



Public Transport Authority
Yanhep Rail Extension
Biological Assessment

January 2018

Executive summary

The Public Transport Authority (PTA) is in the planning stage for the extension of the northern suburbs passenger railway from Butler (Romeo Road) to Yanchep. The alignment extends from Butler train station to the proposed Yanchep Railway Station, a distance of approximately 16 kilometres (km).

The PTA commissioned GHD in 2016 and 2017 to undertake vegetation, flora and fauna surveys for various survey area associated with the project. This report combines the survey results from these assessments. The results will be used to assess the ecological impact of the project and inform the environmental approvals process.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.6 and the assumptions and qualifications contained throughout this report.

Key findings

Vegetation

Broad scale pre-European vegetation mapping by Beard (1979) indicates three vegetation associations within the survey area. The current extents of vegetation associations 949, 998 and 1007 are greater than 36% of their pre-European extents at all levels (State, IBRA bioregion, IBRA subregion and LGA). Regional vegetation mapped by Heddlé *et al.* (1980) indicates four vegetation complexes occur within the survey area. All four complexes have greater than 31% of their pre-European extents remaining within the SCP IBRA bioregion and in the City of Wanneroo.

The desktop study revealed no Department of Biodiversity Conservation and Attractions (DBCA) managed conservation areas located within the survey area. There are three Bush Forever sites that intersect the survey area:

- Bush Forever site 289 (Ningana Bushland, Yanchep/ Eglington) intersects the middle of survey area
- Bush Forever site 288 (Yanchep National Park and Adjacent Bushland) intersects the northern extent of the survey area
- Bush Forever site 130 (Link between Yanchep and Neerabup National Parks) intersects one of the eastern extensions

The majority of the survey area is an Environmentally Sensitive Area (ESA). This is related to the nine Threatened Ecological Communities (TECs) that intersect the survey area at various locations. These were:

- Seven occurrences of the Aquatic Root Mat Community in Caves of the SCP (Caves SCP01) (TEC)
- One occurrence of Woodlands over sedgeland in Holocene dune swales of the southern SCP (SCP19b) (TEC)
- One occurrence of *Melaleuca huegelii* – *M. acerosa* (*M. systema*) shrublands on limestone ridges (SCP26a) (TEC)

Fifteen vegetation types were identified within the survey area; thirteen of these were remnant native vegetation, and two were dominated by planted taxa and opportunistic non-native species. The majority of the survey area was rated Excellent to Very Good in condition with the vegetation structure largely intact with some herbaceous and grassy weeds present (35.13 % of

the survey area). Areas rated Degraded and Completely Degraded have been historically cleared or impacted by grazing and are dominated by introduced species.

Based on statistical analysis, key diagnostic characteristics and field observations it was determined that seven vegetation types align with five conservation significant communities within the survey area:

1. Banksia Woodlands of the SCP TEC
 - Listed as Endangered under the EPBC Act and listed as a Priority 3 PEC by DBCA
 - Identified through field observations and key diagnostic characteristics
2. *Melaleuca huegelii* – *M. acerosa* [*M. systema*] shrublands on limestone ridges (26a) Endangered TEC
 - Listed as Endangered by DBCA
 - Identified through field observations and statistical analysis
3. Banksia dominated woodlands of the SCP IBRA region Priority Ecological Community (PEC)
 - Listed as a Priority 3 by DBCA
 - Identified through field observations and key diagnostic characteristics
4. Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC
 - Listed as a Priority 3 by DBCA
 - Identified through field observations and key diagnostic characteristics
5. Northern Spearwood shrublands and woodlands (24) PEC
 - Listed as a Priority 3 by DBCA
 - Identified through field observations and statistical analysis

Flora

Two hundred and forty flora taxa (including subspecies and varieties) were recorded during the field assessments. This comprised of 179 native taxa, 61 introduced flora taxa. No *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Wildlife Conservation Act 1950* (WC Act) listed flora were recorded within the survey area. One DBCA Priority-listed flora taxon was recorded; *Hibbertia spicata* subsp. *leptotheca* (P3), it was recorded in quadrat 8, in VT08. The known habitat for this taxon is limestone outcrops and cliffs (WA Herbarium 1998-). Vegetation types VT02 and VT03 had occasional limestone outcroppings, so these vegetation types may also provide suitable a habitat for this taxon.

Of the introduced taxa, four are listed as Declared Pests under the *Biosecurity and Management Act 2007* and/or as a Weeds of National Significance (WONS); **Gomphocarpus fruticosus* (narrowleaf cottonbush) and **Solanum linnaeanum* (Apple of Sodom) are Declared Pests **Lantana camara* (common lantana) and **Asparagus asparagoides* (Bridal Creeper) are both classed as Declared Pests and WONS.

Fauna

Nine main fauna habitat types are present within the survey area (*Eucalyptus* woodland, *Banksia sessilis* over low mixed shrubland, mixed *Banksia* woodland, mixed tall shrubland, Lomandra herb lands on secondary dunes, planted *Eucalyptus* woodland, *Acacia* shrubland, limestone ridgelines and highly disturbed areas. Four of these habitat types provide high value habitat for fauna. These four habitat types cover approximately 75% of the total survey area demonstrating the overall high value of the area. The remaining 25% includes medium to low value habitat for fauna.

The fauna surveys recorded 68 vertebrate fauna species, including 51 birds, eight reptiles and nine mammals. Three species of conservation significance were recorded during the survey, Carnaby's Black Cockatoo (*Calyptrorhynchus latirostris*) – listed as Endangered under EPBC Act and WC Act, Western Brush Wallaby (*Macropus Irma*) listed as Priority 4 under the WC Act and Rainbow Bee-eater (*Merops ornatus*) listed as IA under the WC Act.

A further five conservation significant species were considered likely to occur within the survey area, including:

- Southern Brown Bandicoot / Quenda (*Isodon obesulus subsp. fusciventer*) – Priority 4 listed by DBCA
- Peregrine Falcon (*Falco peregrinus*) – Listed as other specially protected fauna by DBCA
- Western Quoll (*Dasyurus geoffroii*) – Listed as Vulnerable by the EPBC Act and DBCA
- Jewelled South West Ctenotus (*Ctenotus gemmula*) – Listed as Priority 3 by DBCA
- Black Striped Snake (*Neelaps calonotos*) – Listed as Priority 3 by DBCA

A Black Cockatoo assessment identified 128.39 ha of suitable foraging habitat and 67 potential breeding trees were recorded, three with hollows. Of these, none had evidence of being previously used for nesting and one had hollows of suitable size to support breeding. The 67 potential breeding trees had a DBH of >500 mm which means they may be suitable for breeding in the future.

Environmental approvals

The need to refer under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any Matters of National Environmental Significance (MNES). Referral is recommended given listed Threatened species and ecological communities were recorded within the survey area.

In relation to potential biological impacts associated with the project, they are linked to native vegetation clearing and loss of fauna habitat. The potential impacts from the loss of native vegetation and loss of fauna habitat may be effectively assessed through Part V of the *Environmental Protection Act 1986* (EP Act), without requiring formal assessment by the Environmental Protection Authority (EPA). However, it is recommended the PTA discuss this approach with the EPA, as they may decide to assess the proposal given the high profile nature of the project and potential impact to other non-ecological environmental factors.

If the EPA does not assess the Project, a clearing permit will be required from the Department of Water and Environmental Regulation (DWER). An assessment against the Ten Clearing Principles determined clearing the entire survey area is likely to be at variance to Principles a), b), d), and h).

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1. Introduction

1.1 Project background

The Public Transport Authority (PTA) is in the planning stage for the extension of the northern suburbs passenger railway, the Yanchep Rail Extension (the project). The proposed alignment extends from Romeo Road in Butler to the proposed Yanchep Railway Station, a distance of approximately 16 kilometres (km).

An initial environmental investigation including a desktop and field survey was completed by GHD Pty Ltd (GHD) in spring 2010 (GHD 2011), with an additional survey completed in spring 2012 (GHD 2012). Due to the age of the previous surveys and refinements to the proposed alignment additional survey effort during spring 2016 and autumn, winter and summer 2017 were required.

1.2 Purpose of the report

The PTA commissioned GHD in 2016 and 2017 to undertake vegetation, flora and fauna surveys for various survey area associated with the project. This report combines the survey results from the biological surveys listed in Table 1.

Table 1 Flora and vegetation survey timing and effort

Date	Survey effort	Area
1-3 November 2016	Detailed survey Pt 1	Original alignment
3-5 May 2017	Detailed survey Pt 2	Original alignment
11-12 July 2017	Reconnaissance	Extension 1
5-7 December 2017	Detailed survey	Extension 2

The results of the assessment as detailed in this report will be used to assess the potential ecological impact of the project and inform the environmental approvals process.

1.3 Project location

1.3.1 Survey area

The survey area is located between Butler and Yanchep, extending from Butler train station in Butler to the proposed Yanchep Railway Station. The survey area is approximately 16 km long, covers 165 hectares (ha) and includes three components:

- 2016/17 survey (original alignment): approximately 13.7 km long and 40 metres (m) wide, increasing width at some station locations and other areas as required. The original alignment covers 87.39 ha.
- 2017 (extension 1): an additional 1.7 km section north of the original alignment and a 10 m buffer of the original alignment within Bush Forever site 289. The additional areas cover approximately 21.84 ha.
- 2017 (extension 2): an additional 400 m south and multiple extensions of varying length and width in an east and west direction of the original alignment. The additional areas cover approximately 55.90 ha

The three above components have been merged into one large area, referred to as the survey area. The survey area is mapped in Figure 1, Appendix A.

1.3.2 Study area

A study area was defined for the desktop based searches of the assessment and includes a 10 km buffer of the survey area.

1.4 Scope of works

The scope of works for the detailed flora and fauna survey included:

- A desktop review of publically available information and relevant reports commissioned by the PTA was completed to determine the environmental values of the study area.
- A biological survey of the survey area was undertaken to identify:
 - The presence or potential presence of any Threatened or Priority Flora
 - Vegetation community types present, including presence of any Threatened or Priority Ecological Communities (PECs or TECs).
 - Vegetation condition, including the location of any Weeds of National Significance (WONS) or Declared Weeds
 - Flora species recorded including introduced species
 - Vegetation growing in association with wetlands or watercourses
 - The presence or potential presence of any Threatened or Priority fauna
 - Fauna habitat types, with a targeted Black Cockatoo habitat survey
 - Fauna species recorded including introduced species
- Preparation of a biological survey report (this document) that:
 - Documents the results of the desktop assessment and field survey, including mapping
 - Identifies and discusses potentially occurring significant flora, vegetation and fauna species and their habitat (including identifying potential breeding or feeding habitat for Black Cockatoos)
 - Assesses the project clearing against the 10 Clearing Principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986*
 - Provides general advice with respect to environmental approvals as the final alignment and disturbance footprint for the project are yet to be finalised
- Provision of spatial files in GIS format

1.5 Relevant legislation, conservation codes and background information

In Western Australia (WA) significant communities, and flora and fauna are protected under both Federal and State Government legislation. In addition, regulatory bodies also provide a range of guidance and information on expected standards and protocols for environmental surveys.

An overview of key legislation and guidelines, conservation codes and background information relevant to this Project are provided in Appendix B.

1.6 Limitations and assumptions

This report has been prepared by GHD for PTA and may only be used and relied on by PTA for the purpose agreed between GHD and PTA as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than PTA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by PTA and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of infrastructure, access tracks and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed the flora and fauna values within the survey area, as shown in Figure 1, Appendix A. Should the survey area change or be refined, further assessment may be required.

2. Methodology

2.1 Desktop assessment

Prior to the commencement of the field survey, a desktop assessment was undertaken to identify relevant environmental information pertaining to the study area and to assist in survey design. The desktop assessment involved a review of:

- Previous reports relevant to the study area including:
 - GHD 2011 *Northern Suburbs Railway Alignment from Romeo Rd (Alkimos) to Yanchep; Graceful Sun-moth Survey*
 - GHD 2012 *Northern Suburbs Railway Alignment Butler to Yanchep Environmental Investigation*
- The Department of the Environment and Energy (DEE) Protected Matters Search Tool (PMST) to identify communities and species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within the study area (DEE 2016a) (Appendix C)
- The DBCA TEC and PEC database to determine the potential for TECs or PECs to be present within the study area
- The DBCA *NatureMap* database for flora and fauna species previously recorded within the study area (DBCA 2007–) (Appendix C)
- The DBCA Threatened (Declared Rare) and Priority Flora database (TPFL), Threatened and Priority Fauna database, and the WA Herbarium database (WAHERB) and for Threatened and Priority flora species listed under the *Wildlife Conservation Act 1950* (WC Act) and listed as priority by DBCA, previously recorded within the study area
- Existing datasets including previous vegetation mapping of the survey area (Beard 1979), aerial photography, geology/soils and hydrology information to provide background information on the variability of the environment, likely vegetation units and fauna habitats and to identify areas with potential to contain TECs, PECs, and Threatened and Priority listed flora and fauna species.

The environmental constraints identified in the desktop assessment are mapped in Figures 2, 3 and 4, Appendix A.

2.2 Field survey

2.2.1 Vegetation and flora

GHD botanists (Gaynor Owen, SL012042, Mat Gannaway and Angela Benkovic, SL012111) completed a dual season detailed vegetation and flora assessment of the original alignment, a reconnaissance survey of extension 1 and a detailed survey of extension 2. The timing and survey efforts of each area are shown in Table 1 (see section 1.2).

The field surveys were undertaken to verify the results of the desktop assessment, identify and describe the dominant vegetation units, assess vegetation condition, and identify and record vascular flora taxa present at the time of survey. Searches for conservation significant or other significant ecological communities and flora taxa were also undertaken during the field surveys.

The survey methodology employed by GHD was undertaken with reference to the Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

Data collection

Field survey methods involved a combination of sampling quadrats and relevés located in identified vegetation units and traversing the survey area by foot. Thirty-six non-permanent quadrats and five relevés were described throughout the survey area.

Quadrats (measuring 10 m x 10 m – area of 100 m²) were located within each identified vegetation unit. A minimum of two quadrats were located within each identified vegetation unit, where possible. Field data at each quadrat was recorded on a pro-forma data sheet and included the parameters detailed in Table 2.

Table 2 Data collected during the field survey

Aspect	Measurement
Collection attributes	Personnel/recorder; date, quadrat dimensions, photograph of the quadrat.
Physical features	Aspect, soil attributes, ground surface cover, leaf and wood litter.
Location	Coordinates recorded in GDA94 datum using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed using the condition rating scale adapted by EPA (2016a) for the South West Botanical Province.
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer. List of all species within the quadrat including average height and cover (using a modified Braun-Blanquet scale)

A flora inventory was compiled from taxa listed in described quadrats and from opportunistic floristic records throughout the survey area (Appendix D).

Vegetation units

Vegetation units were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations.

