Detailed Flora and Vegetation Survey
Donnybrook Shafts

Prepared for Department of Mines, Industry Regulation and Safety
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EXECUTIVE SUMMARY

Onshore Environmental Consultants Pty Ltd (Onshore Environmental) was commissioned by the Department of Mines, Industry Regulation and Safety (DMIRS) to undertake a detailed flora and vegetation survey of approximately 50 hectares within the Argyle Forest Block (F27) which supports historic mine workings (herein referred to as the study area). The study area is situated approximately 2 km south of Donnybrook, between Goodwood Road and Upper Capel Road. DMIRS is working in partnership with the Department of Biodiversity, Conservation and Attractions (DBCA) to address safety risks associated with historic mine workings under the Abandoned Mines Program.

A single season detailed flora and vegetation survey was completed between the 21st and 22nd of September 2020. A total number of 179 plant taxa (including varieties and subspecies) from 48 families and 114 genera was recorded from the study area. Species representation was greatest among the Fabaceae, Proteaceae, Asparagaceae Ericaceae and Myrtaceae families. The most speciose genera were *Acacia* (11 taxa), *Lomandra* (9 taxa each), *Hibbertia* (6 taxa), *Gompholobium* and *Stylidium* (5 taxa each).

None of the plant taxa currently identified from the study area were gazetted as Threatened Flora pursuant to the *Biodiversity Conservation Act 2016* (BC Act) or listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). One species recorded from the study area was listed as Priority flora taxon by the DBCA; *Acacia semitrullata* (Priority 4).

A total of ten introduced species were recorded from the study area:

- **Arctotheca calendula;*
- **Briza maxima;*
- **Conyza bonariensis;*
- **Ehrharta calycina;*
- **Ehrharta longiflora;*
- **Hypochaeris glabra;*
- **Oxalis glabra;*
- **Petrorhagia dubia;*
- **Ursinia anthemoides;* and
- **Vinca major.*

None of these species are listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act 2007).

A total of four vegetation associations were described and mapped from the study area. None of the vegetation associations were aligned with any federal or state listed Threatened Ecological Communities (TECs) or state listed Priority Ecological Communities (PECs).

Vegetation condition was rated as *very good* across the majority of the study area with disturbances including access tracks, historical mining and exploration activities, logging, weeds and dieback.

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1.0 INTRODUCTION

1.1 Preamble

Onshore Environmental was commissioned by DMIRS to undertake a detailed flora and vegetation survey within part of the Argyle Forest Block, referred to as the study area. The study area is situated 2 km south of Donnybrook in the south-west of Western Australia. It is located within the Shire of Donnybrook-Balingup between Goodwood Road and the Upper Capel Road (Figure 1). The study area contains a number of old mine workings which pose a safety risk to the recreational and operational use of the forest block. A total of 42 features including shafts, collapsed shafts, costeans and small pits occur within the study area, with the potential for additional unrecorded features. DMIRS is planning to remediate ten priority features which occur close to the primary access tracks. The potential for further remediation works for additional abandoned mine features will also be assessed. The detailed flora and vegetation survey included targeted searches for species of conservation significance and weeds within a 20 m buffer around the identified abandoned mine features.

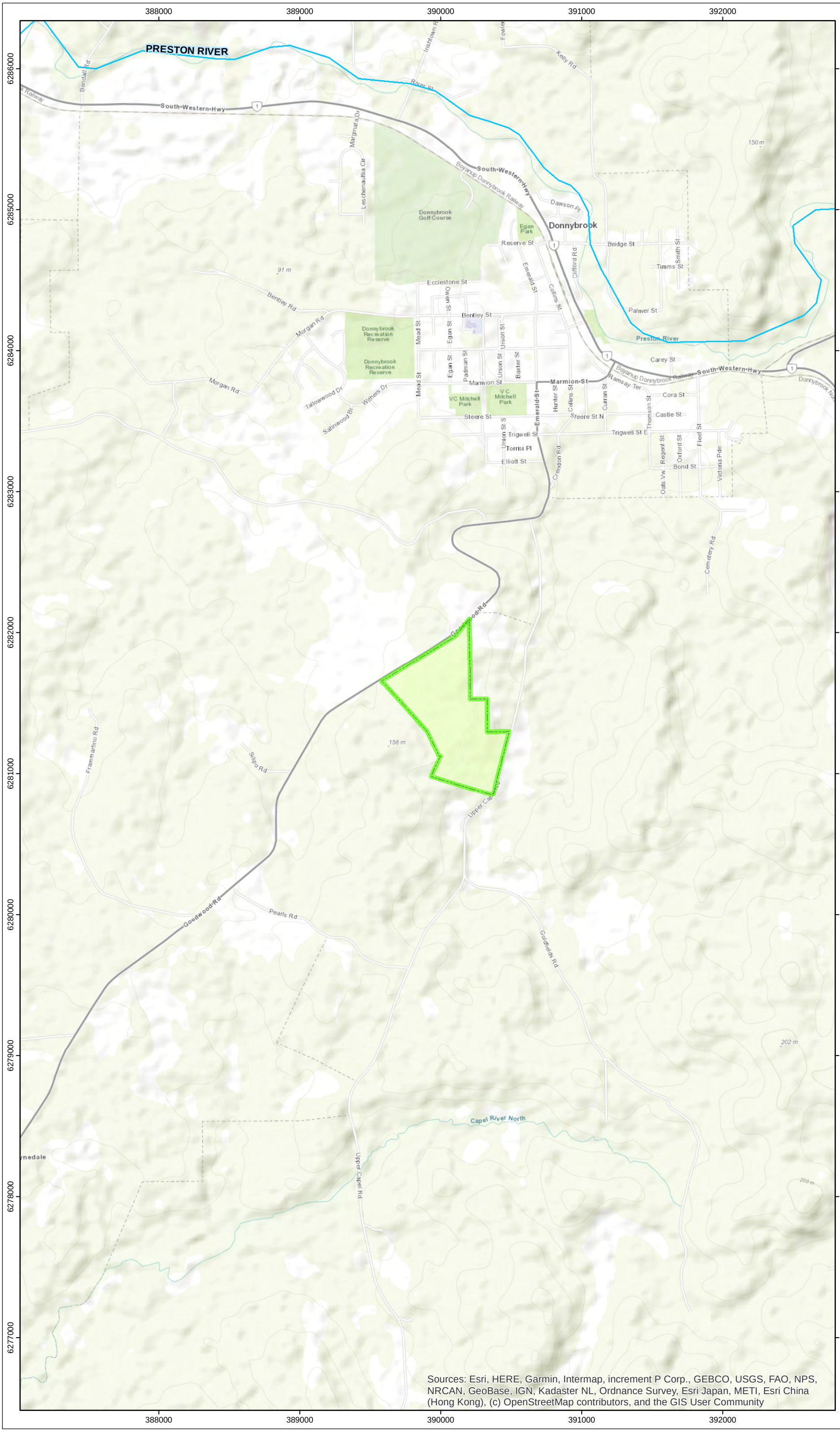
1.2 Land Use

The dominant land uses surrounding the study area are State forest, urban development forming the town of Donnybrook, grazing lands and horticulture. Mining activities also occur in the wider region and include a small number of proposed, operational and rehabilitated mine sites. The Donnybrook area has a history of gold mining dating back to the first discovery in 1897. The Donnybrook Goldfield was proclaimed in 1899 and mined until 1903. Three historical gold mines occur within the Argyle State forest; Queen of the South, Empress Helena and Arc of Gold. The Donnybrook area supported potato production up until the 1970s, but more recently has become a fruit growing area with apples being the major crop.

1.3 Biogeographic Regions

The latest version of the Interim Biogeographic Regionalisation for Australia (IBRA7) divides Australia into 89 bioregions based on climate, geology, landform, native vegetation and species, and includes 419 sub-regions (Department of Environment 2013). The bioregions and sub-regions are the reporting unit for assessing the status of native ecosystems and their level of protection in the National Reserve System. The study area is located within the Southern Jarrah Forest (JF2) sub-region within the Jarrah Forest bioregion. The Southern Jarrah Forest subregion is described as "*Duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by Marri-Wandoo woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands."*

The vegetation of the subregion is described as "*Jarrah-Marri forest in the west grading to Marri and Wandoo woodlands in the east, with extensive areas of swamp vegetation in the southeast dominated by Paperbarks and Swamp Yate. The understorey of the forest and woodland reflects the more mesic nature of this area. The majority of the diversity in the communities occurs on the lower slopes or near granite soils where there are rapid changes in site conditions*" (Hearn *et al*. 2002).



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Argyle Block

FIGURE 1
Location of the study area

Legend

Study Area

N

0 250 500 750
Meters

1:25,000

Datum: GDA94
Projection: MGA Zone 50

Date:	16/10/2020
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1.4 Climate

The climate of the south-west is Mediterranean, with hot, dry summers and mild, wet winters. The nearest weather station at Donnybrook has been operational since 1900. The average annual rainfall for Donnybrook is 969.8 mm, with the highest long-term average monthly totals exceeding 180 mm in June and July (Bureau of Meteorology [BOM] 2020). Rainfall for the four months preceding the September 2020 field survey was below average, with a total of 567 mm recorded, compared to the long term average of 655 mm for the same period (Figure 2).

Average summer maximum temperature for Donnybrook is 30.6°C in January, with winter maximum temperatures dropping to 16.6°C during July (Figure 2).

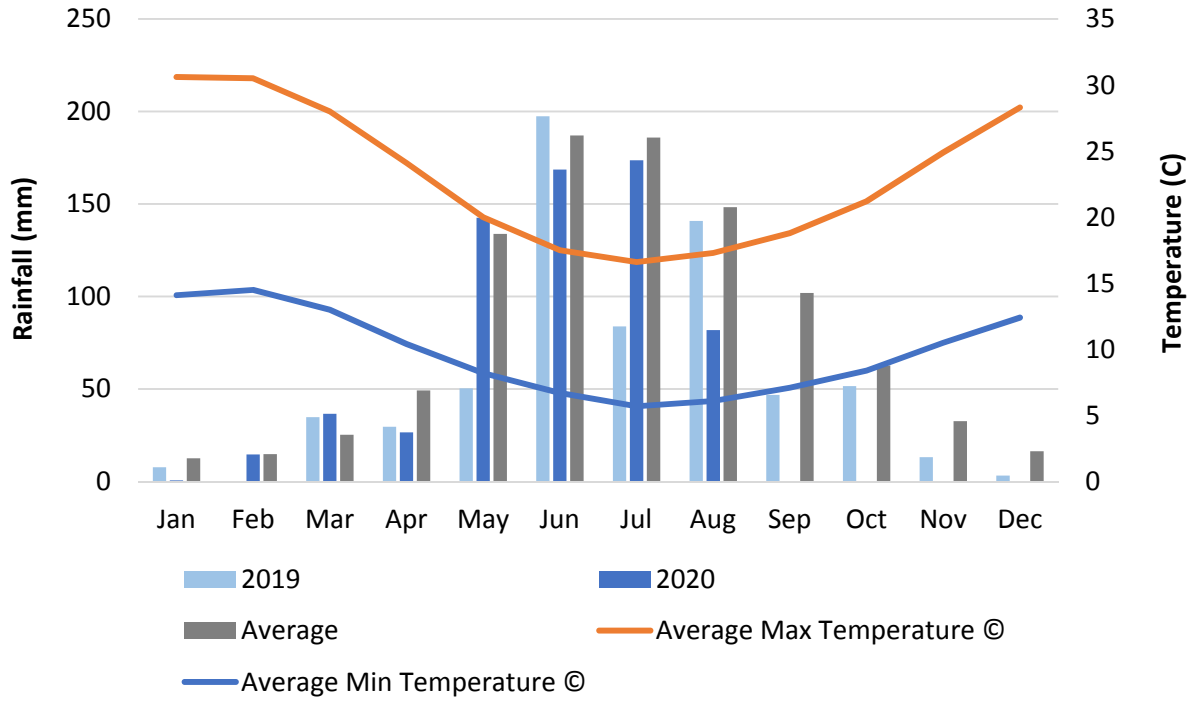

Figure 2 Rainfall and climatic data recorded at the Donnybrook station for 2019 and 2020, with long term average (Bureau of Meteorology 2020).

1.5 Soils and Landforms

Detailed mapping of the soils and landforms of Western Australia's south-west has been undertaken by the Department of Agriculture (Purdie *et al* 2004). As part of these surveys a hierarchy of soil-landscape mapping units were developed for land resource surveys in Western Australia. The study area is located within the Wellington-Blackwood survey area (Tille *et al* 1996) which was mapped at a scale of 1:100,000. The study area occurs within the Avon Province which is further divided into four soil-landscape zones; the Western Darling Range, Eastern Darling Range, Donnybrook Sunkland and the Warren-Denmark Southland Zone.

The study area occurs within the Donnybrook Sunkland Zone, with the following systems occurring within the study area:

- Blackwood Plateau System: Lateritic plateau, in the Donnybrook Sunkland. Sandy gravel, loamy gravel and deep sand with vegetation of Jarrah-marri forest; and
- Goodwood Valleys System: Valleys, of the Donnybrook Sunkland. Sandy gravel, loamy gravel and deep sands with vegetation of Jarrah-marri forest and woodland.

The Blackwood Plateau System consists of a broad, gently undulating plateau. The system is dominated by broad lateritic divides with gravels and sands formed over Bunbury Basalt. There are also small areas of swampy terrain, consisting of shallow, minor valleys. Valleys are either U-shaped with swampy floors or more deeply incised, V-shaped valleys with narrow floors.

The Goodwood Valleys System consists of a series of low valleys formed by major rivers including the Blackwood, Preston and Capel Rivers. The sides of the valleys consist of gravels and sands while the river terraces support alluvial brown deep sands and alluvial brown loamy earths on valley floors. There are occasional swampy depressions and raised flats.

The Australian Soil Resource Information System (ASRIS) provides soil and land resource information across Australia. The following soil types occur within the study area (CSIRO 2015):

- Tc5: Dissected plateau at low elevation of gently undulating to low hilly relief and characterised by extensive block laterite and lateritic (ironstone) gravels; some swamps: chief soils on slopes and undulating areas are generally hard acidic yellow mottled soils containing small to very large amounts of ironstone gravels.

1.6 Geology

The major geological feature of the area is the Darling Fault which runs in a north south direction to the west of the study area. The Darling Fault forms the divide between two geological provinces of the south-west; The Perth Basin to the west and the Yilgarn Block to the east. The study area lies on the Darling Scarp which is the surface expression of the Darling Fault.

The geology of the study area has been mapped as part of the Geological Survey of Western Australia by Wilde and Walker (1982). The major geological units of the Donnybook area are:

- Qrc: Colluvium, including valley fill deposits, variably lateritised and podsolized;

- Qpa: Guildford Formation – alluvium (clay, loam, sand, gravel) variably lateritised and podsolized;
- Czl: Laterite – chiefly massive, but includes overlying pisolithic gravel and minor lateritised sand;
- Kn: Donnybrook Sandstone – feldspathic sandstone and grit, with minor ripple marked shale and conglomerate; and
- Anb: Quartz-feldspar-biotite (garnet) gneiss, generally well banded. Includes blastomylonlonite.

1.7 Flora and Vegetation

Beard (1981) mapped the original natural vegetation of the Swan Area at a 1:1,000,000 scale. The study area occurs within the South-west Botanical Province in the Menzies Subdistrict and the Chapman System. The original vegetation mapping undertaken by Beard (1981) was refined by Shepherd *et al*. (2002), who defined two vegetation associations covering the study area (Figure 3). The Pre-European extent currently remaining for the vegetation associations within the study area is 11% and 66% (Table 1). The proportion of the current extent within Class I-IV reserves is less than 7% (Table 1).

Table 1 Pre-European extent of vegetation associations occurring within the study area (Government of Western Australia 2018).

Vegetation Association	System	Description	Pre-European Extent (ha)	% Remaining	% Current Extent in Class I-IV Reserves
999	Chapman	Medium woodland; Marri	115,706.59	11.26	6.69
1017	Chapman	Medium open woodland; Jarrah and Marri, with low woodland; Banksia	17,528.01	65.90	1.84

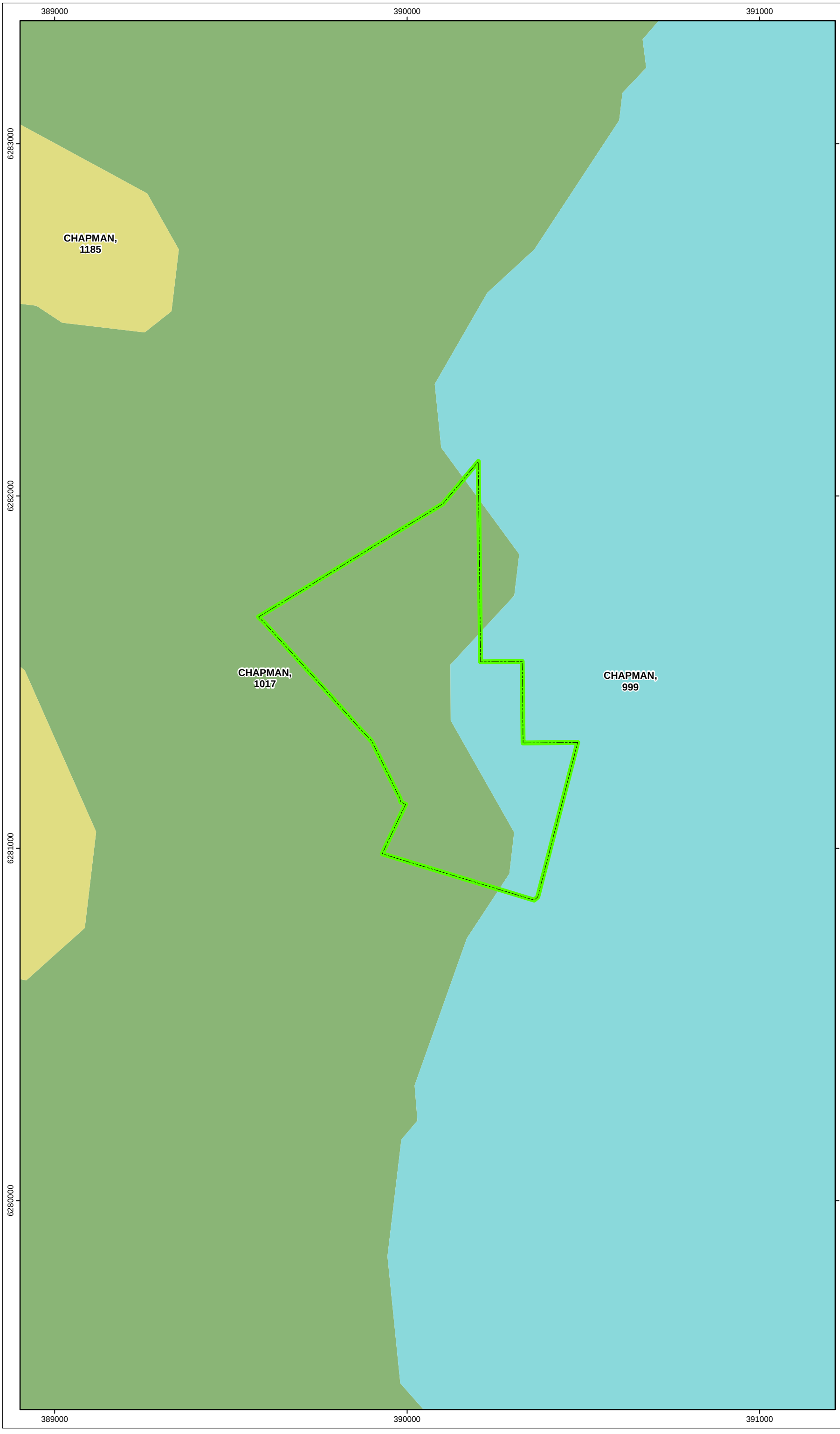

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FIGURE 3
Beard (1981) vegetation associations represented within the study area

Legend

- Study Area

Pre-European Vegetation (Beard 1975)

- CHAPMAN, 1017
- CHAPMAN, 1185
- CHAPMAN, 999

N

0 100 200 300
Meters

1:10,000

Datum: GDA94
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2.0 METHODOLOGY

2.1 Legislation and Guidance Statements

The detailed flora and vegetation survey was carried out in a manner that is compliant with Environmental Protection Authority (EPA) requirements for the environmental surveying and reporting of flora and vegetation in Western Australia:

- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a);
- Environmental Factor Guideline: Flora and Vegetation (EPA 2016b); and
- Statement of Environmental Principles, Factors and Objectives (EPA 2020).

