used to describe areas occurring along narrow creek lines, minor drainage lines or small soaks that either do not fit well with other units, appear to be ecotonal or could not be interpreted These areas are often very narrow or small and share species with adjacent vegetation. Key structural species of other wetland units are often dominant species including *Taxandria juniperina, Melaleuca rhaphiophylla, Melaleuca preissiana, Eucalyptus patens, Callistachys lanceolata, Banksia littoralis, Taxandria linearifolia, Hakea ceratophylla, Lepidosperma striatum, Baumea juncea, Schoenus acuminatus, Leptocarpus tenax* and *Cyathochaeta avenacea.* Other species include *Rhadinothamnus anceps, Baumea vaginalis, Astartea laricifolia* and *Astartea scoparia*.
Damplands/Creeklines		
Mixed *Banksia littoralis* Open Woodland	45	Mixed *Banksia littoralis* Open Woodland is essentially a mapping unit encompassing *Banksia littoralis* low open woodlands that occur in small seasonal swamps but do not show uniformity in understorey species nor fit other *B. littoralis* dominated woodlands (43, 44). Most occurrences were on the flats inland of the coastal dune systems and due to disturbance were not well sampled. Few floristic patterns were discerned other than the dominance of *B. littoralis* and its occurrence on sand in small depressions or along minor drainage lines. The understorey is either a shrubland or open heath over a sedgeland. Dominant shrub species, recorded at different sites included *Astartea laricifolia, Taxandria parviceps, Taxandria fragrans* and *Xanthorrhoea preissii. Lepidosperma effusum* was a dominant in some modified sites. The presence of species more

		typical of well drained sandy sites including *Melaleuca thymoides, Dasypogon bromeliifolius* and *Patersonia umbrosa* suggest that some sites are reasonably free draining. *Banksia littoralis* trees were also observed occasionally as emergents in *Melaleuca preissiana* Low Woodland (49) and *Homalospermum firmum/Callistemon glaucus* Swamp Thicket (48) but these units differed in the presence of species tolerant of long periods of water logging such *as Homalospermum firmum* and *Schoenus multiglumis*. Whether some occurrences of this unit are similar to *Xanthorrhoea* Lowland Sedgeland is unclear (see notes Unit 41).
Pericalymma spongiocaule Low Heath	39	*Pericalymma spongiocaule* Low Heath is typically found at the edges of drainage depressions on grey sandy soil where drainage is impeded by an impervious subsurface layer (T. Griffin pers. comm.). It also occurs mid slope or on crests where there is localized impeded drainage. Within the survey area it appears to have a strong affinity with Minor Valley and Dempster landform units (Churchward et al. 1988). Many patches are very small with the dominance of *Pericalymma spongiocaule* the distinctive feature of this unit along with a very diverse sedgeland usually dominated by *Tremulina tremula. Beaufortia anisandra* is often co-dominant with other common shrub species that include *Adenanthos obovatus, Calothamnus schaueri, Actinodium cunninghamii, Andersonia caerulea, Hypocalymma ericifolium, Leucopogon pendulus and Lysinema conspicuum.* Codominant sedges include *Mesomelaena tetragona, Anarthria gracilis* and *Hypolaena fastigiata*, with *M. tetragona* occasionally the dominant sedge. The herb layer is typically very sparse with *Dasypogon bromeliifolius* the most prominent herb. The grasses *Amphipogon debilis* and *Amphipogon laguroides* are often present. An emergent or very sparse tree stratum and taller shrub species may be present particularly on undulating ground where the trees and taller shrubs form open clumps on slightly higher ground. In these areas additional common species include *Eucalyptus staeri, E. marginata, Allocasuarina fraseriana, Kingia australis, Beaufortia decussata, Hakea ceratophylla, Sphaerolobium grandiflorum* and *Taxandria parviceps*. On slightly drier or sandier sites *Melaleuca thymoides, Dasypogon bromeliifolius* and *Lyginia barbata* may be present. Along drainage lines this unit is often present just upslope of *Evandra aristata* Sedgeland (46).
Coastal		
Coastal Heath	3	Coastal Heath is restricted to light grey sand on the coastal dunes system with extensive areas present from Torndirrup National Park west to Torbay Inlet. The mixed open heath is very diverse, occurring above a low open heath and a mixed sedgeland with *Cyathochaeta equitans* prominent and clumps of *Agonis flexuosa* common. Common larger shrubs include those typical of range of soils including *Bossiaea linophylla, Banksia grandis, Hakea florida, Hibbertia furfuracea* (typical of lateritic and granitic soils), *Jacksonia horrida, Adenanthos cuneatus, Leucopogon obovatus*, (acidic sand) and *Acacia cochlearis, Spyridium globulosum* and less frequently *Adenanthos sericeus* and *Banksia praemorsa* (alkaline soils). *Banksia grandis* and *Hakea prostrata* are present as prostrate forms. Other typical species include *Hibbertia racemosa, Pimelea rosea subsp rosea, Amperea ericoides, Logania serpyllifolia, Allocasuarina humilis, Platysace compressa, Loxocarya cinerea, Lepidosperma densiflora, Anarthria prolifera* and *Lyginia spp.*
Coastal B*anksia ilicifolia*/Peppermint Low Woodland	4	Coastal *Banksia ilicifolia*/Peppermint Low Woodland is restricted to coastal areas where it is found on deep acidic sand, typically on lower slopes. It is common on the Torndirrup Peninsula, where it usually occurs down slope of the Coastal Heath (3), Limestone Heath (5) and Peppermint Low Forest (2) mosaic. A canopy of *Banksia ilicifolia* and *Agonis flexuosa* is characteristic of this unit with *Banksia attenuata* and *Allocasuarina fraseriana* co-dominant in some areas. The understorey is usually an open heath over a low shrubland and sedgeland. Common understorey species include *Jacksonia horrida, Pultenaea reticulata, Melaleuca thymoides, Adenanthos cuneatus, Leucopogon obovatus, Leucopogon reflexus, Acacia pulchella, Astroloma baxteri, Bossiaea praetermissa, Hibbertia racemosa, Anarthria scabra, Anarthria prolifera, Schoenus caespititius, Lyginia barbata, Mesomelaena gracilipes, Cyathochaeta equitans, Dasypogon bromeliifolius* and *Amperea ericoides.*
Peppermint Low Forest	2	Peppermint Low Forest is restricted to the coastal dune system where it commonly occurs in swales and flats. A dense canopy of *Agonis flexuosa* (Peppermint) is characteristic of this unit with the structure varying from a closed heath on exposed coastal slopes to a low closed forest in swales with shrub species often sub or codominant in exposed areas. A tall shrubland of *Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla* and *Leucopogon obovatus* is usually present over an open or closed sedgeland with *Rhagodia baccata, Hardenbergia comptoniana* and *Clematis pubescens* common.
Upland Eucalypt Woodland Forest		

Jarrah Woodland	11	Jarrah Woodland is found on grey sand on lower to middle slopes in coastal and near coastal hills from near Young Siding to Mt Clarence and the Vancouver Peninsula. It is not as diverse floristically as other Jarrah dominated units and has an understorey dominated by species typical of deep well-drained sandy soils. The canopy is relatively open with Banksia ilicifolia and Corymbia calophylla occasionally present. The understorey is often a Taxandria parviceps tall shrubland above one or two lower open shrub layers, an Anarthria scabra/Hypolaena exsulca Sedgeland and mixed open herbland dominated by Dasypogon bromeliifolius, and/or Patersonia umbrosa and Pteridium esculentum. Common understorey shrubs include Pultenaea reticulata, Melaleuca thymoides, Acacia pulchella, Bossiaea praetermissa, Leucopogon rubricaulis, Xanthosia rotundifolia and Boronia crenulata. In western areas, Jarrah Woodland often occurs down slope from Marri/Jarrah Forest/Peppermint Woodland (10) and upslope of Eucalyptus patens Low Woodland (33). This unit has floristic affinities with Coastal Banksia ilicifolia/Peppermint Low Woodland (4) but differs in the presence and dominance of Eucalyptus marginata, Taxandria parviceps, Pteridium esculentum and Patersonia umbrosa and the absence of Agonis flexuosa, Adenanthos cuneatus, Astroloma baxteri, Amperea ericoides and Hibbertia racemosa. Around Quaranup and the lower slopes of Mt Adelaide these two units appear to intergrade.
Jarrah/Sheoak/*E.staeri* Sandy Woodland	13	Jarrah/Sheoak/*Eucalyptus staeri* Sandy Woodland is usually found on gentle middle to lower slopes on sandy soil overlying laterite. This unit usually occurs between Jarrah/Marri/Sheoak Laterite Forest (12) and Banksia coccinea Shrubland/*Eucalyptus staeri*/Sheoak Open Woodland (14) and shares many species with these units. The understorey is typically very diverse though species and structural diversity decreases with age. A low open woodland of *Banksia attenuata* and less frequently *Banksia ilicifolia* is often present as a secondary tree strata over a tall open scrub, open heath, low shrubland, sedgeland and herbland. Dominant understorey species include *Banksia grandis, Beaufortia decussata, Persoonia longifolia, Melaleuca thymoides, Adenanthos cuneatus, Agonis theiformis, Isopogon longifolius, Leucopogon glabellus, Gompholobium scabrum, Daviesia flexuosa, Daviesia incrassata, Xanthosia rotundifolia, Beaufortia anisandra, Astroloma baxteri, Cyathochaeta equitans, Anarthria scabra, Tricostularia elatior subsp. elatior, Anarthria prolifera* and *Dasypogon bromeliifolius*. On lower slopes *Eucalyptus marginata* is usually absent and *Taxandria parviceps* is often the dominant shrub over a less diverse lower shrub layer and dense Anarthria scabra, Dasypogon bromeliifolius sedgeland/herbland. This unit often occurs upslope of *Banksia coccinea* Shrubland/*Eucalyptus staeri*/Sheoak Open Woodland (14) with the boundary marked by a more open tree strata, the dominance of Banksia coccinea and *Jacksonia spinosa* in the latter unit and absence of species typical of lateritc soil including *Eucalyptus marginata, Banksia grandis, Agonis theiformis, Persoonia longifolia* and *Isopogon longifolius.* Upslope it abuts Jarrah/Marri/Sheoak Laterite Forest (12) from which it differs in the presence of many species typical of sandy soil including *Banksia attenuata, Adenanthos cuneatus, Melaleuca thymoides, Cyathochaeta equitans* and *Anarthria scabra.*
Marri/Jarrah Coastal Hills Forest	17	Marri/Jarrah Coastal Hills Forest is a diverse unit associated with the granitic coastal hills. It occurs on a variety of soils from gravelly loam, gravelly sand to sandy loam and sand, with granite and lateritic exposures frequently present. One sub-unit, Marri Forest over *Acacia leioderma* Tall Scrub (17c) is typically found around drainage depressions in the north east of the survey area and may represent a separate unit. The structure of this unit is highly variable with both Marri and Jarrah occurring as shrubs or low mallees on the windswept exposed coastal slopes and occurring as an open forest on the deeper soil of more protected slopes and gullies. High floristic diversity, dense tall shrub layers and a sedgeland frequently dominated by *Lepidosperma gracile* and *Cyathochaeta avenacea* are typical of this unit as is the dominance or co-dominance of *Corymbia calophylla* in the overstorey. A wide variety of tall to medium shrubs may dominate or codominate the understorey including *Gastrolobium coriaceum, Hakea trifurcata, Hibbertia furfuracea, Banksia formosa, Taxandria angustifolia, Beaufortia decussata, Hakea elliptica, Bossiaea linophylla, Hovea elliptica, Acacia leioderma and Agonis theiformis. Common lower shrubs include Sphaerolobium alatum, Acacia browniana subsp. browniana, Grevillea pulchella* and *Chorizema rhombeum*. This unit often merges with Marri/Jarrah Forest/Peppermint Woodland which occurs on deeper moister soil. Less frequently it merges with Jarrah/Marri/Sheoak Laterite Forest (12), which occurs down slope and on shallower more lateritic soil; with Gardner/*Hakea spp* Shrubland (18) which occurs upslope in more exposed areas on the eastern edge of the survey area and with *Hakea spp* Transitional Shrubland (22) which is associated with very shallow soil around granite slabs.
Marri/Jarrah Forest/Peppermint	10	Marri/Jarrah Forest/Peppermint Woodland is found scattered in the southern half of the survey area occurring on well drained sand and sandy loam on hill slopes and adjacent to larger creeks and rivers. The structure varies from a low open forest on exposed coastal slopes to open forest

Woodland		in protected gullies. *Eucalyptus marginata* may be a sub-dominant canopy species with *Agonis flexuosa* usually forming a sparse secondary tree stratum. The understorey is not very diverse and often dominated by a *Hibbertia furfuracea* Open Heath over *Tremandra stelligera* Low Open Shrubland, Mixed Open Sedgeland and Pteridium esculentum Herbland. A tall shrubland of *Bossiaea linophylla* is sometimes present with *Gastrolobium bilobum* present near granite outcrops and *Trymalium odoratissimum* and *Lasiopetalum floribundum* present on wetter sites. Sedges include those typical of both sandy and granitic soils and the grasses *Tetrarrhena laevis* and *Microlaena stipoides* frequently occur on damper sites. Along the coastal hills this unit usually merges with Marri/Jarrah Coastal Hills Forest (17) which occurs on drier shallow soils and with *Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/Yate Woodland around granite outcrops. Along creek lines this unit often merges upslope with Jarrah/Marri/Sheoak Laterite Forest (12) and on the western hills occurs downslope of Karri Forest (9).
Non native		
Non-Indigenous	-	-
Weeds	-	-

2.3.2 Flora

Southern Ecology were engaged to undertake a detailed flora and vegetation survey of approximately 38 ha of AHP which encompassed the 30 metre (m) wide corridor around proposed and existing trails (Southern Ecology 2020). The surveys occurred in Spring 2017 and Spring 2020 and recorded a total of 317 vascular plant species from 67 families. Of the native flora identified during the Southern Ecology (2020) survey, or previously known from the survey area, one was considered 'Threatened' flora protected under the *EPBC Act* and seven listed by DBCA as 'Priority' as follows:

- *Caladenia harringtoniae* (T);
- *Stylidium falcatum (P2);*
- *Lasiopetalum sp. Denmark (B.G. Hammersley 2012) (P3P4);*
- *Synaphea preissii (P3);*
- *Adenanthos cunninghamii (P4);*
- *Corybas ?limpidus (P4);*
- *Spyridium spadiceum P4; and*
- *Thysanotus isantherus (P4).*

The most species rich families were Fabaceae, Proteaceae, Myrtaceae and Orchidaceae. This exceeds the number species previously known from the AHP, according to vouchers with the Western Australian Herbarium (approximately 244 taxa within the AHP). The combined total (survey area and surrounding AHP) number of species for the AHP is 413 (Flora survey, Albany Heritage Park Trail Network, City of Albany, 2020).