Vegetation units were described based on structure, dominant taxa and cover characteristics as defined by quadrat data and field observations. Vegetation unit descriptions follow the National Vegetation Information System (NVIS) and are consistent with NVIS Level V (Association), and are grouped within NVIS Level III (Broad Floristic Formation). At Level V up to three taxa per stratum are used to describe the association (ESCAVI 2003).

Comparison of vegetation units with regional datasets

The most recent and detailed floristic analysis on the SCP was completed by Gibson *et al.* (1994). The Gibson *et al.* (1994) study established 509 standard area sites across the SCP; floristic data was recorded, and based on the presence or absence of individual species and multi-variant analysis techniques, used to define 30 floristic community types (FCTs). A further 13 subdivisions were evident within the 30 FCTs, making a total of 43 types. The work of Gibson *et al.* (1994), and other unpublished data collected as part of the System 6 and Part System 1 Update program and from various sources (e.g. Griffin 1994 and Keighery 1996 – collected to be directly comparable with Gibson *et al.* (1994)) was incorporated into Bush Forever (Government of WA (GoWA) 2000) (referred to in this report as the SCP dataset). Bush Forever identified a further 23 FCTs, including 15 supplementary groups and reclassification a number of FCTs. In total 66 FCTs are recognised for the SCP. The categorisation of TECs and PECs on the SCP has been largely defined by FCTs.

Inference analysis

GHD quadrat data was compared to existing data (where available) for FCTs described on the SCP. Species that occur in greater than 50 per cent of quadrats within each FCT (listed in Table 3) were compared to recorded GHD species for each vegetation unit and inferences between FCTs and vegetation units made.

Statistical analysis

PRIMER v6 (Clarke and Gorley 2006) was used to compare the GHD quadrats to existing data (where available) for FCTs described on the SCP. PRIMER is limited in use for this purpose as analysis is based on all species recorded in quadrats, includes introduced species and does not take into account dominance of species. Further interpretation of statistical results, coupled with multiple field surveys and desktop information is needed to determine whether the vegetation units are representative of a certain FCT.

Information from the SCP dataset was extracted for each FCT described on Uplands centred on Spearwood and Quindalup Dunes, as well as those identified in the desktop searches (e.g. TEC and PEC searches). Representative quadrats from each FCT were selected for the analysis and are shown in Table 3.

Two FCTs identified in the desktop searches were removed from the analysis, these included the Aquatic Root Mat Community Number 1 of Caves of the SCP (Caves SCP01) TEC and Shrublands on clay flats (10a) TEC. There were no established caves or areas of clay flats present within the survey area.

Table 3 List of Gibson *et al.* (1994) quadrats used in PRIMER analysis

Floristic Community Type Name and ID	Status	Quadrats
Sedgeland in Holocene dune swales (19a)	TEC	PB-1, PB-6, rich01
Woodlands over sedgeland in Holocene dune swales (19b)	TEC	cool 09, cool14, cool15, xyan10
<i>Banksia ilicifolia</i> woodlands (22)	PEC *	5F01, BANK-1, BNR27, BNR29, BNR32, DEJONG01, ELE18, ELE23, jand03, MELA-10, MELA-5, MPK02, MR11, pinj12, PLINE-6, raven05, WARB-2, WARB-4, white07, YAN-17, YAN-18, YAN-22, zBEER 01
SCP <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands (23b)	PEC *	5A01, 5C02, 5C04, 5C06, 5D01, 5E01, BC3, BNR03, BNR19, BNR26, BNR30, BNR31, BNR33, ELDO-1, ELE01, ELE03, ELE08, ELE16, ELE17, ELE24, ELE28, MELA-2, MELA-3, MELA-6, MELA-7, MELA-8, MELA-9, MHR01, MILT-3, MILT-7, MILT-8, MIME 01, MNP01, MNP02, MOOR 05, MOOR 06, MOOR 07, MOOR 08, MOOR 09, MP01, MP04, MP05, MP06, MP08, MP09, MP10, MPK01, MPK03, MR05, MR09, MR10, MR12, MR13, mrnp04, MUCK-1, MUK01, MWR04, MWR08, MWR10, OYR01, PLINE-1, PLINE-2, RAAF-1, RAAF-2, RAAF-3, RGR01, RGR04, SF01, SF02, SINT-1, WN084CHE, WN086CHE, WN089CHE, WN090HED, WN093HED, WN100WNR, YAN-19, YAN-20, zBEER 04
Northern Spearwood shrublands and woodlands (24)	PEC	bold07, bold09, bold12, bold13, bold14, bold23, BOLD-1, BOLD-2, BOLD-3, BOLD-4, buck01, CHIDPT-1, Hepb03, MI23, MTB-1, NEER-1, NEER-7, NEER-9, NEER-10, NEER-11,

Floristic Community Type Name and ID	Status	Quadrats
		PTWALT-1, star01, star02, TRIG-5, TRIG-6, xbeer01
Southern <i>Eucalyptus gomphocephala</i> – <i>Agonis flexuosa</i> woodlands (25)	PEC **	bold16, bunb01, C71-4, colriv01, CORON-2, gelor01, GMaid01, GMaid03, KEME-1, leda01, LYONS-2, MEAL-1, MINN-1, MINN-3, much04, MYALUP-2, NMaid05, PAGA-6, PAGA-8, tokyu01, vines01, yela03
<i>Melaleuca huegelii</i> – <i>M. acerosa</i> [<i>M. systema</i>] shrublands on Limestone ridges (26a)	TEC	CLIFT02, CLIFT03, SHE-4, SHE-5, SVH-1, WABL-1, YAN-2, YAN-12, YAN-13, YAN-15, YAN-24, zYAN4, zYAN5
Woodlands and mallees on Limestone (26b)		BW03, Guild05, Guild09, Hepb02, MEAL-2, NWIL-2, OYR02, SHE-1, SHE-3, SHE-6, tokyu02, tokyu05, WABL-2, WABL-3, WHILL-5, wilb04, wilb13, YALG-1, YALG-2, YALG-6, YALG-7, YAN-1, YAN-10, YAN-11, YAN-14, YAN-16, YAN-23, YAN-5
Species poor mallees and shrublands on Limestone (27)		bold18, bold22, BU03, PAR1, SVH-2, WHILL-3, WHILL-4, wilb05, YALG-3, YALG-4, YALG-5, YALG-8
Spearwood <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands (28)		4M03, beel01, BULL-1, BULL-10, BULL-11, BULL-4, BULL-9, DEPOT-1, Guild08, HARRY-1, HARRY-2, Hepb01, KING-1, KING-2, leda02, MILT-4, moore01, moore02, moore03, much01, much03, NEER-2, NEER-20, NEER-21, NEER-22, NEER-23, NEER-3, NEER-4, NEER-5, NEER-6, NEER-8, Pinn01, Pinn03, quinn02, sams01, sand01, SEAB-6, SHE-2, SHENT-1, star03, tokyu03, TRIG-3, TRIG-4, WABL-4, WARI-1, WARI-2, WATERRD1, wilb06, wilb07, wire01, wire02, WOODV-1, WOODV-2, YAN-25, YAN-3, YAN-4, YAN-6, YAN-8, YAN-9, yela01, yuri02
Coastal shrublands on shallow sands [southern SCP] (29a)	PEC	BMaid02, BU01, BU02, BU04, BURN-1, BURN-2, GARD02, MI21, NAVB-2, NMaid01, NMaid03, Pinn02, PRES-1, rich02, rott2, SEAB-4, SEAB-5, SEAB-8, TRIG-2, wilb11
<i>Acacia</i> shrublands on taller dunes [southern SCP] (29b)	PEC	bold08, bold11, Guild01, Guild03, Guild04, Guild06, Guild10, MI01, MI02, MI06, MI07, MI09, MI18, NPRES-1, NWIL-1, NWIL-3, PB-2, PB-3, PB-4, PB-5, SEAB-2, SEAB-7, SW06, SW07, SW11, tokyu04, tokyu07, TRIG-1, WHILL-1, WHILL-2, wilb01, wilb08, wilb09, wilb12
<i>Callitris preissii</i> and/or <i>Melaleuca lanceolata</i> forests and woodlands(30a2)		bold06, GARD04, MHENRY-1, MHENRY-2, PEPGRV-1, PEPGRV-2, SEAB-1, WOODP-1, WOODP-2, xyan08
Quindalup <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands (30b)	PEC	LESCH-1, LESCH-2, LESCH-3, LESCH-4, LESCH-5, NMaid04, PERB-1, pip01, Possum3, Possum4
S11		bold05, m4601, m4602, MI04, MI05, MI08, rott01, SW05, SW08, SW09, SW10, TR06, TR07, TR08
S12		MI11, MI12, MI17, MI19, MI22, SW02, SW03, SW04, TR03, TR04, TR05, wilb02
S14		MI10, MI13, MI14, MI15, MI16, MI20, SW01, TR01, TR02

* A component of the Endangered Banksia woodlands of the SCP EPBC listed TEC

**Can form a component of the Endangered Banksia Woodlands of the SCP EPBC listed TEC

Multiple site analysis

Two multiple site analyses were performed; the first was with GHD quadrat data set Q1-Q29 and the second was with GHD quadrat data set Q30 –Q36. The analyses were completed separately and coincided with the survey for Extension 1 and 2, respectively (Appendix D). Both data sets were treated the same and combined with the SCP quadrat data and a presence/absence matrix was created of all taxa (including perennials and annuals). The dissimilarity between quadrats was determined using the Bray-Curtis measure and the Resemblance function in PRIMER. A Cluster analysis (using Agglomerative Hierarchical Clustering technique) based on group average was undertaken using the Bray-Curtis similarity matrix and results presented as a dendrogram. In addition, a nonmetric multi-dimensional analysis (MDS) was undertaken using the Bray-Curtis similarity matrix and results presented as a two dimensional scatter plot. A factor was added to the output to define sample groups by FCT. The outputs of the PRIMER analysis were used to inform decisions on vegetation units.

Single site insertion analysis

A single site insertion (SSI) analysis was conducted on GHD quadrats that were considered to align with FCT 26a. The SSI analysis involved analysing GHD quadrats Q08, Q21, Q24, Q32, Q33 and Q36 individually against the SCP dataset. This type of analyses is considered a more powerful method of grouping each quadrat with the SCP data and therefore enables a more robust result.

Vegetation condition

The vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (devised by Keighery (1994) and adapted by EPA (2016a). The scale recognises the intactness of vegetation and consists of six rating levels. The vegetation condition rating scale is located in Appendix B.

Flora identification and nomenclature

Species that were well known to the survey botanists were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. All specimens collected during the field assessment were dried and processed in accordance with the requirements of the WA Herbarium. Species were identified by the use of taxonomic literature, electronic keys and online electronic databases.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (WA Herbarium 1998–) and the EPBC Act Threatened species database provided by DEE (2017a).

Nomenclature used in this report follows that used by the WA Herbarium as reported on *FloraBase* (WA Herbarium 1998–).

Surveys for conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. aerial photography, geology, soils and topography data, EPBC Act PMST, TPFL, *NatureMap* and the WAHERB databases search results) was reviewed to determine conservation significant flora taxa potentially present within the study area and locations. Additionally, ecological information (e.g. habitat, associated flora taxa and phenology) was sourced from *FloraBase* (WA Herbarium 1998–) and other relevant publications where available, to provide further details.

Potential habitats were searched by opportunistic sampling. Locations within the survey area with differing hydrology, fire or disturbance history to the surrounding areas were also searched where identified.

2.2.2 Fauna

GHD ecologists Glen Gaikhorst and Claudia Perry undertook a Level 1 fauna survey (reconnaissance survey) of the survey area from 1 – 2 November 2016. Claudia Perry or Melissa Jensen undertook the subsequent surveys on 3 – 5 May, 11 July 2017 and 5 – 7 December 2017. The majority of the survey area was traversed on foot and by vehicle over the course of the surveys to identify and describe the dominant fauna habitat types present and their condition, assess habitat connectivity, and identify and record fauna species within the survey area. An assessment of the likelihood of conservation significant fauna and their habitats occurring within the survey area was also undertaken.

The survey methodology employed by GHD was undertaken with reference to the EPA *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016b).

Habitat assessment

A fauna habitat assessment was undertaken to document the type, condition and extent of habitats within the survey area. The following information was recorded:

- Habitat structure (e.g. vegetation type, presence/absence of structural layers such as ground cover and mid storey)
- Presence/absence of refuge including: density of ground covers, fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
- Presence/absence of waterways including type, extent and habitat quality within waterway
- Location of the habitat within the survey area in comparison to the habitat within the surrounding landscape
- Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey area
- Current land use and disturbance history
- Evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance
- Evaluation of the likelihood of occurrence of conservation significant fauna within the habitat (based on presence of suitable habitat)
- A representative photograph of each habitat type

Opportunistic fauna searches

Opportunistic fauna searches were also conducted across the survey area. Opportunistic searches involved:

- Searching the survey area for tracks, scats, bones, diggings and feeding areas for both native and feral species
- Searching through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and hollow logs
- Visual and aural surveys, which accounted for many bird species potentially utilising the survey area
- Recording GPS locations of any conservation significant fauna species

Black Cockatoos

A targeted survey for Black Cockatoo was conducted in accordance with the EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's Cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo (vulnerable) *Calyptorhynchus banksii naso*, (Department of Sustainability, Environment, Water, Populations, and Communities (DSEWPaC) 2012). The assessment included:

- The identification and recording (via GPS) of the locations of potential and actual breeding habitat within the survey area (relevant tree species with a DBH of >500 mm for Jarrah, Marri and Tuart or DBH of >300 mm for Wandoo or Salmon Gum)
- Identifying, describing and recording the size of existing tree hollows and any evidence of use by Black Cockatoos within the survey area
- Identifying, describing and recording the diameter at breast height (DBH) of trees with existing hollows within the survey area
- Identifying, recording and describing the locations of potential night roosting habitat
- Identifying, recording and describing the locations of potential foraging habitat

The survey distinguished between actual and potential breeding habitat as per the following:

- Actual nest trees: Evidenced as currently being used or have been used in the past
- Potential habitat: Trees with available hollows that do not show evidence of use now or in the past; trees with hollows that do not show evidence of use now or in the past where the hollow is not available (e.g. hollows are occupied by bees or galahs); and those trees without hollows but which have the potential to develop hollows in the future, and which have DBH >500 mm or 300 mm for different species.

Fauna species identification

Identification of fauna species was made in the field using available field guides and electronic guides (e.g. Morcombe 2004). Where identification was not possible, photographs of specimens were collected to be later identified.

Nomenclature used in this report follows that used by the WA Museum and the DBCA NatureMap database (DBCA 2007–) with the exception of birds, where by Christidis and Boles (2008) was used.

2.3 Limitations

2.3.1 Desktop limitations

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the area. The records from the DBCA searches of threatened flora and fauna provide more accurate information for the general area. However, some records of collections, sightings or trappings cannot be dated and often misrepresent the current range of threatened species.

New Wildlife Conservation (Rare Flora) and Wildlife Conservation (Specially Protected Fauna) Notices were gazetted February 2017. To date information contained in publically available databases such as *NatureMap* does not reflect these newly gazetted Notices. This report has been updated to reflect the conservation status of flora and fauna listed in these Notices. However, the outputs of database searches contained in this report such as *NatureMap*, does not reflect the conservation status of flora and fauna listed in these Notices.