2.2 Desktop Assessment

2.2.1 Literature Review

Regional scale reports relevant to the study area locality were reviewed, including:

- Beard (1981) Vegetation Survey of Western Australia - Swan, 1:1,000,000 Vegetation Series;
- Mattiske and Havel (1998) Regional Forest Agreement vegetation complexes;
- Hearn *et al* (2003) Management of Significant Flora Values in South-west Forests and Associated Ecosystems; and
- Keighery *et al* (2008) A Floristic Survey of the Whicher Scarp.

At the local scale a previous flora and vegetation survey was completed within the study area in 2003:

- Conservation and Land Management (CALM) (2003) Threatened Flora and Ecological Community Search of Argyle State Forest (SF 27) (in part) and Reserve 37474.

Three additional surveys have also been completed within the local area and were reviewed as part of the desktop assessment:

- Cable Sands Pty Ltd (2000) Gwindinup Heavy Minerals Sand Mine Consultative Environmental Review;
- Cable Sands Pty Ltd (2006) Flora and Vegetation of the Happy Valley Mining Leases; and
- Bunbury Outer Ring Road (BORR) Team (2019) Bunbury Outer Ring Road Southern Section Vegetation and Flora Study.

The previous surveys identified above were reviewed to provide a regional context for the survey, and to identify the vegetation types and species of conservation significance with potential to occur within the study area.

2.2.2 Database Searches

Desktop searches included databases relating to significant flora, TECs and PECs previously collected or described within, or in close proximity to, the study area. The search was extended beyond the study area to place flora values into a local and regional context. The following databases were searched:

- NatureMap: This database represents the most comprehensive source of information on the distribution of Western Australia's flora, comprising records from the DBCA database and the Western Australian Herbarium (WAH) Specimen Database (40 km radial search; accessed 14th September 2020) (DBCA 2020a);
- DBCA's Threatened and Priority flora database was searched to confirm the NatureMap results (50 km radial search; September 2020) (DBCA 2020b);
- DBCA's TEC, PEC and Environmentally Sensitive Areas (ESAs) database was searched to identify significant communities (100 km radial search; September 2020) (DBCA 2020c);
- EPBC Act Protected Matters Database (50 km radial search; accessed 14th September 2020) (DoEE 2020); and
- International Union for Conservation of Nature (IUCN) database (accessed 14th September 2020) (IUCN 2020).

2.2.3 Assessment of Conservation Significance

The conservation significance of flora and ecological communities are classified at a Commonwealth, State and Local level on the basis of various Acts and Agreements, including:

International Level:

- IUCN: The IUCN 'Red List' lists species at risk under nine categories (status codes) (Appendix 1).

Commonwealth Level:

- EPBC Act: The DoEE lists Threatened flora and ecological communities, which are determined by the Threatened Species Scientific Committee according to criteria set out in the Act. The Act lists flora that are considered to be of conservation significance under one of six categories (Appendix 1).

State Level:

- BC Act: At a State level, native flora species are protected under the BC Act - Wildlife Conservation Notice. A number of species are assigned an additional level of conservation significance based on a limited number of known populations and the perceived threats to these locations (Appendix 1); and
- DBCA Priority list: DBCA produces a list of Priority species and ecological communities that have not been assigned statutory protection under the WC Act. Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added under Priorities 1, 2 or 3. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been removed from the threatened species list for other taxonomic reasons, are placed in Priority 4. These species require regular monitoring (see Appendix 1). The list of PECs identifies those that need further investigation before nomination for TEC status at a State level.

Local Level:

- Species may be considered of local conservation significance because of their patterns of distribution and abundance. Although not formally protected by legislation, such species are acknowledged to be in decline as a result of threatening processes, primarily habitat loss through land clearing.

2.2.4 Assessment of Likelihood of Occurrence in the Study Area

A list of conservation significant flora and fauna species occurring within a 50 km radius of the study area was compiled during the literature review and database searches. The likelihood of each taxon occurring within the study area was assessed using a set of rankings and criteria (as described in Table 2). The criteria are based on presence of suitable landform (inferred from aerial imagery with contours overlayed, and from knowledge of the adjacent areas) and distance to known records.

Table 2 Ranking system used to assign the likelihood that a flora taxon would occur within the study area.

Rank	Criteria
Recorded	The species has been recorded in the study area.
Likely to occur	The species has previously been recorded from a landform/habitat which is present within the study area, and there are previous records within a 10 km radius of the study area.
Possible to occur	The species has previously been recorded from a landform/habitat which is present within the study area, and there are previous records within a 20 km radius of the study area.
Unlikely to occur	The landform/habitat from which the species has previously been recorded is absent within the study area, and there are no previous records within a 50 km radius of the study area.

2.3 Survey Methodology

2.3.1 Timing and Personnel

The flora and vegetation survey was completed by Principal Botanist Dr Darren Brearley and Senior Ecologist Ms Jessica Waters on the 21st and 22nd of September 2020.

2.3.2 Sampling of Study Sites

The field survey involved systematic sampling using quadrats (referred to as study sites). Relevé vegetation descriptions were made to increase the accuracy of vegetation mapping and targeted searches were completed in habitats where it was anticipated that significant flora might occur, and surrounding identified mine features. The study sites were 10 metres by 10 metres in dimension which is standard for the Jarrah Forest bioregion. A total of 12 quadrats were formally assessed. The species accumulation curve demonstrates a decline in the number of new species recorded approaching the total sample area of 1,200 m^2 (Figure 4). The locations of all quadrats is provided in Figure 5.

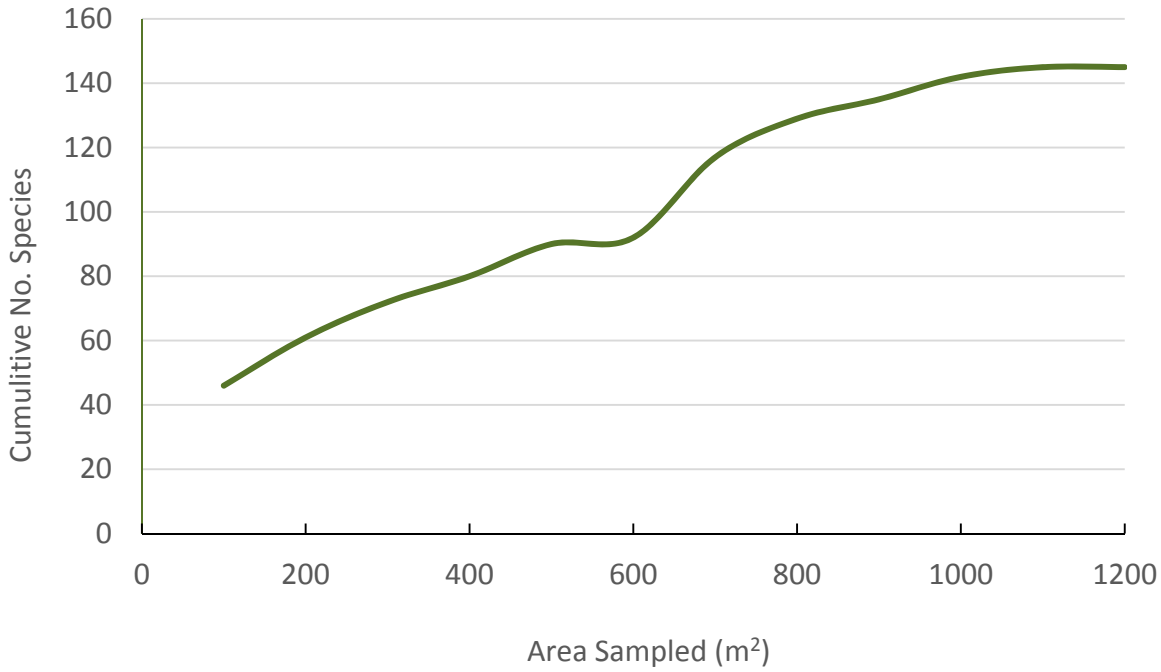

Figure 4 Species accumulation curve for the 12 quadrats (1,200 m^2) formally assessed within the study area.

The sampling sites were assessed to provide a list of total flora occurring within the study area and a description of the vegetation structure. Data collected covered a range of environmental parameters including:

- Landform and habitat;
- Aspect;
- Soil colour and soil type;
- Rock type;
- Slope (angle);
- Vegetation condition;
- Disturbance (caused by fire, clearing, grazing etc.);
- Age since fire;
- Broad floristic formation;
- Vegetation association description; and
- Height and percentage ground cover provided by individual plant taxa.

Other parameters recorded for each study site were:

- Study site number and date of assessment;
- Names of the botanists undertaking the assessment;
- Location description a waypoint - GPS coordinate (GDA94) using a handheld GPS; and
- Photograph number.

Vegetation condition for each of the study sites was determined using a recognised rating scale (based on Keighery 1994, see Appendix 2).

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FIGURE 5
Location of study sites (quadrats) within the study area

Legend

- Study Area
- Sample Sites

DS-01
DS-02
DS-03
DS-04
DS-05
DS-06
DS-07
DS-08
DS-09
DS-10
DS-11
DS-12

GOODWOOD RD
UPPER CAPEL RD

N

0 25 50 75 100 125
Meters

1:5,000

Datum: GDA94
Projection: MGA Zone 50

Date:	16/10/2020
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Requested by:	DB

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2.3.3 Targeted Surveys for Conservation Significant Species

Targeted searches for species of conservation significance were completed within the study area. Ground truthing provided an opportunity to record opportunistic locations for Threatened and Priority listed flora, and to undertake closer examination of specific landforms where conservation significant flora would be expected to occur. Targeted searches were also conducted within a 20 m radius of known mine features.

2.3.4 Weed Survey and Mapping

Introduced species were recorded from the study sites assessed within the study area. Opportunistic collections were also made while moving throughout the study area, with targeted weed searches completed in high moisture habitats.

2.3.5 Floristic Analysis

A multivariate statistical analysis of the floristic quadrat data (12 quadrats) was completed to assist in understanding the vegetation-habitat relationships within the study area. Statistical analysis of quadrat data can support delineation of vegetation associations within the study area and provide comparison against locally significant communities (TECs and PECs) where quadrat data is available.

A two-way classification (Agglomerative Hierarchical Fusion) of the presence/absence quadrat data was carried out on the 145 taxa by 12 quadrat dataset using the program PATN (Belbin 2003). The flexible unweighted pair group method with arithmetic mean (UPGMA) classification strategy was used (β = -0.1), together with the Bray-Curtis site similarity measure. The number of groups to be determined was set at four. The primary output of the classification was in the form of a dendrogram (Appendix 3).

The results from the statistical analysis need to be appropriately analysed by an experienced botanist, and effects such as fire disturbance, ephemeral taxa, and spatial distribution of quadrats taken into consideration when interpreting the results. Plant taxa that occupy a range of vegetation types can obscure vegetation patterning and influence statistical outputs. It must be acknowledged that the results of multivariate statistical analysis may not always align with the delineated vegetation associations; in these insistences an explanation for the differences will be provided.

2.3.6 Vegetation Association Mapping

The classification of vegetation associations within the study area follow the height, life form and density classes of Muir (1997) (see Appendix 4). This is largely a structural classification suitable for broader scale mapping, but taking all ecologically significant strata into account.

The vegetation association description leads with the most dominant strata (based on percent cover) and flora species listed start with the most dominant taxon (Table 3). Table 4 further describes and categorises these strata and gives examples of potential growth forms for each, e.g. over-storey (U), mid-storey (M) and under-storey (G) vegetation strata. Vegetation associations recorded within the study area are grouped according to ‘broad floristic formation’ (refer to Table 3). A broad floristic formation describes the dominant growth form, cover and

height as well as the dominant land cover genus for the dominant stratum (Department of Environment and Heritage (DEH) 2003).

Table 3 Vegetation association descriptions (based on the methods used under the National Vegetation Information System, DEH 2003).

Description	Species	Cover	Soils	Landscape Position	Example
Broad Floristic Formation	The one dominant genus name for the dominant stratum, e.g. *Acacia*	One cover class for the dominant stratum, e.g. Low Woodland. If two strata have the same cover range, the taller stratum is listed	Not relevant	Not relevant	*Acacia* Low Woodland
Vegetation Association (describe three strata – refer Table 3)	Up to three dominant species listed for each stratum, e.g. *Acacia incurvaneura Acacia pruinocarpa* and *Acacia pteraneura*	One cover class code for each stratum, e.g. Low Open Woodland, Open Shrubland, Low Open Shrubland	State soil colour and type, e.g. red sandy loam	Include the landscape position, e.g. stony plain	Low Open Woodland of *Acacia incurvaneura, A.pruinocarpa* & *A.pteraneura* over Open Shrubland of *Eremophila spathulata* over Low Open Shrubland of *Ptilotus schwartzii, P.obovatus* & *Solanum lasiophyllum* on red sandy loam on stony plains

Table 4 Vegetation Stratum Levels (modified from DEH 2003).

Stratum Description	Example Growth Forms
Over-storey (U)	
Tallest tree sub-stratum; for forests and woodlands this will generally be the dominant stratum	Trees, tree mallee, and vines (mallee shrubs)
Sub-canopy layer; second tree layer	
Sub-canopy layer; third tree layer	
Mid-storey (M)	
Tallest shrub layer	Shrubs, low trees, mallee shrubs, grass-trees, tree-ferns, cycads, palms, and vines (low shrubs, tall grasses, tall forbs, tall sedges)
Second shrub layer	
Third shrub layer	
Under-storey (U)	
Tallest ground species	Grasses, forbs, sedges, rushes, lichens, epiphytes, low shrubs, ferns, bryophytes, cycads, grass-trees, and vines
Other ground species	

The vegetation mapping utilised high-resolution aerial photography of the entire study area at a scale of 1:12,500, with definition of vegetation polygons based on contrasting shading patterns. Ground truthing of the study area was completed during the survey with vegetation

descriptions made within selected vegetation polygons to confirm dominant structural layers and associated plant taxa. The 12 study sites and numerous relevé plots were overlaid on the aerial photography, and associated flora and vegetation data was used to provide vegetation association descriptions for individual polygons defined.

2.3.7 Vegetation Association Coding

A vegetation association code was applied to each vegetation association. This code is comprised of the dominant landform on which the vegetation association occurs and the dominant plant taxa in each vegetation stratum.

2.3.8 Vouchering

A voucher specimen was taken for any collection that could not be verified in the field. Taxonomy was completed by Dr Jerome Bull at the WAH.

2.3.9 Field Survey Constraints

The EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2016a) lists seven potential limitations that field surveys may encounter. These limitations are addressed in Table 5.

Table 5 Relevance of limitations, as identified by EPA (2016a), to the flora and vegetation survey.

Constraint	Relevance
Availability of contextual information at a regional and local scale	One previous flora and vegetation survey has been completed within the study area. There are also several surveys from the area providing an excellent local database.
Proportion of flora recorded and/or collected, any identification issues	It is likely that a large proportion of the total flora occurring within the study area was recorded given the high intensity sampling completed during the field survey. The seasonal conditions were rated as excellent, with many of the plants encountered flowering at the time of survey.
Survey timing, rainfall, season of survey	The field survey was completed during the spring period. Below average rainfall was received during the four months prior to the field survey, however seasonal conditions were rated as excellent.
Disturbance that may have affected the results of the survey such as fire, flood or clearing	There were no disturbances recorded within the study area that influenced survey outcomes. Disturbances within the study area were restricted to access tracks, historical mine disturbance, logging and dieback. Disturbances did not impact on the ability to complete the field survey.
Was the appropriate area fully surveyed (effort and extent)	A Principal Botanist and Senior Ecologist spent two 12 hour field days covering the entire study area. A total of 12 quadrats supplemented by numerous relevé sites were assessed within the study area. A targeted survey was completed within a 20 m radius of all historical mine features. This represented an extensive survey effort. The latest EPA technical guidelines (EPA 2016a) recommends that a minimum of three quadrats should be sampled in each vegetation unit. Three quadrats were sampled within each of the vegetation associations mapped.

Constraint	Relevance
Access restrictions within the survey area	The study area was accessed on foot, noting that vegetation mapping was facilitated by high-resolution aerial photography. Access did not pose any restrictions to undertaking the field survey.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	The Principal Botanist working on the survey (Dr Darren Brearley) has more than 25 years' experience working in the region, and has completed a number of surveys in close proximity to the study area.

3.0 RESULTS

3.1 Desktop Review

3.1.1 Regional Flora Surveys

Mattiske and Havel (1998) mapped vegetation complexes of the south-west region at a scale of 1:50,000. Two vegetation complexes were identified within the study area; the Kingia and Donnybrook complexes. The Kingia vegetation complex is described as: "Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Allocasuarina fraseriana* - *Banksia grandis* - *Xylomelum occidentale* on lateritic uplands in perhumid and humid zones." The Donnybrook vegetation complex is described as 'Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Agonis flexuosa* on slopes of the escarpment in the humid zone."

Hearn *et al* (2003) assessed significant flora values of the south-west forests including identification of areas of high flora species richness, centres of endemic flora, centres of relictual flora, centres of disjunct flora, Declared Rare Flora and Threatened Ecological Communities. The Whicher Range, situated in close proximity to the study area, was identified as an area of high flora species richness and endemism in the south-west.