2.4 Fauna

The AHP provides habitat for a number of animals. Leighton and Gilfillan (2012) reported that there are more than 160 native fauna species within the AHP, including 11 mammals, 127 birds, 8 frogs and 6 reptiles including the following Threatened Fauna list under the Commonwealth EPBC Act:

- Carnby's Black-Cockatoo (*Calyptorhynchus latirostris*);
- Forest Red Tailed Black-Cockatoo (*Calyptorhynchus banksii naso*);
- Baudin's Black- Cockatoo (*Calyptorhynchus baudinii*); and
- Western Ringtail Possum (*Pseudocheirus occidentalis*).

2.4.1 Black Cockatoos

2.4.1.1 Carnaby's Black-Cockatoo

Carnaby's Cockatoo listed as Endangered under the EPBC Act, feed on the seeds, nuts and flowers, of a variety of native and introduced plant species and insect larvae (DAWE 2021). Food plants generally occur within proteaceous genera such as *Banksia*, *Hakea* and *Grevillea*, though they are known to forage on eucalypt species in woodland areas. Carnaby's Cockatoo have also adapted to feeding on exotic species such as pines, cape lilac and weeds such as wild radish and wild geranium (DAWE 2021). Carnaby's Cockatoo usually breed between July and December in the hollows of live or dead eucalypts; primarily in Salmon Gum and Wandoo, but also within Jarrah, Marri and other eucalypt species (Johnstone & Kirkby 2011). Hollows are usually at least 2 m above ground, sometimes over 10 m and the depth of the hollow varies from 0.25 m to 6 m (DAWE 2021).

2.4.1.2 Forest Red Tailed Black-Cockatoo

Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*), listed as Vulnerable under the EPBC Act, depend primarily on Marri and Jarrah trees for both foraging and nesting. The seeds of

both eucalypts are the favoured food source of the birds and hollows within live or dead individual trees are utilised for nesting purposes (Johnstone & Kirkby 2011). Breeding varies between years and occurs at times of Jarrah and Marri fruiting. These black cockatoos breed in woodland, forest or artificial nest boxes, but may also breed in former woodland or forest that has been reduced to isolated trees (DAWE 2021).

2.4.1.3 Baudin's Black- Cockatoo

Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*) primarily occur in eucalypt forests and forage at all strata levels within the forests with a tendency to favour areas containing Marri (Johnstone and Kirkby 2011, DAWE 2021). Breeding generally occurs in the Jarrah, Marri and Karri forests of the southwest of Western Australia in areas averaging more than 750 mm of rainfall annually (DAWE 2021).

2.4.2 Western Ringtail Possum

The Western Ringtail Possum is currently listed as Critically Endangered under the EPBC Act. The population of these possums in the AHP is part of a small south coastal population and is considered an important population in the species range. Western Ringtail Possums are known to occur throughout the AHP (Biota 2019a; Leighton and Gilfillan 2012). A recent assessment of the Western Ringtail Possum population in the AHP was undertaken by Biota using a distance sampling approach covering the extent of the Park (Biota 2019b). This assessment indicated an average density of 4.13 possums per hectare and an estimated population of 1,100 ± 423 individuals in the park (Biota 2019b).

The Recovery Plan for the species (DPAW 2017) details vegetation communities critical to the species includes mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity and high foliage nutrients; jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) forests and woodlands; coastal heath, jarrah/marri woodland and forest, peppermint woodlands, myrtaceous heaths and shrublands, Bullich (*Eucalyptus megacarpa*) dominated riparian zones and karri forest. They build a nest like structure called a dray to sleep in during the day. They favour thick shrubland and peppermint tree areas to build these structures. The Recovery Plan (DPAW 2017) notes that any habitat where Western Ringtail Possums occur naturally are considered critical and worthy of protection. Therefore, the entirety of the AHP is considered to be important Western Ringtail Possum habitat (Biota 2019a) as their presence is widespread across the park.

3. AHP Current Disturbances and Threats

Major threats to flora and vegetation values within he AHP include weed invasion, Phytophthora dieback and unauthorised access and clearing.

3.1 Weed invasion

Weeds have impacted on disturbed areas in AHP, such as roadsides, firebreaks, fire access tracks, car parks and trails (AHP Link Trails V2, 2020). During Southern Ecology 2017 and 2020 survey of the 38ha impact site, fifty-one weed species were recorded with one being a Weed of National Significance (WoNS) and several others are declared pests or are recognized as significant by local government authorities and include:

- *Acacia longifolia* (Sydney Wattle);
- *Acacia paradoxa* (Kangaroo Thorn);
- *Agapanthus praecox* (Agapanthus);
- *Allium ampeloprasum* (Allium);
- *Asparagus asparagoides* (Bridal Creeper) WONS;
- *Cortaderia selloana* (Pampas Grass);
- *Dipogon lignosus* (Dipogon lignosus);
- *Ehrharta calycina* (Perennial Veldt Grass);
- *Freesia alba × leichtlinii* (Freesia);
- *Leptospermum laevigatum* (Victorian Teatree);
- *Lonicera japonica* (Japanese Honeysuckle);
- *Pinus radiata* (Pine);
- *Pittosporum undulatum* (Sweet Pittosporum);
- *Polygala myrtifolia* (Milkwort);
- *Psoralea pinnata* (Taylorina);
- *Senecio angulatus* (Creeping Groundsel);
- *Senecio glastifolius* (Pink Ragwort);
- *Ulex europaeus* (Gorse);
- *Vinca major (*Blue Periwinkle);
- *Watsonia meriana var. bulbillifera* (Bugle Lily); and
- *Zantedeschia aethiopica* (Arum Lily).

3.2 Phytophthora dieback

Phytophthora Dieback is a deadly plant disease, which has caused the death of susceptible species in the AHP (Great Southern Bio Logic 2022). Areas identified as most at risk are vehicle access tracks and trails. A broad scale Phytophthora dieback survey was undertaken (Great Southern Bio Logic 2016) focusing on areas of confirmed disease presence and high risk disease vectors. Phytophthora dieback was found to be distributed across the entire AHP, with the exclusion of the small granite shrubland south of Marine Drive, which was considered to be uninterpretable due to the lack of indicator species.

Recently, a more comprehensive Phytophthora Dieback occurrence data was obtained by Great Southern Bio Logic (2022) within the trail link project area. Consistent with previous surveys, Phytophthora Dieback was identified widely across the trail link project area, however, visually active disease expression was limited to vegetation that contained suitable numbers of disease indicator species (Great Southern Bio Logic 2022). See Appendix C for dieback distribution map within the trail link project area.

3.3 Unauthorised access and clearing

The majority of trails used in the AHP are unsanctioned or informal due to the highly permeability of the Park (AHP Link Trails V2, 2020). Many trails have not been formally planned or designed nor has their construction been in accordance with best practice. The increased demand for trails, particularly mountain bike trails in the AHP has led to greater intensity of usage, and further degradation of the trails and impacts on the surrounding natural environment (AHP Link Trails V2, 2020).

4. Rehabilitation Commitments and Completion Criteria

4.1 Rehabilitation objectives

The key objectives of this RMP are as follows:

- re-establish plant species known to occur naturally to the AHP and reduce weed populations in identified revegetation sites; and
- creation and enhancement of vegetation which will provide resilient habitat for Western Ringtail Possums and Black Cockatoos.

The objectives of the RMP will be met through achievement of the completion criteria detailed in section which will be undertaken in accordance with the rehabilitation strategy described in 5. As Black Cockatoos and Western Ringtail Possums are frequent and widespread users of the AHP, it is considered that through re-establishing vegetation types commonly found across the Park, an increase in habitat will result for these Threatened species.

4.2 Rehabilitation Area baseline data collection

Baseline data for Rehabilitation Areas was collected by Southern Ecology in Spring 2022 (see 0 for data collected and Figure 4.1). A table has been provided (Table 4.1) below summarising the area of each respective rehabilitation area and the proposed vegetation unit (in accordance with ARVS mapping) to be reinstated as a result of rehabilitation activities including:

1. Marri/Jarrah Forest/Peppermint Woodland (ARVS 10).
2. Jarrah/Sheoak/E.staeri Sandy Woodland (ARVS 13).
3. Marri/Jarrah Coastal Hills Forest (ARVS 17).
4. Gastrolobium bilobum/Hakea elliptica Granite Shrubland/Yate Woodland (ARVS 23).
5. Melaleuca persiana Low Woodland (ARVS 49).

A visual representation for the rehabilitation areas is shown in Figure 4.2

Note, due to the scale of the proposed tracks and trails to be rehabilitated baseline data was unable to be collected during the Southern Ecology (2022) survey as establishing quadrats would be inefficient and time consuming. Existing ARVS data will be used to inform species selection within these areas. Upon review of the proposed track and trail rehabilitation locations and in consideration of the ARVS vegetation unit mapping (Appendix B) the track and trails intersect multiple vegetation types including those listed above. A site inspection should occur at each of the track and trail locations ahead of rehabilitation activities commencing to ground truth the rehabilitation area and confirm site specific requirements. If revegetation is required, species selection will be undertaken based on application of the species list for the appropriate ARVS vegetation units which intersects the site. The track and trail rehabilitation will occur on a staged basis in accordance with the CoA's commitment to rehabilitation of these areas.

Legend

- Albany heritage park

Degraded rehabilitation areas

- Area A
- Area B
- Area C
- Area D
- Area E
- Area F
- Cadastre Address (LGATE-002)

Tracks and trails

- Existing rehabilitation
- Existing immediate rehabilitation
- Existing future rehabilitation
- Quadrat location
- Major road
- Minor road
- Tracks

Scale: 1:17,500 at A4 (0 100 200 metres)	**Albany heritage park trail** **City of Albany**
Coord. Sys. GDA 1994 MGA Zone 50	**QUADRAT LOCATIONS**
Job Number: 63719	
Client: City of Albany	**FIGURE 4.1**
Version: A / Date: 11-Jan-2023	strategen JBS&G
Drawn By: cthatcher / Checked By: CT	

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\City of Albany\63719 Revegetation Management Plan Albany Heritage Park Trails\GIS\02_MapProjects\63719_AlbanyHP_R01_v1\63719_AlbanyHP_R01_v1.aprx
Image Reference: www.nearmap.com© - Imagery Date: 16 November 2022.

Table 4.1: Rehabilitation areas

Rehabilitation area reference	Area (ha)	Vegetation unit to be established through rehabilitation	Representative photo/s of site (Southern Ecology 2022)	Comments
Degraded areas				
Area A	5.61	Marri/Jarrah Coastal Hills Forest (ARVS 17)	 Quadrat 2 and 3	High weed load including **Acacia longifolia, *Leptospermum laevigatum, *Psoralea pinnata *Anthoxanthum odoratum, *Arctotheca calendula, *Asparagus asparagoides, *Bromus diandrus, *Carpobrotus edulis, *Cenchrus pedicellatus, *Cerastium glomeratum, *Ehrharta calycina,, *Lysimachia arvensis, *Pelargonium capitatum and*Taraxacum khatoonae*
Area B	0.11	*Melaleuca persiana* Low Woodland (ARVS 49)	 Quadrat 4	High weed load including **Psoralea pinnata, *Solanum laciniatum, *Holcus lanatus* and **Juncus articulatus*
Area C	0.15	Jarrah/Sheoak/*E.staeri* Sandy Woodland (ARVS 13)	 Quadrat 8	High weed load including **Anthoxanthum odoratum, *Avena fatua, *Eragrostis curvula, *Freesia alba x leichtlinii, *Lagurus ovatus, *Ornithopus compressus, *Pelargonium capitatum, *Plantago lanceolata* and **Watsonia meriana var. bulbillifera*

Area D	0.06	Jarrah/Sheoak/*E.staeri* Sandy Woodland (ARVS 13)	 Quadrat 7	High weed load including **Briza maxima, *Pelargonium capitatum* and**Ursinia anthemoides* Soil type is white sand erosion control will be required.
Area E	0.99	*Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/Yate Woodland (ARVS 23)	 Quadrat 10	High weed load including **Acacia paradoxa, *Cotoneaster pannosus, *Pittosporum undulatum, *Polygala myrtifolia, *Avena fatu,a *Sporobolus africanus,s *Stenotaphrum secundatum and *Watsonia meriana cv. bulbillifera*
Area F	0.30	Marri/Jarrah Forest/Peppermint Woodland (ARVS 10)	 Quadrat 12	High weed load **Coprosma repens, *Dipogon lignosus, *Pittosporum undulatum, *Zantedeschia aethiopica, *Cenchrus pedicellatus* and **Vinca major*
Tracks and trails				

Tracks and trails 0.94ha		TBD (where revegetation is required)	 	 	Ripping required to alleviate compaction at some sites. High weed load noted in photos taken at some trail locations. Site inspection required to confirm site specific requirements.

Legend

- Albany heritage park

Degraded rehabilitation areas

- Area A
- Area B
- Area C
- Area D
- Area E
- Area F

- Cadastre Address (LGATE-002)

Tracks and trails

- Existing rehabilitation
- Existing immediate rehabilitation
- Existing future rehabilitation
- Major road
- Minor road
- Tracks

Scale: 1:17,500 at A4	0 100 200 metres
Coord. Sys. GDA 1994 MGA Zone 50	
Job Number: 63719	
Client: City of Albany	
Version: A	Date: 11-Jan-2023
Drawn By: cthatcher	Checked By: CT

Albany heritage park trail
City of Albany

REHABILITATION AREAS

FIGURE 4.2

strategen JBS&G

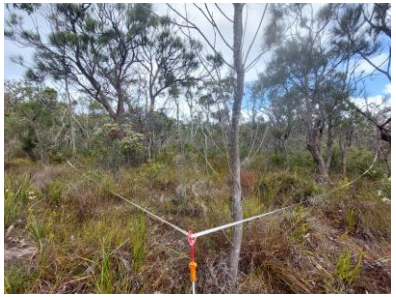
File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\City of Albany\63719 Revegetation Management Plan Albany Heritage Park Trails\GIS\02_MapProjects\63719_AlbanyHP_R01_v1\63719_AlbanyHP_R01_v1.aprx
Image Reference: www.nearmap.com© - Imagery Date: 16 November 2022.