2.3.2 Field survey limitations

The EPA (2016a) Technical Guide states that flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 4. Based on this assessment, the present survey effort has not been subject to any constraints which affect the thoroughness of the assessment and the conclusions which have been formed.

Table 4 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information.	Nil	Adequate information is available for the survey area, this includes: <ul style="list-style-type: none"> Broad scale (1:250,000) mapping by Beard (1979) and digitised by Shepherd <i>et al.</i> (2002) Regional biogeography (Mitchell <i>et al.</i> 2002)
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial vertebrate fauna were sampled during the survey. Non-vascular flora, invertebrate and aquatic fauna were not surveyed.
Proportion of flora collected and identified (based on sampling, timing and intensity) Proportion of fauna identified, recorded and/or collected	Minor	<p>The detailed vegetation and flora survey was undertaken over two seasons, in spring 2016 and autumn 2017, the reconnaissance survey of extension 1 was completed in winter 2017 and the detailed survey of extension 2 was completed in December 2017. The flora recorded from the field survey is discussed in section 4.1.4 and a full flora species list is provided in Appendix D. The portion of flora collected and identified was considered moderate; and it is likely the survey under-recorded some grass species (Poaceae), herbs and orchids due to poor flowering material during the field assessments. Grasses, annuals and orchids were observed during the spring assessment, however due to a lack of flowering and/or fruiting bodies were not identifiable, and as such, are likely to be underrepresented in the flora collected.</p> <p>Reconnaissance fauna surveys were undertaken in spring 2016, autumn 2017, winter 2017 and summer 2017. The fauna assessment sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Many cryptic species would not have been identified during a reconnaissance survey and seasonal variation within species often requires targeted surveys at a particular time of the year. Of the fauna species recorded during the survey, all species were identified to species level.</p> <p>The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the survey area. No sampling for invertebrates or aquatic species occurred. The information available on the identification, distribution and conservation status of invertebrates is generally less extensive than that of vertebrate species.</p>
Flora determination	Minor	<p>Flora determination was undertaken by GHD ecologists in the field and at the WA Herbarium. Three taxa could only be identified to family level only, 34 taxa could be identified to genus level only, and 1 taxon could be tentatively identified to species level, due to lack of flowering and/or fruiting material required for identification. Some species, particularly grasses, sedges and herbs, may have been overlooked due to lack of material.</p> <p>The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time report development, but it should be noted this may change in response to ongoing research and review of International Union for Conservation Nature criteria.</p>

Aspect	Constraint	Comment
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Minor	<p>The majority of the survey area was accessed on foot or traversed by vehicle. The southern section of the survey area (400 m) located within the Butler station rail corridor was fenced off and access prohibited; this area was observed through the fence.</p> <p>For the remainder of the survey area access tracks created as a result of infrastructure development (road, water and electrical services) allowed access to the majority of the survey area. Information gained from the survey was extrapolated across those sections of the survey area not accessed on foot during the field survey to assist with determining the vegetation and habitat types for the entire survey area.</p>
Mapping reliability	Minor	<p>The vegetation was mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1979) and field data.</p> <p>Data was recorded in the field using hand-held GPS tools (e.g. Nomad Juno and Garmin GPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The Garmin GPS units used for this survey are accurate to within ± 5 metres on average. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.</p>
Timing/weather/season/cycle	Moderate	<p>The field surveys were conducted during spring (1 – 4 November 2016), autumn (3 – 5 May 2017), winter (11 – 12 July 2017) and summer (5 - 7 December 2017).</p> <p>In the three months prior to the spring survey (August-October), the Gingin weather recording station (No. 009178, Bureau of Meteorology (BoM) 2017) (located approximately 19 km north of the survey area) recorded a total of 249.6 mm of rainfall. This total is approximately 10% higher than the long-term average for the same period (August - October; 226.1 mm) (BoM 2017).</p> <p>The weather conditions during the spring field survey included:</p> <ul style="list-style-type: none"> • Daily maximum temperature ranging from 23.8 to 33.2 °C • Daily minimum temperature ranging from 7.9 to 14.0 °C • Daily rainfall 0 mm. <p>In the three months prior to the autumn survey (February-April), the Gingin weather recording station (No. 009178, BoM 2017) recorded a total of 185.0 mm of rainfall. This total is significantly higher than the average for this period, which is 65.9 mm (BoM 2017).</p> <p>The weather conditions during the autumn field survey included:</p> <ul style="list-style-type: none"> • Daily maximum temperature ranging from 24.3 – 31.1 °C • Daily minimum temperature ranging from 9.5 – 16.1 °C • Daily rainfall 0.0-3.0 mm. <p>In the three months prior to the winter survey (April-June), the Gingin weather recording station (No. 009178, BoM 2017) recorded a total of 117.8.0 mm of rainfall. This total is significantly lower than the average for this period, which is 214.5 mm (BoM 2017).</p> <p>The weather conditions during the autumn field survey included:</p> <ul style="list-style-type: none"> • Daily maximum temperature ranging from 18.7 – 20.8 °C

Aspect	Constraint	Comment
		<ul style="list-style-type: none"> • Daily minimum temperature ranging from 10.1 – 11.4 °C • Daily rainfall 0 mm. <p>In the three months prior to the summer survey (September-November), the Gingin weather recording station (No. 009178, BoM 2017) recorded a total of 109.6 mm of rainfall. This total is less than the average for this period, which is 137.2 mm (BoM 2017).</p> <p>The weather conditions during the summer field survey included:</p> <ul style="list-style-type: none"> • Daily maximum temperature ranging from 28.0 – 30.2 °C • Daily minimum temperature ranging from 14.9 – 17.3 °C • Daily rainfall 0 mm. <p>The weather conditions recorded during the survey periods are considered unlikely to have impacted upon the vegetation and flora survey.</p> <p>The survey timings were considered appropriate for the flora and fauna field survey.</p>
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	Much of the survey area has been subjected to historical disturbance events (e.g. clearing, dumping); however, these disturbances did not impact the survey.
Intensity (in retrospect, was the intensity adequate)	Nil	The vascular flora of the survey area was sampled in accordance with EPA (2016a) and terrestrial fauna sampled in accordance to EPA (2016b). The survey area was sufficiently covered by GHD zoologists and botanists during the survey.
Resources	Nil	Adequate resources were employed during the field survey. Thirty-one person days were spent undertaking the survey using three zoologists and three botanists.
Access restrictions	Minor	Access to the survey area within the fenced off rail corridor at Butler station was prohibited.
Experience levels	Nil	The zoologists and botanists who executed the survey are practitioners suitably qualified and experienced in their respective fields. Glen Gaikhorst (senior zoologist) has over 22 years' experience undertaking fauna surveys within WA. Melissa Jensen and Claudia Perry (zoologist) have 9 and 3 years' experience undertaking fauna surveys, respectively. Botanists Gaynor Owen, Mat Gannaway and Angela Benkovic all have over 10 years' experience undertaking flora surveys within WA.

3. Desktop assessment

3.1 Climate

The study area is located in the South Western Province of WA and experiences a temperate climate with distinctly dry, hot summers and cool, wet winters.

The BoM Gingin Aero station (site number 009178) is the nearest weather station to the study area with continuous long-term data (19.0 km from the study area). Climatic data from this site indicates the mean maximum temperature of the area ranges from 18.2 °C in July to 33.3 °C in February and the mean minimum temperature ranges from 6.0 °C in July to 17.1 °C in February. The mean annual rainfall is 666.9 mm with an average of 101 rain days per year (BoM 2017). Climate statistics for the region are summarised in Plate 1 (source: Weather Zone 2017)

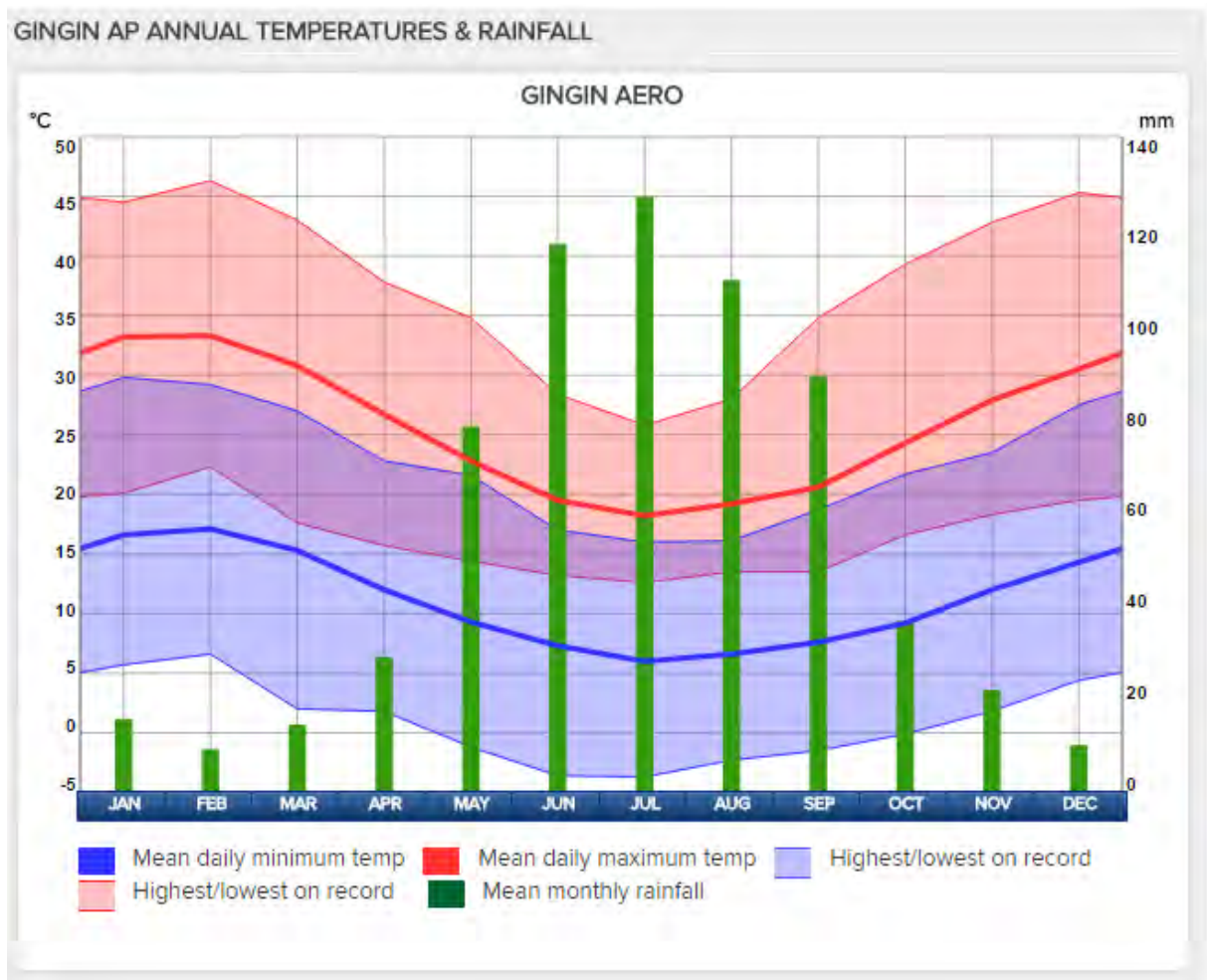


Plate 1 Mean climate statistics for Gingin Aero (Weather zone 2017)

3.2 Regional biogeography

The survey area is situated in the Southwest Botanical Province of WA (Beard 1990) within the SCP (SWA) bioregion and the Perth (SWA2) subregion as described by the Interim Biogeographic Region of WA (IBRA) (DEE 2016b).

The SCP bioregion is a low lying coastal plain, mainly covered with woodlands. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats and coastal limestone. Heath and/or Tuart woodlands occur on limestone, *Banksia* and Jarrah-*Banksia* woodlands on

Quaternary marine dunes of various ages and Marri on colluvial and alluvial soils. The subregion also includes a complex series of seasonal wetlands (Mitchell *et al.* 2002).

3.3 Landform and soils

Soil-landscape mapping of the South West of WA (DAFWA 2007) indicates that the survey area is located on the Quindalup Dunes and Spearwood Dunes landforms. The Quindalup Dunes comprises dunes and ridges generally oriented parallel to the present coast, composed of unconsolidated (calcareous) sands and shell fragments. The Spearwood Dunes lie landward of the Quindalup Dunes and consist of mainly brown and yellow sands of varying depths over limestone (Tamala Limestone). The DAFWA (2007) soil mapping indicates there are six different soil types within the survey area:

- Quindalup South Subsystem
 - Shallow calcareous sands over limestone and much rock outcrop (211Qu_Qs)
 - Calcareous sands with organic staining to about 30 cm, overlying pale brown sand with definite cementation below 1 m (211Qu_Q1)
 - Calcareous sands have organic staining to about 20 cm, passing into pale brown sand, some cementation below 1 m (211Qu_Q2)
 - Calcareous sands showing variable depths of surface darkening (211Qu_Qp)
- Spearwood Subsystem
 - Yellow deep sands (211Sp_Ky)
 - Bare limestone or shallow siliceous or calcareous sand over limestone (211Sp_KIs)
 - Irregular banks of karst depressions. Some limestone outcrop. Shallow brown sands. (211Sp_SP)

3.4 Hydrology

A search of the Department of Water and Environmental Regulation (DWER) Geographic Data Atlas (DWER 2016) indicates the survey area is within the DWER Swan-Avon Region. A summary of the Geographic Data Atlas queries for the survey area is provided in Table 5.

Table 5 Department of Water and Environmental Regulation geographic data atlas queries for the project area

Aspect	Details	Result
Groundwater area	Groundwater areas proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (RIWI Act).	Perth groundwater area
Groundwater subareas	Groundwater subareas proclaimed under the RIWI Act.	Quinns, Eglinton and Yanchep subareas
Surface water areas	Surface water areas proclaimed under the RIWI Act.	None present
Irrigation district	Irrigation Districts proclaimed under the RIWI Act.	None present
Rivers	Rivers proclaimed under the RIWI Act.	None present
Public Drinking Water Source Areas (PDWSA)	PDWSAs is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the <i>Metropolitan Water Supply, Sewage and Drainage Act 1909</i> or the <i>Country Area Water Supply Act 1947</i> .	Perth Coastal and Gwelup Underground Water Pollution Control Area

Aspect	Details	Result
Waterway Management Areas	Areas proclaimed under the <i>Waterway Conservation Act 1976</i> .	None present

3.4.1 Watercourses

There are no drainage lines within or adjacent to the survey area.

3.4.2 Wetlands

The EPBC Act PMST did not identify any International significant listed wetland within 10 km of the survey area. However, one nationally important wetland is located within 10 km of the survey area, the Loch McNess System (Yanchep Lake). The Loch McNess System occurs approximately 1.5 km east of the survey area within Yanchep National Park (Figure 4, Appendix A).