A floristic survey of the Whicher Scarp was undertaken between 1990 and 2007 to provide detailed information on the species and communities of conservation significance that occur in the area (Keighery *et al* 2008). The area surveyed extends from Burekup to Dunsborough and is approximately 10km west of the study area at the closest point. A total of 124 quadrats were assessed.

The following significant flora values were identified as part of the survey:

- A total of six unique vegetation complexes, two of which were considered highly restricted and three with less than 30% area remaining;
- Diverse woodland floristic assemblages and restricted/rare wetland communities;
- High species diversity with approximately 900 native species recorded;
- High levels of endism;
- Over 60 species listed with conservation significance at a state level and nine federally listed species (at the time of survey); and
- Over 100 species with disjunct populations.

A summary of the current species of conservation significance from this survey are presented in Table 6.

3.1.2 Previous Baseline Flora Surveys

The results of the sole baseline flora and vegetation survey previously undertaken within the study area, and three additional surveys undertaken in close proximity, are presented in Table 6.

Table 6 Previous surveys completed in close proximity to the study area.

Name	Company	Dates	Floristics	Conservation Significant Species	Conservation Significant Communities
A floristic survey of the Whicher Scarp	Keighery *et al* (2008)	Multiple Surveys from 1990-2007	8 floristic groups, and 20 subgroups or community types	Threatened*: Daviesia elongata, Gastrolobium modestum, Banksia mimica, Banksia nivea* subsp*. uliginosa, Banksia squarrosa* subsp*. argillacea, Grevillea brachystylis* subsp*. grandis, Petrophile latericola, Verticordia densiflora* var*. pedunculata.* Priority 1*: Calytrix retrorsifolia, Thysanotus formosus, Andersonia ferricola, Hemigenia rigida, Orianthera wendyae, Boronia humifusa, Stylidium ferricola, Stylidium perplexum, Dillwynia* sp. Capel (P.A. Jurjevich 1771), *Loxocarya striata* subsp. *implexa, Platytheca anasima, Platytheca* sp. Sabina (G.J. & B.J. Keighery 295). Priority 2*: Actinotus whicheranus, Amperea micrantha, Andersonia barbata, Eucalyptus relicta, Gastrolobium whicherense, Stenanthemum sublineare, Synaphea polypodioides.* Priority 3*: Acacia inops, Boronia capitata* subsp*. gracilis,Boronia tetragona, Calothamnus lateralis* var*. crassus, Caustis* sp. Boyanup (G.S. McCutcheon 1706), *Cyathochaeta teretifolia, Hakea oldfieldii, Isopogon formosus subsp. dasylepis, Johnsonia inconspicua, Lasiopetalum laxiflorum, Lepyrodia heleocharoides, Loxocarya magna, Olearia strigosaPultenaea pinifolia, Schoenus pennisetis, Synaphea hians, Synaphea petiolaris* subsp*. simplex, Tetratheca parvifolia.* Priority 4: *Acacia flagelliformis, Acacia semitrullata, Acacia tayloriana, Astroloma* sp. Nannup (R.D. Royce 3978), *Banksia meisneri* subsp*. ascendens, Caladenia speciosa, Calothamnus quadrifidus* subsp*. teretifolius, Chamelaucium erythrochlorum, Franklandia triaristata, Lambertia rariflora subsp. rariflora, Pultenaea skinneri, Thysanotus glaucus, Tripterococcus* sp. Brachylobus (A.S. George 14234)	Six vegetation types with restricted distribution: • Whicher Scarp woodlands of grey/white sands; • Central Whicher Scarp Mountain Marri woodland; • Whicher Scarp woodlands of coloured sands;and laterites. • Central Whicher Scarp Jarrah woodland; • Whicher Scarp Jarrah woodland of deep coloured sands; and • Dardanup Jarrah and Mountain Marri woodland on laterite.

Name	Company	Dates	Floristics	Conservation Significant Species	Conservation Significant Communities
Threatened Flora and Ecological Community search of Argyle State Forest (SF 27) (in part) and Reserve 37474	CALM (2003)	4th and 13th May 2003	NA	*Acacia semitrullata* (P4)	None
Gwindinup Heavy Minerals Sand Mine Consultative Environmental Review	Cable Sands Pty Ltd (2000)	NA	190 taxa from 33 families	*Boronia humifusa* (P1), *Acacia semitrullata* (P4), *Acacia flagelliformis* (P4). Additional species recorded are no longer Priority.	None
Flora and Vegetation of the Happy Valley Mining Leases	Cable Sands Pty Ltd (2006)	31st October and 5th November 2005	286 taxa form 149 genera and 48 families	*Daviesia elongata* (DRF), *Andersonia ferricola* (P1), *Boronia humifusa* (P1), *Stenanthemum sublineare* (P2), *Franklandia triaristata* (P4)	None
Bunbury Outer Ring Road Southern Section Vegetation and Flora Study	BORR Team (2019)		267 taxa from 182 genera and 62 families	*Caladenia speciosa* (P4), *Acacia semitrullata* (P4)	*Banksia* Woodlands of the Swan Coastal Plain (TEC), Tuart (*Eucalyptus gomphocephala*) forests and woodlands of the Swan Coastal Plain (TEC), *Banksia* dominated woodlands of the SCP IBRA region (PEC - P3), Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC

3.1.2 Threatened Flora listed under the EPBC Act

A search of the EPBC Act Protected Matters database was undertaken for a 50 km radius around the study area (DoEE 2020). Thirty-nine Threatened Flora, as listed under the EPBC Act, were recorded as occurring or having suitable habitat within the 50 km search radius (Table 7). The species recorded included five species listed as Critically Endangered, 23 species listed as Endangered, and 11 species listed as Vulnerable. It is noted that many of these are restricted to the Whicher Scarp which commences west of the study area.

3.1.3 Threatened Flora listed under the IUCN Red List

A search of the IUCN database (IUCN 2020) determined that no Threatened Flora taxon was likely to occur within the study area.

3.1.4 Threatened Flora listed under the BC Act

A total of 12 Threatened Flora taxon were identified from the DBCA rare flora database search (DBCA 2020) as occurring within a 50 km radius of the study area.

3.1.5 Priority Flora recognised by the DBCA

A total of 53 Priority Flora were identified as potentially occurring within a 50 km radius of the study area (from the DBCA rare flora and Nature Map searches) (Table 7).

One taxa has previously been recorded within the study area: *Acacia semitrulata* (P4). Twenty-eight taxa were considered 'likely' to occur within the study area (as per criteria set out in Table 2) based on occurrence of habitat and proximity of previous records (Table 7). The remaining taxa were determined as unlikely to occur within the study area.

3.1.6 TECs listed under State and Federal Legislation

A search of the ecological community database (DBCA 2020) identified two federally listed TEC records within 15 km of the study area (Table 8).

3.1.7 PECs recognised by DBCA

A search of DBCA's ecological community database (DBCA 2020) identified seven PECs that occur within a 15 km radius of the study area (Table 8).

Table 7 Significant flora previously recorded from a 50 km search radius around the study area.

Taxon	SCC	FCC	Habitat	Likelihood
Acacia drummondii subsp*. affinis*	3		Lateritic gravelly soils.	Likely
Acacia flagelliformis	4		Sandy soils. Winter-wet areas.	Unlikely
Acacia semitrullata	4		White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.	Recorded
Andersonia ferricola	1		White sand or red-brown loam over ironstone. Seasonally wet flats.	Unlikely
Andersonia gracilis	T	E	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely
Aponogeton hexatepalus	4		Mud. Freshwater: ponds, rivers, claypans.	Unlikely
Austrostipa bronwenae	T	E	Grey-brown sandy loam or dark brown loam over clay in low-lying winter wet areas.	Unlikely
Austrostipa jacobsiana	T	CE	Sandy-loam over lime-marl rock in a seasonal dampland.	Unlikely
Banksia mimica	T	E	White or grey sand over laterite, sandy loam.	Likely
Banksia nivea subsp. uliginosa	T	E	Red, sandy, shallow loams over ironstone in thick scrub, in winter wet southern and Scott ironstones.	Unlikely
Banksia squarrosa subsp*. argillacea*	T	V	White/grey sand, gravelly clay or loam. Winter-wet flats, clay flats.	Unlikely
Blennospora doliiformis	3		Grey or red clay soils over ironstone. Seasonally wet flats.	Unlikely
Boronia capitata subsp*. gracilis*	3		White/grey or black sand. Winter-wet swamps, hillslopes.	Likely
Boronia humifusa	1		Gravelly clay loam over laterite. Jarrah-marri open forest.	Likely
Brachyscias verecundus	T	CE	In a moss sward. On a granite outcrop.	Unlikely
Caladenia busselliana	T	E	Sandy loam. Winter-wet swamps.	Unlikely
Caladenia harringtoniae	T	V	Winter-wet flats, margins of lakes, creek lines, granite outcrops.	Unlikely
Caladenia hoffmanii	T	E	Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies.	Unlikely
Caladenia huegelii	T	E	Grey or brown sand, clay loam.	Unlikely
Caladenia leucochila	T	E	Sand amongst laterite slightly upslope of seasonally damp areas, elevation between 330-345m.	Unlikely
Caladenia procera	T	CE	Alluvial loamy flats, jarrah/marri/peppermint woodland, dense heath, sedges.	Unlikely
Caladenia speciosa	4		White, grey or black sand.	Likely
Calothamnus quadrifidus subsp*. teretifolius*	4		Clay with ironstone, wet in winter, with tall shrubland.	Unlikely
Caustis sp. Boyanup (G.S. McCutcheon 1706)	3		White or grey sand.	Likely
Chamaescilla gibsonii	3		Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Unlikely
Chamelaucium erythrochlorum	4		Lateritic soil, pale sandy clay, or loam soils, Jarrah/Marri Woodland.	Likely
Chamelaucium roycei	T	V	Winter wet low-lying habitats in open forest Red lateritic sandy or clayey soils.	Unlikely
Corybas abditus	3		Black peaty soils. Winter-wet swamps.	Unlikely

Taxon	SCC	FCC	Habitat	Likelihood
Cyathochaeta teretifolia	3		Grey sand, sandy clay. Swamps, creek edges.	Unlikely
Darwinia whicherensis	T	E	Shallow, red, sandy clay over ironstone, in winter-wet flats.	Unlikely
Daviesia elongata	T	V	Midslope, sand, laterite.	Likely
Dillwynia sp. Capel (P.A. Jurjevich 1771)	1		Littered grey loamy sand, rocky soils. Valleys, rangelands.	Likely
Diuris drummondii	T	V	Low-lying depressions, swamps.	Unlikely
Diuris micrantha	T	V	Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely
Diuris purdiei	T	E	Grey-black sand, moist. Winter-wet swamps.	Unlikely
Drakaea elastica	T	E	White or grey sand. Low-lying situations adjoining winter-wet swamps.	Unlikely
Drakaea micrantha	T	V	White-grey sand.	Unlikely
Eleocharis keigheryi	T	V	Sandy loam. Emergent in freshwater: creeks, claypans.	Unlikely
Eucalyptus x phylacis	T	E	Laterite, loam over granite. Coastal areas.	Unlikely
Franklandia triaristata	4		White or grey sand.	Likely
Gastrolobium modestum	T	V	Shallow red clay-loam or grey sand, ironstone. Gullies and edges of flats.	Likely
Gastrolobium papilio	T	E	Sandy clay over ironstone and laterite. Flat plains.	Unlikely
Gastrolobium sp. Yoongarillup (S.Dilkes s.n. 1/9/1969)	1		Grey sand, seasonally wet flats.	Likely
Gastrolobium whicherense	2		Red-grey sandy clay over quartzite. Steep westerly slopes.	Likely
Goodenia arthrotricha	T	E	Granite rocks, slopes.	Unlikely
Grevillea bronwenae	3		Grey sand over laterite, lateritic loam. Hillslopes.	Likely
Grevillea elongata	T	V	Gravelly clay, sandy clay, sand. Road verges, swamps, creek banks.	Unlikely
Grevillea maccutcheonii	T	E	Shallow soils over laterite, clay. Seasonally inundated sites.	Unlikely
Grevillea ripicola	4		Sandy clay, clay or gravelly loam. Swampy flats, granite outcrops, along watercourses.	Unlikely
Hemiandra sp. Windy Harbour (B.J. Conn & J.A. Scott BJC 3344)	3		In shallow soil between outcropping granite rocks.	Unlikely
Isopogon formosus subsp*. dasylepis*	3		Sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas.	Unlikely
Jacksonia gracillima	3		Sandy soil.	Likely
Jacksonia velveta	T	E	Brown gravelly loam, dry grey sand, ironstone. Slight hillslopes, ridges.	Unlikely
Johnsonia inconspicua	3		White-grey or black sand. Low dunes, winter-wet flats.	Unlikely
Lambertia echinata subsp*. occidentalis*	T	E	White sandy soils over laterite, orange/brown-red clay over ironstone. Flats to foothills, winter-wet sites.	Unlikely
Lasiopetalum laxiflorum	3		Woodland or forest, in gravelly, brown clay over laterite, rarely in white sand.	Likely
Leucopogon sp. Busselton (D. Cooper 243)	2		Brown-white clayey sand over laterite.	Likely

Taxon	SCC	FCC	Habitat	Likelihood
Leucopogon kirupensis	2		Rocky upland site, in shallow, sandy loam over granite.	Likely
Lomandra whicherensis	3		Ridge top. Brown lateritic sandy clay. *Eucalyptus marginata* / *C. calophylla* / *E. haematoxylon* low woodland.	Likely
Loxocarya magna	3		Sand, loam, clay, ironstone. Seasonally inundated or damp habitats.	Unlikely
Myriophyllum echinatum	3		Clay. Winter-wet flats.	Unlikely
Orianthera wendyae	1		Brown lateritic sandy clay.	Likley
Ornduffia submersa	4		Aquatic.	Unlikely
Petrophile latericola	T	E	Red lateritic clay. Winter-wet flats.	Unlikely
Pithocarpa corymbulosa	3		Gravelly or sandy loam. Amongst granite outcrops.	Unlikely
Platytheca anasima	2		Gentle slopes of white-grey sand or brown sandy loam.	Likely
Pultenaea pinifolia	3		Loam or clay. Floodplains, swampy areas.	Unlikely
Pultenaea skinneri	4		Sandy or clayey soils. Winter-wet depressions.	Unlikely
Schoenus loliaceus	2		Sandy soils. Winter-wet depressions.	Unlikely
Schoenus pennisetis	3		Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	Unlikely
Stenanthemum sublineare	2		Littered white sand. Coastal plain.	Unlikely
Stylidium acuminatum subsp. *acuminatum*	2		Brown lateritic loam soils.	Likely
Stylidium nitidum	1		Gentle slopes, white/grey sand with lateritic gravel.	Likely
Stylidium paludicola	3		Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Unlikely
Stylidium perplexum	1		Upped ridge slope, latertitic soils.	Likely
Synaphea hians	3		Sandy soils. Rises.	Likely
Synaphea odocoileops	1		Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas.	Unlikely
Synaphea petiolaris subsp. *simplex*	3		Sandy soils. Flats, winter-wet areas.	Unlikely
Synaphea polypodioides	3		Light brown loam, red-brown sandy loam, gravelly, brown sandy clay over laterite. In undulating areas.	Likely
Synaphea sp. Argyle (R. Butcher RB 1323)	1		Embankment area of small creekline.	Unlikely
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	T	CE	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely
Synaphea sp. Pinjarra (R. Davis 6578)	T		Grey clayey sand. Swamp.	Unlikely
Synaphea sp. Pinjarra Plain (A.S. George 17182)	T	E	Grey sandy loam or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains.	Unlikely
Synaphea sp. Redgate Road (J. Scott 16)	1		Grey clay, litter. Winter-wet areas, wet areas along road verges and ditches.	Unlikely

Taxon	SCC	FCC	Habitat	Likelihood
Synaphea sp. Serpentine (G.R. Brand 103)	T	CE	Grey-brown sandy-loam or clay in seasonally wet areas.	Unlikely
Synaphea stenoloba	T	E	Sandy or sandy clay soils. Winter-wet flats, granite.	Unlikely
Tetraria australiensis	T	V	Edges of winter creek.	Unlikely
Tetraria sp. Blackwood River (A.R. Annels 3043)	3		Loam soil.	Unlikely
Tetratheca parvifolia	3		Loam soils.	Unlikely
Thelymitra variegata	2		Sandy clay, sand, laterite.	Likely
Thysanotus unicupensis	3		Dry lateritic and grey sandy soils in moderately sunny places within Jarrah/Marri forests.	Likely
Verticordia attenuata	3		White or grey sand. Winter-wet depressions.	Unlikely
Verticordia densiflora var. *pedunculata*	T	E	Grey/yellow sand, sandy loam. Winter-wet low-lying areas.	Unlikely
Verticordia plumosa var. *ananeotes*	T	E	Sandy loam. Seasonally inundated plains.	Unlikely
Verticordia plumosa var. *vassensis*	T	E	White/grey sand. Winter-wet flats.	Unlikely

Table 8 Threatened and Priority Ecological Communities occurring within a 15 km radius of the study area (DBCA 2020).