4.3 Reference site floristic data collection

As part of the Southern Ecology (2022) flora and vegetation survey floristic data was collected at reference sites within AHP to inform the completion criteria for this RMP (see 0 for data collected). Five quadrats were established in different vegetation types to allow monitoring of the success of implementation of this RMP. Table 4.2 provides a summary of the reference site floristic data.

Table 4.2: Reference Site Floristic Data Summary

Vegetation Type (ARVS Vegetation Unit)	Vegetation Structure				Average Species Richness	Representative photo
	Condition	Layer	Height/Cover	Species List		
***Melaleuca persiana* Low Woodland (ARVS 49)**	Excellent	Upper	4m, >70%	*Melaleuca preissiana, Callistachys lanceolata, Agonis flexuosa*	25	 Quadrat 1
		Middle	2m, <10%	*Adenanthos obovatus, Aotus intermedia, Astartea sp., Callistemon glaucus, Clematis pubescens and Taxandria parviceps*		
		Ground	1m, >70%	*Anarthria prolifera, Anarthria scabra, Anigozanthos flavidus, Dampiera leptoclada, Dasypogon bromeliifolius, Empodisma gracillimum, Gahnia decomposita, Lepidosperma sp., Leptocarpus tenax, Opercularia hispidula, Patersonia umbrosa, Pteridium esculentum, Schizaea fistulosa, Schoenus multiglumis, Stylidium squamosotuberosum and Xanthosia rotundifolia*		
Marri/Jarrah Coastal Hills Forest (ARVS 17)	Excellent	Upper	8m, 10-30%; 4m, <10%	*Eucalyptus marginata, Corymbia calophylla, Agonis theiformis, Agonis flexuosa*	31	 Quadrat 5
		Middle	2m, 10-30%; 1.5m, 30-70%	*Acacia browniana, Billardiera fusiformis, Boronia crenulata subsp. crenulate, Hakea elliptica, Hibbertia cuneiformis, Hovea trisperma, Jacksonia horrida, Leucopogon obovatus subsp. obovatus, Leucopogon rubricaulis, Leucopogon sp. Coujinup (M.A. Burgman 1085), Melaleuca thymoides, Spyridium globulosum, Xanthorrhoea platyphylla*		
		Ground	<1m, >70%; <1m, 30-70%	*Agrostocrinum hirsutum, Amperea ericoides, Anarthria prolifera, Anarthria scabra, Anigozanthos flavidus, Conostylis setigera subsp. setigera, Dasypogon bromeliifolius, Desmocladus fasciculatus, Dianella revoluta, Drosera sp., Ficinia nodosa, Gompholobium knightianum, Hibbertia acerosa, Hypolaena exsulca, Johnsonia teretifolia, Lepidosperma squamatum, Lepidosperma striatum, Loxocarya cinerea, Opercularia hispidula, Patersonia umbrosa, Schoenus caespititius*		

Jarrah/Sheoak/ *E.staeri* Sandy Woodland (ARVS 13)	Excellent	Upper	8m, 10-30%	*Nuytsia floribunda, Eucalyptus marginata, Allocasuarina fraseriana, Agonis theiformis*	24	 Quadrat 9
		Middle	2m, <10%	*Acacia browniana, Comesperma virgatum, Jacksonia horrida, Leucopogon obovatus subsp. obovatus, Melaleuca thyoides, Spyridium globulosum*		
		Ground	<1m, >70%	*Anarthria prolifera, Anarthria scabra, Caladenia flava, Conostylis setigera subsp. setigera, Dasypogon bromeliifolius, Desmocladus fasciculatus, Gompholobium capitatum, Haemodorum spicatum, Johnsonia lupulina, Patersonia limbate, Phlebocarya ciliate, Schoenus caespititius, Schoenus curvifolius, Stylidium repens*		
***Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/Yate Woodland (ARVS 23)**	Excellent	Upper	4m, 10-30%	*Eucalyptus marginata, Corymbia calophylla, Agonis theiformis*	32	 Quadrat 11
		Middle	2m, 30-70%	*Acacia sulcate, Banksia Formosa, Bossiaea linophylla, Calytrix hirta, Dodonaea ceratocarpa, Gastrolobium bilobum, Hakea linearis, Hakea prostrata, Hakea trifurcate, Hibbertia cunninghamii, Hovea elliptica, Kingia australis, Leucopogon obovatus subsp. obovatus, Spyridium globulosum, Spyridium majoranifolium, Xanthorrhoea platyphylla*		
		Ground	1m, 10-30%	*Amphipogon amphipogonoides, Anarthria gracilis, Anarthria prolifera, Andersonia sprengelioides, Astroloma pallidum, Chorizema rhombeum, Cyathochaeta avenacea, Lepidosperma angustatum, Lomandra pauciflora, Mesomelaena tetragona, Stylidium spathulatum, Tetraria octandra, Tetrarrhena laevis*		
Marri/Jarrah Forest/Pepper mint Woodland (ARVS 10)	Excellent	Upper	10m, 10-30%	*Corymbia calophylla, Agonis theiformis*	19	 Quadrat 13
		Middle	2m, 30-70%	*Bossiaea linophylla, Hakea florida, Hibbertia cunninghamii, Hovea elliptica, Kennedia coccinea, Leucopogon australis,, Leucopogon obovatus subsp. obovatus, Leucopogon propinquus, Xanthorrhoea platyphylla*		
		Ground	<1m, 30-70%	*Cyathochaeta avenacea, Lepidosperma gracile, Lomandra pauciflora, Opercularia hispidula, Patersonia umbrosa, Platysace filiformis, Tetraria octandra, Tetrarrhena laevis*		

4.4 Completion Criteria

The completion criteria established for this project include species diversity, density of native vegetation cover and weed coverage and are outlined in the tables below for each respective rehabilitation area and corresponding vegetation unit to be established.

The completion targets for all areas managed under this plan have been designed based on a six-year implementation plan (Table 9.1), which includes at least one year of site preparation, planting and / or seeding, and a five-year management period. The strategy for weed management and revegetation works is intended to be adaptable over the management period, based on learnings from the on-going revegetation works across the site. Variations to the management strategies will be agreed with DWER prior to implementation.

Furthermore, the vegetation units proposed to be established at each of the rehabilitation locations each contain foraging and breeding species utilised by the threatened Western Ringtail Possums and Black Cockatoos such as Jarrah, Marri, Peppermint Trees. As mentioned previously in section 2.4.2, the entire AHP is considered suitable habitat for the Western Ringtail Possum. It is therefore considered that through rehabilitation of these areas with the appropriate vegetation unit, the objective to ensure the *creation and enhancement of vegetation which will provide resilient habitat for Western Ringtail Possums* will be met.

During the Southern Ecology (2022) inspection it was noted that most areas had a high weed load (see Appendix D and Table 4.1). Completion criteria set for weed coverage has accounted for this.

4.4.1 Rehabilitation Area A Completion Criteria

The rehabilitation completion criteria for Rehabilitation Area A is based on reference site data collection for vegetation type Marri/Jarrah Coastal Hills Forest (ARVS 17).

Table 4.3: Completion criteria Rehabilitation Area A

Criterion	Baseline	Completion target	Completion Criteria
Species richness	Site average species richness is 31 (native sp. only).	Minimum of 60% of native species, based on reference sites.	Promote vegetation growth (via topsoil transfer, direct seeding and infill planting) with local provenance species to achieve a minimum species richness of 18 native species.
Dominant tree species	There are four dominant tree species.	Have the same dominant tree species as present at reference site	The revegetation site upper canopy will consist of some or all of the following dominant tree's species: *Eucalyptus marginata, Corymbia calophylla, Agonis theiformis* and *Agonis flexuosa*.
Total native vegetation	Native vegetation cover at reference site: • Upper -8m, 10-30%; 4m, <10% • Middle- 2m, 10-30%; 1.5m, 30-70% • Ground- <1m, >70%; <1m, 30-70%	At least 60% native vegetation cover in comparison to reference site.	The revegetation site will have at least 60% native vegetation in comparison to reference site.
Weeds	Weeds are absent at reference site.	Weed cover is no greater than 30% cover	The revegetation site should have a maximum of 30% weed cover.

4.4.2 Rehabilitation Area B Completion Criteria

The rehabilitation completion criteria for Rehabilitation Area B is based on reference site data collection for vegetation type *Melaleuca persiana* Low Woodland (ARVS 49).

Table 4.4: Completion criteria Rehabilitation Area B

Criterion	Baseline	Completion target	Completion Criteria
Species richness	Site average species richness is 25 (native sp. only).	Minimum of 60% of native species returned, based on reference sites.	Promote vegetation growth (via topsoil transfer, direct seeding and infill planting) with local provenance species to achieve a minimum species richness of 15 native species.
Dominant tree species	There are three dominant tree species.	Have the same dominant tree species and average coverage as present at reference sites.	The revegetation site upper canopy will consist of some or all of the following dominant trees species: *Melaleuca preissiana, Callistachys lanceolata, Agonis flexuosa*.
Total native vegetation	Native vegetation cover at reference site: • Upper- 4m, >70% • Middle- 2m, <10% • Ground- 1m, >70%	At least 60% native vegetation cover in comparison to reference site.	The revegetation site will have at least 60% native vegetation in comparison to reference site.
Weeds	Weeds are absent at reference site.	Weed cover is no greater than 30% cover	The revegetation site should have a maximum of 30% weed cover.

4.4.3 Rehabilitation Area C and D Completion Criteria

The rehabilitation completion criteria for Rehabilitation Area B is based on reference site data collection for vegetation type *Jarrah/Sheoak/E.staeri Sandy Woodland* (ARVS 13).

Table 4.5: Completion criteria Rehabilitation Area C and D

Criterion	Baseline	Completion target	Completion Criteria
Species richness	Site average species richness is 24 (native sp. only).	Minimum of 60% of native species returned, based on reference sites.	Promote vegetation growth (via topsoil transfer, direct seeding and infill planting) with local provenance species to achieve a minimum species richness of 14 native species.
Dominant tree species	There are four dominant tree species.	Have the same dominant tree species and average coverage as present at reference sites.	The revegetation site upper canopy will consist of some or all of the following dominant trees species: *Nuytsia floribunda, Eucalyptus marginata, Allocasuarina fraseriana, Agonis theiformis.*
Total native vegetation	Native vegetation cover at reference site: • Upper - 8m, 10-30% • Middle - 2m, <10% • Ground - <1m, >70%	At least 60% native vegetation cover in comparison to reference site.	The revegetation site will have at least 60% native vegetation in comparison to reference site.
Weeds	Weeds are absent at reference site.	Weed cover is no greater than 30% cover	The revegetation site should have a maximum of 30% weed cover.

4.4.4 Rehabilitation Area E Completion Criteria

The rehabilitation completion criteria for Rehabilitation Area B is based on reference site data collection for vegetation type *Gastrolobium bilobum/Hakea elliptica Granite Shrubland/Yate Woodland (ARVS 23).*

Table 4.6: Completion criteria Rehabilitation Area E

Criterion	Baseline	Completion target	Completion Criteria
Species richness	Site average species richness is 32 (native sp. only).	Minimum of 60% of native species returned, based on reference sites.	Promote vegetation growth (via topsoil transfer, direct seeding and infill planting) with local provenance species to achieve a

			minimum species richness of 19 native species.
Dominant tree species	There are three dominant tree species.	Have the same dominant tree species and average coverage as present at reference sites.	The revegetation site upper canopy will consist of some or all of the following dominant trees species: *Eucalyptus marginata, Corymbia calophylla, Agonis theiformis.*
Total native vegetation	Native vegetation cover at reference site: • Upper- 4m, 10-30% • Middle- 2m, 30-70% • Ground- 1m, 10-30%	At least 60% native vegetation cover in comparison to reference site.	The revegetation site will have at least 60% native vegetation in comparison to reference site.
Weeds	Weeds are absent at reference site.	Weed cover is no greater than 30% cover	The revegetation site should have a maximum of 30% weed cover.

4.4.5 Rehabilitation Area F Completion Criteria

The rehabilitation completion criteria for Rehabilitation Area F is based on reference site data collection for vegetation type Marri/Jarrah Forest/Peppermint Woodland (ARVS 10).

Table 4.7: Completion criteria Rehabilitation Area F

Criterion	Baseline	Completion target	Completion Criteria
Species richness	Site average species richness is 19 (native sp. only).	Minimum of 60% of native species returned, based on reference sites.	Promote vegetation growth (via topsoil transfer, direct seeding and infill planting) with local provenance species to achieve a minimum species richness of 19 native species.
Dominant tree species	There are two dominant tree species.	Have the same dominant tree species and average coverage as present at reference sites.	The revegetation site upper canopy will consist of some or all of the following dominant trees species: *Corymbia calophylla* and *Agonis theiformis*
Total native vegetation	Native vegetation cover at reference site: • Upper - 10m, 10-30% • Middle - 2m, 30-70% • Ground - <1m, 30-70%	At least 60% native vegetation cover in comparison to reference site.	The revegetation site will have at least 60% native vegetation in comparison to reference site.
Weeds	Weeds are absent at reference site.	Weed cover is no greater than 30% cover	The revegetation site should have a maximum of 30% weed cover.

4.4.6 Tracks and Trails Completion Criteria

The CoA has committed to rehabilitating these areas on a staged basis and as such, a site inspection will occur at each of the track and trail locations ahead of rehabilitation activities commencing to confirm site specific requirements. Based on ARVS vegetation mapping the track and trail locations intersect multiple vegetation units including those where reference site data has been collected for rehabilitation areas A to F:

- Marri/Jarrah Forest/Peppermint Woodland (ARVS 10);
- Jarrah/Sheoak/*E.staeri* Sandy Woodland (ARVS 13);
- Marri/Jarrah Coastal Hills Forest (ARVS 17);
- *Gastrolobium bilobum*/*Hakea elliptica* Granite Shrubland/Yate Woodland (ARVS 23); and
- *Melaleuca persiana* Low Woodland (ARVS 49).

Following the site inspection, if revegetation is deemed to be required at the track and trail location, the appropriate ARVS vegetation unit reference site data used for areas A-F will be used to inform species selection and the corresponding completion criteria established in sections 4.4.1 to 4.4.6 will be applied. In track and trail locations where the above ARVS vegetation units are not considered

appropriate for use in revegetation activities, a suitable qualified expert will be engaged to determine a suitable planting species list and completion criteria.