The Geomorphic Wetlands SCP dataset (Hill *et al.* 1996) identified nine wetlands within 5 km of the survey area (Table 6). These included five Conservation Category Wetlands (CCW), three Resource Enhancement Wetlands (REW) and one Multiple Use Wetland (MUW).

Table 6 Geomorphic wetlands within study area

Name	Category
Loch McNess	CCW
Yonderup Lake	CCW
Wilgarup Lake	CCW
Pippidinny Swamp	CCW
Nowergup Lake	CCW
Beonaddy Swamp	REW
Coogee Swamp	REW
Carabooda Lake	REW
Mindarie Lake	MUW

3.5 Land use

3.5.1 DBCA managed lands

No DBCA-managed conservation areas are located within the survey area. The closest DBCA managed area is Yanchep National Park (R 9868, Class A) located adjacent (east) to the survey area (Figure 3, Appendix A).

3.5.2 Environmentally Sensitive Areas

The majority of the survey area lies with an Environmentally Sensitive Area (ESA). This ESA likely aligns with the presence of TECs and their buffer zones within the survey area. Three Bush Forever sites intersect the survey area:

- Bush Forever site 289 (Ningana Bushland, Yanchep/ Eglinton) intersects the middle of the survey area
- Bush Forever site 288 (Yanchep National Park and Adjacent Bushland) intersects the northern extent of the survey area
- Bush Forever site 130 (Link between Yanchep and Neerabup National Parks) intersects one of the eastern extensions.

The ESA and Bush Forever sites within the survey area are illustrated in Figure 3, Appendix A.

3.6 Vegetation and flora

3.6.1 Broad vegetation mapping and extents

Broad scale (1:250,000) pre-European vegetation mapping of the area has been completed by Beard (1979) at an association level. The mapping indicates that three vegetation associations intersect the survey area:

- Low woodland; banksia (association 949)
- Medium woodland; tuart (association 998)
- Mosaic: Shrublands; *Acacia lasiocarpa* & *Melaleuca acerosa* [now *M. systena*] heath / Shrublands; *Acacia rostellifera* & *Acacia cyclops* thicket (association 1007)

Regional vegetation has been mapped by Heddle *et al.* (1980) based on major geomorphic units on the SCP. The Heddle *et al.* (1980) mapping indicates that four vegetation complexes on Aeolian deposits of the SCP are present within the survey area:

- Quindalup complex: Coastal dune complex consisting mainly of two alliances- the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata* – *Callitris preissii* and the closed scrub of *Acacia rostellifera*.
- Cottesloe complex – north: Predominantly low open forest and low woodland of *Banksia attenuata* – *B. menziesii* – *Eucalyptus todtiana*; closed heath on the limestone outcrops.
- Cottesloe complex – central and south: Mosaic of woodland of *Eucalyptus gomphocephala* and open forest of *E. gomphocephala* – *E. marginata* – *Corymbia calophylla*; closed heath on the limestone outcrops.
- Herdsman Complex: Dominated by sedgelands and a woodland of *E. rudis* – *Melaleuca* spp. The vegetation on elevated areas of Herdsman is mainly associated with that of adjacent Cottesloe and Karrakatta units.

The pre-European mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of the vegetation associations have been determined by the state-wide vegetation remaining extent calculations maintained by the DBCA (latest update October 2016 – Government of Australia (GoWA) 2016). As shown in Table 7, the current extents of vegetation associations 949, 998 and 1007 are greater than 36% of their pre-European extents at all levels (State, IBRA bioregion, IBRA subregion and LGA).

GoWA (2017) has assessed the vegetation complexes mapped by Heddle *et al.* (1980) against presumed pre-European extents within the SCP IBRA bioregion (Table 8) and the City of Wanneroo (Table 9) respectively. All four complexes have greater than 31% of their pre-European extents remaining within the SCP IBRA bioregion and in the City of Wanneroo.

3.6.2 Conservation significant ecological communities

A search of the EPBC Act PMST identified three EPBC Act-listed TECs potentially occurring within the study area. These TECs were also identified in a search of the DBCA TEC/PEC database, however, one is listed as a Priority 3 PEC by DBCA. A further two TECs and seven PECs were identified in the DBCA TEC/PEC database search. Details on all of these communities are provided in Table 10.

There are nine occurrences of TECs that intersect the survey area at various locations (Figure 2, Appendix A). The majority of the survey area overlays seven occurrences of the Aquatic Root

Mat Community in Caves of the SCP (Caves SCP01) TEC. The middle section of the survey area intersects one occurrence of Woodlands over sedgelands in Holocene dune swales of the southern SCP (SCP19b) TEC, and the southern section of the survey area intersects one occurrence of the *Melaleuca huegelii* – *M. acerosa* (*M. systema*) shrublands on limestone ridges (SCP26a) TEC.

Table 7 Extents of vegetation associations mapped with the survey area (GoWA 2016)

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed lands
SCP IBRA bioregion		1,501,221.93	580,697.31	38.68	37.35
Perth IBRA sub-region		1,117,757.03	467,145.63	41.79	38.06
1007	State: WA	30,407.75	20,753.02	68.25	12.07
	IBRA bioregion: SCP (SWA)	30,109.89	20,741.41	68.89	8.32
	IBRA sub-region: Perth (SWA2)	30,109.89	20,741.41	68.89	8.32
	LGA: City of Wanneroo	8,058.91	4,865.20	60.37	1.93
949	State: WA	218,193.94	123,038.57	56.39	24.42
	IBRA bioregion: SCP (SWA)	209,983.26	120,178.91	57.23	13.91
	IBRA sub-region: Perth (SWA2)	184,475.82	104,034.41	56.39	14.88
	LGA: City of Wanneroo	37,138.40	17,092.80	46.02	18.57
998	State: WA	51,015.33	18,523.50	36.31	32.97
	IBRA bioregion: SCP (SWA)	50,867.50	18,523.20	36.41	21.01
	IBRA sub-region: Perth (SWA2)	50,867.50	18,523.20	36.41	12.01
	LGA: City of Wanneroo	4,635.30	2,745.00	59.22	53.33

Table 8 Extents of vegetation complexes on the SCP mapped within the survey area (GoWA 2017)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	% of pre-European extent remaining	% of pre-European extent with formal protection
Quindalup complex	54,573.87	33,078.58	60.61	8.38
Cottesloe complex - north	43,474.31	25,169.36	57.89	9.51
Cottesloe complex – central and south	45,299.61	14,664.42	32.37	8.79
Herdsmen Complex	9,665.15	3,069.70	31.76	10.84

Table 9 Extents of vegetation complexes within in City of Wanneroo mapped within the survey area (GoWA 2017)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	% of pre-European extent remaining	Proportion of the vegetation complex within the LGA %
Quindalup complex	8,818.26	5,368.14	60.88	16.16
Cottesloe complex - north	8,715.75	5,955.20	68.33	20.05
Cottesloe complex – central and south	13,313.58	5,556.62	41.74	29.39
Herdsmen Complex	1,759.23	819.96	46.61	18.20

Table 10 Threatened and Priority Ecological Communities identified in the desktop searches

Community type	EPBC Act	DBCAs	Description	Location
Aquatic Root Mat Community in Caves of the SCP (TEC) (Caves SCP01)	Endangered	Critically Endangered	At Yanchep and on the Leeuwin Naturaliste Ridge, permanent streams and pools occur in caves and some support dense growths of root mats (from living Tuart trees). The root mats provide a constant and abundant primary food source for some of the richest aquatic cave communities known. Caves containing the aquatic root mat community at Yanchep occur where sandy soils underlie superficial limestone and where the waters of the Gnangara Mound seep through the sand to form a system of subterranean pools and streams.	Intersects the majority of the survey area
Sedgelands in Holocene dune swales of the southern SCP (TEC) (SCP19)	Endangered	Critically Endangered	The community occurs in linear damplands and occasionally sumplands, between Holocene dunes. Typical and common native species are the shrubs <i>Acacia rostellifera</i> , <i>A. saligna</i> , <i>Xanthorrhoea preissii</i> , the sedges <i>Baumea juncea</i> , <i>Ficinia nodosa</i> , <i>Lepidosperma gladiatum</i> , and the grass <i>Poa porphyroclados</i> . Several exotic weeds are found in this community but generally at low cover values. Two sub-groups identified: <ul style="list-style-type: none"> Community type 19a is termed 'sedgelands in Holocene dune swales' and generally occurs in the younger swales. Community type 19b is termed 'woodlands over sedgelands in Holocene dune swales' and tends to occur in older swales. This subgroup has an overstorey of woodlands including <i>Eucalyptus gomphocephala</i>, <i>Melaleuca raphiophylla</i> and <i>Banksia littoralis</i>. 	SCP19b intersects the middle of the survey area
<i>Melaleuca huegelii</i> – <i>M. acerosa</i> (<i>M. systema</i>) shrublands on limestone ridges (TEC) (SCP26a)		Endangered	Species rich thickets, heaths or scrubs dominated by <i>Melaleuca huegelii</i> , <i>M. systema</i> (previously <i>M. acerosa</i>), <i>Banksia sessilis</i> over <i>Grevillea preissii</i> , <i>Acacia lasiocarpa</i> and <i>Spyridium globulosum</i> , occurring on skeletal soil on ridge slopes and ridge tops. Broadly occurs on Spearwood Sands (Tamala Limestone) on large limestone ridges.	Intersects the southern section of the survey area
Shrublands on dry clay flats (TEC) (10a)	Critically Endangered	Endangered	A distinctive feature of the particular clay pan wetlands that comprise the ecological community is the suite of geophytes and annual flora that germinates, grows and flowers sequentially as these areas dry over summer, producing a floral display for over three months. The clay pans have very high species richness, a number of local endemics and are the most floristically diverse of the SCP wetlands	Occurs approximately 9 km east of the survey area

Community type	EPBC Act	DBCAs	Description	Location
SCP <i>Banksia attenuata</i> – <i>B. menziesii</i> woodlands (PEC) (SCP23b)	Endangered TEC (part)	PEC - Priority 3	(A component of the Endangered Banksia Woodlands of the SCP EPBC listed TEC) Endangered TEC (part) These woodlands occur in the Bassendean system, from Melaleuca Park to Gingin. Occurs in reasonably extensive Banksia woodlands north of Perth.	Occurs approximately 7 km east of the survey area
<i>Banksia ilicifolia</i> woodlands (PEC) (SCP22)	Endangered TEC (part)	Priority 3	(A component of the Endangered Banksia Woodlands of the SCP EPBC listed TEC) Endangered TEC (part) Low lying sites generally consisting of <i>Banksia ilicifolia</i> – <i>B. attenuata</i> woodlands, but <i>Melaleuca preissiana</i> woodlands and scrubs are also recorded. Occurs on Bassendean and Spearwood systems in the central SCP north of Rockingham. Typically has very open understorey, and sites are likely to be seasonally waterlogged.	Occurs approximately 7 km east of the survey area
Quindalup <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands (PEC) (SCP30b)		Priority 3	This community is dominated by either <i>Eucalyptus gomphocephala</i> or <i>Agonis flexuosa</i> . The presence of <i>Hibbertia cuneiformis</i> , <i>Geranium retrorsum</i> and <i>Dichondra repens</i> differentiate this group from other Quindalup community types. The type is found from the Leschenault Peninsular south to Busselton.	Occurs approximately 350 m north of the survey area
Southern <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands (PEC) (SCP25)	Endangered TEC (part)	Priority 3	Can form a component of the Endangered Banksia Woodlands of the SCP EPBC listed TEC or the Tuart Woodlands of the SCP PEC) Woodlands of <i>Eucalyptus gomphocephala</i> - <i>Agonis flexuosa</i> south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than tuart were occasionally recorded, including <i>Corymbia calophylla</i> at Paganoni block and <i>Eucalyptus decipiens</i> at Kemerton, however tuarts are emergent nearby. Banksias found in this community include <i>Banksia attenuata</i> , <i>B. grandis</i> and <i>B. littoralis</i> . However, Tuart formed the overstorey nearby	Occurs approximately 7 km north of the survey area
Northern Spearwood shrublands and woodlands (PEC) (SCP24)	Endangered TEC (part)	Priority 3	(Can be a component of the Endangered Banksia Woodlands of the SCP EPBC listed TEC) Endangered TEC (part) Heaths with scattered <i>Eucalyptus gomphocephala</i> occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system. The heathlands in this group typically include <i>Dryandra sessilis</i> (now <i>Banksia sessilis</i>), <i>Calothamnus quadrifidus</i> , and <i>Schoenus grandiflorus</i>	Occurs approximately 850 m south east of the survey area
<i>Acacia</i> shrublands on taller dunes (PEC) (SCP29b)		Priority 3	Community is dominated by <i>Acacia</i> shrublands or mixed heaths on the larger dunes. This community stretches from Seabird to south of Mandurah. No consistent dominant but species such as <i>Acacia rostellifera</i> , <i>Acacia lasiocarpa</i> , and <i>Melaleuca acerosa</i> (now <i>M. systema</i>) were important.	Occurs approximately 7 km north and 7 km south of the survey area

Community type	EPBC Act	DBCAs	Description	Location
Coastal shrublands on shallow sands (PEC) (SCP29a)		Priority 3	Mostly heaths on shallow sands over limestone close to the coast. No single dominant but important species include <i>Spyridium globulosum</i> , <i>Rhagodia baccata</i> , and <i>Olearia axillaris</i>	Occurs approximately 8 km south of the survey area
<i>Banksia</i> woodlands of the SCP (TEC) <i>Banksia</i> dominated woodlands of the SCP IBRA region (PEC)	Endangered	Priority 3	The ecological community is a woodland associated with the SCP of southwest WA. A key diagnostic feature is a prominent tree layer of <i>Banksia</i> , with scattered <i>Eucalyptus</i> and other tree species often present among or emerging above the <i>Banksia</i> canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range.	Community considered likely to occur within the study area

3.6.3 Flora diversity

The *NatureMap* database search identified 957 plant taxa, representing 134 families that have been recorded within the study area. This total comprises 789 native flora taxa and 168 introduced flora taxa. Dominant families recorded within the study area include Fabaceae (86 taxa), Myrtaceae (70 taxa) and Asteraceae (67 taxa). The *NatureMap* database search is provided in Appendix C.

3.6.4 Conservation significant flora

Desktop searches of the EPBC Act PMST database, *NatureMap* database, DBCA TPFL and WAHERB databases identified the presence/potential presence of 49 conservation significant flora taxa within the study area. The desktop searches recorded:

- Eight taxa listed under the EPBC Act and/or as Threatened under the WC Act
- Six Priority 1 taxa
- Seven Priority 2 taxa
- Seventeen Priority 3 taxa
- Eleven Priority 4 taxa

The locations of conservation significant flora registered on the DBCA databases are mapped in Figure 2, Appendix A.