Community	SCC	FCC	Description
Swan Coastal Plain Paluslope Wetlands	Priority 1		Permanent wetlands associated with groundwater seepage from the base of the Whicher Scarp. Vegetation consists of combinations of the following species: *Melaleuca preissiana, Taxandria linearifolia, Taxandria fragrans, Melaleuca incana* and *Cyathochaeta teretifolia*. Other species include: *Eucalyptus patens, Homalospermum firmum, Gahnia decomposita, Callistachys lanceolata, Hakea linearis, Melanostachya ustulata, Evandra aristata, Beaufortia sparsa, Calistemon glaucus and Pultenaea pinifolia.*
Whicher Scarp Jarrah woodland of deep coloured sands	Priority 1	A component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC	Occurs through the Central and North Whicher Scarp on midslopes on deep, generally coloured sands rarely associated with laterites. Community includes common sand taxa especially *Hypolaena exsulca, Dasypogon bromeliifolius, Stirlingia latifolia, Petrophile linearis, Melaleuca thymoides* and *Adenanthos meisneri*.
Banksia Dominated Woodlands of the Swan Coastal Plain	Priority 3	Endangered	Dominated by *Banksia attenuata* and/or *B. menziesii*. *Banksia prionotes* or *Banksia ilicifolia* may also occur as dominants. The community typically occurs on well drained, low nutrient soils on sandplain landforms and is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau.
West Whicher Scarp *Banksia attenuata* woodland (Swan Coastal Plain centred woodlands of grey/white sands community B2)	Priority 1	A component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC	Similar to the open *Banksia attenuata* woodlands, with Peppermint (*Agonis flexuosa*) from the grey sands of the western Whicher Scarp. The community is species poor with taxa including: *Allocasuarina fraseriana, Banksia attenuata, Xylomellum occidentale, Bossiaea praetermissa, Calytrix flavescens, Gompholobium tomentosum, Hibbertia hypericoides, Hovea stricta, Hypocalymma robustum, Kunzea rostrata, Petrophile linearis* and a suite of grasses, herbs and sedges.
Central Whicher Scarp Mountain Marri woodland	Priority 1	A component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC.	Occurs on the mid slopes of the Whicher Scarp with identifying taxa including: *Ricinocarpus* aff*. cyanescens, Hibbertia ferruginea, Platysace filiformis, Conospermum capitatum* subsp*. glabratum, Thysanotus arbuscular, Schoenus brevisetis, Phlebocarya filifolia, Leucopogon glabellus, Pimelea rosea* subsp*. rosea, Adenanthos obovatus, Stylidium carnosum* and *Gompholobium capitatum.*
Eucalyptus haematoxylon - E. marginata woodlands on Whicher foothills	Priority 3		Community occurs along the northern edge of State Forest along the base of the Whicher Range and is comprised of *Eucalyptus haematoxylon*, *Corymbia calophylla*, *Eucalyptus marginata* forests and woodlands. Taxa virtually restricted to the type include *Acacia varia* subsp. *varia*, *Paragonis grandiflora* and *Xanthosia pusilla*.
Southern *Banksia attenuata* woodlands	Priority 3	Endangered	Restricted to sand sheets at the base of the Whicher Scarp, the sand sheets on elevated ridges or the sand plain south of Bunbury. Consists of *Banksia attenuata* or *Eucalyptus marginata* and *B. attenuata* woodlands. Common taxa include *Acacia extensa*, *Jacksonia* sp. Busselton, *Laxmannia sessiliflora*, *Lysinema ciliatum* and *Johnsonia acaulis*.

3.2 Flora Species

A total number of 179 plant taxa (including varieties and subspecies) from 48 families and 114 genera were recorded from the study area (Table 9, Appendix 5). Species representation was greatest among the Fabaceae, Proteaceae, Asparagaceae, Ericaceae and Myrtaceae families (Table 9). The most speciose genera were *Acacia* (11 taxa), *Lomandra* (9 taxa each), *Hibbertia* (6 taxa), *Gompholobium* and *Stylidium* (5 taxa each). The most common taxon encountered across the study area was *Hibbertia hypericoides* recorded from 11 of the 12 quadrats assessed. An additional four species were recorded from nine of the quadrats assessed; *Corymbia calophylla*, *Chamaescilla corymbosa, Gompholobium tomentosum* and *Tetraria* sp. Jarrah Forest (R. Davis 7391).

Table 9 Statistics for total flora recorded from the study area.

Overview	No. Taxa
Families	48
Genera	114
Taxa (species, subspecies, varieties)	179
Native Taxa	169
Introduced Taxa	10
Threatened Flora	0
Priority Flora	1
Speciose Families	**No. Taxa**
Fabaceae	27
Proteaceae	20
Asparagaceae	11
Ericaceae	9
Myrtaceae	9
Asteraceae	8
Orchidaceae	8
Speciose Genera	**No. Taxa**
Acacia	11
Lomandra	9
Hibbertia	6
Gompholobium	5
Stylidium	5

3.3 Significant Flora

3.3.1 Threatened Flora listed under the BC Act and EPBC Act

None of the plant taxa recorded from the study area were gazetted as Threatened Flora (T) under the EPBC Act or the BC Act.

3.3.2 Significant Flora

One Priority flora species was recorded form the study area; *Acacia semitrullata* (Priority 4) (Figure 6, Appendix 6).

Acacia semitrullata (Priority 4)

Acacia semitrullata is a slender, erect, pungent shrub, reaching 0.7 m high (Plate 1). Flowers are cream-white and are produced between May to October. This species has been recorded from clay or more commonly white/grey sand, sometimes over laterite on sandplains or swampy areas. It is often found colonising areas of soil disturbance, likely in response to seed scarification. *Acacia semitrullata* is distributed widely between Mandurah and Augusta.

Within the study area, *Acacia semitrullata* was recorded as approximately 200 individuals from 52 spot locations in northern and eastern sectors of the study area. Plants typically occurred as scattered individuals (<1% foliar cover) in grey sand on lower slopes, noting a higher density of plants along the edge of tracks and areas of soil disturbance. Targeted searches confirmed five records occurred within a 20 m radius of historical mine features (Figure 6).

Plate 1 *Acacia semitrullata* (Priority 4) within the study area.

3.4 Introduced Flora

A total of ten introduced species were recorded from the study area:

- **Arctotheca calendula;*
- **Briza maxima;*
- **Conyza bonariensis;*
- **Ehrharta calycina;*
- **Ehrharta longifolia;*
- **Hypochaeris glabra;*
- **Oxalis glabra;*
- **Petrorhagia dubia;*
- **Ursinia anthemoides;* and
- **Vinca major.*

None of the above species are Declared Pests as listed under the BAM Act.

DMIRS

FIGURE 6

Location of conservation significant flora within the study area

Legend

- Study Area

Significant Flora

- Acacia semitrullata (A.s)

Features

- Other
- Collapsed Shaft
- Opencut
- Shallow Workings
- Underground

N

0 25 50 75 100 125

Meters

1:5,000

Datum: GDA94
Projection: MGA Zone 50

Date:	16/10/2020
Status:	Final
Figure:	6
Sheet Size:	A3
Internal Reference:	DMIRS Sig Flora
Drawn by:	GSM
Requested by:	DB

GOODWOOD RD

UPPER CAPEL RD

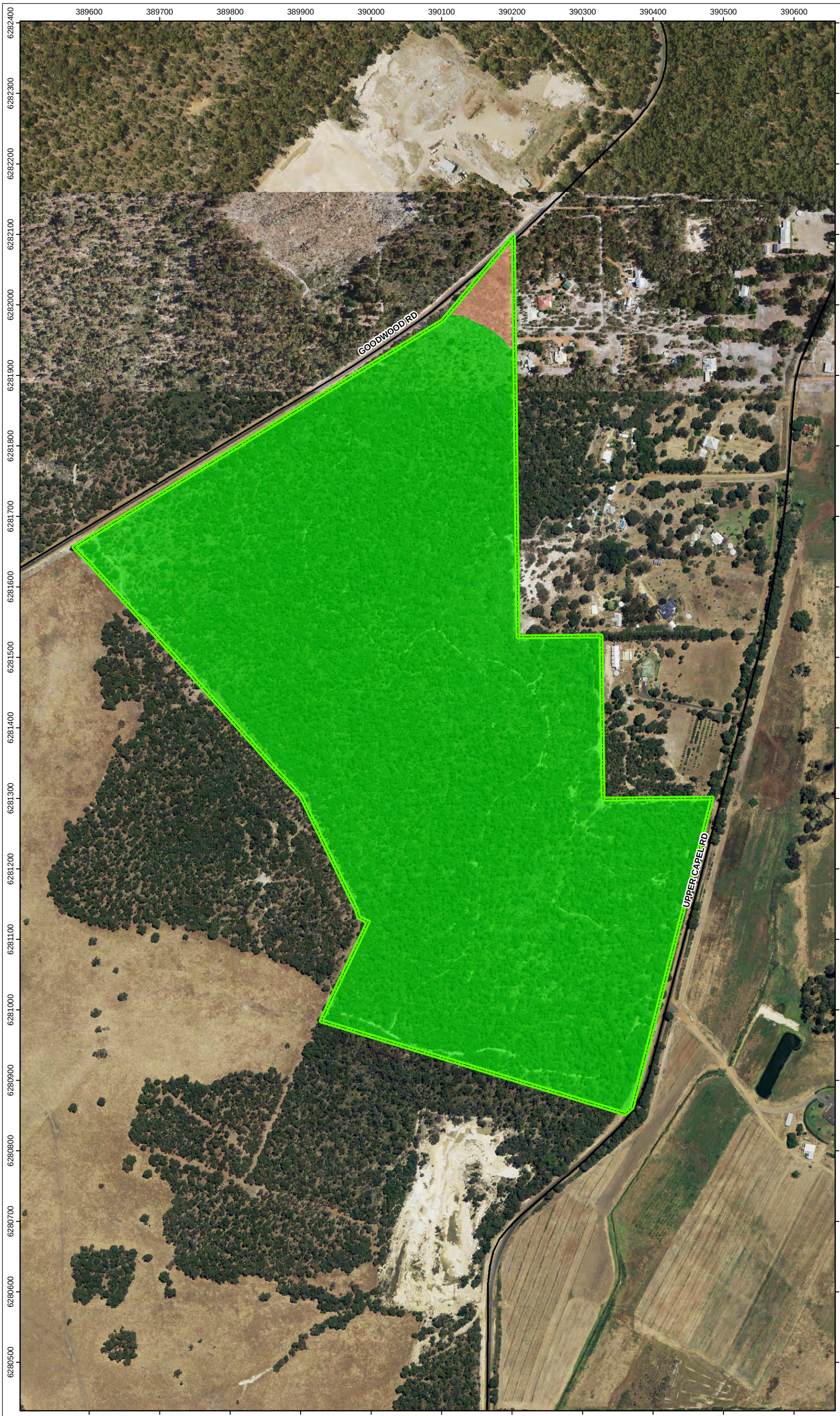
A.s

3.5 Vegetation Condition

The majority of vegetation within the study area was rated as being of *very good* condition, with a localised area in the north-east corner rated as *good* (Figure 7, Table 10). Recorded disturbances included access tracks, historical mining and exploration activities, weeds, logging and dieback.

Table 10 Vegetation condition within the study area.

Condition	Area (ha)	% of Total
Very Good	49.67	98.6
Good	0.69	1.4
Total	50.36	



DMIRS

FIGURE 7
Vegetation condition map for the study area

Legend

- Study Area

Vegetation Condition

- Good
- Very Good

N

0 25 50 75 100 125

Meters

1:5,000

Datum: GDA94
Projection: MGA Zone 50

Date:	16/10/2020
Status:	Final
Figure:	7
Sheet Size:	A3
Internal Reference:	DMIRS Veg_cond
Drawn by:	GSM
Requested by:	DB

3.6 Vegetation

A total of four vegetation associations, classified as four broad floristic formations, were described and mapped from the study area (Figure 8, Table 11). A species by site matrix and raw data for the 12 study sites is presented in Appendices 7 and 8 respectively.

The latest EPA technical guidelines (EPA 2016a) recommend that a minimum of three quadrats be sampled within each vegetation type. All vegetation associations had three quadrats sampled.

The vegetation of the study area consisted predominantly of hill crests and hill slopes supporting forest units of Marri (*Corymbia calophylla),* Jarrah (*Eucalyptus marginata)* and Sheoak (*Allocasuarina fraseriana)* over typical Jarrah forest understorey species. Two localised areas on lower slopes supported woodland of *Banksia attenuata* in grey sand.

None of the vegetation associations described and mapped from the study area were aligned with any TECs or PECs documented from the Jarrah Forest bioregion. The two small areas of *Banksia* Woodland occurring within the study area show affinities with the *Banksia* Dominated Woodlands of the Swan Coastal Plain. However, as the study area is not situated on the Swan Coastal Plain, this vegetation type is not considered to be representative of the TEC or associated PECs.

Table 11 Vegetation associations mapped within the study area.

Vegetation Code	Broad Floristic Formation	Description	Sites
HS BaNfAf MtSlAm Kg	*Banksia* Low Woodland A	Low Woodland A of *Banksia attenuata*, *Nuytsia floribunda* and *Allocasurina fraseriana* over Dwarf Scrub C of *Melaleuca thymoides, Stirlingia latifolia, Adenanthos meisneri* and *Calytrix* cf. *leschenaultii* with Open Scub of *Kunzea glabrescens* and Open Dwarf Scrub D of *Phlebocarya ciliata, Dasypogon bromeliifolius* and *Bossiaea eriocarpa* on hillslopes on grey sands	DS-02 DS-05, DS-11
HS CcEm HhXgBd Xp	*Corymbia* Forest	Forest of *Corymbia calophylla* and *Eucalyptus marginata* over Low Heath D of *Hibbertia hypericoides, Xanthorrhoea gracilis* and *Banksia dallanneyi* with Open Low Scrub B of *Xanthorrhoea preissii* and Very Open Low Sedges of *Tetraria* sp. Jarrah Forest (R. Davis 7391) and *Mesomelaena tetragona* on hillslopes on grey sands	DS-08, DS-09, DS-10
HS EmCcAl AfEmCc Bl	*Eucalyptus* Forest	Forest of *Eucalyptus marginata, Corymbia calophylla* and *Allocasuarina fraseriana* over Low Woodland A of *Allocasuarina fraseriana*, *Eucalyptus marginata* and *Corymbia calophylla* over Open Low Scrub A of *Bossiaea linophylla* and Open Dwarf Scrub D of *Bossiaea ornata*, *Opercularia hispidula* and *Hibbertia commutata* on upper hillslopes on grey sands	DS-03, DS-04, DS-06
HS CcEm AfCcEm PcHhDb	*Corymbia* Woodland	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over Low Woodland A of *Allocasuarina fraseriana*, *Corymbia calophylla* and *Eucalyptus marginata* over Low Heath D of *Phlebocarya ciliata*, *Hibbertia hypericoides* and *Dasypogon bromeliifolius* with Open Low Scrub A of *Bossiaea linophylla* and *Kunzea glabrescens* on lowerslopes on grey sands	DS-01, DS-07, DS-12

ONSHORE ENVIRONMENTAL

DMIRS

FIGURE 8
Vegetation association map for the study area

N

0 25 50 75 100 125
Meters

1:5,000

Datum: GDA94
Projection: MGA Zone 50

Date:	16/10/2020
Status:	Final
Figure:	8
Sheet Size:	A3
Internal Reference:	DMIRS Veg_Ass.
Drawn by:	GSM
Requested by:	DB

GRIFFIN SPATIAL & MAPPING

Code	HS CcEm HhXgBd Xp
Broad Floristic Formation	*Corymbia* Forest
Vegetation Association	Forest of *Corymbia calophylla* and *Eucalyptus marginata* over Low Heath D of *Hibbertia hypericoides, Xanthorrhoea gracilis* and *Banksia dallanneyi* with Open Low Scrub B of *Xanthorrhoea preissii* and Very Open Low Sedges of *Tetraria* sp. Jarrah Forest (R. Davis 7391) and *Mesomelaena tetragona* on hillslopes on grey sands

Quadrats Sampled	DS-08, DS-09, DS-10
Area (ha)	4.04 ha (8.0% of study area)
Soils and Geology	Grey sands
Land Form	Hillslopes
Priority Ecological Community	No
Conservation Significant Flora	*Acacia semitrullata* (P4)
Vegetation Condition	Very Good
Disturbances	Historical mining and exploration, road/access track, logging
Average Fire Age	Old (6+ yrs)

Code	HS EmCcAl AfEmCc Bl
Broad Floristic Formation	*Eucalyptus* Forest
Vegetation Association	Forest of *Eucalyptus marginata, Corymbia calophylla* and *Allocasuarina fraseriana* over Low Woodland A of *Allocasuarina fraseriana*, *Eucalyptus marginata* and *Corymbia calophylla* over Open Low Scrub A of *Bossiaea linophylla* and Open Dwarf Scrub D of *Bossiaea ornata*, *Opercularia hispidula* and *Hibbertia commutata* on upper hillslopes on grey sands

Quadrats Sampled	DS-03, DS-04, DS-06
Area (ha)	29.05 ha (57.7% of study area)
Soils and Geology	Grey sands
Land Form	Upper Hillslopes
Priority Ecological Community	No
Conservation Significant Flora	*Acacia semitrullata* (P4)
Vegetation Condition	Very Good
Disturbances	Historical mining and exploration, road/access track, logging
Average Fire Age	Old (6+ yrs)

Code	HS CcEm AfCcEm PcHhDb
Broad Floristic Formation	*Corymbia* Woodland
Vegetation Association	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over Low Woodland A of *Allocasuarina fraseriana*, *Corymbia calophylla* and *Eucalyptus marginata* over Low Heath D of *Phlebocarya ciliata*, *Hibbertia hypericoides* and *Dasypogon bromeliifolius* with Open Low Scrub A of *Bossiaea linophylla* and *Kunzea glabrescens* on lower slopes on grey sands

Quadrats Sampled	DS-01, DS-07, DS-12
Area (ha)	14.21 ha (28.2% of study area)
Soils and Geology	Grey sands
Land Form	Lower slopes
Priority Ecological Community	No
Conservation Significant Flora	*Acacia semitrullata* (P4)
Vegetation Condition	Very Good
Disturbances	Historical mining and exploration, road/access track, logging
Average Fire Age	Old (6+ yrs)

Code	HS BaNfAf MtSlAm Kg
Broad Floristic Formation	*Banksia* Low Woodland A
Vegetation Association	Low Woodland A of *Banksia attenuata*, *Nuytsia floribunda* and *Allocasurina fraseriana* over Dwarf Scrub C of *Melaleuca thymoides, Stirlingia latifolia, Adenanthos meisneri* and *Calytrix* cf. *leschenaultii* with Open Scub of *Kunzea glabrescens* and Open Dwarf Scrub D of *Phlebocarya ciliata, Dasypogon bromeliifolius* and *Bossiaea eriocarpa* on hillslopes on grey sands

Quadrats Sampled	DS-02, DS-05, DS-11
Area (ha)	3.06 ha (6.1% of study area)
Soils and Geology	Grey sand
Land Form	Hillslopes
Priority Ecological Community	No
Conservation Significant Flora	*Acacia semitrullata* (P4)
Vegetation Condition	Good-Very Good
Disturbances	Historical mining and exploration, road/access track, weeds, logging, dieback
Average Fire Age	Old (6+ yrs)

3.7 Representation and Reservation of Vegetation

Regional mapping completed by Beard (1981) was utilised to assess the representation of vegetation within the study area. Two Beard vegetation associations were represented within the study area (Table 12, Figure 3). Beard association 999 was aligned with the vegetation types mapped as HS CcEm HhXgBd Xp by Onshore Environmental, with the remaining three vegetation types overlaying Beard association 1017.

In terms of representation, the Western Australian Government is committed to the National Objectives Targets for Biodiversity Conservation which includes a target that prevents clearance of ecological communities with an extent below 30% of that present at pre-European settlement (Department of Natural Resources and Environment 2002, EPA 2000).

When considering representation at the State level, the two Beard associations represented within the study area (999 and 1017) currently have 11% and 66% of their respective pre-European extent remaining (Table 12, Government of Western Australia 2018).

The study area is located within the Jarrah Forest bioregion, specifically within the Southern Jarrah Forest subregion (as discussed in Section 1.3). When considering the representation of vegetation at the IBRA regional level, 25% and 76% of the pre-European extent remains for the 999 and 1017 vegetation associations represented (Table 12).