5. Rehabilitation Strategy

5.1 General methodology

The strategy for rehabilitation at most sites across AHP will consist of the following works:

- Seed collection;
- Tracks and trails site inspection;
- Site preparation;
- Erosion control;
- Weed control;
- Topsoil transfer;
- Revegetation;
- Access control;
- Pest control;
- Hygiene management.

5.2 Seed collection

A suitably qualified expert will be appointed to undertake seed collection within the AHP for use in revegetation activities. The species list provided in Table 4.2 for each respective vegetation unit will be targeted during seed collection event/s.

Species will initially be targeted within the proposed project area as a priority and before vegetation clearing works commence. Where sufficient seed is not available within the project area, seed collections will be extended to surrounding approved collection areas within AHP.

The optimal timing for seed collection will be October to March, although collection timings may vary depending on seasonal fluctuations in flowering and seed production timings.[1]

5.3 Tracks and trails site inspection

Prior to commencing rehabilitation activities across the proposed tracks and trail areas, a site inspection will be required to obtain baseline site data to inform site specific activities required at each location, species planting lists (if revegetation required) and completion criteria to be applied.

5.4 Site preparation

Site preparation will include a combination of techniques, aiming to reduce the presence of weed material at the site prior to topsoil placement and revegetation activities commencing.

Where appropriate, scalping may be undertaken in areas devoid of native vegetation and are likely to have a significant weed load in the topsoil. Scalping involves complete removal of the surface soil to a depth of approximately 5-10 cm. Material removed from revegetation areas should be taken off site and disposed of or buried on site to a depth where weed seeds are unlikely to germinate.

Furthermore, ripping will be undertaken in areas deemed necessary to maximise water infiltration, promote soil aeration and alleviate compaction. Ripping involves fracturing the ground to a depth of approximately 0.5cm to ensure plant roots can develop and creates microhabitats for seedling

[1] Optimal timing for seed sowing or most seedlings is October- December to produce robust seedlings by the usual planting times in winter, so preferable for seed collection to occur in previous spring/summer to maximise species diversity and avoid inferior seedlings.

establishment. It is anticipated that ripping is undertaken over late summer or early autumn (March – April) which will aid new plant growth in spring following planting. This is likely to be required at most if not all track and trail locations.

5.5 Erosion control

Due to the Project area being located adjacent to the coast, erosion control structures are proposed to assist in stabilisation and prevent erosion during plant establishment. Depending on the steepness of any given slope, these may include:

- coir netting; and
- jute matting.

Each of the above options are biodegradable and will naturally break down over time and will be employed on an as required basis.

5.6 Weed control

Weed control will commence in winter, prior to revegetation activities commencing. This will be in the form of a broad scale weed spray over rehabilitation areas (where required) to reduce initial weed loads prior to planting. Weed control will occur up to four times in 12 months, depending on weeds present and severity of infestation (most likely timing: late autumn, midwinter, mid-spring, early summer). Up to twelve months of weed control will be undertaken prior to any revegetation works occurring.

Weed control post planting will be focused on the immediate areas surrounding planted seedlings (e.g., 1 m radius around planted seedlings). This approach will increase the survival of planted seedlings while maintaining the current and future vegetation type of the rehabilitation areas (native trees over grass).

Pending monitoring results, isolated weed control will be undertaken twice a year at the rehabilitation areas in winter and spring.

Table 5.1: Summary of weed control methods

Weed control method		Indicative weed type
Chemical Control	Initial broad scale spray herbicide application	For blanket control of most weed species including grass weeds prior to revegetation germination/ seed planting
	Spot spray herbicide application	For targeted control of most weed species including grass weeds after revegetation germination/ seedling planting
	Stem injection, cut and paint	To control large woody weeds
Manual control	Hand weeding	Weeds encountered within and immediately adjacent to tree guards will be removed by hand to ensure no off target damage with chemical control

5.7 Topsoil transfer

Topsoil as it is referred to within this RMP includes approximately the top 10-20 cm of undisturbed soil present in areas which contained native bushland up until the point of clearing of vegetation for the purposes of the project. The intention is to salvage the seed bank present within this part of the soil profile, and to transfer the contained biodiversity to the chosen offsite area for use in the rehabilitation project. Topsoil from the project will be salvaged during clearing activities to use in rehabilitation of the rehabilitation areas. Topsoil removal and stockpiling will be undertaken during clearing activities. Topsoil removal will involve scraping of the material prior to loading into trucks for haulage to a stockpile storage location. Where possible the topsoil will be transferred directly to the rehabilitation area for respreading to promote growth from the existing topsoil seed bank.

Topsoil transfer will be undertaken in accordance with the project's OHMP (Great Southern Bio Logic 2022), specifically:

- Vegetation cleared from trail alignments in *High Risk* weed management zones and/or dieback infested/uninterpretable zones is not to be used for rehabilitation of areas outside of the the identified *High Risk* management zone and/or dieback infested/uninterpretable zone.

The five general areas of weed occurrence which have been defined as High Risk weed management zones as per the OHMP (Great Southern Bio Logic 2022) include:

- west of the Padre White Lookout;
- around the general public carpark at the top of Clarence/Corndarup (base of the stairs);
- surrounding the ANZAC Memorial Complex including carparks, gun placements and cafes;
- south of the Binalup / Middleton Beach commercial precinct; and
- along the bitumen dual use path south of Marine Drive.

Note that the OHMP does not map these *High Risk* weed management zones and includes a requirement to revisit known weed occurrences and accurately identify and spatially map the extent of infestations so that hygiene measures can effectively apply. Topsoil transfer will therefore not be undertaken until these High Risk weed management zones have been spatially identified to avoid weed infested topsoil being used in revegetation activities.

5.8 Direct seeding

In areas deemed suitable, direct seeding will be undertaken using the local provenance seed collected during clearing. Direct seeding is best suited to large, cleared areas. Seeding will be undertaken in Autumn, prior to the main winter rainfall and following the required soil preparation and weed treatment.

5.9 Planting

Seedling planting, in the form of tubestock, will be undertaken in rehabilitation areas where direct seeding is deemed not suitable (e.g., infilling areas to increase plant density). Planting will occur in early winter, within one month of the first rains.

Planting is proposed to be undertaken at a density of at least 12,000-15,000 stems/ha for shrub/groundcover plants and 400-500 stems/ for tree/overstorey species with a target survival rate of 70%.

Seedlings used for planting should be suitably mature, between 6 to 12 months to enable optimal establishment and growth. Tubestock should also not be root bound and planting should be undertaken as follows:

- optimal location of each species should be chosen at the time of planting to ensure appropriate condition for each species (e.g., topography, shade/sun, soil moisture etc);
- seedling should be planted so that the stem is vertical, and the base of the plant is slightly below the original soil surface;
- soil surrounding the seedling root ball should be pressed in firmly to avoid air pockets; and
- a protective guard and at least one stake will be placed around the seedling to protect the vegetation from grazing and wind damage.

It is anticipated that no post-planting watering will be needed as winter rain will provide adequate water to support the tubestock following planting. The timing of planting will ensure that rainfall will provide the planted seedlings with access to sufficient water during their establishment phase. If during monitoring plant stress is observed, contingency for a wetting agent or additional watering options will be investigated.

5.10 Access control

Signage and fencing will be installed on the boundary of the rehabilitation areas to limit public accessibility. Signage will detail the restoration efforts occurring on site and note the accessibility limitations to the area, whilst fencing will provide physical access restrictions. Limited public accessibility will maximise potential for rehabilitation success. In areas deemed suitable brush and/or branches may be used to prevent access.

5.11 Pest control

Tree guards are to be installed around planted seedlings which will provide protection from grazing animals. If impacts from animal activities (i.e., evidence of grazing) are recorded during monitoring, contingency measures as described in Table 7.1 will be implemented.

5.12 Hygiene management

The OHMP developed for the trail link project will be implemented during rehabilitation works to minimise the risk of spreading or introducing dieback from one site to another (Great Southern Bio Logic 2022). Specifically:

- All machinery and equipment used during rehabilitation activities will be clean upon entry and exit to and from the AHP; and
- All machinery and equipment will be cleaned before moving from one rehabilitation site to another and when moving from an infected to uninterpretable area. These disease boundaries will be marked in the field for ease of identification.

6. Rehabilitation Monitoring

The purpose of monitoring actions is to determine whether the environmental objectives for this RMP are being achieved, and whether the management actions require revision or review. Table 6.1 outlines the monitoring program proposed to be undertaken for a minimum of six years but will continue until the completion criteria are achieved or as otherwise agreed with DWER.

Table 6.1: Monitoring actions for rehabilitation areas

Parameter	Purpose	Frequency	Potential measures	Responsibility
Revegetation success	To monitor establishment of vegetation and compare progress to completion criteria.	Spring, annually for six years	Within monitoring quadrats, data to inform the following items will be recorded: 1. density of native flora species; 2. weed species percentage; 3. native flora species richness; and 4. foliage cover plant health (i.e. evidence of water stress, pests, animal grazing).	Environmental consultant
No physical damage to fencing and/or flagging around rehabilitation areas.	To ensure that no unauthorised access is occurring within rehabilitation areas.	Annually and opportunistically during other works	Visual observation of fence lines/ rehabilitation area boundary during monitoring.	Environmental consultant/ revegetation contractor
Weed and dieback hygiene measures are being implemented prior to entry to the site	To ensure that all vehicles and machinery are subject to hygiene management procedures, for dieback and weeds	Annually and opportunistically	Review of hygiene register and inspection logs.	Environmental consultant/ revegetation contractor
No evidence of feral animal grazing in rehabilitation areas.	To ensure that feral animals are not affecting rehabilitation success.	Annually and opportunistically	Visual observation of grazing or predation during monitoring.	Environmental consultant/ revegetation contractor
Soil erosion and compaction	To ensure soil is stabilised and prevent rehabilitation efforts failing.	Annually and opportunistically	• Amount of soil exposed • Soil penetration (compaction) • Loss in surface elevation • Cross section of profile • Maximum trail incision (depth) • Centreline depth • Trail width	Environmental consultant/ revegetation Contractor
Vegetation damage	To prevent damage to vegetation	Annually and opportunistically	• Evidence of trampling • Vegetation height • % vegetation cover • Plant species richness • Plant abundance • Plant stem density • Plant community composition • Presence of dieback • Weed abundance • Seed dispersal • Litter depth • Tree scarring	Environmental consultant/ revegetation Contractor

7. Maintenance and Contingency measures

Contingency actions will be initiated if monitoring indicates that management actions detailed for rehabilitation areas have not been successful or effective. Table 7.1 identifies the contingency actions to be initiated if the objectives for rehabilitation areas are not being met. The contingency actions can be triggered at any time during the rehabilitation program following monitoring. Monitoring and contingency actions will continue to be implemented until such time as the completion criteria in Table 7.1 are met and/or upon agreement with DWER.

Table 7.1 Contingency actions for rehabilitation areas

Trigger	Action
Increase in distribution, abundance or density/cover of a specific weed species or persistence (within quadrats) of weed infestation subsequent to treatment	• Map the revised extent of the specific weed species within the site. • Identify activities that may have potentially increased the abundance, distribution, or density/cover of weed species. • Review and revise (if required) weed control program (may involve seeking advice from relevant authorities) according to findings from point 2. • Implement revised hygiene control and education measures. • New weed species observed within monitoring quadrats or opportunistically within rehabilitation areas
New weed species observed within monitoring quadrats or opportunistically within rehabilitation areas	• Map the distribution of the newly introduced weed species. • Identify activities that may have potentially introduced the weed species. • Review and revise (if required) weed control program (may involve seeking advice from relevant authorities) to include relevant controls for new species. • Implement revised hygiene control and education measures.

Unrestricted or unauthorised access	• Determine how access was gained and, if possible, the likely time of access.
	• Implement remedy, which could include:
	  ○ repair fence/s
	  ○ erect signs to highlight private property
	  ○ install barriers around pedestrian paths.
	• Monitor success of control.

Increase in feral animal activity observed	• Review, revise (if required) and implement control program (may involve seeking advice from relevant authorities). • Monitor success of remedy.
Fire incident	• Respond to fire in accordance with relevant Department of Fire and Emergency • Services (DFES) and/or the City's fire response procedures. • Investigate cause of fire. • Implement any remedial actions, if practicable, to prevent future fire incidents, seeking advice of DFES if necessary. • Monitor success of remedy.
Inadequate native flora species richness and/or cover to achieve targets	• Identify cause. • Implement approach to remedy cause, which could include: • Collecting additional provenance seed for direct seeding or plant propagation to compensate for the insufficient native plant species richness and/or cover • Undertake infill seedling planting and direct seeding • Application of fertilisers or wetting agents etc, as approved by DBCA. • Monitor success of remedy.

8. Reporting

The CoA will provide annual reports on the implementation of the rehabilitation, monitoring results, progress towards meeting completion criteria and contingency actions to DWER. This report is likely to include:

- Evidence of weed control events undertaken (photos and receipts/invoices);
- Weed species observed during weed control events;
- Evidence of vehicle inspections (inspection records);
- Photos of public access prevention;
- Photos of weed prevention;
- Results of vegetation condition mapping including:
  - Percentage of each condition type across rehabilitation areas;
- Results of revegetation monitoring including:
  - Percentage survival / mortality of planted seedlings within revegetation areas; and
  - Any evidence of water stress / potential factors contributing to mortality.

9. Implementation Schedule

An indicative implementation schedule is provided in Table 9.1. A detailed schedule will be developed in consultation with key stakeholders.