3.7 Fauna

3.7.1 Fauna diversity

The *NatureMap* database search identified 602 fauna species previously recorded within the study area. This total included 209 birds, 61 reptiles, nine amphibians and 43 mammals. The remainder of species are marine fish and invertebrates and were not considered as part of this survey (except for conservation-listed invertebrates that were recorded opportunistically).

3.7.2 Conservation significant fauna

The EPBC Act PMST and *NatureMap* database identified the presence, or potential presence of 21 conservation significant fauna species, excluding marine or migratory/marine as no marine habitat was present within the survey. In addition to the 21 species identified by the database searches, 12 additional species were considered for this assessment as a result of a review of the species listed under Schedules 1-4 of the WC Act (revised February 2017).

3.8 Previous survey results

Two previous field surveys were completed in November 2010 (GHD 2011) and October 2012 (GHD 2012), to identify the environmental values of a similar alignment to the current survey area.

Vegetation and flora

The previous surveys did not identify any TECs or PECs within the survey area. Additionally no Threatened flora were located, although three Priority flora were recorded; *Conostylis pauciflora* subsp. *euryrhipis* (P4), *C. pauciflora* subsp. *pauciflora* (P4) and *Beyeria cinerea* subsp. *cinerea* (P3). The surveys recorded 193 plant taxa, comprising of 153 natives and 40 introduced species.

Fauna

The previous survey for a similar alignment identified 57 vertebrate fauna species including 42 birds, nine reptile and six mammal species in the survey area. Of these, five species are introduced including the Laughing Kookaburra (*Dacelo novaeguineae*), Red Fox (*Vulpes vulpes*), Feral Cat (*Felis catus*), House Mouse (*Mus musculus*) and European Rabbit (*Oryctolagus cuniculus*).

Four species of conservation significance were recorded in 2012 including Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Rainbow Bee-eaters (*Merops ornatus*), Graceful Sun Moth (*Synemon gratiosa*) and a ground cricket (*Pachysaga munggai* or *strobila*). Carnaby's Black Cockatoo is listed as Endangered under the EPBC Act and WC Act. The Rainbow Bee-eater is listed under International Agreement under the WC Act. The Graceful Sun-moth is list Priority 4 under DBCA. The ground cricket could not be identified to species level and was either *P. munggai* or *P. strobila*, which are listed as Priority 3 or Priority 1, respectively.

4. Field survey results

4.1 Vegetation and flora

4.1.1 Vegetation types

Fifteen vegetation types were identified and described for the survey area (Table 11 and Figure 5, Appendix A). Thirteen of the vegetation types comprised remnant native vegetation. The remaining two vegetation types were dominated by planted taxa and scattered native species.




The vegetation types were distributed in a mosaic like pattern along the survey area as the soil landscapes and dune landforms changed. *Banksia sessilis* and *Spyridium globulosum* tall shrubland (VT03) was the dominant vegetation type within the survey area (28.40 ha) occurring in patches along the entire alignment. *Eucalyptus decipiens* woodland (VT11) and *Banksia attenuata* and *B. grandis* low woodland (VT15) were the most vegetation types within the survey area, occupying 0.26 ha and 0.08 ha respectively.




Areas identified as cleared are devoid of native vegetation. These areas primarily occur within newly established housing estates and infrastructure corridors.




A floristic analysis was used to compare the GHD quadrats to existing data (where available) for FCTs described and surveyed by Gibson *et al.* (1994) on uplands centred on Spearwood and Quindalup Dunes. The cluster analysis and resulting dendrograms showed a clear separation of quadrats from FCTs s14, 22 and 23b; other FCTs had quadrats on multiple clades. The GHD quadrats clustered on one clade separate to all other FCT quadrats (Appendix D). This preliminary analysis indicates that, statistically, the vegetation recorded in the GHD quadrats does not have strong affinities to any TECs or PECs known from the area.




A two dimensional MDS scatter plot was also produced and largely reflected the dendrogram. FCT s14, 22 and 23b showed the most discrete grouping. However, the scatter plot illustrates some GHD quadrats having affinities to FCTs 24, 25, 26b, 27 and 28 (Appendix D). The statistical outputs indicate partial statistical alignment between the GHD vegetation types and the previously described Gibson *et al.* (1994) FCTs based on taxa present or absence. However, limitations with the data analysis include no consideration of dominant taxa within each vegetation type.




Table 11 Recorded vegetation types


Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
<i>Acacia saligna</i> and <i>Xanthorrhoea preissii</i> tall shrubland (VT01)	<i>Acacia saligna</i> , <i>Xanthorrhoea preissii</i> tall shrubland over mixed introduced sparse herbland/grassland	Slopes of dunes with brown sandy soils.	13.46 ha	Quadrat: 1 & 26	
<i>Banksia sessilis</i> and <i>Melaleuca systema</i> mid-shrubland (VT02)	<i>Banksia sessilis</i> , <i>Melaleuca systema</i> , <i>Calothamnus quadrifidus</i> , <i>Hakea lissocarpa hypericoides</i> low open shrubland over mixed sparse herbland	Slopes of dunes with yellow sandy soils.	8.75 ha	FCT 24 (PEC) Quadrats: 2, 20 & 23	
<i>Banksia sessilis</i> and <i>Spyridium globulosum</i> tall shrubland (VT03)	<i>Banksia sessilis</i> , <i>Spyridium globulosum</i> tall shrubland over <i>Calothamnus quadrifidus</i> , <i>Melaleuca systema</i> low shrubland over open sedgeland <i>Mesomelaena pseudostygia</i> , <i>Desmocladius flexuosus</i>	Dune swales with brown sandy soils.	28.40 ha	FCT 24 (PEC) Quadrats: 3, 10 & 16	

Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
<i>Banksia attenuata</i> , <i>B. menziesii</i> low woodland (VT04)	<i>Banksia attenuata</i> , <i>B. menziesii</i> low woodland over shrubland <i>Calothamnus quadrifidus</i> , <i>Hakea trifurcata</i> , <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> over sparse sedgeland <i>Mesomelaena pseudostygia</i> , <i>Desmocladius flexuosus</i> .	Undulating plain with brown-yellow sandy soils.	27.66 ha	Association 949 Banksia woodlands TEC/ Banksia dominated woodlands PEC Quadrats: 4, 18, 19, 22, 29, 30, 31, 34 & 35	
<i>Lomandra</i> sp. herbland (VT05)	<i>Melaleuca systema</i> , <i>Hibbertia hypericoides</i> isolated shrubs over <i>Lomandra</i> sp. <i>Conostylis candicans</i> , <i>Kennedia prostrata</i> herbland.	Dunes ridges with white to brown sandy soils.	14.63 ha	Quadrats: 5, 9 & 12	
<i>Eucalyptus gomphocephala</i> tall woodland (VT06)	<i>Eucalyptus gomphocephala</i> tall woodland over <i>Spyridium globulosum</i> tall sparse shrubland	Slopes of dunes with brown sandy soils.	3.38 ha	Tuart (<i>Eucalyptus gomphocephala</i>) woodlands of the SCP PEC Quadrats: 6, 25 & 27 Relevé: R1	

Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
<i>Eucalyptus</i> sp., <i>Agonis flexuosa</i> woodland (VT07)	<i>Eucalyptus</i> sp., <i>Agonis flexuosa</i> woodland over <i>Spyridium globulosum</i> sparse shrubland.	Slopes of dunes with brown sandy soils.	0.32 ha	Quadrat: 7	
<i>Melaleuca huegelii</i> and <i>M. systema</i> shrubland (VT08)	<i>Melaleuca huegelii</i> , <i>M. systema</i> <i>Grevillea preissii</i> shrubland over sparse herbland <i>Hardenbergia comptoniana</i>	Upper slopes and ridge of dunes with brown to yellow sandy soils and numerous limestone outcropping.	1.28 ha	FCT 26a (TEC) Quadrats: 8, 21, 24, 32, 33 & 36 Relevé: R5	
<i>Banksia attenuata</i> woodland (VT09)	<i>Banksia attenuata</i> low woodland over <i>Melaleuca systema</i> , <i>Spyridium globulosum</i> , <i>Xanthorrhoea preissii</i> shrubland over sparse mixed sedgeland	Undulating plain and dune swales with brown sandy soils.	8.45 ha	Association 949 Banksia woodlands TEC/ Banksia dominated woodlands PEC Quadrats: 11, 14 & 15	

Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
<i>Xanthorrhoea preissii</i> shrubland (VT10)	<i>Xanthorrhoea preissii</i> tall shrubland over <i>Jacksonia calcicola</i> , <i>Hakea prostrata</i> , <i>Banksia dallanneyi</i> low open shrubland over <i>Lomandra</i> sp., <i>Conostylis</i> spp. open herbland	Slopes of dunes with brown sandy soils.	2.20 ha	Quadrat: 13 & 28 Relevé: R2	
<i>Eucalyptus decipiens</i> woodland (VT11)	<i>Eucalyptus decipiens</i> woodland over <i>Banksia sessilis</i> , <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> shrubland over <i>Conostylis aculeata</i> , <i>Mesomelaena pseudostygia</i> , <i>Desmocladus flexuosus</i> sparse herbland	Undulating plain with brown sandy soils.	0.26 ha	Quadrat: 17	
Planted (VT12)	Areas with planted shrubs and trees of both native and introduced species. Understorey is generally comprised of introduced herbs and grasses.	Undulating plain and dunes slopes with sandy soils.	9.98 ha	Relevé: R3	

Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
Scattered Natives (VT13)	Areas with isolated native shrubs, normally <i>Acacia</i> spp., over mixed introduced grasses and herbs.	Undulating plain and dunes slopes with sandy soils.	24.73 ha	-	
<i>Acacia rostellifera</i> tall shrubland (VT14)	Occasional <i>Spyridium globulosum</i> with <i>Acacia rostellifera</i> tall shrubland over <i>Melaleuca systema</i> low isolated heath shrub over * <i>Lagurus ovatus</i> and * <i>Vulpia myuros</i> open grassland	Undulating plain and dune slopes with sandy soils.	0.80 ha	Relevé: R4	
<i>Banksia attenuata</i> and <i>B. grandis</i> low woodland (VT15)	<i>Banksia attenuata</i> , <i>B. grandis</i> and <i>Allocasuarina fraseriana</i> low woodland over <i>Xanthorrhoea preissii</i> tall isolated clumps of shrubs over * <i>Carpobrotus edulis</i> , * <i>Pelargonium capitatum</i> and * <i>Avena barbata</i> herbland/grassland.	Plain with brown sandy soils	0.08 ha	Association 949 Banksia dominated woodlands PEC Relevé: R6	

Vegetation type	Vegetation Type Description	Landform and Substrate	Extent (ha)	Vegetation Association/FCT alignment & quadrat reference	Photograph
Not accessible / Cleared	Areas devoid of native vegetation that have been cleared for housing and infrastructure or partially revegetated within the rail corridor.	-	20.73 ha	-	

4.1.2 Vegetation condition

The vegetation condition within the survey area was rated as Pristine to Completely Degraded in condition. The extents of the vegetation condition ratings mapped within the survey area are detailed in Table 12 and mapped in Figure 6, Appendix A.

The small area rated as Pristine comprised vegetation within the centre of the survey area that was a very thick *Banksia sessilis* community, the thickness of the vegetation inhibits the growth of weeds and reduced the presence of motorcycle tracks. Much of the survey area was rated as Excellent to Very Good in condition with the vegetation structure largely intact and some herbaceous and grassy weeds present (35.12% of the survey area). The survey area is intersected by a large number of tracks that are utilised by the local residents resulting in some areas affected by soil erosion and becoming infesting with weeds. The Degraded and Completely Degraded areas have been historically cleared or impacted by grazing and are dominated by introduced species. The cleared areas are devoid of native vegetation and are associated with cleared areas for housing and infrastructure (12.55% of the survey area).

Table 12 Extent of vegetation condition ratings mapped within the survey area

Vegetation Condition	Extent in survey area (ha)
Pristine	1.25
Excellent	27.44
Very Good	30.56
Very Good - Good	0.98
Good	27.90
Good - Degraded	1.39
Degraded	20.23
Completely Degraded	34.64
Not rated – cleared	20.73
Total	165.13 ha

4.1.3 Conservation significant ecological communities

The statistical analysis identified the possible presence of two conservation significant ecological communities within the survey area:

- Southern *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands (FCT 25) Priority 3 PEC¹
- Northern Spearwood shrublands and woodlands (FCT 24) Priority 3 PEC¹.

Additionally, assessing the vegetation types described at a broad level, based on dominant species, landform features and field observations a further four conservation significant ecological communities were identified within the survey area:

- *Banksia* Woodlands of the SCP TEC
- *Banksia* dominated woodlands of the SCP IBRA region PEC²
- *Melaleuca huegelii* – *M. acerosa* [*M. systema*] shrublands on limestone ridges (FCT 26a) Endangered TEC

¹ Community is also recognised as part of the *Banksia* Woodlands of the Swan Coastal Plain TEC, which is listed as Endangered under the EPBC Act.

- Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP Priority 3 PEC.

Statistically some GHD quadrats showed affinity to FCT 25. Statistics and field observations aligned the quadrats of GHD VT02 and VT03 to FCT 24. A number of areas of GHD VT04 and VT09 met the key diagnostic characteristics of the Banksia Woodlands of the SCP TEC. Field observations also found GHD VT04 and VT09 aligned with the *Banksia* dominated woodlands of the SCP IBRA region PEC and GHD VT08 aligned closely with FCT 26a. A description of each conservation significant ecological community and its occurrence within the survey area is described below and extent mapped in Figure 7, Appendix A.

Southern *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands PEC

The Southern *Eucalyptus gomphocephala* and/ or *Agonis flexuosa* woodlands (SCP 25) PEC is generally found south of Woodman Point. The community is characterised by *Eucalyptus gomphocephala* (Tuart), with other dominants, occasionally records include *Corymbia calophylla* and *E. decipiens*. Other common species are *Agonis flexuosa*, *Hibbertia hypericoides*, *Macrozamia riedlei*, *Acacia willdenowiana* and *Hardenbergia comptoniana*. One occurrence of this PEC was recorded approximately 7 km north of the survey area (DBCA TEC/PEC database).

The flora assessment conducted by GHD recorded *Eucalyptus gomphocephala* and *Agonis flexuosa* dominated communities (VT06 and VT07 respectively) within the survey area. However, the GHD quadrats that represented these communities did not align statistically with SCP 25, nor do the vegetation types contain most/all the key indicator species present in this PEC. The GHD quadrats that clustered more closely with SCP 25 were identified as *Banksia* spp. dominated woodland communities. The Southern *Eucalyptus gomphocephala* and/ or *Agonis flexuosa* woodlands PEC is recognised as a component of the *Banksia* Woodlands of the SCP EPBC Act listed TEC (where a *Banksia* canopy is present), and this may explain the statistical results.

The *Eucalyptus gomphocephala* (Tuart) vegetation units could not be confidently aligned with the Southern *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands PEC and this community is unlikely to occur within the survey area.