The study area falls entirely within the Shire of Donnybrook. At this local level 17% and 74% of the pre-European extent remains for the 999 and 1017 vegetation associations represented (Table 12).

The 1017 vegetation association (Medium open woodland; Jarrah and Marri, with low woodland; Banksia) is determined to be well represented at all levels (state-wide, bioregional [IBRA region and IBRA sub-region] and local). The 999 vegetation association (Medium woodland; Marri vegetation) is determined to be poorly represented, with less than 30% of the pre-European extent remaining at all three levels.

In terms of reservation, there is a benchmark for a minimum of 15% of each Beard vegetation association to be protected in Class I-IV reserves (Commonwealth of Australia 1997). The proportion of the current extent of the 999 vegetation association occurring within Class I-IV reserves at a state level for is 7%, noting that approximately 24% is within DBCA managed lands (Table 12). For vegetation association 1017, 2% of the current extent occurs within Class I-IV reserves at a state level and approximately 73% is within DBCA managed lands (Table 12). Hence the reservation status for both Beard associations represented within the study area is below the 15% benchmark, and they are considered to be poorly reserved.

Table 12 Pre-European extent of vegetation represented on the basis of identified datasets (Government of Western Australia 2018).

Beard Vegetation Association	Pre-European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining	Current Extent in Class I-IV Reserves (ha)	% Current Extent in Class I-IV Reserves	Current Extent DBCA Managed Lands (ha)	% Current Extent DBCA Managed Lands
State-wide							
999 Medium woodland; Marri	115,706.59	13,024.44	11.26	871.97	6.69	3,113.99	23.91
1017 Medium open woodland; Jarrah and Marri, with low woodland; Banksia	17,528.01	11,550.51	65.90	212.55	1.84	8,406.73	72.78
Beard Vegetation System - Chapman							
999	11,149.82	2,816.52	25.26	597.91	21.23	1,674.63	59.46
1017	11,065.70	8,860.21	80.07			8,000.99	90.30
IBRA Region - Jarrah Forest							
999	11,531.17	2,895.03	25.11	614.68	21.23	1,746.53	60.33
1017	11,846.91	9,028.80	76.21	21.71	0.24	8,022.70	88.86
IBRA Sub-Region – Southern Jarrah Forest							
999	11,531.17	2,895.03	25.11	614.68	21.23	1,746.53	60.33
1017	11,545.93	8,940.67	77.44			8,000.99	89.49
Local Government – Shire of Donnybrook							
999	4,447.68	765.77	17.22			370.88	48.43
1017	6,417.95	4,751.21	74.03			4,180.59	87.99

3.8 Conservation Significance of Vegetation

3.8.1 National Significance

None of the four vegetation associations recorded from the study area support Threatened Flora listed under the EPBC Act, or are aligned with any federal listed TECs. Therefore, vegetation within the study area is not considered to be of national significance.

3.8.2 State Significance

None of the four vegetation associations recorded from the study area support Threatened Flora listed under the BC Act or are aligned with any state listed TECs or PECs. However, all vegetation associations supported the Priority 4 flora species *Acacia semitrullata* as currently listed by the DBCA. Hence all vegetation associations are considered to be of state significance (refer to Figure 8).

3.8.3 Local Significance

None of the vegetation associations were determined to be of local conservation significance.

4.0 SUMMARY

A single season detailed flora and vegetation survey of approximately 50 ha within the Argyle State forest was completed in September 2020 by Onshore Environmental. A total number of 179 plant taxa (including varieties and subspecies) from 48 families and 114 genera were recorded from the study area. Species representation was greatest among the Fabaceae, Proteaceae, Asparagaceae, Ericaceae and Myrtaceae families. The most speciose genera were *Acacia*, *Lomandra*, *Hibbertia*, *Gompholobium* and *Stylidium*.

None of the plant taxa recorded from the study area were gazetted as Threatened Flora under the EPBC Act or the BC Act. One Priority flora taxon, as listed by the DBCA, was recorded from the study area; *Acacia semitrullata* (Priority 4).

A total of ten introduced species were recorded from the study area. None of these species are listed Declared Pests listed under the BAM Act.

A total of four vegetation associations classified as four broad floristic formations were described and mapped from the study area. None of the vegetation associations were aligned with known TECs or PECs documented from the Jarrah Forest bioregion.

Vegetation condition was rated as *very good* across 98.6% of the study area with a localised area in the north-east corner rated as *good.* Disturbances included access tracks, historical mining and exploration activities, logging, weeds and dieback.

There were two Beard vegetation associations extending across the study area. Beard association 999, which is aligned with vegetation type HS CcEm HhXgBd Xp as mapped by Onshore Environmental, is determined to be poorly represented (state-wide, bioregional [IBRA region and IBRA sub-region] and local), with less than 30% of the pre-European extent remaining at all three levels. In terms of reservation, both of the Beard associations, 999 and 1017, are determined to be poorly reserved, with <15% of the current pre-European extent protected in Class I-IV reserves (Commonwealth of Australia 1997). However, both associations are well represented within DBCA managed lands.

The four vegetation types mapped by Onshore Environmental were determined to be of state significance owing to the presence of the Priority 4 flora taxa *Acacia semitrullata*. None of the four vegetation types were of national or local significance.

5.0 STUDY TEAM

The detailed flora and vegetation survey was planned, co-ordinated and executed by the following personnel:

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YALLINGUP WA 6282
M 0427 339 842
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Project Staff

Dr Darren Brearley	PhD	Project Manager and Principal Botanist
Dr Jerome Bull	PhD	Taxonomist
Ms Jessica Waters	BSc	Senior Ecologist
Mrs Kerry Keenan		Data Analyst
Mr Todd Griffin		GIS Specialist

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APPENDIX 1

Conservation Codes

Conservation codes for Western Australian Flora and Fauna

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T **Threatened species**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Conservation codes for Western Australian flora and fauna

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX **Extinct species**

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW **Extinct in the wild species**

Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI **Migratory species**

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD **Species of special conservation interest (conservation dependent fauna)**

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS **Other specially protected species**

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

Conservation codes for Western Australian flora and fauna

P **Priority species**

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 **Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 **Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 **Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 **Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens
[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Last updated 3 January 2019

Conservation categories for flora described under the EPBC Act

Category	Description
Extinct (Ex)	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	A species is categorised as extinct in the wild if it is only known to survive in cultivations, in captivity, or as a naturalised population well outside its past range; or if it has not been recorded in its known/expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	The species is facing an extremely high risk of extinction in the wild and in the immediate future.
Endangered (EN)	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival, or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable (VU)	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent (CD)	The species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Conservation categories for species described under the IUCN

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

APPENDIX 2

Vegetation condition scale
(as developed by Keighery 1994)

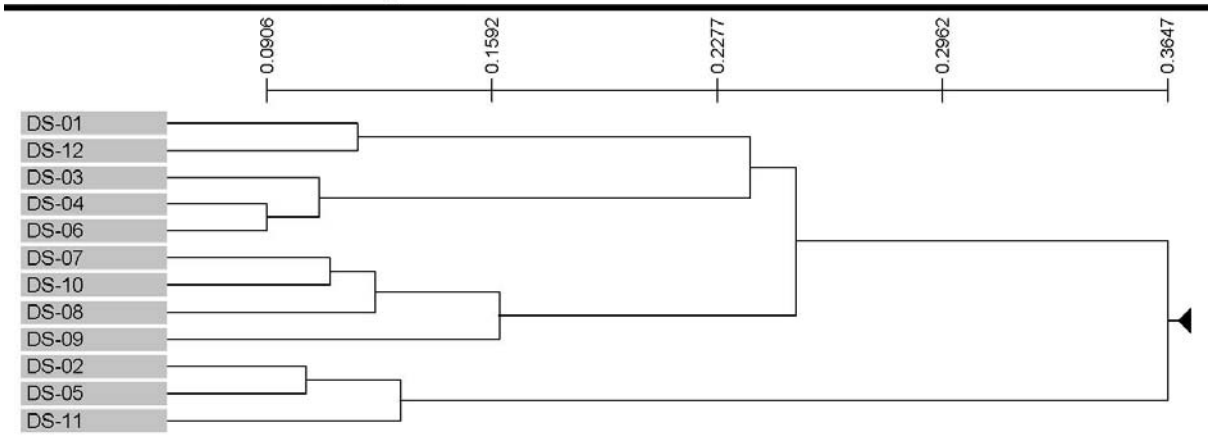
Condition	Code	Description
Pristine	1	Pristine or nearly so, no obvious signs of disturbance.
Excellent	2	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	3	Vegetation structure altered; obvious signs of disturbance.
Good	4	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
Degraded	5	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching Very Good condition without intensive management.
Completely Degraded	6	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

APPENDIX 3

Column Fusion Dendrogram
12 quadrats by 145 plant taxa

Fusion Type: Flexible UPGMA Beta = -0.10
On Association: Two-Step (Columns) Created on: 13:27:55, October 16, 2020

Column Fusion Dendrogram



APPENDIX 4

Vegetation classifications for the study area base on Muir (1997).

Height Class	Canopy Cover				
	100 - 70%	70 - 30%	30 - 10%	10 - 2%	< 2%
Trees > 30 m	High Closed Forest	High Open Forest	High Woodland	High Open Woodland	Scattered Tall Trees
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland	Scattered Trees
Trees < 10 m	Low Closed Woodland	Low Open Forest	Low Woodland	Low Open Woodland	Scattered Low Trees
Mallee	Closed Mallee	Mallee	Open Mallee	Very Open Mallee	Scattered Mallees
Shrubs > 2 m	Closed Scrub	Open Scrub	High Shrubland	High Open Shrubland	Scattered Tall Shrubs
Shrubs 1-2 m	Closed Heath	Open Heath	Shrubland	Open Shrubland	Scattered Shrubs
Shrubs < 1 m	Low Closed Heath	Low Open Heath	Low Shrubland	Low Open Shrubland	Low Scattered Shrubs
Hummock Grass	Closed Hummock Grassland	Hummock Grassland	Open Hummock Grassland	Very Open Hummock Grassland	Scattered Hummock Grass
Tussock Grass	Closed Tussock Grassland	Tussock Grassland	Open Tussock Grassland	Very Open Tussock Grassland	Scattered Tussock Grass
Bunch Grass	Closed Bunch Grassland	Bunch Grassland	Open Bunch Grassland	Very Open Bunch Grassland	Scattered Bunch Grass
Sedges	Closed Sedges	Sedges	Open Sedges	Very Open Sedges	Scattered Sedges
Herbs	Closed Herbs	Herbs	Open Herbs	Very Open Herbs	Scattered Herbs

APPENDIX 5

Total flora list from the study area

Family	Genus	Species	Infra Rank	Infra Name
Anarthriaceae	*Anarthria*	*prolifera*		
Anarthriaceae	*Lyginia*	*imberbis*		
Apiaceae	*Pentapeltis*	*peltigera*		
Apiaceae	*Platysace*	*compressa*		
Apiaceae	*Platysace*	*tenuissima*		
Apiaceae	*Xanthosia*	*candida*		
Apiaceae	*Xanthosia*	*huegelii*		
Apocynaceae	**Vinca*	*major*		
Araliaceae	*Trachymene*	*pilosa*		
Asparagaceae	*Lomandra*		cf.	*drummondii*
Asparagaceae	*Lomandra*	*drummondii*		
Asparagaceae	*Lomandra*	*caespitosa*		
Asparagaceae	*Lomandra*	*hermaphrodita*		
Asparagaceae	*Lomandra*	*nigricans*		
Asparagaceae	*Lomandra*	*preissii*		
Asparagaceae	*Lomandra*	*purpurea*		
Asparagaceae	*Lomandra*	*sericea*		
Asparagaceae	*Lomandra*	*sonderi*		
Asparagaceae	*Thysanotus*	*arbuscula*		
Asparagaceae	*Thysanotus*	*patersonii*		
Asteraceae	**Arctotheca*	*calendula*		
Asteraceae	**Conyza*	*bonariensis*		
Asteraceae	**Hypochaeris*	*glabra*		
Asteraceae	**Ursinia*	*anthemoides*		
Asteraceae	*Craspedia*	*variabilis*		
Asteraceae	*Lagenophora*	*huegelii*		
Asteraceae	*Rhodanthe*	*citrina*		
Asteraceae	*Trichocline*	*spathulata*		
Boryaceae	*Borya*	*sphaerocephala*		
Caryophyllaceae	**Petrorhagia*	*dubia*		
Casuarinaceae	*Allocasuarina*	*fraseriana*		
Celastraceae	*Tripterococcus*	*brunonis*		
Colchicaceae	*Burchardia*	*congesta*		
Colchicaceae	*Burchardia*	*umbellata*		
Commelinaceae	*Cartonema*	*philydroides*		
Cyperaceae	*Lepidosperma*	*longifolia*		
Cyperaceae	*Lepidosperma*	*squamatum*		
Cyperaceae	*Mesomelaena*	*tetragona*		
Cyperaceae	*Tetraria*	*octandra*		
Cyperaceae	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)
Dasypogonaceae	*Dasypogon*	*bromellifolius*		
Dilleniaceae	*Hibbertia*	*amplexicaulis*		
Dilleniaceae	*Hibbertia*	*commutata*		
Dilleniaceae	*Hibbertia*	*diamesogenos*		
Dilleniaceae	*Hibbertia*	*hypericoides*		
Dilleniaceae	*Hibbertia*	*racemosa*		
Dilleniaceae	*Hibbertia*	*vaginata*		
Droseraceae	*Drosera*	*erythrorhiza*		
Droseraceae	*Drosera*	*menziesii*		
Droseraceae	*Drosera*	*pallida*		

Family	Genus	Species	Infra Rank	Infra Name
Droseraceae	*Drosera*	*stolonifera*		
Elaeocarpaceae	*Tetratheca*	*hirsuta*	subsp.	*viminea*
Ericaceae	*Andersonia*	*involucrata*		
Ericaceae	*Astroloma*	*ciliatum*		
Ericaceae	*Astroloma*	*pallidum*		
Ericaceae	*Conostephium*	*pendalum*		
Ericaceae	*Leucopogon*	*capitellatus*		
Ericaceae	*Styphelia*	*conostephioides*		
Ericaceae	*Styphelia*	*propinqua*		
Ericaceae	*Styphelia*	*propinqua*		
Ericaceae	*Styphelia*	*tenuiflora*		
Euphorbiaceae	*Monotaxis*	*occidentale*		
Fabaceae	*Acacia*	*semitrullata*		
Fabaceae	*Acacia*	*applanata*		
Fabaceae	*Acacia*	*extensa*		
Fabaceae	*Acacia*	*huegelii*		
Fabaceae	*Acacia*	*latericola*		
Fabaceae	*Acacia*	*obovata*		
Fabaceae	*Acacia*	*preissiana*		
Fabaceae	*Acacia*	*pulchella*	var.	*glaberrima*
Fabaceae	*Acacia*	*pulchella*	var.	*pulchella*
Fabaceae	*Acacia*	*scalpelliformis*		
Fabaceae	*Acacia*	*stenoptera*		
Fabaceae	*Bossiaea*	*eriocarpa*		
Fabaceae	*Bossiaea*	*linophylla*		
Fabaceae	*Bossiaea*	*ornata*		
Fabaceae	*Chorizema*	*cordatum*		
Fabaceae	*Daviesia*	*physodes*		
Fabaceae	*Gompholobium*	*knightianum*		
Fabaceae	*Gompholobium*	*marginatum*		
Fabaceae	*Gompholobium*	*ovatum*		
Fabaceae	*Gompholobium*	*polymorphum*		
Fabaceae	*Gompholobium*	*tomentosum*		
Fabaceae	*Hovea*	*chorizemifolia*		
Fabaceae	*Hovea*	*elliptica*		
Fabaceae	*Isotropis*	*cuneifolia*		
Fabaceae	*Kennedia*	*prostrata*		
Fabaceae	*Labichea*	*punctata*		
Fabaceae	*Mirbelia*	*dilatata*		
Goodeniaceae	*Dampiera*	*linearis*		
Goodeniaceae	*Lechenaultia*	*biloba*		
Goodeniaceae	*Scaevola*	*calliptera*		
Haemodoraceae	*Anigozanthos*	*manglesii*		
Haemodoraceae	*Conostylis*	*aculeata*		
Haemodoraceae	*Conostylis*	*serrulata*		
Haemodoraceae	*Conostylis*	*setigera*		
Haemodoraceae	*Haemodorum*	*laxum*		
Hemerocallidaceae	*Johnsonia*	*acaulis*		
Hemerocallidaceae	*Agrostocrinum*	*hirsutum*		
Hemerocallidaceae	*Caesia*	*micrantha*		
Hemerocallidaceae	*Dianella*	*revoluta*		

Family	Genus	Species	Infra Rank	Infra Name
Hemerocallidaceae	*Johnsonia*	*lupulina*		
Hypoxidaceae	*Hypoxis*	*occidentalis*		
Iridaceae	*Freesia*	*alba × leichtlinii*		
Iridaceae	*Orthrosanthus*	*laxus*		
Iridaceae	*Patersonia*	*babianoides*		
Iridaceae	*Patersonia*	*occidentalis*		
Juncaceae	*Luzula*	*meridionalis*		
Lamiaceae	*Hemiandra*	*pungens*		
Lauraceae	*Cassytha*	*racemosa*		
Lindsaeaceae	*Lindsaea*	*linearis*		
Loganiaceae	*Orianthera*	*serpyllifolia*		
Loranthaceae	*Nuytsia*	*floribunda*		
Myrtaceae	*Calothamnus*	*sanguineus*		
Myrtaceae	*Calytrix*		cf.	*leschenaultii*
Myrtaceae	*Corymbia*	*calophylla*		
Myrtaceae	*Darwinia*	*citriodora*		
Myrtaceae	*Eucalyptus*	*marginata*		
Myrtaceae	*Hypocalymma*	*angustifolium*		
Myrtaceae	*Hypocalymma*	*robustum*		
Myrtaceae	*Kunzea*	*glabrescens*		
Myrtaceae	*Melaleuca*	*thymoides*		
Olacaceae	*Olax*	*benthamiana*		
Orchidaceae	*Caladenia*	*flava*		
Orchidaceae	*Caladenia*	*reptans*		
Orchidaceae	*Cyanicula*	*sericea*		
Orchidaceae	*Drakaea*	*glyptodon*		
Orchidaceae	*Elythranthera*	*brunonis*		
Orchidaceae	*Lyperanthus*	*serratus*		
Orchidaceae	*Pterostylis*	*recruva*		
Orchidaceae	*Pyrorchis*	*nigricans*		
Oxalidaceae	**Oxalis*	*glabra*		
Haemodoraceae	*Phlebocarya*	*ciliata*		
Phyllanthaceae	*Phyllanthus*	*calycinus*		
Pittosporaceae	*Billardiera*	*heterophylla*		
Pittosporaceae	*Billardiera*	*variifolia*		
Poaceae	**Briza*	*maxima*		
Poaceae	**Ehrharta*	*calycina*		
Poaceae	**Ehrharta*	*longifolia*		
Poaceae	*Neurachne*	*alopecuroidea*		
Poaceae	*Tetrarrhena*	*laevis*		
Podocarpaceae	*Podocarpus*	*drouynianus*		
Proteaceae	*Adenanthos*	*meisneri*		
Proteaceae	*Adenanthos*	*obovatus*		
Proteaceae	*Banksia*	*attenuata*		
Proteaceae	*Banksia*	*bipinnatifida*	subsp.	*bipinnatifida*
Proteaceae	*Banksia*	*dallanneyi*		
Proteaceae	*Banksia*	*grandis*		
Proteaceae	*Conospermum*	*capitatum*		
Proteaceae	*Franklandia*	*triaristata*		
Proteaceae	*Grevillea*	*diversifolia*		
Proteaceae	*Grevillea*	*pilulifera*		