Table 9.1: Indicative implementation schedule

Stage	Action	Timing	Responsibility	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 and beyond
Tracks and trails site inspection	Inspection of tracks and trails to identify any site specific requirements	Likely to be ongoing due to staged approach to trail rehabilitation	CoA			Likely to be ongoing due to staged approach to trail rehabilitation			
Pre-planting tasks and site preparation	Seed and topsoil collection	October to March prior to seedling propagation (completed)	CoA will engage and coordinate specific sub-contractors as required.	X					
	Place tubestock orders with nursery (if required)	Beginning of summer prior to planting	CoA will engage and coordinate specific sub-contractors as required.		X				
	Weed control	Autumn prior to planting	CoA will engage and coordinate specific sub-contractors as required.	X					
	Fencing and ripping (if required)	February - April, prior to planting	CoA will engage and coordinate specific sub-contractors as required.		X				
Vegetation establishment	Plant tubestock, propagated seedlings and undertake direct seeding	May – June	CoA will engage and coordinate specific sub-contractors as required.			X			

Stage	Action	Timing	Responsibility	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 and beyond
Monitoring	Vegetation monitoring against completion criteria	Spring (formal) Opportunistic (informal)	CoA will engage and coordinate specific sub-contractors as required.		X	Until completion criteria have been met			
	Weed monitoring	Spring (formal) Opportunistic (informal)	CoA will engage and coordinate specific sub-contractors as required.		X	Until completion criteria have been met			
	Dieback monitoring	Spring	CoA will engage and coordinate specific sub-contractors as required.		X	Ongoing annually			
Maintenance and contingency actions	Weed control	Following winter rain	CoA will engage and coordinate specific sub-contractors as required.		X	Until completion criteria have been met			
	Infill planting	May - July	CoA will engage and coordinate specific sub-contractors as required.		X	Until completion criteria have been met			
	Signage/ fencing	As required	CoA will engage and coordinate specific sub-contractors as required.			As required ad indicated by monitoring			
Reporting	Annual Progress and Monitoring Report	Annually	CoA will engage and coordinate specific sub-contractors as required.		X	Ongoing annually until completion criteria have been met			

10. References

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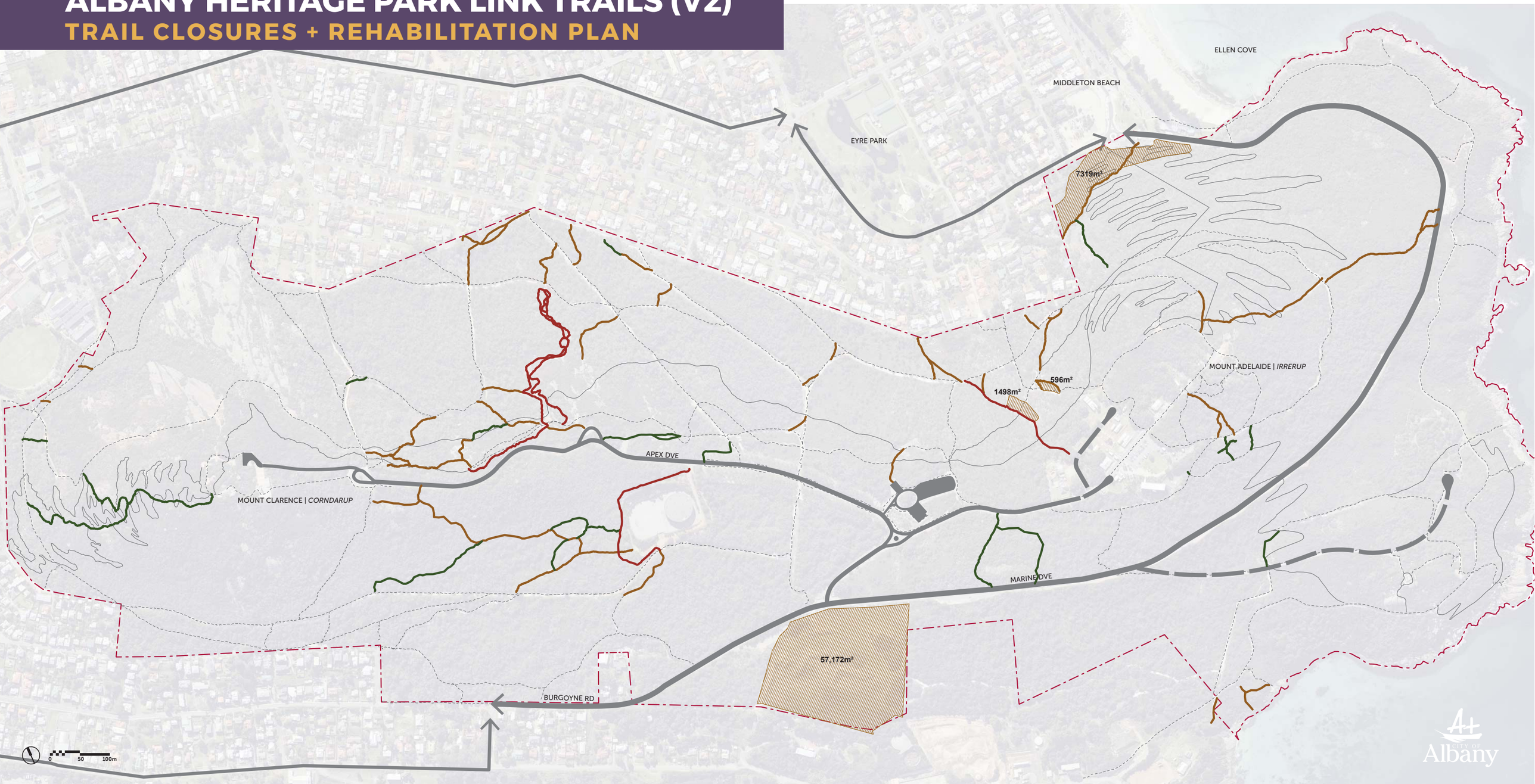
Appendix A Trail Closures and Rehabilitation Plan

ALBANY HERITAGE PARK LINK TRAILS (V2)

TRAIL CLOSURES + REHABILITATION PLAN



GENERAL LEGEND

- Existing Trail
- Proposed Trail
- Revised Buffer (30m)
- Site Boundary
- Existing Rehabilitated Trail — TOTAL LENGTH: 2534m, AREA: 3801m²
- Proposed Trail for Rehabilitation (immediate) — TOTAL LENGTH: 4325m, AREA: 6487m²
- Possible Future Trail for Rehabilitation (Staged) — TOTAL LENGTH: 1802m, AREA: 2703m²

**areas calculated on an average trail width of 1.5m

- Proposed Area for Weed removal and Rehabilitation (immediate) TOTAL AREA : 66,585m² (6.66 ha)

NOTE:

In addition, the City of Albany is currently implementing a 3-year revegetation project at the nearby (1 km north) Lake Seppings to enhance the coastal vegetation corridor between the AHP and Emu Point, for the Western Ringtail Possum and other fauna. This project is partly funded through the 20 Million Trees Program, and involves planting 50,000 seedlings over 1.7 Ha.

Appendix B ARVS Vegetation Units AHP

ALBANY HERITAGE PARK LINK TRAILS (V2)
SIGNIFICANT FLORA + ARVS VEGETATION UNITS

REFER TO ATTACHMENTS:

ATTACHMENT 11: FLORA SURVEY REPORT, Dec 2017; MAP 3A + B: CONSERVATION SIGNIFICANT FLORA, PAGE 28

ATTACHMENT 14: ARVS VEGETATION UNITS / COMMUNITIES, 2010

GENERAL LEGEND

- Existing Trail
- Proposed Trail
- Original Buffer (30m)
- Revised Buffer (30m)

ALBANY REGIONAL VEGETATION UNITS (ARVS)

GRANITE OUTCROPS

- *Hakea spp* Transitional Shrubland
- *Acacia sulcata/Leucopogon assimilis* Granite Shrubland
- *Gastrolobium bilobum/Hakea elliptica* Granite Shrubland/ Yate Woodland
- *Taxandria marginata* Granite Shrubland

WETLANDS

- *Callistachys spp* Thicket
- *Homalospermum firmum/Callistemon glaucus* Peat Thicket
- *Melaleuca preissiana* Low Woodland
- Miscellaneous Drainage Woodland/Shrubland

DAMPLANDS/CREEKLINES

- Mixed *Banksia littoralis* Open Woodland
- *Pericalymma spongiocaule* Low Heath

COASTAL

- Coastal Heath
- Coastal B*anksia ilicifolia*/Peppermint Low Woodland
- Peppermint Low Forest

UPLAND EUCALYPT WOODLAND/FOREST

- Jarrah Woodland
- Jarrah/Sheoak/*E.staeri* Sandy Woodland
- Marri/Jarrah Coastal Hills Forest
- Marri/Jarrah Forest/Peppermint Woodland

NON NATIVE

- Non-indigenous
- Weeds

CONSERVATION SIGNIFICANT FLORA

- *Stylidium falcatum* (P1)
- *Spyridium spadiceum* (P4)
- *Melaleuca ringens* (P4)
- *Thysanotus isantherus* (P4)

Appendix C Dieback Distribution (Great Southern Bio Logic 2022)

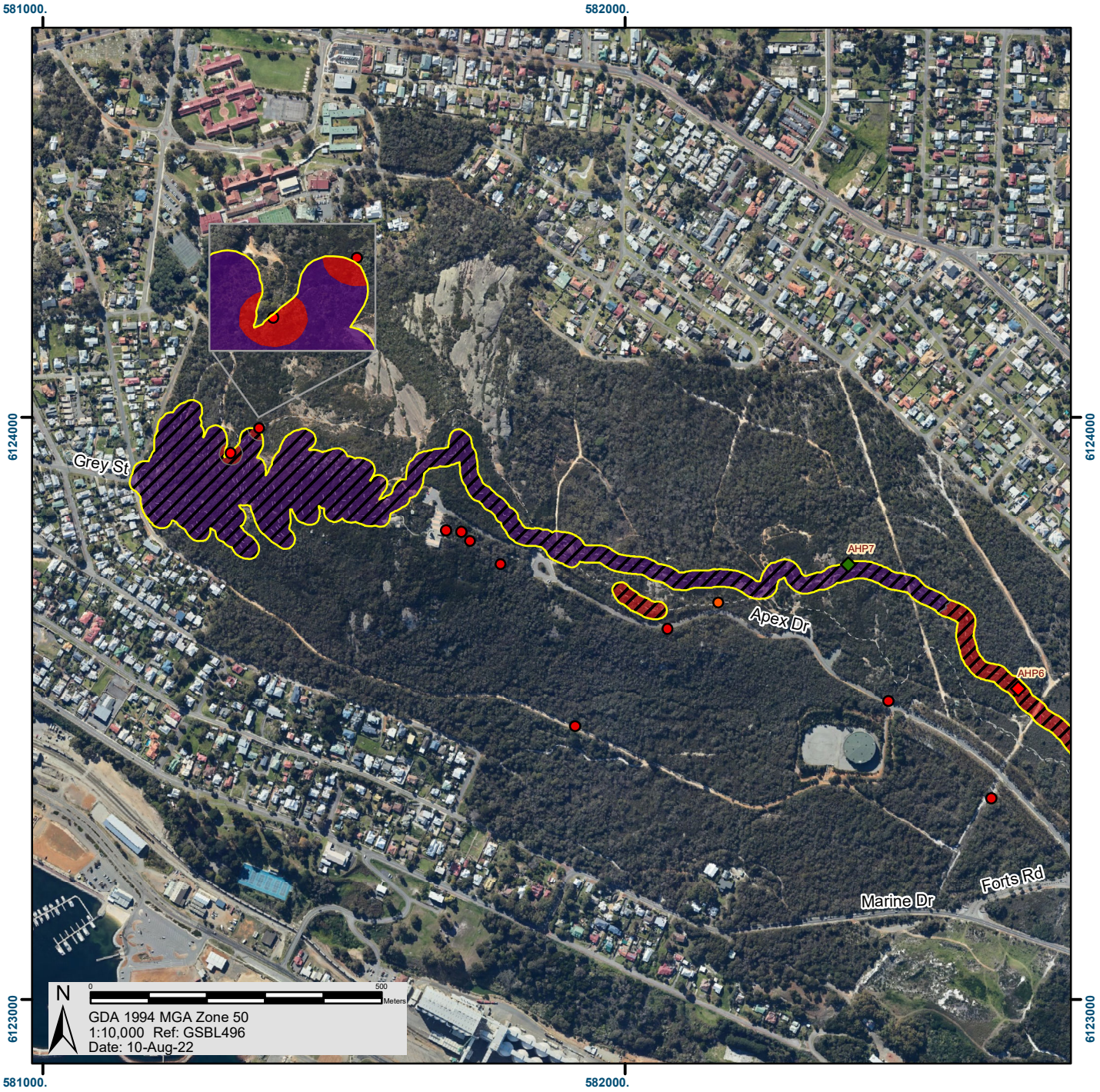


Figure 2-1: Phytophthora Dieback Occurrence showing Sample Locations - Albany Heritage Park 2022 (West)

Dieback Status

- Infested
- Uninterpretable
- Unprotectable

Sample Result

- P. cinnamomi
- Negative
- Historic P. cinnamoni
- Historic P. multivora
- 200521 AHP Stage 1 Revised Trail alignments
- Survey Area

Operational Hygiene Management Plan - Albany Heritage Park Link Trails Network 2022 prepared for the City of Albany, August 2022

GREAT SOUTHERN BIO LOGIC

Phytophthora Dieback occurrence as at June 2022 - Comprehensive Survey. Recheck required from June 2023.