Northern Spearwood shrublands and woodlands PEC

The Northern Spearwood shrublands and woodlands (24) PEC occurs as heaths or heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. *Banksias* found in this community include *Banksia attenuata* and *B. menziesii*. The heathlands in this group typically include *Dryandra sessilis* (now *Banksia sessilis*), *Calothamnus quadrifidus* and *Schoenus grandiflorus*, with other common species including *Hardenbergia comptoniana*, *Melaleuca acerosa* and *Xanthorrhoea preissii*.

The GHD vegetation types that were statistically representative of the Northern Spearwood shrublands and woodlands PEC were VT02 and VT03. Field observations also confirmed the similarities. The key characteristics of Northern Spearwood shrublands and woodlands PEC met by VT02 and VT03, were:

- Occurs on the western SCP on the Cottesloe units of the Spearwood system
- The vegetation types includes occurrences of *Banksia attenuata* and *B. menziesii*
- The heath community may consist of *Banksia sessilis*, *Calothamnus quadrifidus*, *Melaleuca systena*, *Xanthorrhoea preissii*, *Lepidosperma squamatum*, *Hardenbergia comptoniana*, *Phyllanthus calycinus*, *Conostylis aculeata*, *Dianella revoluta*, *Lomandra maritima*, *Schoenus grandiflorus*, *Desmodcladus flexuosa* and *Austrostipa flavescens*

GHD vegetation types VT02 (8.75 ha) and VT03 (28.40 ha) aligned with the Northern Spearwood shrublands and woodlands PEC

Banksia Woodlands of the SCP TEC

The Banksia Woodlands of the SCP TEC is restricted to the SCP IBRA bioregion and immediately adjacent areas, including the Dandaragan Plateau, from Jurien Bay in the north, to Dunsborough in the south, and northwest on the Whicher and Darling escarpments (DEE 2016c). The ecological community typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands (DEE 2016c).

During the field survey two vegetation types were assessed as meeting the key diagnostic characteristics for the Banksia Woodlands of the SCP TEC, as outlined in DEE (2016c). Specifically:

- The survey area occurs in the SCP IBRA bioregion
- The survey area occurs on sandplain landform, notably Spearwood and Quindalup sands
- The vegetation types have a low woodland structure and the upper sclerophyllous layer is dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. The understorey consists of a mid-ground sclerophyllous shrub layer and/or a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs that sometimes includes grasses.

Furthermore, the mapped areas meet the minimum condition and patch size criteria outlined by DEE (2016c) necessary to be considered as part of the TEC. A breakdown of the TEC areas within the survey area is detailed in Table 13.

Table 13 Extent of Banksia Woodlands of the SCP TEC within the survey area

Condition rating	Minimum patch size	Vegetation type and extent
Excellent	0.5 ha	VT04: 6.39 ha
Very Good	1 ha	VT04: 7.78 ha VT09: 6.68 ha
Good	2 ha	VT04: 8.20 ha VT09: 0.66 ha
Total		29.71 ha

Banksia dominated woodlands of the SCP IBRA region PEC

The field assessment also confirmed the presence of the Banksia dominated woodlands of the SCP IBRA region PEC, listed as Priority 3 by DBCA. This PEC differs from the TEC in that it has no minimum condition and patch size thresholds. Vegetation types VT04, VT09 and VT15 are representative of the Banksia dominated woodlands of the SCP IBRA region PEC.

There is 36.18 ha of the PEC present within the survey area (this total includes 29.71 ha which also aligns with the Banksia Woodlands of the SCP TEC). A breakdown of the PEC is detailed Table 14.

Table 14 Extent of Banksia dominated woodlands of the SCP IBRA region PEC within the survey area

Vegetation type	Vegetation condition	Extent (ha)
VT04	Excellent	6.39
	Very Good	7.78
	Good	8.20
	Degraded	5.13
	Completely Degraded	0.16
VT09	Very Good	6.67
	Good	0.66
	Degraded	0.86
	Completely Degraded	0.25
VT15	Degraded	0.08
Total		36.18

***Melaleuca huegelii-Melaleuca systema* shrublands of limestone ridges TEC**

The *Melaleuca huegelii-Melaleuca systema* shrublands of limestone ridges TEC occurs on skeletal soils on ridge slopes and ridge tops with limestone outcropping. The community is described as comprising of species rich thickets, heaths or scrubs dominated by *Melaleuca huegelii*, *M. systema*, *Banksia sessilis* over *Grevillea preissii*, *Acacia lasiocarpa* and *Spyridium globulosum* (community 26a as described by Gibson *et al.* 1994). The community is highly restricted and known from massive limestone ridges around Yanchep north of Perth, and south of Perth near Lake Clifton.

Field observations inferred GHD VT08 may align with TEC 26a, but the multiple site analysis was inconclusive. Therefore, a SSI analysis using quadrats represented by VT08 (Q08, Q21, Q24, Q32, Q33 & Q36) was performed. Six two-dimensional MDS scatter plots were produced and are provided in Appendix D. The statistical outputs indicate the following:

- Q08 – showed affinities to FCTs 24, 26a and 29
- Q21 – showed affinities to FCTs 24, 26a, 26b and 27
- Q24 – showed affinities to FCTs 26a and 29b
- Q32 – showed affinities to FCTs 26a, 27 and 29b
- Q33 – showed affinities to FCTs 26a, 27 and 29b
- Q36 – showed affinities to FCTs 24, 26a and 27.

Each quadrat represented by GHD VT08 showed affinities with variable FCTs. However, all showed affinities to FCT 26a.

GHD VT08 aligned with *Melaleuca huegelii-Melaleuca systema* shrublands of limestone ridges TEC based on landform, vegetation structure and species composition. The vegetation type contained many of the key species outlined in the community description (e.g. *Melaleuca huegelii*, *M. systema* and *Grevillea preissii*) and generally was in Very Good to Excellent condition. There is 1.28 ha of this TEC present within the survey area.

***Tuart (Eucalyptus gomphocephala)* woodlands of the Swan Coastal Plain PEC**

Mostly confined to Quindalup Dunes and Spearwood Dunes from Jurien Bay to the Sabina River, with outliers along some rivers. Tuart is the key dominant canopy species however; Tuart communities comprise a variety of flora and fauna assemblages. Flora commonly occurring with

Tuart include Peppermint (*Agonis flexuosa*), *Banksia attenuata*, *Banksia grandis*, *Allocasuarina fraseriana*, *Xylomelum occidentale*, *Macrozamia riedlei*, *Xanthorrhoea preissii*, *Spyridium globulosum*, *Templetonia retusa* and *Diplolaena dampieri*.

During the field survey one vegetation type was assessed as meeting the key diagnostic characteristics for the Tuart woodlands of the Swan Coastal Plain PEC, as outlined in DEE (2017b), specifically:

- The survey area occurs in the SCP IBRA bioregion
- The survey area occurs on sandplain landform, notably Spearwood and Quindalup sands
- The vegetation type is a tall woodland with *Eucalyptus gomphocephala* being the dominant canopy species
- Vegetation type (VT06) meets the established tree size criteria (>15 cm DBH) and patch definition².

GHD vegetation type VT06 (3.38 ha) aligned with the Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain PEC

4.1.4 Flora diversity

Two hundred and forty flora taxa (including subspecies and varieties) representing 57 families and 151 genera were recorded from the survey area during the field survey. This total comprised of 179 native taxa and 61 introduced flora taxa.

Dominant families recorded from the survey area included:

- Poaceae (28 taxa)
- Fabaceae (26 taxa)
- Proteaceae (25 taxa).

The number of native species typically recorded in 100 m² within the Quindalup and Spearwood Dune systems ranges from 9-35 and 37-55 respectively (GoWA 2000). Based on described quadrats, species diversity ranged from 12 to 49 (average 32) taxa per 100 m². The survey area is considered representative of the floristic diversity in the area. The highest floristic diversity was recorded in VT02.

4.1.5 Conservation significant flora

No EPBC Act or WC Act listed flora were recorded within the survey area, however, one DBCA Priority-listed flora species was recorded within the survey area during the field survey, *Hibbertia spicata* subsp. *leptotheca* (P3). The species is described as an erect or spreading shrub, approximately 0.2-0.5 m high with yellow flowers. *Hibbertia spicata* subsp. *leptotheca* is recorded in the SCP IBRA bioregion where it grows near coastal limestone ridges, outcrops and cliffs (WA Herbarium 1998–).

Hibbertia spicata subsp. *leptotheca* was recorded in quadrat 8, VT08 – *Melaleuca huegelii* and *M. systema* shrubland. Within this quadrat one plant was recorded (Figure 7, Appendix A). The known habitat for this taxon is limestone outcrops and cliffs (WA Herbarium 1998-). Vegetation types VT02 and VT03 had occasional limestone outcroppings, so these vegetation types may also provide suitable a habitat for this taxon.

² Patches contain at least three established tuart trees, with no more than 40 m between their canopies. At least two of these tuart trees must be alive

Likelihood of occurrence

A likelihood of occurrence assessment was conducted post-field survey for all conservation significant flora taxa identified in the desktop assessment (Appendix D). This assessment took into account previous records, habitat requirements, efficacy of the survey, intensity of the survey, flowering times and the cryptic nature of species.

The likelihood of occurrence assessment post-field survey concluded that one taxon is known to occur (*Hibbertia spicata* subsp. *leptotheca*), three taxa are likely to occur, 13 taxa may possibly occur and the remaining 32 taxa are unlikely or highly unlikely to occur within the survey area. The three taxa likely to occur have previously been recorded within the study area (Table 15).

Table 15 Taxa likely to occur within the survey area

Taxa	Known habitat (WA Herbarium, 1998-)	Vegetation types that support known habitat
<i>Beyeria cinerea</i> subsp. <i>cinerea</i> (P3)	Heath over slopes with grey/ yellow sand over limestone.	VT02, VT03 and VT05
<i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i> (P4)	Heath over white, grey or yellow sand. Consolidated dunes.	VT02, VT03 and VT05
<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i> (P4)	Heath over grey sand, limestone. Hillslopes, consolidated dunes.	VT02, VT03 and VT05

4.1.6 Introduced flora

Sixty one introduced flora taxa were recorded in the survey area. Of the introduced taxa, four are listed as Declared Pests under the *Biosecurity and Management Act 2007* and/or as a WONS (DEE 2013):

- **Gomphocarpus fruticosus* (Narrowleaf Cottonbush) – Declared Pest
- **Solanum linnaeanum* (Apple of Sodom) – Declared Pest
- **Lantana camara* (Common Lantana) – Declared Pest and WONS
- **Asparagus asparagoides* (Bridal Creeper) - Declared Pest and WONS.

The remaining introduced taxa are considered environmental weeds and all have been previously recorded on the SCP. The locations of **Gomphocarpus fruticosus*, **Solanum linnaeanum*, **Lantana camara* and **Asparagus asparagoides* within the survey area are mapped in Figure 6, Appendix A.

4.2 Fauna

4.2.1 Fauna habitats

The survey identified nine fauna habitat types within the survey area. These habitat types are closely aligned to the vegetation types described in section 4.1.1 and are presented below in Table 16 and mapped in Figure 8, Appendix A. They consist of:

- *Eucalyptus* woodland
- *Banksia sessilis* over low mixed shrubland
- Mixed *Banksia* woodland

- Mixed tall shrubland
- *Lomandra* herb lands on secondary dunes
- Limestone ridge lines
- Planted *Eucalyptus* woodland
- *Acacia* shrubland
- Highly disturbed



4.2.2 Fauna habitat connectivity and disturbance

The survey area is a mosaic of intact remnant and previously disturbed areas. Much of the region is designated for residential development and many areas show evidence of clearing since the 2012 surveys. Although bisected by roads and residential suburbs connectivity is currently present north and south via a thin strip of natural vegetation. Parts of the survey area have been affected by varying degrees of disturbance. Dumping was present throughout the majority of the survey area in particular adjacent to tracks and roads which are easily accessible to the public. Weeds were also present throughout the majority of the survey area in varying degrees. Weed species increased adjacent to tracks and roads due to edge effects.

4.2.3 Habitat quality

The fauna habitat value is largely high with several areas of medium quality, however the overall habitat value is considered to be high.

Table 16 Fauna habitat types within survey area

Habitat type	Indicative photograph
<p><i>Eucalyptus</i> woodland 3.38 ha</p> <p>This habitat incorporates vegetation types VT06</p> <p>This habitat type is dominated by Tuart (<i>Eucalyptus gomphocephala</i>) with a mixed under story of shrubs and weed understory. The vegetation varies slightly in species composition and density throughout the survey area depending on the amount of disturbance but is always dominated by Tuart. This habitat had deep sandy soils with litter and woody debris associated to Tuarts and shrub layers. Some of the woody debris areas were very thick able to provide refuge areas for ground dwelling mammals and reptiles. Few large logs were present in this habitat which is likely an artefact off historical fire activity, although little fire activity was recorded during the survey. This woodland provides excellent cover for small bush birds and mammals with numerous aerial species recorded in this habitat type.</p> <p><u>Conservation significant species:</u></p> <p>Two species of conservation significance was recorded in this habitat type, Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>) and the Rainbow Bee-eater (<i>Merops ornatus</i>). The Carnaby's Black Cockatoo was recorded resting in the habitat type however is likely to also utilise it for roosting. The Rainbow Bee-eaters were recorded foraging on the outskirts of this habitat type. The Western Brush Wallaby (<i>Macropus irma</i>) (resident) Southern Brown Bandicoot (<i>Isodon obesulus fusciventer</i>) (resident), Peregrine Falcon (<i>Falco peregrinus</i>) (foraging) and Chuditch (<i>Dasyurus geoffroi</i>) (foraging) may all opportunistically use this habitat.</p> <p>Habitat Value - High</p>	
<p><i>Banksia sessilis</i> over low mixed shrubland 37.16 ha.</p> <p>This habitat incorporates vegetation types VT02, VT03.</p> <p>This habitat type is dominated by <i>Banksia sessilis</i> with sparse <i>Acacia</i>, <i>Hakea</i>, <i>Xanthorrhoea</i> and <i>Olearia</i> species over a low native shrubland and weed understory. The vegetation varies slightly in species composition throughout the survey area but it always dominated by <i>Banksia sessilis</i>. This habitat often had either heavy loam soils with limestone incursion or limestone capping. Some areas of limestone were extensive and may provide hide areas for fauna species. In some areas the limestone formed pinnacles amongst the vegetation. This shrubland provides excellent cover for small bush birds and mammals with numerous aerial species recorded in this habitat type.</p>	

Habitat type

Conservation significant species:

One species of conservation significance was recorded in this habitat type, Carnaby's Black Cockatoo. The Carnaby's Black Cockatoo was recorded feeding in the habitat type throughout the survey area. The Western Brush Wallaby (resident) Southern Brown Bandicoot (resident), Peregrine Falcon (foraging) and Chuditch (resident, foraging) may all opportunistically use this habitat. The ground cricket *Pachysaga spp.* was recorded in this habitat in 2012 and is likely a resident.

Habitat Value - High

Indicative photograph



Mixed *Banksia* woodland 36.19 ha.