Family	Genus	Species	Infra Rank	Infra Name
Proteaceae	*Grevillea*	*trifida*		
Proteaceae	*Hakea*	*amplexicaulis*		
Proteaceae	*Hakea*	*lissocarpha*		
Proteaceae	*Isopogon*	*formosus*		
Proteaceae	*Persoonia*	*elliptica*		
Proteaceae	*Persoonia*	*longifolia*		
Proteaceae	*Petrophile*	*linearis*		
Proteaceae	*Stirlingia*	*latifolia*		
Proteaceae	*Synaphea*	*gracillima*		
Proteaceae	*Xylomelum*	*occidentale*		
Restionaceae	*Desmocladus*	*fasciculatus*		
Restionaceae	*Hypolaena*	*exsulca*		
Rubiaceae	*Opercularia*	*apiciflora*		
Rubiaceae	*Opercularia*	*hispidula*		
Rutaceae	*Boronia*	*spathulata*		
Rutaceae	*Philotheca*	*spicata*		
Stylidiaceae	*Stylidium*		cf.	*amoenum*
Stylidiaceae	*Stylidium*	*junceum*		
Stylidiaceae	*Stylidium*	*piliferum*		
Stylidiaceae	*Stylidium*	*schoenoides*		
Stylidiaceae	*Stylidium*	*spathulatum*		
Thymelaeaceae	*Pimelea*	*preissii*		
Violaceae	*Hybanthus*	*floribundus*		
Xanthorrhoeaceae	*Chamaescilla*	*corymbosa*		
Xanthorrhoeaceae	*Xanthorrhoea*	*gracilis*		
Xanthorrhoeaceae	*Xanthorrhoea*	*preissii*		
Zamiaceae	*Macrozamia*	*riedlei*		

APPENDIX 6

Conservation significant flora recorded from the study area

Note: Records shaded grey occur with 20 metres of mine features.

Genus	Species	Cons Code	Easting	Northing
Acacia	*semitrullata*	P4	390129	6281967
Acacia	*semitrullata*	P4	390107	6281968
Acacia	*semitrullata*	P4	390088	6281958
Acacia	*semitrullata*	P4	390075	6281955
Acacia	*semitrullata*	P4	390079	6281965
Acacia	*semitrullata*	P4	390060	6281947
Acacia	*semitrullata*	P4	390059	6281939
Acacia	*semitrullata*	P4	390051	6281929
Acacia	*semitrullata*	P4	390104	6281519
Acacia	*semitrullata*	P4	390126	6281530
Acacia	*semitrullata*	P4	390199	6281665
Acacia	*semitrullata*	P4	390120	6281561
Acacia	*semitrullata*	P4	390090	6281538
Acacia	*semitrullata*	P4	390236	6281491
Acacia	*semitrullata*	P4	390198	6281521
Acacia	*semitrullata*	P4	390169	6281510
Acacia	*semitrullata*	P4	390169	6281515
Acacia	*semitrullata*	P4	390156	6281517
Acacia	*semitrullata*	P4	390154	6281534
Acacia	*semitrullata*	P4	390151	6281540
Acacia	*semitrullata*	P4	390132	6281585
Acacia	*semitrullata*	P4	390135	6281591
Acacia	*semitrullata*	P4	390182	6281671
Acacia	*semitrullata*	P4	390174	6281662
Acacia	*semitrullata*	P4	390171	6281656
Acacia	*semitrullata*	P4	390202	6281649
Acacia	*semitrullata*	P4	390198	6281624
Acacia	*semitrullata*	P4	390263	6281484
Acacia	*semitrullata*	P4	390263	6281471
Acacia	*semitrullata*	P4	390173	6281637
Acacia	*semitrullata*	P4	389953	6281840
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	390114	6281971
Acacia	*semitrullata*	P4	389902	6281478
Acacia	*semitrullata*	P4	389902	6281478
Acacia	*semitrullata*	P4	389902	6281478
Acacia	*semitrullata*	P4	390173	6281605
Acacia	*semitrullata*	P4	390173	6281605
Acacia	*semitrullata*	P4	390303	6281307
Acacia	*semitrullata*	P4	390181	6281552
Acacia	*semitrullata*	P4	390181	6281552
Acacia	*semitrullata*	P4	390181	6281552
Acacia	*semitrullata*	P4	390181	6281552

APPENDIX 7

Species by site matrix for the study area

Genus	Species	Infra Rank	Infra Name	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06	DS-07	DS-08	DS-09	DS-10	DS-11	DS-12
**Briza*	*maxima*							X				X	X	X	
**Hypochaeris*	*glabra*			X	X		X	X	X				X	X	X
**Oxalis*	*glabra*												X		
**Ursinia*	*anthemoides*				X			X							
^Acacia	*semitrullata*													X	
^Johnsonia	*inconspicua*														
Acacia	*extensa*			X		X	X			X	X	X			X
Acacia	*huegelii*				X										
Acacia	*obovata*										X				
Acacia	*preissiana*					X	X						X		
Acacia	*pulchella*					X	X			X	X	X	X		
Acacia	*pulchella*	var.	glaberrima					X						X	
Acacia	*pulchella*	var.	pulchella												
Acacia	*stenoptera*									X	X	X			
Adenanthos	*meisneri*			X	X			X						X	X
Agrostocrinum	*hirsutum*			X		X				X		X			X
Allocasuarina	*fraseriana*			X	X	X	X		X	X				X	X
Anarthria	*prolifera*			X											X
Andersonia	*involucrata*									X					
Anigozanthos	*manglesii*			X	X			X							
Astroloma	*ciliatum*										X				
Banksia	*attenuata*							X						X	
Banksia	*bipinnatifida*	subsp.	*bipinnatifida*								X				
Banksia	*dallanneyi*									X	X		X		
Banksia	*grandis*					X	X		X						
Billardiera	*heterophylla*									X				X	
Billardiera	*variifolia*										X	X			
Boronia	*spathulata*					X	X			X					
Bossiaea	*eriocarpa*				X			X		X	X			X	X
Bossiaea	*linophylla*			X		X	X		X						X
Bossiaea	*ornata*					X	X		X	X		X	X		
Burchardia	*congesta*			X		X		X			X	X		X	X

Genus	Species	Infra Rank	Infra Name	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06	DS-07	DS-08	DS-09	DS-10	DS-11	DS-12
Caesia	*micrantha*									X		X	X		
Caladenia	*flava*			X	X					X			X	X	X
Calytrix		cf.	*leschenaultii*					X						X	
Cassytha	*racemosa*											X	X		X
Chamaescilla	*corymbosa*			X	X			X		X	X	X	X	X	X
Chorizema	*nanum*												X		
Conostylis	*aculeata*				X			X		X			X	X	
Conostylis	*serrulata*			X	X			X							X
Conostylis	*setigera*									X	X				X
Corymbia	*calophylla*			X		X	X	X	X	X	X	X	X		
Craspedia	*variabilis*									X					
Dampiera	*linearis*			X		X	X			X	X				
Dasypogon	*bromeliifolius*			X	X	X									X
Daviesia	*physodes*			X						X					X
Desmocladus	*fasciculatus*									X	X		X		
Dianella	*revoluta*			X											
Drosera	*erythrorhiza*									X	X	X			
Drosera	*menziesii*				X			X			X				X
Drosera	*pallida*			X						X	X	X	X	X	X
Drosera	*stolonifera*								X		X	X	X		
Elythranthera	*brunonis*				X					X					
Eucalyptus	*marginata*			X		X	X				X	X	X		X
Franklandia	*triaristata*							X						X	
Gompholobium	*knightianum*						X			X					
Gompholobium	*marginatum*									X	X		X		
Gompholobium	*ovatum*											X			
Gompholobium	*tomentosum*			X	X		X	X		X	X		X	X	X
Grevillea	*trifida*											X			
Grevillea	*pilulifera*												X		
Haemodorum	*laxum*										X		X		
Hakea	*amplexicaulis*					X					X	X	X		
Hakea	*lissocarpha*										X				

Genus	Species	Infra Rank	Infra Name	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06	DS-07	DS-08	DS-09	DS-10	DS-11	DS-12
Hemiandra	*pungens*			X	X			X						X	X
Hibbertia	*amplexicaulis*					X	X		X		X	X			
Hibbertia	*commutata*						X		X						
Hibbertia	*diamesogenos*					X					X				
Hibbertia	*hypericoides*			X	X	X	X		X	X	X	X	X	X	X
Hibbertia	*racemosa*			X		X	X		X			X		X	
Hibbertia	*vaginata*							X							
Hovea	*chorizemifolia*						X		X						
Hybanthus	*floribundus*									X					
Hypocalymma	*angustifolium*			X						X	X	X	X	X	
Hypocalymma	*robustum*					X									X
Hypolaena	*exsulca*				X			X		X			X		X
Isopogon	*formosus*							X			X				
Isotropis	*cuneifolia*							X							
Kennedia	*prostrata*											X	X		
Kunzea	*glabrescens*			X	X			X						X	X
Labichea	*punctata*										X				
Lagenophora	*huegelii*						X		X	X		X	X	X	X
Lechenaultia	*biloba*									X	X				X
Lepidosperma	*longifolia*								X						
Lepidosperma	*squamatum*			X	X			X			X				
Leucopogon	*capitellatus*					X						X	X		X
Styphelia	*conostephioides*							X					X	X	
Styphelia	*propinqua*									X		X			X
Lindsaea	*linearis*			X								X			
Lomandra		cf.	*drummondii*									X	X		
Lomandra	*drummondii*														
Lomandra	*sonderi*			X		X	X								
Lomandra	*caespitosa*											X		X	
Lomandra	*hermaphrodita*			X	X					X	X			X	X
Lomandra	*purpurea*			X		X	X				X	X			
Lomandra	*nigricans*														

Genus	Species	Infra Rank	Infra Name	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06	DS-07	DS-08	DS-09	DS-10	DS-11	DS-12
Lomandra	*sericea*			X		X	X		X		X	X			X
Lomandra	*preissii*														
Lomandra		sp.	indet	X		X				X	X				
Luzula	*meridionalis*												X		
Lyginia	*imberbis*				X			X							
Lyperanthus	*serratus*														
Macrozamia	*riedlei*			X		X	X		X			X	X		
Melaleuca	*thymoides*				X			X						X	
Mesomelaena	*tetragona*										X		X		
Mirbelia	*dilatata*												X		
Monotaxis	*occidentale*														
Neurachne	*alopecuroidea*												X	X	
Nuytsia	*floribunda*							X							
Olax	*benthamiana*						X			X					
Opercularia	*apiciflora*									X		X			
Opercularia	*hispidula*			X		X	X		X		X	X		X	X
Orianthera	*serpyllifolia*			X		X	X			X					
Patersonia	*occidentalis*									X	X				
Pentapeltis	*peltigera*									X		X	X		
Persoonia	*elliptica*									X					
Persoonia	*longifolia*						X		X		X	X	X		
Petrophile	*linearis*			X		X	X							X	
Philotheca	*spicata*				X	X		X			X	X	X	X	
Phlebocarya	*ciliata*				X			X		X				X	X
Phyllanthus	*calycinus*									X			X		
Pimelea	*suaveolens*									X					
Platysace	*compressa*									X					
Platysace	*tenuissima*			X		X	X		X			X			
Pyrorchis	*nigricans*				X			X						X	
Rhodanthe	*citrina*													X	
Scaevola	*calliptera*			X		X			X		X	X			X
Stirlingia	*latifolia*				X			X						X	

Genus	Species	Infra Rank	Infra Name	DS-01	DS-02	DS-03	DS-04	DS-05	DS-06	DS-07	DS-08	DS-09	DS-10	DS-11	DS-12
Stylidium	*carnosum*													X	
Stylidium	*piliferum*				X									X	
Stylidium	*schoenoides*										X				
Stylidium	*spathulatum*			X		X									
Styphelia	*glaucifolia*										X				
Styphelia	*nitens*														
Styphelia	*propinqua*														
Styphelia	*tenuiflora*			X		X	X				X				
Synaphea	*gracillima*									X					
Tetraria	*octandra*									X	X	X	X		
Tetraria		sp.	Jarrah Forest (R. Davis 7391)	X		X	X		X	X	X	X	X		X
Tetrarrhena	*laevis*			X		X									
Tetratheca	*hirsuta*			X		X						X			
Thysanotus	*patersonii*			X	X	X				X			X	X	
Thysanotus		sp.	indet				X							X	
Trachymene	*pilosa*				X			X							
Trichocline	*spathulata*						X		X	X					
Xanthorrhoea	*gracilis*										X	X			
Xanthorrhoea	*preissii*									X	X		X		
Xanthosia	*candida*									X			X		
Xanthosia	*huegelii*			X			X	X		X		X	X	X	X
Xylomelum	*occidentale*			X											X

APPENDIX 8

Representative raw data and total flora spreadsheets recorded for the 12 quadrats assessed within the study area

Study Sites

SITE_ID	LANDFORM	BROAD FLORISTIC FORMATION	VEGETATION ASSOCIATION	VEG_CONDITION	SLOPE	LAST_FIRE	EASTING	NORTHING
DS-01	Hillslope	Corymbia Woodland	Woodland of Corymbia calophylla and Eucalyptus marginata over Low Woodland A of Corymbia calophylla, Eucalyptus marginata and Allocasuarina fraseriana over Dwarf Scrub D of Dasypogon bromellifolius and Phlebocarya ciliata with Open Low Scrub A of Bossiaea linophylla over Open Dwarf Scrub C of Adenanthos meisneri, Philotheca spicata and Gomphloboium tomentosum	Very Good	Low	Old (6+ yr)	389953	6281840
DS-02	Hillslope	Dasypogon Dwarf Scrub D	Dwarf Scrub D of Dasypogon bromellifolius, Phlebocarya ciliata and Bossiaea eriocarpa with Open Scrub of Kunzea glabrescens over Open Low Scrub B of Kunzea glabrescens, Melaleuca thymoides and Stirlingia latifolia over Very Open Low Sedges of Hypolaena exsulca and Lyginia imberbis	Good	Low	Old (6+ yr)	390114	6281971
DS-03	Hillcrest/ Upper Hillslope	Eucalyptus Forest	Forest of Eucalyptus marginata over Low Woodland A of Eucalyptus marginata, Allocasuarina fraseriana, Corymbia calophylla (Banksia grandis) over Dwarf Scrub D of Hibbertia hypericoides, Bossiaea ornata (Hypocalymma robustum) with Open Low Scrub A of Bossiaea linophylla	Very Good	Low	Old (6+ yr)	390078	6281735
DS-04	Hillcrest/ Upper Hillslope	Allocasuarina Low Forest A	Low Forest A of Allocasuarina fraseriana, Eucalyptus marginata and Corymbia calophylla with Woodland of Eucalyptus marginata and Corymbia calophylla over Open Low Scrub A of Bossiaea linophylla over Open Dwarf Scrub D of Bossiaea ornata, Opercularia hispidula and Hibbertia commutata	Very Good	Low	Old (6+ yr)	389902	6281478
DS-05	Hillslope	Banksia Low Woodland A	Low Woodland A of Banksia attenuata and Nuytsia floribunda over Dwarf Scrub C of Melaleuca thymoides, Stirlingia latifolia, Adenanthos meisneri and Calytrix cf. lechenaultii with Open Woodland of Corymbia calophylla and Banksia attenuata over Open Scrub of Kunzea glabrescens and Banksia attenuata over Open Dwarf Scrub D of Phlebocarya ciliata	Very Good	Low	Old (6+ yr)	390173	6281605
DS-06	Hillcrest/ Upper Hillslope	Eucalyptus Forest	Forest of Eucalyptus marginata, Corymbia calophylla and Allocasuarina fraseriana over Low Woodland A of Allocasuarina fraseriana over Open Scrub of Bossiaea linophylla and Banksia grandis over Open Dwarf Scrub D of Opercularia hispidula, Bossiaea ornata and Hibbertia commutata	Very Good	Low	Old (6+ yr)	390038	6281212
DS-07	Other	Phlebocarya Low Heath D	Low Heath D of Phlebocarya ciliata and Hibbertia hypericoides (Lechenaultia biloba) with Woodland of Corymbia calophylla and Eucalyptus marginata over Low Woodland A of Allocasuarina fraseriana, Corymbia calophylla and Eucalyptus marginata	Very Good	Low	Old (6+ yr)	390011	6280999
DS-08	Hillslope	Eucalyptus Forest	Forest of Eucalyptus marginata and Corymbia calophylla over Low Heath D of Hibbertia hypericoides, Banksia dallanneyi and Xanthorrhoea gracilis with Very Open Low Sedges of Mesomelaena tetragona and Tetraria sp. Jarrah Forest (R. Davis 7391)	Very Good	Low	Old (6+ yr)	390303	6281307
DS-09	Hillslope	Corymbia Forest	Forest of Corymbia calophylla and Eucalyptus marginata over Low Heath D of Hibbertia hypericoides, Xanthorrhoea gracilis and Bossiaea ornata with Low Woodland B of Persoonia longifolia, Eucalyptus marginata and Corymbia calophylla over Open Low Scrub B of Xanthorrhoea preissii	Very Good	Moderate	Old (6+ yr)	390352	6281155
DS-10	Hillslope	Corymbia Forest	Forest of Corymbia calophylla and Eucalyptus marginata over Low Dwarf Scrub C of Phyllanthus calycinus, Hibbertia hypericoides and Leucopogon capitellatus with Open Scrub of Mirbelia dilatata over Open Low Scrub B of Xanthorrhoea preissii over Very Open Low Sedges of Tetraria sp. Jarrah Forest (R. Davis 7391)	Very Good	Low	Old (6+ yr)	390346	6281011
DS-11	Hillslope	Banksia Low Forest A	Low Forest A of Banksia attenuata and Allocasuarina fraseriana over Low Heath D Stirlingia latifolia, Phlebocarya ciliata and Styphelia conostephioides with Scrub of Kunzea glabrescens over Dwarf Scrub C of Stirlingia latifolia, Melaleuca thymoides and Adenanthos meisneri	Very Good	Low	Old (6+ yr)	390181	6281552
DS-12	Hillslope	Eucalyptus Woodland	Woodland of Eucalyptus marginata, Corymbia calophylla and Allocasuarina fraseriana over Low Heath D of Phlebocarya ciliata, Hibbertia hypericoides and Leucopogon capitellatus with Low Woodland A of Allocasuarina fraseriana, (Eucalyptus marginata, Corymbia calophylla) over Open Scrub of Kunzea glabrescens and Bossiaea linophylla	Very Good	Low	Old (6+ yr)	390148	6281875