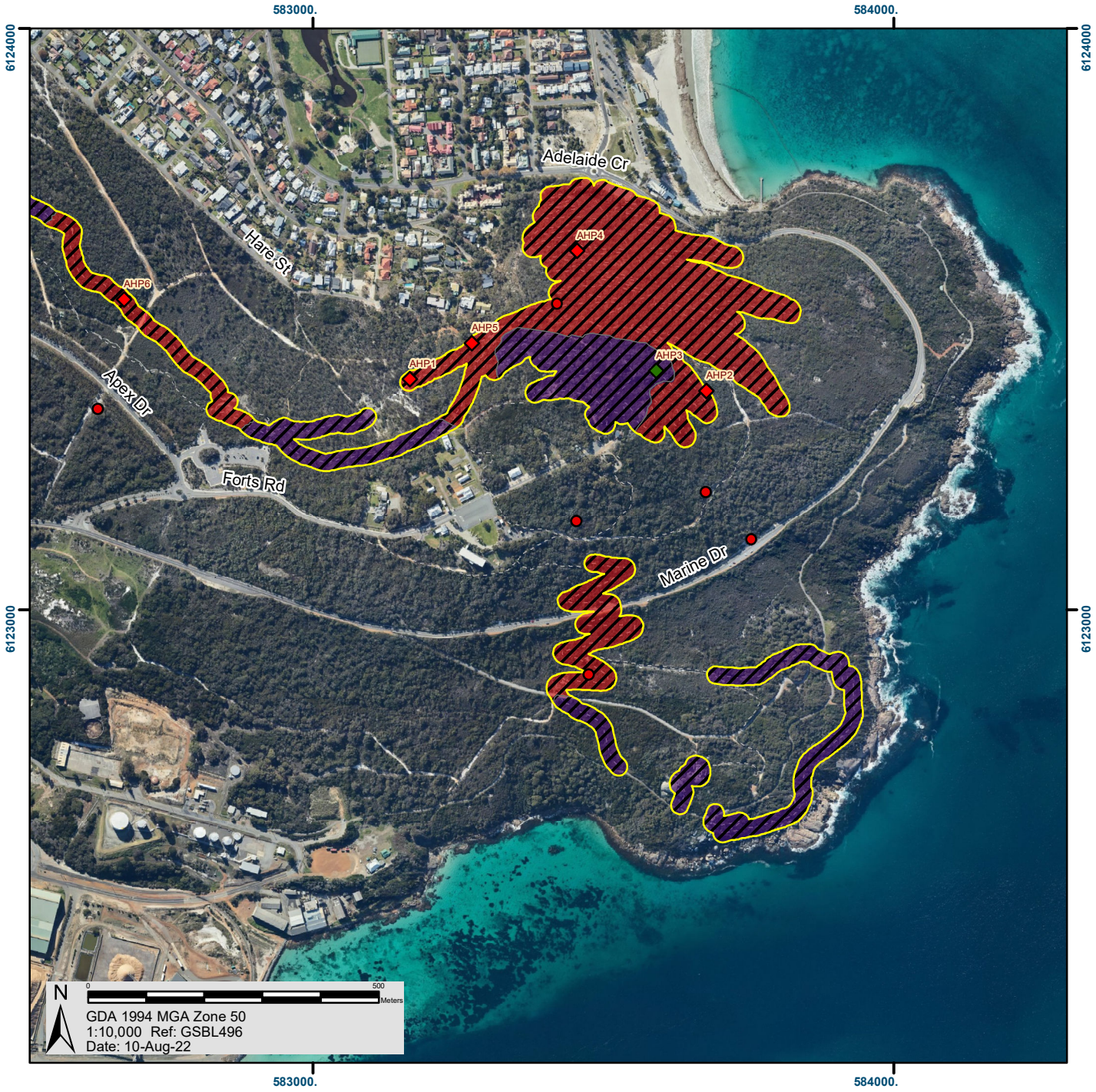


Figure 2-2: Phytophthora Dieback Occurrence showing Sample Locations - Albany Heritage Park 2022 (East)

Dieback Status

- Infested
- Uninterpretable
- Unprotectable

Sample Result

- P. cinnamomi
- Negative
- Historic P. cinnamoni
- Historic P. multivora
- 200521 AHP Stage 1 Revised Trail alignments
- Survey Area

Operational Hygiene Management Plan - Albany Heritage Park Link Trails Network 2022 prepared for the City of Albany, August 2022

GREAT SOUTHERN BIO LOGIC

Phytophthora Dieback occurrence as at June 2022 - Comprehensive Survey. Recheck required from June 2023.

Appendix D Southern Ecology 2022 Survey Summary Data

Taxon Inventory

FAMILY	TAXON	STATUS
Aizoaceae	**Carpobrotus edulis*	
Anarthriaceae	*Anarthria gracilis*	
Anarthriaceae	*Anarthria prolifera*	
Anarthriaceae	*Anarthria scabra*	
Anarthriaceae	*Lyginia barbata*	
Apiaceae	*Platysace filiformis*	
Apiaceae	*Xanthosia rotundifolia*	
Apocynaceae	**Vinca major*	
Araceae	**Zantedeschia aethiopica*	
Asparagaceae	**Asparagus asparagoides*	
Asparagaceae	*Lomandra pauciflora*	
Asteraceae	**Arctotheca calendula*	
Asteraceae	**Cirsium vulgare*	
Asteraceae	**Taraxacum khatoonae*	
Asteraceae	**Ursinia anthemoides*	
Asteraceae	*Senecio minimus*	
Caryophyllaceae	**Cerastium glomeratum*	
Casuarinaceae	*Allocasuarina fraseriana*	
Colchicaceae	*Burchardia congesta*	
Cyperaceae	*Cyathochaeta avenacea*	
Cyperaceae	*Ficinia nodosa*	
Cyperaceae	*Gahnia decomposita*	
Cyperaceae	*Isolepis cernua var. setiformis*	
Cyperaceae	*Lepidosperma angustatum*	
Cyperaceae	*Lepidosperma gracile*	
Cyperaceae	*Lepidosperma sp.*	

Cyperaceae	*Lepidosperma squamatum*
Cyperaceae	*Lepidosperma striatum*
Cyperaceae	*Mesomelaena tetragona*
Cyperaceae	*Schoenus caespititius*
Cyperaceae	*Schoenus curvifolius*
Cyperaceae	*Schoenus multiglumis*
Cyperaceae	*Tetraria octandra*
Dasypogonaceae	*Dasypogon bromeliifolius*
Dasypogonaceae	*Kingia australis*
Dennstaedtiaceae	*Histiopteris incisa*
Dennstaedtiaceae	*Pteridium esculentum*
Dilleniaceae	*Hibbertia acerosa*
Dilleniaceae	*Hibbertia cuneiformis*
Dilleniaceae	*Hibbertia cunninghamii*
Dilleniaceae	*Hibbertia furfuracea*
Droseraceae	*Drosera erythrorhiza*
Droseraceae	*Drosera pallida*
Droseraceae	*Drosera sp.*
Ericaceae	*Andersonia sprengelioides*
Ericaceae	*Astroloma pallidum*
Ericaceae	*Leucopogon australis*
Ericaceae	*Leucopogon obovatus subsp. obovatus*
Ericaceae	*Leucopogon propinquus*
Ericaceae	*Leucopogon rubricaulis*
Ericaceae	*Leucopogon sp. Coujinup (M.A. Burgman 1085)*
Euphorbiaceae	*Amperea ericoides*
Fabaceae	**Acacia longifolia*
Fabaceae	**Acacia paradoxa*
Fabaceae	**Dipogon lignosus*

Fabaceae	**Ornithopus compressus*
Fabaceae	**Psoralea pinnata*
Fabaceae	*Acacia alata*
Fabaceae	*Acacia browniana*
Fabaceae	*Acacia sulcata*
Fabaceae	*Aotus intermedia*
Fabaceae	*Bossiaea linophylla*
Fabaceae	*Callistachys lanceolata*
Fabaceae	*Chorizema rhombeum*
Fabaceae	*Gastrolobium bilobum*
Fabaceae	*Gompholobium capitatum*
Fabaceae	*Gompholobium knightianum*
Fabaceae	*Hovea elliptica*
Fabaceae	*Hovea trisperma*
Fabaceae	*Jacksonia horrida*
Fabaceae	*Kennedia coccinea*
Geraniaceae	**Pelargonium capitatum*
Goodeniaceae	*Dampiera leptoclada*
Goodeniaceae	*Dampiera linearis*
Haemodoraceae	*Anigozanthos flavidus*
Haemodoraceae	*Conostylis setigera subsp. setigera*
Haemodoraceae	*Haemodorum spicatum*
Haemodoraceae	*Phlebocarya ciliata*
Hemerocallidaceae	*Agrostocrinum hirsutum*
Hemerocallidaceae	*Dianella revoluta*
Hemerocallidaceae	*Johnsonia lupulina*
Hemerocallidaceae	*Johnsonia teretifolia*
Hemerocallidaceae	*Stypandra glauca*
Iridaceae	**Freesia alba x leichtlinii*

Iridaceae	**Watsonia meriana cv. bulbillifera*
Iridaceae	**Watsonia meriana var. bulbillifera*
Iridaceae	*Patersonia limbata*
Iridaceae	*Patersonia umbrosa*
Juncaceae	**Juncus articulatus*
Juncaceae	*Juncus pallidus*
Loranthaceae	*Nuytsia floribunda*
Myrtaceae	**Leptospermum laevigatum*
Myrtaceae	*Agonis flexuosa*
Myrtaceae	*Agonis theiformis*
Myrtaceae	*Astartea sp. winged*
Myrtaceae	*Callistemon glaucus*
Myrtaceae	*Calytrix hirta*
Myrtaceae	*Corymbia calophylla*
Myrtaceae	*Eucalyptus marginata*
Myrtaceae	*Melaleuca preissiana*
Myrtaceae	*Melaleuca thymoides*
Myrtaceae	*Melaleuca thyoides*
Myrtaceae	*Taxandria parviceps*
Orchidaceae	*Caladenia flava*
Orchidaceae	*Caladenia latifolia*
Oxalidaceae	*Oxalis perennans*
Phytolaccaceae	**Phytolacca octandra*
Pittosporaceae	**Pittosporum undulatum*
Pittosporaceae	*Billardiera fusiformis*
Plantaginaceae	**Plantago lanceolata*
Poaceae	**Anthoxanthum odoratum*
Poaceae	**Avena fatua*
Poaceae	**Briza maxima*

Poaceae	**Bromus diandrus*
Poaceae	**Cenchrus pedicellatus*
Poaceae	**Cortaderia selloana*
Poaceae	**Ehrharta calycina*
Poaceae	**Eragrostis curvula*
Poaceae	**Holcus lanatus*
Poaceae	**Lagurus ovatus*
Poaceae	**Sporobolus africanus*
Poaceae	**Stenotaphrum secundatum*
Poaceae	*Amphipogon amphipogonoides*
Poaceae	*Tetrarrhena laevis*
Polygalaceae	**Polygala myrtifolia*
Polygalaceae	*Comesperma virgatum*
Primulaceae	**Lysimachia arvensis*
Proteaceae	*Adenanthos obovatus*
Proteaceae	*Adenanthos sericeus*
Proteaceae	*Banksia coccinea*
Proteaceae	*Banksia formosa*
Proteaceae	*Hakea elliptica*
Proteaceae	*Hakea florida*
Proteaceae	*Hakea linearis*
Proteaceae	*Hakea prostrata*
Proteaceae	*Hakea trifurcata*
Proteaceae	*Petrophile diversifolia*
Ranunculaceae	*Clematis pubescens*
Restionaceae	*Desmocladus fasciculatus*
Restionaceae	*Empodisma gracillimum*
Restionaceae	*Hypolaena exsulca*
Restionaceae	*Leptocarpus tenax*

Restionaceae	*Loxocarya cinerea*
Rhamnaceae	*Spyridium globulosum*
Rhamnaceae	*Spyridium majoranifolium*
Rosaceae	**Cotoneaster pannosus*
Rubiaceae	**Coprosma repens*
Rubiaceae	*Opercularia hispidula*
Rutaceae	*Boronia crenulata subsp. crenulata*
Rutaceae	*Boronia spathulata*
Sapindaceae	*Dodonaea ceratocarpa*
Schizaeaceae	*Schizaea fistulosa*
Solanaceae	**Solanum laciniatum*
Stylidiaceae	*Stylidium repens*
Stylidiaceae	*Stylidium spathulatum*
Stylidiaceae	*Stylidium squamosotuberosum*
Xanthorrhoeaceae	*Xanthorrhoea platyphylla*

Floristics Summary

Total number of species = 157
Number of families = 46
Number of weed species = 40
Number of conservation significant flora species =
Number of species in families = Fabaceae (14), Cyperaceae (14), Myrtaceae (11), Proteaceae (10), Ericaceae (7), Restionaceae (5), Hemerocallidaceae (5), Haemodoraceae (4)
Number of quadrats = 13
Number of releves = 0
Average richness overall = 18.5 ± 2.6 (S.E.)
Number of singletons = 101

Floristics Site Data

Quadrat:	1	**Latitude:**	582696	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123213	**-Upper (u):**	4m, >70%
Soil Colour:	black	**Condition:**	Excellent	**-Middle (m):**	2m, <10%
Soil Type:	peaty sand	**Fire Age:**	long unburnt	**-Ground (g):**	1m, >70%
Rock Type:	nil				

Vegetation Type: *Melaleuca preissiana Low Woodland (ARVS 49)*

Site Comments: Reference site

Vegetation Description:
U (4m, >70%): ; M (2m, <10%): ; G (1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis flexuosa	u		r		

Callistachys lanceolata	u	i
Melaleuca preissiana	u	d
Adenanthos obovatus	m	r
Aotus intermedia	m	r
Astartea sp. winged	m	r
Callistemon glaucus	m	i
Clematis pubescens	m	r
Taxandria parviceps	m	i
Anarthria prolifera	g	i
Anarthria scabra	g	m
Anigozanthos flavidus	g	r
Dampiera leptoclada	g	r
Dasypogon bromeliifolius	g	i
Empodisma gracillimum	g	i
Gahnia decomposita	g	i
Lepidosperma sp.	g	r
Leptocarpus tenax	g	i
Opercularia hispidula	g	r
Patersonia umbrosa	g	d
Pteridium esculentum	g	r
Schizaea fistulosa	g	r
Schoenus multiglumis	g	r
Stylidium squamosotuberosum	g	r
Xanthosia rotundifolia	g	i

Species outside quadrat/releve: __

Quadrat:	2	**Latitude:**	582662	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123065	**-Upper (u):**	
Soil Colour:	dark grey	**Condition:**		**-Middle (m):**	
Soil Type:	sand	**Fire Age:**		**-Ground (g):**	<1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation site				

Vegetation Description:
U (): ; M (): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
**Acacia longifolia*	m		r		
**Leptospermum laevigatum*	m		i		

Leucopogon obovatus subsp. obovatus	m	r
**Psoralea pinnata*	m	r
**Anthoxanthum odoratum*	g	r
**Arctotheca calendula*	g	r
**Asparagus asparagoides*	g	r
**Bromus diandrus*	g	r
**Carpobrotus edulis*	g	r
**Cenchrus pedicellatus*	g	r
**Cerastium glomeratum*	g	r
**Ehrharta calycina*	g	d
Ficinia nodosa	g	r
**Lysimachia arvensis*	g	r
Oxalis perennans	g	r
**Pelargonium capitatum*	g	r
**Taraxacum khatoonae*	g	r

Species outside quadrat/releve: __

Quadrat:	3	**Latitude:**	582572	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123043	**-Upper (u):**	
Soil Colour:	white	**Condition:**		**-Middle (m):**	2m, >70%
Soil Type:	sand	**Fire Age:**		**-Ground (g):**	<1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation site				

Vegetation Description:
U (): ; M (2m, >70%): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
**Leptospermum laevigatum*	m		d		
**Phytolacca octandra*	m		r		