This habitat incorporates vegetation types VT04, VT09, VT15

This habitat type is dominated by *Banksia* species including *B. attenuata* and *B. menziesii* with some areas of *Banksia sessilis* incursion. Shrub layers of *Acacia*, *Hakea*, *Xanthorrhoea*, *Zamia* and *Olearia* species were also common. This habitat was often very dense and had excellent litter cover and woody debris. Few large logs were present due to the lack of large tree species, however large skirts from *Xanthorrhoea* and *Zamia* palms would provide excellent cover for terrestrial fauna species. Soils were predominantly deep sands. Numerous small reptiles and birds were recorded in this habitat type due to the cover it provides and deep sandy soils. No recent fire scars were evident.

Conservation significant species:

One species of conservation significance was recorded in this habitat type, Carnaby's Black Cockatoo. The Carnaby's Black Cockatoo was recorded feeding in the habitat type throughout the survey area. The Western Brush Wallaby (resident, foraging) Southern Brown Bandicoot (resident, foraging), Peregrine Falcon (foraging) and Chuditch (resident, foraging) may all opportunistically use this habitat. Two reptile species the Jewelled Skink (*Ctenotus gemmula*) and Black Striped snake (*Neelaps calonotos*) are also known to utilise/reside in this habitat. The ground cricket *Pachysaga spp.* may also reside in this habitat.

Habitat Value - High



Habitat type

Mixed tall shrubland – 41.68 ha

This habitat incorporates vegetation types VT01, VT07, VT10, VT11, VT13

This habitat type was dominated by shrubs including *Grevillea*, *Acacia*, *Calothamnus*, *Hakea*, *Xanthorrhoea*, *Melaleuca* and *Olearia* species were most common. This habitat was often very dense and had excellent litter cover and small fine woody debris. Few large logs were present due to the lack of large tree species, however, the density of the vegetation would provide excellent cover for terrestrial fauna species. Soils were predominantly deep sands with minor limestone incursion. No recent fire scars were evident. Numerous birds were recorded in this habitat type due to the flowering plants present. This habitat is also where the Brush Wallaby was recorded.

Note: The area calculated for this fauna habitat type differs to the extent calculated for the incorporated vegetation types (Table 11) as it includes the vegetation within the non-accessible revegetated rail corridor, which was observed through the exclusion fence.

Conservation significant species:

Two species of conservation significance were recorded in this habitat type, Carnaby's Black Cockatoo and Western Brush Wallaby. The Carnaby's Black Cockatoos were recorded feeding in the habitat type throughout the survey area. The Western Brush Wallaby was recorded resting under an *Olearia* next to the track. This species is able to utilise all the habit areas of the survey area as a resident or for foraging. The Southern Brown Bandicoot (resident, foraging), Peregrine Falcon (foraging) and Chuditch (resident, foraging) may all opportunistically use this habitat. Two reptile species the Jewelled Skink and Black Striped snake are also known to utilise/reside in this habitat.

Habitat Value - High

Indicative photograph



Habitat type

***Lomandra* herbland on secondary dunes 14.63 ha**

This habitat incorporates vegetation types VT05

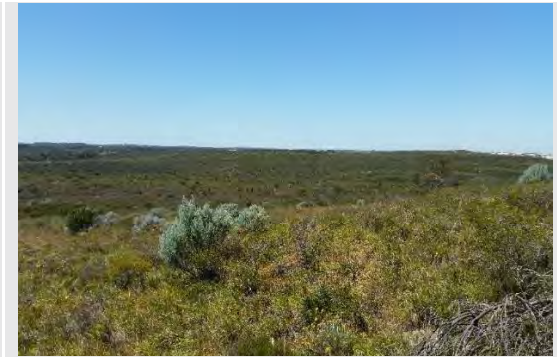
Lomandra dominated herbland was present on secondary dune systems throughout small areas of the survey area. The habitat consisted of *Lomandra* species and low scattered shrubs. The habitat was mostly open with little litter or woody debris and no logs present. The secondary dunes consist of deep mobile sands and appear long unburnt. Few fauna species were recorded in this habitat type however species that preferred open areas like Australasian Pipit and Nankeen Kestrel were recorded.

Conservation significant species:

No species of conservation significance were recorded in this habitat type. The Western Brush Wallaby may utilise the area for foraging. The Southern Brown Bandicoot (foraging), Peregrine Falcon (foraging) and Chuditch (foraging) may all opportunistically use this habitat. Two reptile species the Jewelled Skink and Black Striped snake may also utilise/reside in this habitat. The *Lomandra* is known to be a host species for the Graceful Sun Moth (*Synemon gratiosa*) and this habitat is likely important to this species.

Habitat Value - Medium

Indicative photograph



Limestone ridgelines 1.28 ha

This habitat incorporates vegetation types VT08

Limestone ridgelines were present in small areas of the survey area and included shrubs of *Melaleuca*, *Grevillia* and *Spyridium* species. This habitat had litter and fine woody debris associated to the shrubs which would provide cover to small fossorial species however the limestone ridging would also provide denning and hides. No large logs were present in this habitat type due to the lack of large trees. Few fauna species were recorded in this habitat type however species that prefer to hide in small caves or under rock may utilise this area.

Conservation significant species:

No species of conservation significance were recorded in this habitat type. The Western Brush Wallaby (foraging), Southern Brown Bandicoot (foraging), Peregrine Falcon (foraging) and Chuditch (foraging, denning) may all opportunistically use this habitat.

Habitat Value - Medium



Habitat type

Planted *Eucalyptus* woodland 9.98 ha

This habitat incorporates vegetation types VT12

Several small areas of planted non-native trees were present in the survey area. These consisted of several *Eucalyptus* species including cultivars. These tree species formed good canopy cover and connectivity for areal species however had little understorey present. Litter and branch material was numerous however few large logs were present.

Conservation significant species:

No conservation significant species were recorded in this habitat type. However, Carnaby's Black Cockatoo (feeding and roosting), Southern Brown Bandicoot (foraging), Peregrine Falcon (Foraging) and Chuditch (foraging) may all opportunistically use this habitat.

Habitat value - Medium

Acacia shrubland 0.80 ha

This habitat incorporates vegetation types VT14

Two small areas of *Acacia* shrubland were present at the southern end of the survey area. These consisted of dense stands of *Acacia rostellifera* in close proximity to Highly Disturbed habitat. No logs were present due to the lack of large tree species, however, the density of the vegetation would provide excellent cover for terrestrial fauna species.

Conservation significant species:

No species of conservation significance were recorded in this habitat type. The Western Brush Wallaby (resident), Southern Brown Bandicoot (foraging, resident), Peregrine Falcon (foraging) and Chuditch (foraging) may all opportunistically use this habitat.

Habitat Value - Medium

Indicative photograph



Habitat type

Highly disturbed 20.02 ha

This habitat incorporates vegetation types 'Cleared'.

Highly disturbed areas provide very little to fauna species but can be used by common insectivorous bird species for foraging and by avian and ground dwelling species as corridors.

Note: The area calculated for this fauna habitat type differs to the extent calculated for the incorporated vegetation type (Table 11) as parts of the non-accessable rail corridor have been mapped as Mixed tall shrubland.

Habitat value - Low

Indicative photograph



4.2.4 Fauna diversity

The fauna surveys recorded 68 vertebrate fauna species, including 51 birds, eight reptiles and nine mammals. The results of the survey are summarised in Appendix E. In addition to the species recorded in this survey, GHD recorded a number of species in 2012 that were not identified in 2017. With these species included in the assessment, 79 species are known to utilise the survey area which includes 57 birds, 13 reptiles, nine mammals, in addition to two invertebrates.

4.2.5 Introduced fauna

Eight introduced species were recorded during the field survey, including six mammals and two bird species. These were the Red Fox, European Rabbit, House Mouse, Feral Cat, Laughing Kookaburra, Dog (*Canis lupus familiaris*), Feral Pig (*Sus scrofa*), and Laughing Dove (*Spilopelia senegalensis*). All six species are known from the region; however the Dogs are likely roaming local pets.

4.2.6 Conservation significant fauna

Three fauna species of conservation significance were recorded during the field survey, Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) (Plate 2 – Plate 5), Western Brush Wallaby (*Macropus irma*) (Plate 6) and Rainbow Bee-eater (*Merops ornatus*). During the 2011 Graceful Sun-Moth survey (GHD 2011) the Graceful Sun-Moth was recorded. During the GHD 2012 survey, the ground cricket (*Pachysaga munggai* or *strobila*) was recorded. Neither of these species was recorded during the current surveys.

Black Cockatoo assessment

Foraging habitat

The survey area is located within the modelled feeding and breeding distribution (Yanchep National Park) for Carnaby's Black Cockatoo (DSEWPaC 2012). There are numerous records of this species occurring within and around the survey area. The *Banksia* woodlands, Mixed tall shrubland and *Eucalyptus* woodland provide high foraging habitat value for Carnaby's Black Cockatoo. Approximately 128.39 ha of potential foraging habitat for Black Cockatoos was recorded within the survey area (Figure 8, Appendix A). Table 17 provides a summary of the vegetation types deemed suitable foraging habitat for the species within the survey area. The extent and type of foraging habitat was confirmed by the presence of foraging evidence (e.g. *Banksia* cones, see Plate 3, Plate 4, Plate 5) and a comparison of the flora species recorded with a list of known foraging species (Groom 2011).

Breeding habitat

The field survey identified 67 trees of suitable DBH within the survey area (Figure 8, Appendix A). Trees of this size are considered to have nesting potential currently, or may develop hollows within 100 years. Breeding success is dependent on both the nesting and foraging areas being relatively close together and sufficient to support the population (DSEWPaC 2012). The woodland habitats in the survey area are likely to be utilised by Carnaby's Black Cockatoos for foraging and there is potential for the species to breed in the survey area in the future.

Roosting habitat

The field survey did not identify any Black Cockatoo roosting sites within the survey area, however approximately 13.36 ha of potential roosting habitat was identified (Figure 8, Appendix A). Table 17 provides a summary of the vegetation types deemed suitable roosting habitat for the species within the survey area.

Table 17 Black Cockatoo habitat within survey area

Habitat type	Survey area
Foraging habitat	<p>There is 128.39 ha of foraging habitat for Black Cockatoos within the survey area consisting of the following:</p> <ul style="list-style-type: none"> • Mixed tall Shrubland – 41.68 ha • <i>Banksia sessilis</i> over low mixed shrubland – 37.16 ha • Mixed <i>Banksia</i> woodland – 36.19 ha • <i>Eucalyptus</i> woodland – 3.38 ha • Planted <i>Eucalyptus</i> woodland – 9.98 ha
Actual breeding habitat	No breeding events were recorded within the survey area of any species of Black Cockatoo during the current survey.
Potential breeding habitat	67 potential breeding habitat trees with DBH \geq 500 mm (including 62 Tuarts, one stag and four introduced eucalypts). Of the 67 trees, three had hollows, one of which had hollows of suitable size to potentially support Black Cockatoo breeding use.
Roosting habitat	<p>No roosting sites were recorded as being used by Black Cockatoos within the survey area. There is approximately 13.36 ha of suitable roosting habitat within the survey area, consisting of the following:</p> <ul style="list-style-type: none"> • <i>Eucalyptus</i> woodland – 3.38 ha • Planted <i>Eucalyptus</i> woodland – 9.98 ha



Plate 2 **One of the flocks of Carnaby's Black Cockatoo observed**



Plate 3 Feeding Evidence on *Banksia attenuata*



Plate 4 Feeding evidence on *Banksia sessilis*



Plate 5 Feeding on grasses/weeds and *Rhagodia* sp.

Western Brush Wallaby

The Western Brush Wallaby (listed as Priority 4 by DBCA) occurs only in the South-west of WA and is primarily a grazer, with an optimum habitat of open forest or woodland with low grasses and scrubby thickets. Activity is greatest during the early morning and late afternoon whilst it rests during the hottest part of the day in pairs, or singly, in the shade of a bush or thicket (Van Dyke and Strahan 2008).

During the November 2016 field survey a single Western Brush Wallaby was sighted resting in the shade of a tall shrub (Plate 6). The Western Brush Wallaby may utilise all habitats within the survey area, however the mixed tall shrubland, *Banksia* woodlands and *Eucalyptus* woodlands are of highest value to this species for seeking shelter and foraging.



Plate 6 Western Brush Wallaby recorded during November survey

Rainbow Bee-eater

The Rainbow Bee-eater is a medium-sized bird, and the only species of bee-eater in Australia. The Rainbow Bee-eater is listed under International Agreement under the WC Act. The Rainbow Bee-eater is distributed across much of mainland Australia, and occurs on several near-shore islands (DEE 2017a). The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). During the field survey eight Rainbow Bee-eaters were recorded in the *Eucalyptus* woodland habitat, however the species may utilise all habitats within the survey area.

Graceful Sun-Moth

GHD undertook a Graceful Sun-Moth (GSM) survey in March 2011 in which the GSM was recorded. The GSM was not recorded during the November 2016 or May 2017 surveys however the habitat is still considered to be suitable for the species.

Ground Cricket

The conservation significant invertebrate species *Pachysaga munggai* or *strobila* was observed during the October 2012 field survey. The identification was unable to be identified down to a species level however both species are listed as Priority species by DBCA. The *Pachysaga*

munggai or *strobila* was not recorded during the November 2016 or May 2017 surveys, however given suitable habitat is still present in the survey area it is likely the species could still occur.

Likelihood of Occurrence

Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 20 conservation significant fauna species. In addition to the 20 species identified by the database searches, 12 species were considered for this assessment as a result of a review of the species listed under Schedules 1-4 of the WC Act (revised February 2017). An assessment of the Likelihood of Occurrence for conservation significant fauna in the survey area was conducted (Appendix E). This assessment was based on species biology, habitat requirements, the quality and availability of suitable habitat and records of the species in the survey and surround area (e.g DBCA 2007-).

The assessment identified the likely presence of five additional species of conservation significance that were not recorded during the field survey (Table 18).

Table 18 **Conservation significant fauna ‘likely’ to occur in the Study Area**

Species	Status		Likelihood of occurrence
	WC Act	EPBC	
Peregrine Falcon (<i>Falco peregrinus</i>)	S		Likely, the nearest record is within 10 km of the survey area.
Western Quoll (Chuditch) (<i>Dasyurus geoffroii</i>)	Vu	Vu	Likely, there are records present within 10 km of the survey area and the habitat is suitable for this species.
Southern Brown Bandicoot (Quenda) (<i>Isoodon obesulus subsp. Fusciventer</i>)	P4		Likely, the habitat within the survey area is suitable for this species. There are records present within the survey area.
Jewelled South West Ctenotus (<i>Ctenotus gemmula</i> (SCP subpop.))	P3		Likely, the habitat within the survey area is suitable for this species. There are no records from the survey area however this is likely due to a lack of current data for this species.
Black-striped Snake (<i>Neelaps calonotos</i>)	P3		Likely, the habitat within the survey area is suitable for this species. There are multiple records within 5 km of the survey area.