Flora

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-01	**Hypochaeris*	*glabra*			No	Introduced		+	0.1
DS-01	*Acacia*	*extensa*			No	Native		+	1
DS-01	*Adenanthos*	*meisneri*			No	Native		4	0.5-1
DS-01	*Agrostocrinum*	*hirsutum*			No	Native		+	0.8
DS-01	*Allocasuarina*	*fraseriana*			No	Native		2	2-15
DS-01	*Anarthria*	*prolifera*			No	Native		2	0.2
DS-01	*Anigozanthos*	*manglesii*			No	Native		+	1
DS-01	*Bossiaea*	*linophylla*			No	Native		8	1-3
DS-01	*Burchardia*	*congesta*			No	Native		+	0.6
DS-01	*Caladenia*	*flava*			No	Native		+	0.1
DS-01	*Chamaescilla*	*corymbosa*			No	Native		+	0.2
DS-01	*Conostylis*	*serrulata*			No	Native		0.5	0.3
DS-01	*Corymbia*	*calophylla*			No	Native		20	3-20
DS-01	*Dampiera*	*linearis*			No	Native		+	0.2
DS-01	*Dasypogon*	*bromellifolius*			No	Native		10	0.5
DS-01	*Daviesia*	*physodes*			No	Native		+	0.8
DS-01	*Dianella*	*revoluta*			No	Native		+	0.6
DS-01	*Drosera*	*pallida*			No	Native		+	Cl
DS-01	*Eucalyptus*	*marginata*			No	Native		5	30
DS-01	*Gompholobium*	*tomentosum*			No	Native		2	0.5
DS-01	*Hemiandra*	*pungens*			No	Native		+	0.2
DS-01	*Hibbertia*	*hypericoides*			No	Native		1	0.4
DS-01	*Hibbertia*	*racemosa*			No	Native		+	0.3
DS-01	*Hypocalymma*	*robustum*			No	Native		+	0.4
DS-01	*Kunzea*	*glabrescens*			No	Native		+	1-4
DS-01	*Lepidosperma*	*squamatum*			No	Native		0.5	
DS-01	*Lepidosperma*	*squamatum*			No	Native		+	0.5
DS-01	*Lindsaea*	*linearis*			No	Native		+	0.1
DS-01	*Lomandra*	*hermaphrodita*			No	Native		+	0.15
DS-01	*Lomandra*	*preissii*			No	Native		+	0.2
DS-01	*Lomandra*	*sericea*			No	Native		+	0.2
DS-01	*Lomandra*	*sericea*			No	Native		+	0.1
DS-01	*Lomandra*		cf.	*drummondii*	No	Native		1	0.4
DS-01	*Lyperanthus*	*serratus*			No	Native		+	0.3
DS-01	*Monotaxis*	*occidentale*			No	Native		+	0.1
DS-01	*Opercularia*	*hispidula*			No	Native		4	0.7
DS-01	*Orianthera*	*serpyllifolia*			No	Native		+	0.1
DS-01	*Philotheca*	*spicata*			No	Native		1	0.4
DS-01	*Phlebocarya*	*ciliata*			No	Native		8	0.5
DS-01	*Pyrorchis*	*nigricans*			No	Native		+	0.01
DS-01	*Scaevola*	*calliptera*			No	Native		+	0.1
DS-01	*Styphelia*	*propinqua*			No	Native		0.5	0.6
DS-01	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		3	0.5
DS-01	*Thysanotus*	*patersonii*			No	Native		+	Cl
DS-01	*Xanthosia*	*huegelii*			No	Native		+	0.1
DS-01	*Xylomelum*	*occidentale*			No	Native		0.5	1
DS-02	**Hypochaeris*	*glabra*			No	Introduced		0.5	0.1
DS-02	**Ursinia*	*anthemoides*			No	Introduced		+	0.2
DS-02	*Acacia*	*huegelii*			No	Native		+	0.5
DS-02	*Adenanthos*	*meisneri*			No	Native		+	0.6

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-02	*Allocasuarina*	*fraseriana*			No	Native		+	2
DS-02	*Anigozanthos*	*manglesii*			No	Native		+	0.6
DS-02	*Bossiaea*	*eriocarpa*			No	Native		1	0.3
DS-02	*Caladenia*	*flava*			No	Native		+	0.2
DS-02	*Chamaescilla*	*corymbosa*			No	Native		+	0.1
DS-02	*Conostylis*	*aculeata*			No	Native		2	0.2
DS-02	*Conostylis*	*serrulata*			No	Native		+	0.3
DS-02	*Dasypogon*	*bromellifolius*			No	Native		20	0.5
DS-02	*Drosera*	*menziesii*			No	Native		+	0.5
DS-02	*Elythranthera*	*brunonis*			No	Native		+	0.3
DS-02	*Gompholobium*	*tomentosum*			No	Native		+	0.7
DS-02	*Hemiandra*	*pungens*			No	Native		+	0.1
DS-02	*Hibbertia*	*hypericoides*			No	Native		+	0.5
DS-02	*Hypolaena*	*exsulca*			No	Native		4	0.5
DS-02	*Kunzea*	*glabrescens*			No	Native		6	1-3
DS-02	*Lepidosperma*	*squamatum*			No	Native		0.5	0.5
DS-02	*Lomandra*	*hermaphrodita*			No	Native		+	0.2
DS-02	*Lyginia*	*imberbis*			No	Native		3	0.5
DS-02	*Melaleuca*	*thymoides*			No	Native		2	1.5-1
DS-02	*Philotheca*	*spicata*			No	Native		+	0.5
DS-02	*Phlebocarya*	*ciliata*			No	Native		20	0.5
DS-02	*Pyrorchis*	*nigricans*			No	Native		+	0.05
DS-02	*Stirlingia*	*latifolia*			No	Native		0.5	0.5-1.5
DS-02	*Stylidium*	*piliferum*			No	Native		+	0.3
DS-02	*Thysanotus*	*patersonii*			No	Native		+	0.3
DS-02	*Trachymene*	*pilosa*			No	Native		+	0.05
DS-03	*Acacia*	*extensa*			No	Native		0.5	1.5
DS-03	*Acacia*	*preissiana*			No	Native		+	0.2
DS-03	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		0.5	1
DS-03	*Agrostocrinum*	*hirsutum*			No	Native		+	0.6
DS-03	*Allocasuarina*	*fraseriana*			No	Native		15	5-12
DS-03	*Banksia*	*grandis*			No	Native		+	1
DS-03	*Boronia*	*spathulata*			No	Native		+	0.2
DS-03	*Bossiaea*	*linophylla*			No	Native		2	1.5-2
DS-03	*Bossiaea*	*ornata*			No	Native		4	0.5
DS-03	*Burchardia*	*congesta*			No	Native		+	0.6
DS-03	*Corymbia*	*calophylla*			No	Native		5	5-20
DS-03	*Dampiera*	*linearis*			No	Native		+	0.1
DS-03	*Dasypogon*	*bromellifolius*			No	Native		1	0.4
DS-03	*Eucalyptus*	*marginata*			No	Native		40	5-30
DS-03	*Hakea*	*amplexicaulis*			No	Native		+	0.5
DS-03	*Hibbertia*	*amplexicaulis*			No	Native		+	0.2
DS-03	*Hibbertia*	*diamesogenos*			No	Native		+	0.1
DS-03	*Hibbertia*	*hypericoides*			No	Native		10	0.5
DS-03	*Hibbertia*	*racemosa*			No	Native		+	0.2
DS-03	*Hypocalymma*	*robustum*			No	Native		2	0.5
DS-03	*Leucopogon*	*capitellatus*			No	Native		+	0.1
DS-03	*Lomandra*	*purpurea*			No	Native		+	0.3
DS-03	*Lomandra*	*sericea*			No	Native		+	0.4
DS-03	*Lomandra*	*sonderi*			No	Native		+	0.6
DS-03	*Lomandra*		sp.	indet	No	Native		+	0.2

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-03	*Macrozamia*	*riedlei*			No	Native		0.5	1.5
DS-03	*Opercularia*	*hispidula*			No	Native		1	0.5
DS-03	*Orianthera*	*serpyllifolia*			No	Native		+	0.5
DS-03	*Petrophile*	*linearis*			No	Native		+	1
DS-03	*Philotheca*	*spicata*			No	Native		+	0.3
DS-03	*Platysace*	*tenuissima*			No	Native		+	0.1
DS-03	*Scaevola*	*calliptera*			No	Native		+	0.1
DS-03	*Stylidium*	*spathulatum*			No	Native		+	0.4
DS-03	*Styphelia*	*tenuiflora*			No	Native		+	0.5
DS-03	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		+	0.5
DS-03	*Tetrarrhena*	*laevis*			No	Native		+	0.4
DS-03	*Tetratheca*	*hirsuta*	subsp.	*viminea*	No	Native		1	0.5
DS-03	*Thysanotus*	*patersonii*			No	Native		+	1
DS-04	**Hypochaeris*	*glabra*			No	Introduced		+	0.1
DS-04	*Acacia*	*extensa*			No	Native		+	0.5
DS-04	*Acacia*	*preissiana*			No	Native		+	0.3
DS-04	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		+	1.2
DS-04	*Allocasuarina*	*fraseriana*			No	Native		25	2-20
DS-04	*Banksia*	*grandis*			No	Native		+	1.4
DS-04	*Boronia*	*spathulata*			No	Native		+	0.3
DS-04	*Bossiaea*	*linophylla*			No	Native		5	1.5
DS-04	*Bossiaea*	*ornata*			No	Native		2	0.7
DS-04	*Corymbia*	*calophylla*			No	Native		15	4-25
DS-04	*Dampiera*	*linearis*			No	Native		+	0.1
DS-04	*Eucalyptus*	*marginata*			No	Native		6	10-30
DS-04	*Gompholobium*	*knightianum*			No	Native		+	0.1
DS-04	*Gompholobium*	*tomentosum*			No	Native		+	0.2
DS-04	*Hibbertia*	*amplexicaulis*			No	Native		+	0.2
DS-04	*Hibbertia*	*commutata*			No	Native		1	0.3
DS-04	*Hibbertia*	*hypericoides*			No	Native		+	0.5
DS-04	*Hibbertia*	*racemosa*			No	Native		+	0.3
DS-04	*Hovea*	*chorizemifolia*			No	Native		+	0.2
DS-04	*Lagenophora*	*huegelii*			No	Native		+	0.1
DS-04	*Lomandra*	*purpurea*			No	Native		1	0.6
DS-04	*Lomandra*	*sericea*			No	Native		+	0.7
DS-04	*Lomandra*	*sonderi*			No	Native		1	0.6
DS-04	*Macrozamia*	*riedlei*			No	Native		0.5	1
DS-04	*Olax*	*benthamiana*			No	Native		+	0.4
DS-04	*Opercularia*	*hispidula*			No	Native		4	0.5
DS-04	*Orianthera*	*serpyllifolia*			No	Native		+	0.2
DS-04	*Persoonia*	*longifolia*			No	Native		+	1
DS-04	*Petrophile*	*linearis*			No	Native		0.5	0.6
DS-04	*Platysace*	*tenuissima*			No	Native		+	0.1
DS-04	*Styphelia*	*tenuiflora*			No	Native		+	0.6
DS-04	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		0.5	0.5
DS-04	*Thysanotus*		sp.	indet	No	Native		+	0.1
DS-04	*Trichocline*	*spathulata*			No	Native		+	0.1
DS-04	*Xanthosia*	*huegelii*			No	Native		+	0.1
DS-05	**Briza*	*maxima*			No	Introduced		+	0.1
DS-05	**Hypochaeris*	*glabra*			No	Introduced		2	0.05
DS-05	**Ursinia*	*anthemoides*			No	Introduced		+	0.2

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-05	*Acacia*	*pulchella*	var.	*glaberrima*	No	Native		1	1.5
DS-05	*Adenanthos*	*meisneri*			No	Native		1.5	0.5-1.5
DS-05	*Anigozanthos*	*manglesii*			No	Native		+	0.5
DS-05	*Banksia*	*attenuata*			No	Native		20	2-10
DS-05	*Bossiaea*	*eriocarpa*			No	Native		1	1
DS-05	*Burchardia*	*congesta*			No	Native		+	0.4
DS-05	*Calytrix*		cf.	*leschenaultii*	No	Native		2	0.5-1.5
DS-05	*Chamaescilla*	*corymbosa*			No	Native		1	0.1
DS-05	*Conostylis*	*aculeata*			No	Native		2	0.3
DS-05	*Conostylis*	*serrulata*			No	Native		0.5	0.4
DS-05	*Corymbia*	*calophylla*			No	Native		5	25
DS-05	*Drosera*	*menziesii*			No	Native		+	0.5
DS-05	*Franklandia*	*triaristata*			No	Native		+	0.2
DS-05	*Gompholobium*	*tomentosum*			No	Native		2	1
DS-05	*Hemiandra*	*pungens*			No	Native		+	0.2
DS-05	*Hibbertia*	*vaginata*			No	Native		+	0.4
DS-05	*Hypolaena*	*exsulca*			No	Native		1	0.4
DS-05	*Isopogon*	*formosus*			No	Native		+	0.4
DS-05	*Isotropis*	*cuneifolia*			No	Native		+	0.2
DS-05	*Kunzea*	*glabrescens*			No	Native		3	3
DS-05	*Lepidosperma*	*squamatum*			No	Native		0.5	0.6
DS-05	*Lyginia*	*imberbis*			No	Native		2	0.6
DS-05	*Melaleuca*	*thymoides*			No	Native		3	1.5
DS-05	*Nuytsia*	*floribunda*			No	Native		3	5
DS-05	*Philotheca*	*spicata*			No	Native		+	0.5
DS-05	*Phlebocarya*	*ciliata*			No	Native		7	0.5
DS-05	*Pyrorchis*	*nigricans*			No	Native		+	0.01
DS-05	*Stirlingia*	*latifolia*			No	Native		5	0.5-1.5
DS-05	*Styphelia*	*conostephioides*			No	Native		+	0.4
DS-05	*Trachymene*	*pilosa*			No	Native		+	0.05
DS-05	*Xanthosia*	*huegelii*			No	Native		+	0.2
DS-06	**Hypochaeris*	*glabra*			No	Introduced		+	0.05
DS-06	*Allocasuarina*	*fraseriana*			No	Native		15	5-15
DS-06	*Banksia*	*grandis*			No	Native		1	3
DS-06	*Bossiaea*	*linophylla*			No	Native		1	2
DS-06	*Bossiaea*	*ornata*			No	Native		1	0.5-1
DS-06	*Corymbia*	*calophylla*			No	Native		35	15.-30
DS-06	*Drosera*	*stolonifera*			No	Native		-	-
DS-06	*Hibbertia*	*amplexicaulis*			No	Native		+	0.3
DS-06	*Hibbertia*	*commutata*			No	Native		1	0.3
DS-06	*Hibbertia*	*hypericoides*			No	Native		+	0.5
DS-06	*Hibbertia*	*racemosa*			No	Native		0.5	0.3
DS-06	*Hovea*	*chorizemifolia*			No	Native		+	0.2
DS-06	*Lagenophora*	*huegelii*			No	Native		+	0.05
DS-06	*Lepidosperma*	*longifolia*			No	Native		1	1
DS-06	*Lomandra*	*sericea*			No	Native		+	0.5
DS-06	*Macrozamia*	*riedlei*			No	Native		+	0.5
DS-06	*Opercularia*	*hispidula*			No	Native		4	0.5-1
DS-06	*Persoonia*	*longifolia*			No	Native		+	0.5
DS-06	*Platysace*	*tenuissima*			No	Native		+	0.3
DS-06	*Scaevola*	*calliptera*			No	Native		+	0.05

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-06	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		2	0.5
DS-06	*Trichocline*	*spathulata*			No	Native		+	0.1
DS-07	*Acacia*	*extensa*			No	Native		0.5	1.5
DS-07	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		1	0.5-1
DS-07	*Acacia*	*stenoptera*			No	Native		+	0.3
DS-07	*Agrostocrinum*	*hirsutum*			No	Native		+	0.6
DS-07	*Allocasuarina*	*fraseriana*			No	Native		10	10
DS-07	*Andersonia*	*involucrata*			No	Native		+	0.2
DS-07	*Banksia*	*dallanneyi*			No	Native		1	0.2
DS-07	*Billardiera*	*heterophylla*			No	Native		+	0.5
DS-07	*Boronia*	*spathulata*			No	Native		+	0.4
DS-07	*Bossiaea*	*eriocarpa*			No	Native		0.5	0.3
DS-07	*Bossiaea*	*ornata*			No	Native		+	0.6
DS-07	*Caesia*	*micrantha*			No	Native		+	0.5
DS-07	*Caladenia*	*flava*			No	Native		+	0.1
DS-07	*Chamaescilla*	*corymbosa*			No	Native		+	0.1
DS-07	*Conostylis*	*aculeata*			No	Native		2	0.2
DS-07	*Conostylis*	*setigera*			No	Native		+	0.2
DS-07	*Corymbia*	*calophylla*			No	Native		5	2-6
DS-07	*Craspedia*	*variabilis*			No	Native		+	0.6
DS-07	*Dampiera*	*linearis*			No	Native		+	0.1
DS-07	*Daviesia*	*physodes*			No	Native		+	1
DS-07	*Desmocladus*	*fasciculatus*			No	Native		+	0.1
DS-07	*Drosera*	*erythrorhiza*			No	Native		+	0.05
DS-07	*Drosera*	*pallida*			No	Native		+	0.5
DS-07	*Elythranthera*	*brunonis*			No	Native		+	0.3
DS-07	*Gompholobium*	*knightianum*			No	Native		+	0.3
DS-07	*Gompholobium*	*marginatum*			No	Native		+	0.1
DS-07	*Gompholobium*	*tomentosum*			No	Native		+	0.5
DS-07	*Hibbertia*	*hypericoides*			No	Native		5	0.5
DS-07	*Hybanthus*	*floribundus*			No	Native		+	0.2
DS-07	*Hypocalymma*	*angustifolium*			No	Native		+	0.3
DS-07	*Hypolaena*	*exsulca*			No	Native		0.5	0.3
DS-07	*Lagenophora*	*huegelii*			No	Native		+	0.05
DS-07	*Lechenaultia*	*biloba*			No	Native		3	0.3
DS-07	*Lomandra*	*drummondii*			No	Native		+	0.3
DS-07	*Lomandra*	*hermaphrodita*			No	Native		+	0.2
DS-07	*Olax*	*benthamiana*			No	Native		-	-
DS-07	*Opercularia*	*apiciflora*			No	Native		+	0.2
DS-07	*Orianthera*	*serpyllifolia*			No	Native		+	0.2
DS-07	*Patersonia*	*occidentalis*			No	Native		+	0.3
DS-07	*Pentapeltis*	*peltigera*			No	Native		+	0.1
DS-07	*Persoonia*	*elliptica*			No	Native		-	-
DS-07	*Phlebocarya*	*ciliata*			No	Native		10	0.5
DS-07	*Phyllanthus*	*calycinus*			No	Native		-	-
DS-07	*Pimelea*	*suaveolens*			No	Native		+	0.7
DS-07	*Platysace*	*compressa*			No	Native		-	-
DS-07	*Styphelia*	*propinqua*			No	Native		+	0.4
DS-07	*Synaphea*	*gracillima*			No	Native		+	0.3
DS-07	*Tetraria*	*octandra*			No	Native		+	0.4
DS-07	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		+	0.6