**Psoralea pinnata*	m	d
**Solanum laciniatum*	m	r
**Anthoxanthum odoratum*	g	r
**Asparagus asparagoides*	g	i
**Carpobrotus edulis*	g	r
**Cenchrus pedicellatus*	g	r
**Cirsium vulgare*	g	r
**Cortaderia selloana*	g	i
Ficinia nodosa	g	r
**Holcus lanatus*	g	r
**Watsonia meriana var. bulbillifera*	g	i

Species outside quadrat/releve: __

Quadrat:	4	**Latitude:**	582604	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123003	**-Upper (u):**	
Soil Colour:	black	**Condition:**		**-Middle (m):**	
Soil Type:	peaty sand	**Fire Age:**		**-Ground (g):**	1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation site				

Vegetation Description:
U (): ; M (): ; G (1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
**Psoralea pinnata*	m		i		
**Solanum laciniatum*	m		r		

Histiopteris incisa	g	i
**Holcus lanatus*	g	i
Isolepis cernua var. setiformis	g	r
**Juncus articulatus*	g	i
Juncus pallidus	g	i
Senecio minimus	g	r

Species outside quadrat/releve: __

Quadrat:	5	**Latitude:**	582770	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123042	**-Upper (u):**	8m, 10-30%
Soil Colour:	dark grey	**Condition:**	Excellent	**-Middle (m):**	2m, 10-30%
Soil Type:	sand	**Fire Age:**	long unburnt	**-Ground (g):**	<1m, >70%
Rock Type:	nil				

Vegetation Type: *Marri/Jarrah Coastal Hills Forest (ARVS 17)*

Site Comments: Reference site

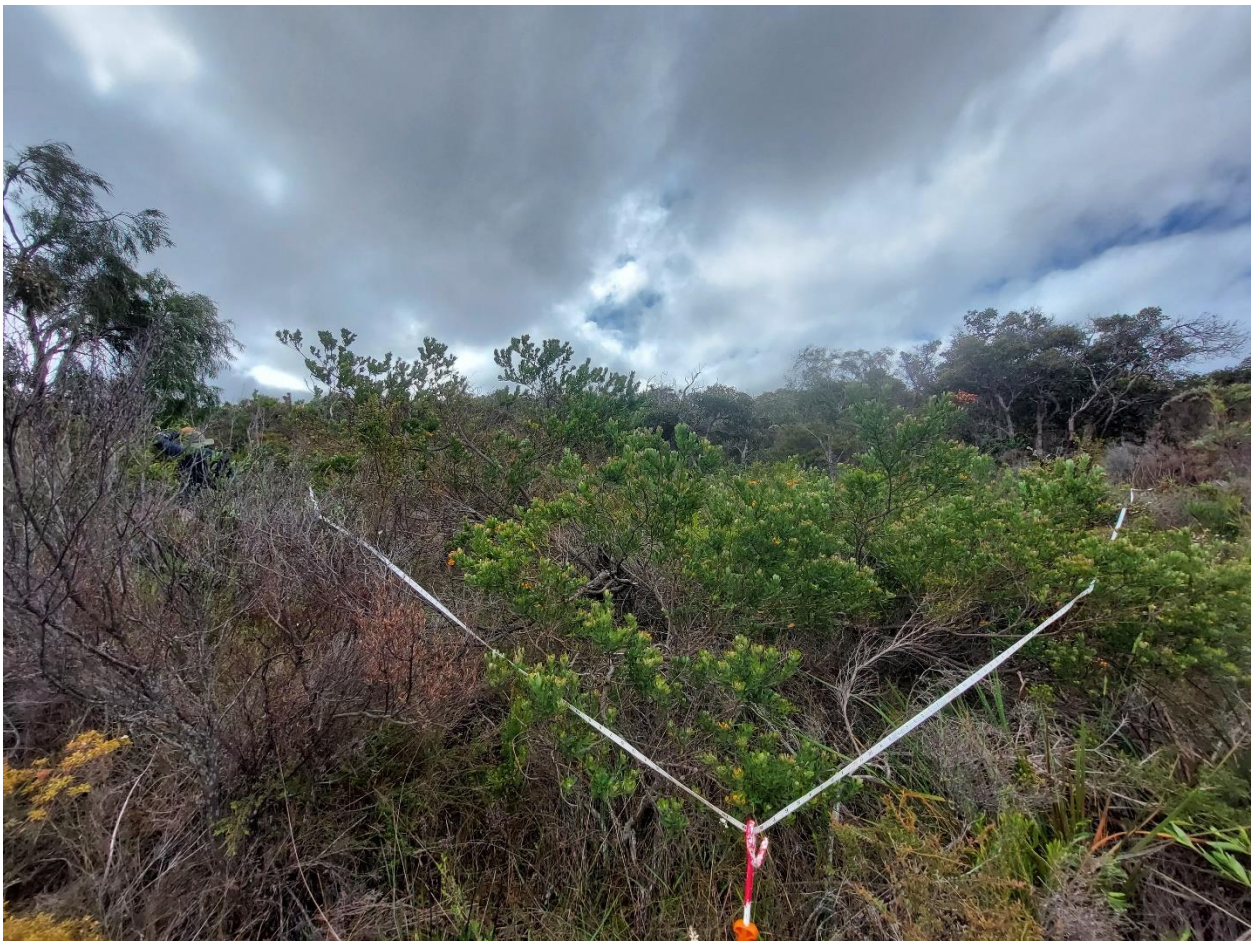
Vegetation Description:
U (8m, 10-30%): ; M (2m, 10-30%): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis theiformis	u		i		
Corymbia calophylla	u		r		

Eucalyptus marginata	u	m
Acacia browniana	m	r
Billardiera fusiformis	m	r
Boronia crenulata subsp. crenulata	m	r
Hakea elliptica	m	i
Hibbertia cuneiformis	m	r
Hovea trisperma	m	r
Jacksonia horrida	m	i
Leucopogon obovatus subsp. obovatus	m	i
Leucopogon rubricaulis	m	r
Leucopogon sp. Coujinup (M.A. Burgman 1085)	m	r
Melaleuca thymoides	m	i
Spyridium globulosum	m	i
Xanthorrhoea platyphylla	m	r
Agrostocrinum hirsutum	g	r
Amperea ericoides	g	r
Anarthria prolifera	g	r
Anarthria scabra	g	i
Anigozanthos flavidus	g	r
Conostylis setigera subsp. setigera	g	r
Dasypogon bromeliifolius	g	i
Desmocladus fasciculatus	g	r
Dianella revoluta	g	r
Drosera sp.	g	r
Ficinia nodosa	g	r
Gompholobium knightianum	g	r
Hibbertia acerosa	g	r
Hypolaena exsulca	g	i
Johnsonia teretifolia	g	r

Lepidosperma squamatum	g	r
Lepidosperma striatum	g	r
Loxocarya cinerea	g	i
Opercularia hispidula	g	r
Patersonia umbrosa	g	r
Schoenus caespititius	g	r

Species outside quadrat/releve: *Adenanthos sericeus, Banksia formosa, Bossiaea linophylla*



Quadrat:	6	**Latitude:**	582401	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123163	**-Upper (u):**	4m, <10%
Soil Colour:	dark grey	**Condition:**	Excellent	**-Middle (m):**	1.5m, 30-70%
Soil Type:	sand	**Fire Age:**	long unburnt	**-Ground (g):**	<1m, 30-70%
Rock Type:	nil				

Vegetation Type: *Marri/Jarrah Coastal Hills Forest (ARVS 17)*

Site Comments: Reference site

Vegetation Description:
U (4m, <10%): ; M (1.5m, 30-70%): ; G (<1m, 30-70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis flexuosa	u		r		
Agonis theiformis	u		i		

Corymbia calophylla	u	i
Eucalyptus marginata	u	i
Banksia coccinea	m	r
Boronia crenulata subsp. crenulata	m	r
Boronia spathulata	m	r
Bossiaea linophylla	m	r
Gastrolobium bilobum	m	m
Leucopogon obovatus subsp. obovatus	m	i
Leucopogon rubricaulis	m	r
Melaleuca thymoides	m	i
Taxandria parviceps	m	i
Anarthria scabra	g	i
Burchardia congesta	g	rr
Caladenia latifolia	g	r
Dampiera linearis	g	r
Dasypogon bromeliifolius	g	r
Dianella revoluta	g	r
Drosera erythrorhiza	g	r
Drosera pallida	g	r
Hypolaena exsulca	g	i
Loxocarya cinerea	g	r
Lyginia barbata	g	r
Stylidium repens	g	r

Species outside quadrat/releve: __

Quadrat:	7	**Latitude:**	583173	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123339	**-Upper (u):**	
Soil Colour:	white	**Condition:**		**-Middle (m):**	
Soil Type:	sand	**Fire Age:**		**-Ground (g):**	<1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation site				

Vegetation Description:
U (): ; M (): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Petrophile diversifolia	m		r		
**Briza maxima*	g		r		

Dasypogon bromeliifolius	g	r
Haemodorum spicatum	g	r
Mesomelaena tetragona	g	r
**Pelargonium capitatum*	g	r
Phlebocarya ciliata	g	r
**Ursinia anthemoides*	g	r

Species outside quadrat/releve: __

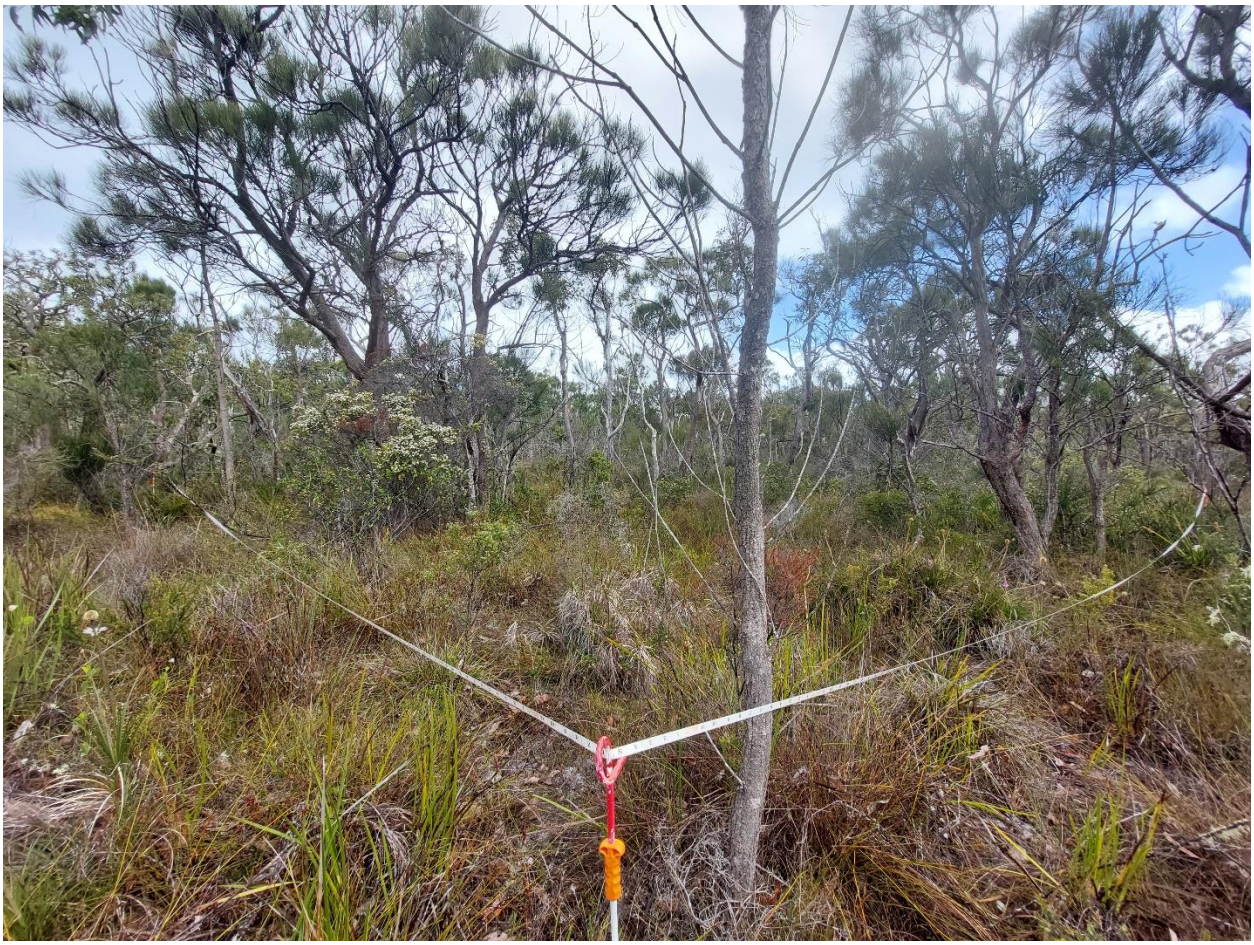
Quadrat:	8	**Latitude:**	583104	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123335	**-Upper (u):**	
Soil Colour:	dark grey	**Condition:**		**-Middle (m):**	
Soil Type:	sand	**Fire Age:**		**-Ground (g):**	<1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation site				

Vegetation Description:
U (): ; M (): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
**Anthoxanthum odoratum*	g		r		
**Avena fatua*	g		r		

**Eragrostis curvula*	g	i
**Freesia alba x leichtlinii*	g	r
**Lagurus ovatus*	g	r
**Ornithopus compressus*	g	r
**Pelargonium capitatum*	g	r
**Plantago lanceolata*	g	r
**Watsonia meriana var. bulbillifera*	g	r

Species outside quadrat/releve: __



Quadrat:	9	**Latitude:**	583063	**Vegetation Structure:**	
Date:	6/10/2022 0:00:00	**Longitude:**	6123342	**-Upper (u):**	8m, 10-30%
Soil Colour:	grey	**Condition:**	Excellent	**-Middle (m):**	2m, <10%
Soil Type:	sand	**Fire Age:**	long unburnt	**-Ground (g):**	<1m, >70%
Rock Type:	nil				

Vegetation Type: *Jarrah/Sheoak/E.staeri Sandy Woodland (ARVS 13)*

Site Comments: Reference site

Vegetation Description:
U (8m, 10-30%): ; M (2m, <10%): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis theiformis	u		i		
Allocasuarina fraseriana	u		m		

Eucalyptus marginata	u	i
Nuytsia floribunda	u	i
Acacia browniana	m	i
Comesperma virgatum	m	r
Jacksonia horrida	m	r
Leucopogon obovatus subsp. obovatus	m	i
Melaleuca thyoides	m	i
Spyridium globulosum	m	r
Anarthria prolifera	g	i
Anarthria scabra	g	m
Caladenia flava	g	r
Conostylis setigera subsp. setigera	g	r
Dasypogon bromeliifolius	g	i
Desmocladus fasciculatus	g	r
Gompholobium capitatum	g	r
Haemodorum spicatum	g	r
Johnsonia lupulina	g	r
Patersonia limbata	g	r
Phlebocarya ciliata	g	r
Schoenus caespititius	g	r
Schoenus curvifolius	g	r
Stylidium repens	g	r

Species outside quadrat/releve: __

Quadrat:	10	**Latitude:**	583358	**Vegetation Structure:**	
Date:	7/10/2022 0:00:00	**Longitude:**	6123634	**-Upper (u):**	10m, 10-30%
Soil Colour:	dark grey	**Condition:**		**-Middle (m):**	4m, >70%
Soil Type:	loamy sand	**Fire Age:**		**-Ground (g):**	1m, 10-30%
Rock Type:	granite				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation/weed removal site				

Vegetation Description:
U (10m, 10-30%): ; M (4m, >70%): ; G (1m, 10-30%):

Taxon	Layer	Dominant	Cover	Status	Comments
Corymbia calophylla	u		i		
**Acacia paradoxa*	m		m		

**Cotoneaster pannosus*	m	i
Dodonaea ceratocarpa	m	i
Gastrolobium bilobum	m	i
Hibbertia furfuracea	m	i
Leucopogon obovatus subsp. obovatus	m	r
**Pittosporum undulatum*	m	r
**Polygala myrtifolia*	m	r
Anarthria gracilis	g	r
**Avena fatua*	g	r
**Sporobolus africanus*	g	r
**Stenotaphrum secundatum*	g	r
**Watsonia meriana cv. bulbillifera*	g	i

Species outside quadrat/releve: __

Quadrat:	11	**Latitude:**	583463	**Vegetation Structure:**	
Date:	7/10/2022 0:00:00	**Longitude:**	6123681	**-Upper (u):**	4m, 10-30%
Soil Colour:	dark grey	**Condition:**	Excellent	**-Middle (m):**	2m, 30-70%
Soil Type:	loamy sand	**Fire Age:**	long unburnt	**-Ground (g):**	1m, 10-30%
Rock Type:	granite				

Vegetation Type: *Gastrolobium bilobum/Hakea elliptica Granite Shrubland/Yate Woodland (ARVS 23)*

Site Comments: Reference site

Vegetation Description:
U (4m, 10-30%): ; M (2m, 30-70%): ; G (1m, 10-30%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis theiformis	u		r		
Corymbia calophylla	u		i		

Eucalyptus marginata	u	i
Acacia sulcata	m	i
Banksia formosa	m	r
Bossiaea linophylla	m	r
Calytrix hirta	m	i
Dodonaea ceratocarpa	m	i
Gastrolobium bilobum	m	i
Hakea linearis	m	i
Hakea prostrata	m	i
Hakea trifurcata	m	i
Hibbertia cunninghamii	m	r
Hovea elliptica	m	i
Kingia australis	m	r
Leucopogon obovatus subsp. obovatus	m	i
Spyridium globulosum	m	r
Spyridium majoranifolium	m	r
Xanthorrhoea platyphylla	m	i
Amphipogon amphipogonoides	g	r
Anarthria gracilis	g	i
Anarthria prolifera	g	r
Andersonia sprengelioides	g	r
Astroloma pallidum	g	r
Chorizema rhombeum	g	r
Cyathochaeta avenacea	g	r
Lepidosperma angustatum	g	m
Lomandra pauciflora	g	r
Mesomelaena tetragona	g	i
Stylidium spathulatum	g	r
Tetraria octandra	g	i

Tetrarrhena laevis	g	r

Species outside quadrat/releve: *Acacia alata, Hibbertia furfuracea, Stypandra glauca*

Quadrat:	12	**Latitude:**	583360	**Vegetation Structure:**	
Date:	7/10/2022 0:00:00	**Longitude:**	6123717	**-Upper (u):**	10m, 10-30%
Soil Colour:	dark brown	**Condition:**		**-Middle (m):**	
Soil Type:	loam	**Fire Age:**	<5y	**-Ground (g):**	<1m, >70%
Rock Type:	nil				
Vegetation Type:	*Weeds*				
Site Comments:	Revegetation/weed removal site				

Vegetation Description:
U (10m, 10-30%): ; M (): ; G (<1m, >70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis flexuosa	u		i		
Corymbia calophylla	u		m		

**Coprosma repens*	m	r
**Dipogon lignosus*	m	m
**Pittosporum undulatum*	m	i
**Zantedeschia aethiopica*	m	i
**Cenchrus pedicellatus*	g	i
Pteridium esculentum	g	r
**Vinca major*	g	m

Species outside quadrat/releve: __

Quadrat:	13	**Latitude:**	582732	**Vegetation Structure:**	
Date:	7/10/2022 0:00:00	**Longitude:**	6123747	**-Upper (u):**	10m, 10-30%
Soil Colour:	brown	**Condition:**	Excellent	**-Middle (m):**	2m, 30-70%
Soil Type:	sand	**Fire Age:**	<5y	**-Ground (g):**	<1m, 30-70%
Rock Type:	nil				

Vegetation Type: *Marri/Jarrah Forest/Peppermint Woodland (ARVS 10)*

Site Comments: Reference site

Vegetation Description:
U (10m, 10-30%): ; M (2m, 30-70%): ; G (<1m, 30-70%):

Taxon	Layer	Dominant	Cover	Status	Comments
Agonis theiformis	u		i		
Corymbia calophylla	u		m		

Bossiaea linophylla	m	d
Hakea florida	m	i
Hibbertia cunninghamii	m	r
Hovea elliptica	m	i
Kennedia coccinea	m	r
Leucopogon australis	m	r
Leucopogon obovatus subsp. obovatus	m	i
Leucopogon propinquus	m	r
Xanthorrhoea platyphylla	m	i
Cyathochaeta avenacea	g	i
Lepidosperma gracile	g	i
Lomandra pauciflora	g	r
Opercularia hispidula	g	r
Patersonia umbrosa	g	m
Platysace filiformis	g	r
Tetraria octandra	g	i
Tetrarrhena laevis	g	r

Species outside quadrat/releve: __

Vegetation and Site Descriptions

1. Melaleuca preissiana Low Woodland (ARVS 49)

Quadrats: 1
Releves:
Soil: black peaty sand
Rock: nil
Landform: NA
Species Richness: Average: 25, Min: 25 Max: 25
Conservation Significant Flora: -
Weeds: -
Condition: Excellent
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	4m, >70%	*Melaleuca preissiana, Callistachys lanceolata, Agonis flexuosa*
Middle	2m, <10%	*Taxandria parviceps, Clematis pubescens, Callistemon glaucus, Astartea sp. winged, Aotus intermedia*
Ground	1m, >70%	*Xanthosia rotundifolia, Stylidium squamosotuberosum, Schoenus multiglumis, Schizaea fistulosa, Pteridium esculentum*

Plate 1: Melaleuca preissiana Low Woodland (ARVS 49)

2. Marri/Jarrah Coastal Hills Forest (ARVS 17)

Quadrats: 5, 6
Releves:
Soil: dark grey sand
Rock: nil
Landform: NA
Species Richness: Average: 31, Min: 25 Max: 37
Conservation Significant Flora: -
Weeds: -
Condition: Excellent
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	8m, 10-30%; 4m, <10%	*Eucalyptus marginata, Corymbia calophylla, Agonis theiformis, Agonis flexuosa*
Middle	2m, 10-30%; 1.5m, 30-70%	*Melaleuca thymoides, Leucopogon rubricaulis, Leucopogon obovatus subsp. obovatus, Boronia crenulata subsp. crenulata, Xanthorrhoea platyphylla*
Ground	<1m, >70%; <1m, 30-70%	*Loxocarya cinerea, Hypolaena exsulca, Dianella revoluta, Dasypogon bromeliifolius, Anarthria scabra*

Plate 2: Marri/Jarrah Coastal Hills Forest (ARVS 17)

3. SandyEmarg

Quadrats: 9
Releves:
Soil: grey sand
Rock: nil
Landform: NA
Species Richness: Average: 24, Min: 24 Max: 24
Conservation Significant Flora: -
Weeds: -
Condition: Excellent
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	8m, 10-30%	*Nuytsia floribunda, Eucalyptus marginata, Allocasuarina fraseriana, Agonis theiformis*
Middle	2m, <10%	*Spyridium globulosum, Melaleuca thyoides, Leucopogon obovatus subsp. obovatus, Jacksonia horrida, Comesperma virgatum*
Ground	<1m, >70%	*Stylidium repens, Schoenus curvifolius, Schoenus caespititius, Phlebocarya ciliata, Patersonia limbata*

Plate 3: SandyEmarg

4. Gastrolobium bilobum/Hakea elliptica Granite Shrubland/Yate Woodland (ARVS 23)

Quadrats: 11
Releves:
Soil: dark grey loamy sand
Rock: granite
Landform: NA
Species Richness: Average: 32, Min: 32 Max: 32
Conservation Significant Flora: -
Weeds: -
Condition: Excellent
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	4m, 10-30%	*Eucalyptus marginata, Corymbia calophylla, Agonis theiformis*
Middle	2m, 30-70%	*Xanthorrhoea platyphylla, Spyridium majoranifolium, Spyridium globulosum, Leucopogon obovatus subsp. obovatus, Kingia australis*
Ground	1m, 10-30%	*Tetrarrhena laevis, Tetraria octandra, Stylidium spathulatum, Mesomelaena tetragona, Lomandra pauciflora*

Plate 4: Gastrolobium bilobum/Hakea elliptica Granite Shrubland/Yate Woodland (ARVS 23)

5. Marri/Jarrah Forest/Peppermint Woodland (ARVS 10)

Quadrats: 13
Releves:
Soil: brown sand
Rock: nil
Landform: NA
Species Richness: Average: 19, Min: 19 Max: 19
Conservation Significant Flora: -
Weeds: -
Condition: Excellent
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	10m, 10-30%	*Corymbia calophylla, Agonis theiformis*
Middle	2m, 30-70%	*Xanthorrhoea platyphylla, Leucopogon propinquus, Leucopogon obovatus subsp. obovatus, Leucopogon australis, Kennedia coccinea*
Ground	<1m, 30-70%	*Tetrarrhena laevis, Tetraria octandra, Platysace filiformis, Patersonia umbrosa, Opercularia hispidula*

Plate 5: Marri/Jarrah Forest/Peppermint Woodland (ARVS 10)

6. Weeds

Quadrats: 2, 3, 4
Releves:
Soil: dark grey sand, white sand, black peaty sand
Rock: nil
Landform: NA
Species Richness: Average: 12.7, Min: 8 Max: 17
Conservation Significant Flora: -
Weeds: **Pelargonium capitatum; *Psoralea pinnata; *Leptospermum laevigatum; *Asparagus asparagoides; *Lysimachia arvensis; *Carpobrotus edulis; *Acacia longifolia; *Cerastium glomeratum; *Anthoxanthum odoratum; *Taraxacum khatoonae; *Bromus diandrus; *Arctotheca calendula; *Cenchrus pedicellatus; *Ehrharta calycina; *Cortaderia selloana; *Holcus lanatus; *Cirsium vulgare; *Solanum laciniatum; *Phytolacca octandra; *Watsonia meriana var. bulbillifera; *Juncus articulatus*
Condition:
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper		
Middle	; 2m, >70%	*Psoralea pinnata, Solanum laciniatum, Leptospermum laevigatum, Phytolacca octandra, Leucopogon obovatus subsp. obovatus*
Ground	<1m, >70%; 1m, >70%	*Holcus lanatus, Ficinia nodosa, Cenchrus pedicellatus, Carpobrotus edulis, Asparagus asparagoides*

Plate 6: Weeds

7. Weeds

Quadrats: 7, 8
Releves:
Soil: white sand, dark grey sand
Rock: nil
Landform: NA
Species Richness: Average: 8.5, Min: 8 Max: 9
Conservation Significant Flora: -
Weeds: **Pelargonium capitatum; *Briza maxima; *Ursinia anthemoides; *Plantago lanceolata; *Anthoxanthum odoratum; *Ornithopus compressus; *Freesia alba x leichtlinii; *Avena fatua; *Eragrostis curvula; *Watsonia meriana var. bulbillifera; *Lagurus ovatus*
Condition:
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper		
Middle		*Petrophile diversifolia*
Ground	<1m, >70%	*Pelargonium capitatum, Watsonia meriana var. bulbillifera, Ursinia anthemoides, Plantago lanceolata, Phlebocarya ciliata*

Plate 7: Weeds

8. Weeds

Quadrats: 10
Releves:
Soil: dark grey loamy sand
Rock: granite
Landform: NA
Species Richness: Average: 14, Min: 14 Max: 14
Conservation Significant Flora: -
Weeds: **Stenotaphrum secundatum; *Acacia paradoxa; *Cotoneaster pannosus; *Pittosporum undulatum; *Watsonia meriana cv. bulbillifera; *Sporobolus africanus; *Avena fatua; *Polygala myrtifolia*
Condition:
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	10m, 10-30%	*Corymbia calophylla*
Middle	4m, >70%	*Polygala myrtifolia, Pittosporum undulatum, Leucopogon obovatus subsp. obovatus, Hibbertia furfuracea, Gastrolobium bilobum*
Ground	1m, 10-30%	*Watsonia meriana cv. bulbillifera, Stenotaphrum secundatum, Sporobolus africanus, Avena fatua, Anarthria gracilis*

Plate 8: Weeds

9. Weeds

Quadrats: 12
Releves:
Soil: dark brown loam
Rock: nil
Landform: NA
Species Richness: Average: 9, Min: 9 Max: 9
Conservation Significant Flora: -
Weeds: **Vinca major; *Cenchrus pedicellatus; *Coprosma repens; *Zantedeschia aethiopica; *Pittosporum undulatum; *Dipogon lignosus*
Condition:
Regional Extent:
Conservation Significance:

Floristics:

Layer	Height/cover	Dominant taxa
Upper	10m, 10-30%	*Corymbia calophylla, Agonis flexuosa*
Middle		*Zantedeschia aethiopica, Pittosporum undulatum, Dipogon lignosus, Coprosma repens*
Ground	<1m, >70%	*Vinca major, Pteridium esculentum, Cenchrus pedicellatus*

Plate 9: Weeds

11. Limitations

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