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-07	*Thysanotus*	*patersonii*			No	Native		+	Cl
DS-07	*Trichocline*	*spathulata*			No	Native		+	0.1
DS-07	*Xanthorrhoea*	*preissii*			No	Native		2	1.5-3
DS-07	*Xanthosia*	*candida*			No	Native		-	-
DS-07	*Xanthosia*	*huegelii*			No	Native		+	0.1
DS-08	*Acacia*	*extensa*			No	Native		+	0.8
DS-08	*Acacia*	*obovata*			No	Native		+	0.1
DS-08	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		+	0.6
DS-08	*Acacia*	*stenoptera*			No	Native		+	0.3
DS-08	*Astroloma*	*ciliatum*			No	Native		+	0.1
DS-08	*Banksia*	*bipinnatifida*	subsp.	*bipinnatifida*	No	Native		-	0.2
DS-08	*Banksia*	*dallanneyi*			No	Native		5	0.3
DS-08	*Billardiera*	*variifolia*			No	Native		+	0.1
DS-08	*Bossiaea*	*eriocarpa*			No	Native		3	0.3
DS-08	*Bossiaea*	*ornata*			No	Native		0.5	0.3
DS-08	*Burchardia*	*congesta*			No	Native		+	0.5
DS-08	*Chamaescilla*	*corymbosa*			No	Native		+	0.05
DS-08	*Conostylis*	*setigera*			No	Native		0.5	0.2
DS-08	*Corymbia*	*calophylla*			No	Native		10	15-20
DS-08	*Dampiera*	*linearis*			No	Native		+	0.05
DS-08	*Desmocladus*	*fasciculatus*			No	Native		+	0.1
DS-08	*Drosera*	*erythrorhiza*			No	Native		+	0.05
DS-08	*Drosera*	*menziesii*			No	Native		+	0.3
DS-08	*Drosera*	*pallida*			No	Native		+	Cl
DS-08	*Drosera*	*stolonifera*			No	Native		+	0.1
DS-08	*Eucalyptus*	*marginatum*			No	Native		40	15-20
DS-08	*Gompholobium*	*marginatum*			No	Native		+	0.2
DS-08	*Gompholobium*	*tomentosum*			No	Native		+	0.1
DS-08	*Haemodorum*	*laxum*			No	Native		+	0.3
DS-08	*Hakea*	*amplexicaulis*			No	Native		+	0.6
DS-08	*Hakea*	*lissocarpha*			No	Native		+	0.8
DS-08	*Hibbertia*	*amplexicaulis*			No	Native		+	0.3
DS-08	*Hibbertia*	*diamesogenos*			No	Native		+	0.1
DS-08	*Hibbertia*	*hypericoides*			No	Native		25	0.5
DS-08	*Hypocalymma*	*angustifolium*			No	Native		+	0.3
DS-08	*Isopogon*	*formosus*			No	Native		+	0.5
DS-08	*Labichea*	*punctata*			No	Native		+	0.2
DS-08	*Lechenaultia*	*biloba*			No	Native		1	0.3
DS-08	*Lepidosperma*	*squamatum*			No	Native		0.5	0.3
DS-08	*Lomandra*	*hermaphrodita*			No	Native		+	0.2
DS-08	*Lomandra*	*purpurea*			No	Native		+	0.4
DS-08	*Lomandra*	*sericea*			No	Native		+	0.3
DS-08	*Lomandra*		sp.	indet	No	Native		+	0.6
DS-08	*Mesomelaena*	*tetragona*			No	Native		4	0.5
DS-08	*Opercularia*	*hispidula*			No	Native		+	0.2
DS-08	*Patersonia*	*occidentalis*			No	Native		+	0.2
DS-08	*Persoonia*	*longifolia*			No	Native		2	1.5-2
DS-08	*Philotheca*	*spicata*			No	Native		+	0.1
DS-08	*Scaevola*	*calliptera*			No	Native		+	0.1
DS-08	*Stylidium*	*schoenoides*			No	Native		+	0.1
DS-08	*Styphelia*	*glaucifolia*			No	Native		+	0.1

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-08	*Styphelia*	*tenuiflora*			No	Native		+	0.5
DS-08	*Tetraria*	*octandra*			No	Native		+	0.4
DS-08	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		5	0.5
DS-08	*Xanthorrhoea*	*gracilis*			No	Native		3	1
DS-08	*Xanthorrhoea*	*preissii*			No	Native		4	1-1.5
DS-09	**Briza*	*maxima*			No	Introduced		+	0.1
DS-09	*Acacia*	*extensa*			No	Native		+	1.2
DS-09	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		0.5	0.5
DS-09	*Acacia*	*stenoptera*			No	Native		+	0.2
DS-09	*Agrostocrinum*	*hirsutum*			No	Native		+	0.7
DS-09	*Billardiera*	*variifolia*			No	Native		2	0.6
DS-09	*Bossiaea*	*ornata*			No	Native		3	0.5
DS-09	*Burchardia*	*congesta*			No	Native		+	0.1
DS-09	*Caesia*	*micrantha*			No	Native		+	0.1
DS-09	*Cassytha*	*racemosa*			No	Native		1	Cl
DS-09	*Chamaescilla*	*corymbosa*			No	Native		+	0.4
DS-09	*Corymbia*	*calophylla*			No	Native		25	2-25
DS-09	*Drosera*	*erythrorhiza*			No	Native		+	0.1
DS-09	*Drosera*	*pallida*			No	Native		+	0.6
DS-09	*Drosera*	*stolonifera*			No	Native		+	0.2
DS-09	*Eucalyptus*	*marginata*			No	Native		20	2-20
DS-09	*Gompholobium*	*ovatum*			No	Native		+	0.3
DS-09	*Grevillea*	*trifida*			No	Native	1	+	0.5
DS-09	*Hakea*	*amplexicaulis*			No	Native		+	0.5
DS-09	*Hibbertia*	*amplexicaulis*			No	Native		+	0.5
DS-09	*Hibbertia*	*hypericoides*			No	Native		30	0.5
DS-09	*Hibbertia*	*racemosa*			No	Native		+	0.2
DS-09	*Hypocalymma*	*angustifolium*			No	Native		+	0.4
DS-09	*Kennedia*	*prostrata*			No	Native		+	0.2
DS-09	*Lagenophora*	*huegelii*			No	Native		+	0.1
DS-09	*Leucopogon*	*capitellatus*			No	Native		+	0.1
DS-09	*Lindsaea*	*linearis*			No	Native		+	0.15
DS-09	*Lomandra*	*caespitosa*			No	Native		0.5	0.1
DS-09	*Lomandra*	*hermaphrodita*			No	Native		+	0.2
DS-09	*Lomandra*	*purpurea*			No	Native		+	0.1
DS-09	*Lomandra*	*sericea*			No	Native		+	0.2
DS-09	*Lomandra*		cf.	*drummondii*	No	Native		+	0.6
DS-09	*Macrozamia*	*riedlei*			No	Native		0.5	1
DS-09	*Opercularia*	*apiciflora*			No	Native		+	0.1
DS-09	*Opercularia*	*hispidula*			No	Native		+	0.7
DS-09	*Pentapeltis*	*peltigera*			No	Native		+	0.1
DS-09	*Persoonia*	*longifolia*			No	Native		5	1-4
DS-09	*Philotheca*	*spicata*			No	Native		+	0.6
DS-09	*Platysace*	*tenuissima*			No	Native		+	0.2
DS-09	*Scaevola*	*calliptera*			No	Native		+	0.1
DS-09	*Styphelia*	*propinqua*			No	Native		+	0.1
DS-09	*Tetraria*	*octandra*			No	Native		+	0.4
DS-09	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		1	0.5
DS-09	*Tetratheca*	*hirsuta*	subsp.	*viminea*	No	Native		+	0.3
DS-09	*Xanthorrhoea*	*gracilis*			No	Native		2	1
DS-09	*Xanthorrhoea*	*preissii*			No	Native		4	1-2.5

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-09	*Xanthosia*	*huegelii*			No	Native		+	0.3
DS-10	**Briza*	*maxima*			No	Introduced		+	0.1
DS-10	**Hypochaeris*	*glabra*			No	Introduced		+	0.1
DS-10	**Oxalis*	*glabra*			No	Introduced		+	0.1
DS-10	*Acacia*	*preissiana*			No	Native		+	0.1
DS-10	*Acacia*	*pulchella*	var.	*pulchella*	No	Native		+	1
DS-10	*Banksia*	*dallanneyi*			No	Native		+	0.2
DS-10	*Bossiaea*	*ornata*			No	Native		0.5	0.5
DS-10	*Caesia*	*micrantha*			No	Native		+	0.2
DS-10	*Caladenia*	*flava*			No	Native		+	0.1
DS-10	*Cassytha*	*racemosa*			No	Native		+	0.2
DS-10	*Chamaescilla*	*corymbosa*			No	Native		+	0.1
DS-10	*Chorizema*	*cordatum*			No	Native		0.5	11
DS-10	*Conostylis*	*aculeata*			No	Native		+	0.2
DS-10	*Corymbia*	*calophylla*			No	Native		35	15-25
DS-10	*Desmocladus*	*fasciculatus*			No	Native		+	0.1
DS-10	*Drosera*	*pallida*			No	Native		+	Cl
DS-10	*Drosera*	*stolonifera*			No	Native		1	0.2
DS-10	*Eucalyptus*	*marginata*			No	Native		5	5-15
DS-10	*Gompholobium*	*marginatum*			No	Native		+	0.1
DS-10	*Gompholobium*	*tomentosum*			No	Native		+	0.4
DS-10	*Grevillea*	*pilulifera*			No	Native	3	+	0.2
DS-10	*Haemodorum*	*laxum*			No	Native		0.5	0.5-1
DS-10	*Hakea*	*amplexicaulis*			No	Native		+	1-2
DS-10	*Hakea*	*lissocarpha*			No	Native		+	0.5
DS-10	*Hibbertia*	*hypericoides*			No	Native		5	0.5
DS-10	*Hypocalymma*	*angustifolium*			No	Native		+	0.4
DS-10	*Hypolaena*	*exsulca*			No	Native		+	0.3
DS-10	*Kennedia*	*prostrata*			No	Native		+	0.1
DS-10	*Lagenophora*	*huegelii*			No	Native		+	0.1
DS-10	*Leucopogon*	*capitellatus*			No	Native		2	0.5
DS-10	*Lomandra*	*nigricans*			No	Native		+	0.4
DS-10	*Lomandra*		cf.	*drummondii*	No	Native		1	0.6
DS-10	*Luzula*	*meridionalis*			No	Native		+	0.1
DS-10	*Lyperanthus*	*serratus*			No	Native		+	0.1
DS-10	*Macrozamia*	*riedlei*			No	Native		0.5	1.5
DS-10	*Mesomelaena*	*tetragona*			No	Native		+	0.5
DS-10	*Mirbelia*	*dilatata*			No	Native		6	2-4
DS-10	*Neurachne*	*alopecuroidea*			No	Native		-	-
DS-10	*Pentapeltis*	*peltigera*			No	Native		+	0.1
DS-10	*Persoonia*	*longifolia*			No	Native		+	1.2
DS-10	*Philotheca*	*spicata*			No	Native		+	0.2
DS-10	*Phyllanthus*	*calycinus*			No	Native		10	0.5
DS-10	*Styphelia*	*propinqua*			No	Native		+	0.3
DS-10	*Tetraria*	*octandra*			No	Native		0.5	0.3
DS-10	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		6	0.5
DS-10	*Thysanotus*	*patersonii*			No	Native		+	Cl
DS-10	*Xanthorrhoea*	*preissii*			No	Native		5	1-2
DS-10	*Xanthosia*	*candida*			No	Native		+	0.2
DS-10	*Xanthosia*	*huegelii*			No	Native		+	0.1
DS-11	**Briza*	*maxima*			No	Introduced		+	0.1

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-11	*Hypochaeris	glabra			No	Introduced		+	0.1
DS-11	Acacia	pulchella	var.	glaberrima	No	Native		+	1.5
DS-11	Acacia	semitrullata			Yes	Native	2	+	0.5
DS-11	Adenanthos	meisneri			No	Native		1	0.7
DS-11	Allocasuarina	fraseriana			No	Native		2	15
DS-11	Banksia	attenuata			No	Native		45	5-15
DS-11	Billardiera	heterophylla			No	Native		+	1
DS-11	Bossiaea	eriocarpa			No	Native		1	0.1
DS-11	Burchardia	congesta			No	Native		+	0.6
DS-11	Caladenia	flava			No	Native		+	0.1
DS-11	Calytrix		cf.	leschenaultii	No	Native		+	0.7
DS-11	Chamaescilla	corymbosa			No	Native		+	0.2
DS-11	Conostylis	aculeata			No	Native		2	0.3
DS-11	Drosera	pallida			No	Native		+	0.2
DS-11	Franklandia	triaristata			No	Native		+	0.2
DS-11	Gompholobium	tomentosum			No	Native		+	0.1-1.5
DS-11	Hemiandra	pungens			No	Native		1	0.1
DS-11	Hibbertia	hypericoides			No	Native		1	0.5
DS-11	Hibbertia	racemosa			No	Native		+	0.3
DS-11	Hypocalymma	robustum			No	Native		+	0.7
DS-11	Kunzea	glabrescens			No	Native		15	2-3
DS-11	Lagenophora	huegelii			No	Native		+	0.2
DS-11	Lomandra	caespitosa			No	Native		+	0.2
DS-11	Lomandra	hermaphrodita			No	Native		+	0.1
DS-11	Melaleuca	thymoides			No	Native		5	0.5-1.2
DS-11	Neurachne	alopecuroidea			No	Native		+	0.3
DS-11	Opercularia	hispidula			No	Native		+	0.3
DS-11	Petrophile	linearis			No	Native		+	0.4
DS-11	Philotheca	spicata			No	Native		+	0.6
DS-11	Phlebocarya	ciliata			No	Native		5	0.3
DS-11	Pyrorchis	nigricans			No	Native		+	0.01
DS-11	Rhodanthe	citrina			No	Native		+	0.1
DS-11	Stirlingia	latifolia			No	Native		15	0.5-1
DS-11	Stylidium	piliferum			No	Native		+	0.1
DS-11	Stylidium		cf.	amoenum	No	Native		+	0.1
DS-11	Styphelia	conostephioides			No	Native		10	0.5
DS-11	Thysanotus	patersonii			No	Native		+	0.2
DS-11	Trachymene	pilosa			No	Native		+	0.1
DS-11	Xanthosia	huegelii			No	Native		+	0.1
DS-12	*Hypochaeris	glabra			No	Introduced		+	0.05
DS-12	Acacia	extensa			No	Native		+	1.2
DS-12	Adenanthos	meisneri			No	Native		+	0.5
DS-12	Agrostocrinum	hirsutum			No	Native		+	0.5
DS-12	Allocasuarina	fraseriana			No	Native		35	2-15
DS-12	Anarthria	prolifera			No	Native		+	0.5
DS-12	Bossiaea	eriocarpa			No	Native		1	0.5
DS-12	Bossiaea	linophylla			No	Native		4	1.5-2.5
DS-12	Burchardia	congesta			No	Native		-	0.4
DS-12	Caladenia	flava			No	Native		+	0.1
DS-12	Cassytha	racemosa			No	Native		+	0.5
DS-12	Chamaescilla	corymbosa			No	Native		+	0.1

SITE_ID	GENUS	SPECIES	INFRA_RANK	INFRA_NAME	SIGNIFICANT	INTRODUCED_NATIVE	NO_INDIVIDUALS	% COVERAGE	PLANT_HEIGHT (m)
DS-12	*Conostylis*	*serrulata*			No	Native		+	0.3
DS-12	*Conostylis*	*setigera*			No	Native		0.5	0.3
DS-12	*Dasypogon*	*bromellifolius*			No	Native		2	0.5
DS-12	*Daviesia*	*physodes*			No	Native		+	0.3
DS-12	*Drosera*	*menziesii*			No	Native		+	0.3
DS-12	*Drosera*	*pallida*			No	Native		+	1
DS-12	*Eucalyptus*	*marginata*			No	Native		+	1
DS-12	*Gompholobium*	*tomentosum*			No	Native		+	0.2
DS-12	*Hemiandra*	*pungens*			No	Native		1	0.3
DS-12	*Hibbertia*	*hypericoides*			No	Native		10	0.5
DS-12	*Hypocalymma*	*robustum*			No	Native		1	1
DS-12	*Hypolaena*	*exsulca*			No	Native		+	0.4
DS-12	*Kunzea*	*glabrescens*			No	Native		8	>2
DS-12	*Lagenophora*	*huegelii*			No	Native		0.5	0.05
DS-12	*Lechenaultia*	*biloba*			No	Native		0.5	0.3
DS-12	*Leucopogon*	*capitellatus*			No	Native		2	0.5
DS-12	*Lomandra*	*hermaphrodita*			No	Native		+	0.1
DS-12	*Lomandra*	*sericea*			No	Native		+	0.5
DS-12	*Opercularia*	*hispidula*			No	Native		+	0.5
DS-12	*Phlebocarya*	*ciliata*			No	Native		40	0.5
DS-12	*Scaevola*	*calliptera*			No	Native		+	0.1
DS-12	*Styphelia*	*propinqua*			No	Native		+	0.3
DS-12	*Tetraria*		sp.	Jarrah Forest (R. Davis 7391)	No	Native		2	0.5
DS-12	*Xanthosia*	*huegelii*			No	Native		+	0.1
DS-12	*Xylomelum*	*occidentale*			No	Native		0.5	1.5