5. Environmental approvals and referrals

This section provides preliminary advice on potential environmental approvals and referrals required, based on the ecological values identified within the survey area. Depending on the final project alignment and disturbance footprint, this preliminary advice may need to be revisited.

5.1 Federal government

Referral to DEE under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any Matters of National Environmental Significance (MNES). MNES are factors that require legislated protection in order to conserve biodiversity, protect world and national heritage places, and comply with international treaties. Table 19 shows an assessment of this Project against MNES.

Table 19 Assessment of Matters of National Environmental Significance

Matter of National Environmental Significance	Present	Need for referral to DotEE under EPBC Act
World Heritage Properties	None	
National Heritage Places	None	
Wetlands of International Significance	None	
Listed Threatened Species and Ecological Communities	Carnaby's Black Cockatoo (Endangered)	Likely There is 128.39 ha of foraging habitat and 67 potential breeding trees within the survey area. Based on an assessment against the risk referral guidelines for the species (DSEWPaC 2012), the project is likely to trigger a referral to the DotEE.
	Potential TECs	Likely Two GHD vegetation types aligned with the <i>Banksia</i> Woodlands of the SCP TEC (29.71 ha).
Migratory Species	None	
Commonwealth Marine Areas	None	
Great Barrier Reef Marine Park	None	
Nuclear Actions (including uranium mines)	None	
A Water Resource (in relation to coal seam gas development and large coal mining development)	None	

5.1.1 Black Cockatoos risk referral assessment

The key potential impacts to Black Cockatoo species in the project area are:

- Loss of approximately 128.39 ha of foraging habitat from the project area for Carnaby's Black Cockatoo
- Loss of 67 potential breeding habitat trees (>500 mm DBH).

In order to assess the potential impacts to Black Cockatoo within the survey area, the DSEWPaC (2012) *EPBC Act referral guidelines for three threatened Black Cockatoo species* was consulted. Within these guidelines, DSEWPaC provides a risk table that gives guidance on what it views as risks/impacts to Black Cockatoos that will trigger referral (Table 20). Risk is broken into three categories: high, uncertain and low and primarily focuses on breeding, feeding and roosting area as well as indirect impacts. If there is uncertainty with regard to risks on Black Cockatoos then the guidelines recommend referring the Project or contacting the DEE to ensure legal certainty.

Outcome

Even though the clearing of habitat within the project area is likely to trigger referral, the impact to the Black Cockatoo is not considered to be significant.

Table 20 Black Cockatoo risk referral table

Risk type	Risk referral
High risk of significant impacts: referral to DSEWPaC recommended	
Clearing of any known nesting tree	Referral is unlikely to be triggered as there are no known nesting trees.
Clearing or degradation of any part of a vegetation community known to contain breeding habitat.	Referral is likely to be triggered, however there is only 67 potential breeding trees recorded and one of these had suitable hollows for breeding.
Clearing of more than 1 ha of quality foraging habitat.	Referral is likely to be triggered as there is 128.39 ha of quality foraging habitat for Black Cockatoos within the survey area.
Clearing or degradation (including pruning of top canopy) of a known roosting project area.	Referral is unlikely to be triggered because there are no known night roosting sites within the project area.
Creating a gap or greater than 4 km between patches of Black Cockatoo habitat breeding, foraging or roosting.	Referral is unlikely to be triggered as the project will not create a gap greater than 4 km between patches of Black Cockatoo habitat if the habitat tree species are removed.
Uncertainty: referral recommended or contact the DSEWPaC	
Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat. Significance will depend on the level and extent of degradation and the quality of the habitat.	Referral is unlikely to be triggered as hydrology and fire regimes of the survey area will not be impacted. Clearing of foraging habitat as stated above is likely to trigger a referral.
Clearing or disturbance of areas surrounding Black Cockatoo breeding, foraging or night roosting habitat that has the potential to degrade habitat through introduction of invasive species, edge effect, hydrological	Referral is unlikely to be triggered as the project will not increase the edge effect, hydrological changes, increase human visitation or fire to the surrounding areas.

changes, increase human visitation or fire.	
Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.	Referral is unlikely to be triggered as there are no known nesting hollows within the project area nor will the action increase competition for nest hollows.
Actions with the potential to introduce known plant diseases such as <i>Phytophthora</i> spp.	Referral is unlikely to be triggered as the area is low risk for dieback
Low risk of significant impacts: referral may not be required but may refer to DSEWPaC for legal certainty	
Actions that do not affect Black Cockatoo habitat or individuals.	N/A
Actions whose impacts occur outside the modelled distribution of the three Black Cockatoos.	N/A

5.2 Western Australian Government

5.2.1 Environmental Protection Authority

Significant proposals must be referred to the EPA under Section 38 of the *Environmental Protection Act 1986* (EP Act). In deciding whether a proposal will be subject to the formal environmental impact assessment process, the EPA takes into account the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

In the absence of a broader environmental assessment, the majority of the potential biological impacts associated with the survey area are linked to native vegetation clearing and loss of fauna habitat. The potential impacts from the loss of native vegetation and loss of fauna habitat may be effectively assessed through Part v of the EP Act. Therefore, with consideration of the biological values discussed in this report, it is considered unlikely that the project would require referral to the EPA under Section 38 of the EP Act based solely on biological considerations. However, it is recommended the PTA discuss this approach with the EPA, as they may decide to assess the proposal given the high profile nature of the project and potential impact to other non-ecological environmental factors.

5.2.2 Department of Water and Environmental Regulation

Clearing of native vegetation is regulated by the DWER and requires a clearing permit under Part V of the EP Act, except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the Environmental Protection (Clearing Native Vegetation) Regulations 2004 and not in an ESA.

When preparing a native vegetation clearing application an assessment of the survey area against the “Ten Clearing Principles” should be undertaken to determine whether the Project is likely to be at variance to the Principles. The Ten Clearing Principles aim to ensure that potential impacts resulting from removal of native vegetation can be assessed in an integrated way. An assessment of the survey area against the Ten Clearing Principles was undertaken and is

provided in Appendix F. The assessment determined that clearing within the survey area is likely to be at variance to:

- a) – Native vegetation should not be cleared if it comprises a high level of biological diversity
- b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA
- d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community
- (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

If the EPA does not assess the Project, a clearing permit will be required.

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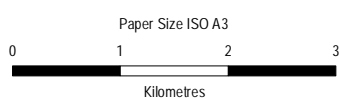
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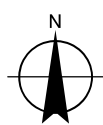
Appendices

Appendix A – Figures

- Figure 1 Project location
- Figure 2 Biological constraints
- Figure 3 Land use constraints
- Figure 4 Hydrological constraints
- Figure 5 Vegetation types and sample locations
- Figure 6 Vegetation condition and significant weed locations
- Figure 7 Conservation significant communities and flora
- Figure 8 Fauna habitats and Black Cockatoo habitats



Map Projection: Transverse Mercator
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 Grid: GDA 1994 MGA Zone 50

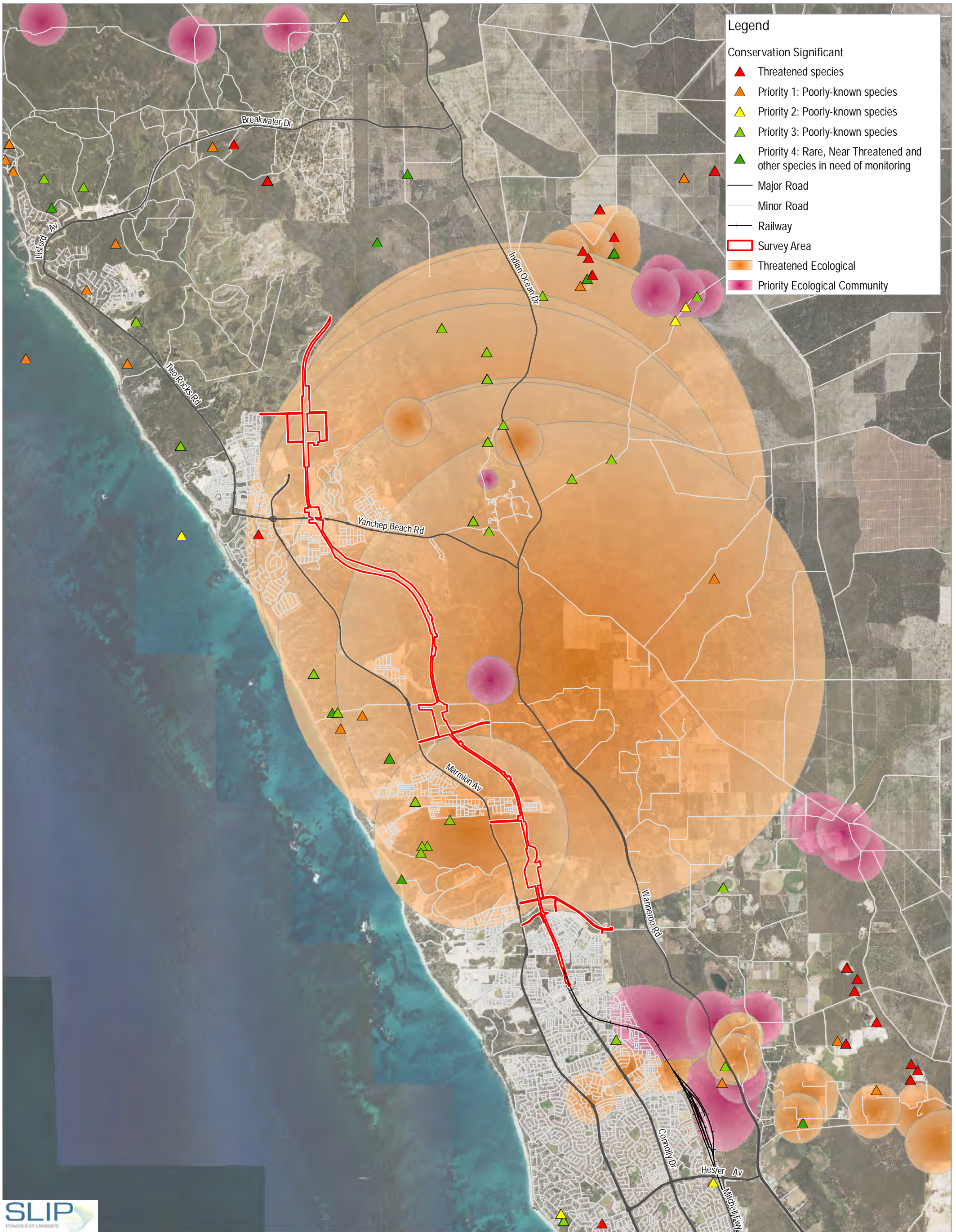


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Locality

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FIGURE 1



Legend

Conservation Significant

- ▲ Threatened species
- ▲ Priority 1: Poorly-known species
- ▲ Priority 2: Poorly-known species
- ▲ Priority 3: Poorly-known species
- ▲ Priority 4: Rare, Near Threatened and other species in need of monitoring

— Major Road

— Minor Road

— Railway

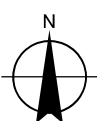
▭ Survey Area

○ Threatened Ecological

○ Priority Ecological Community



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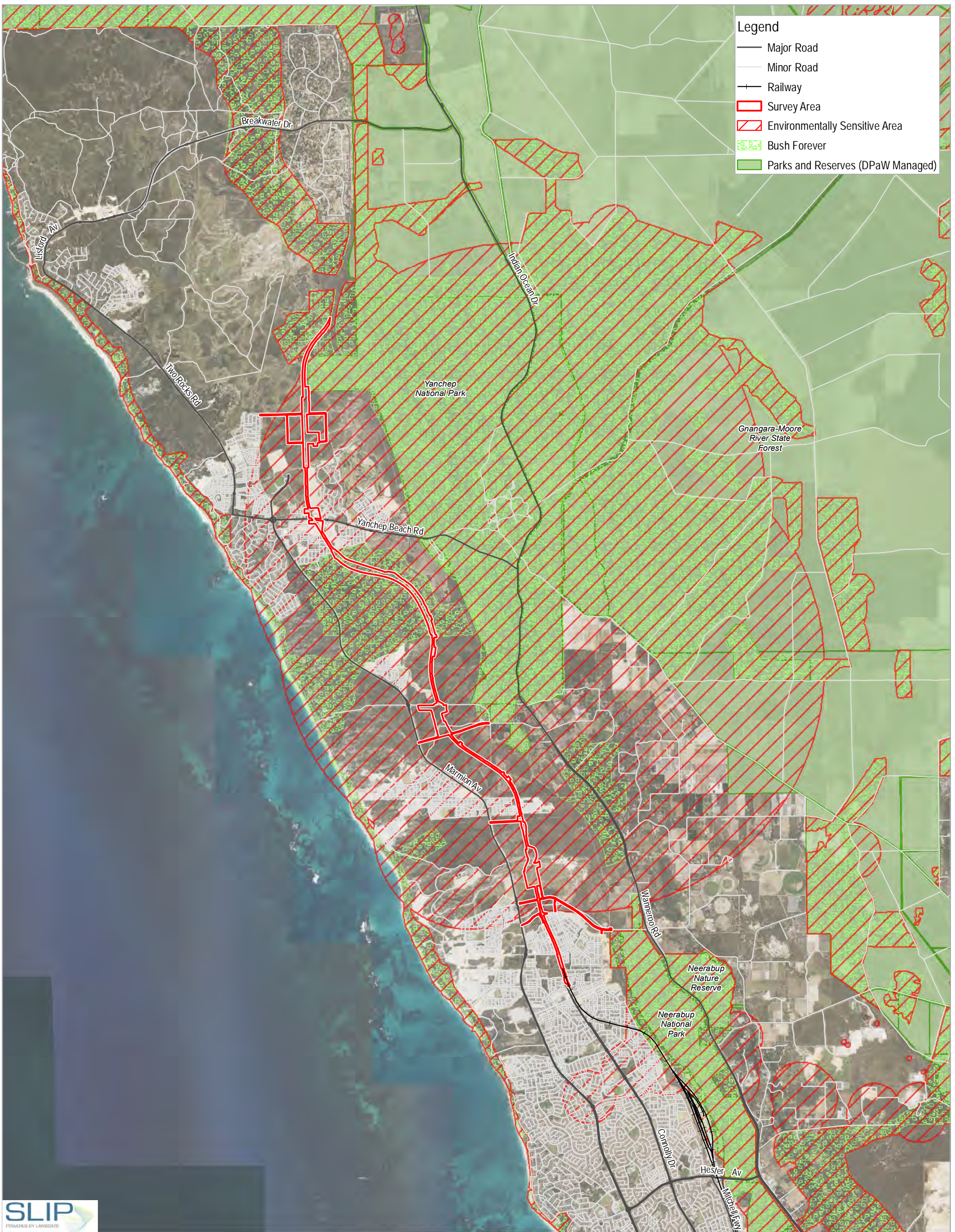


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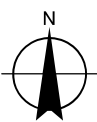
Biological Constraints

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FIGURE 2



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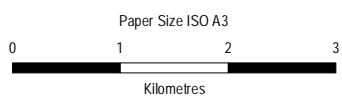
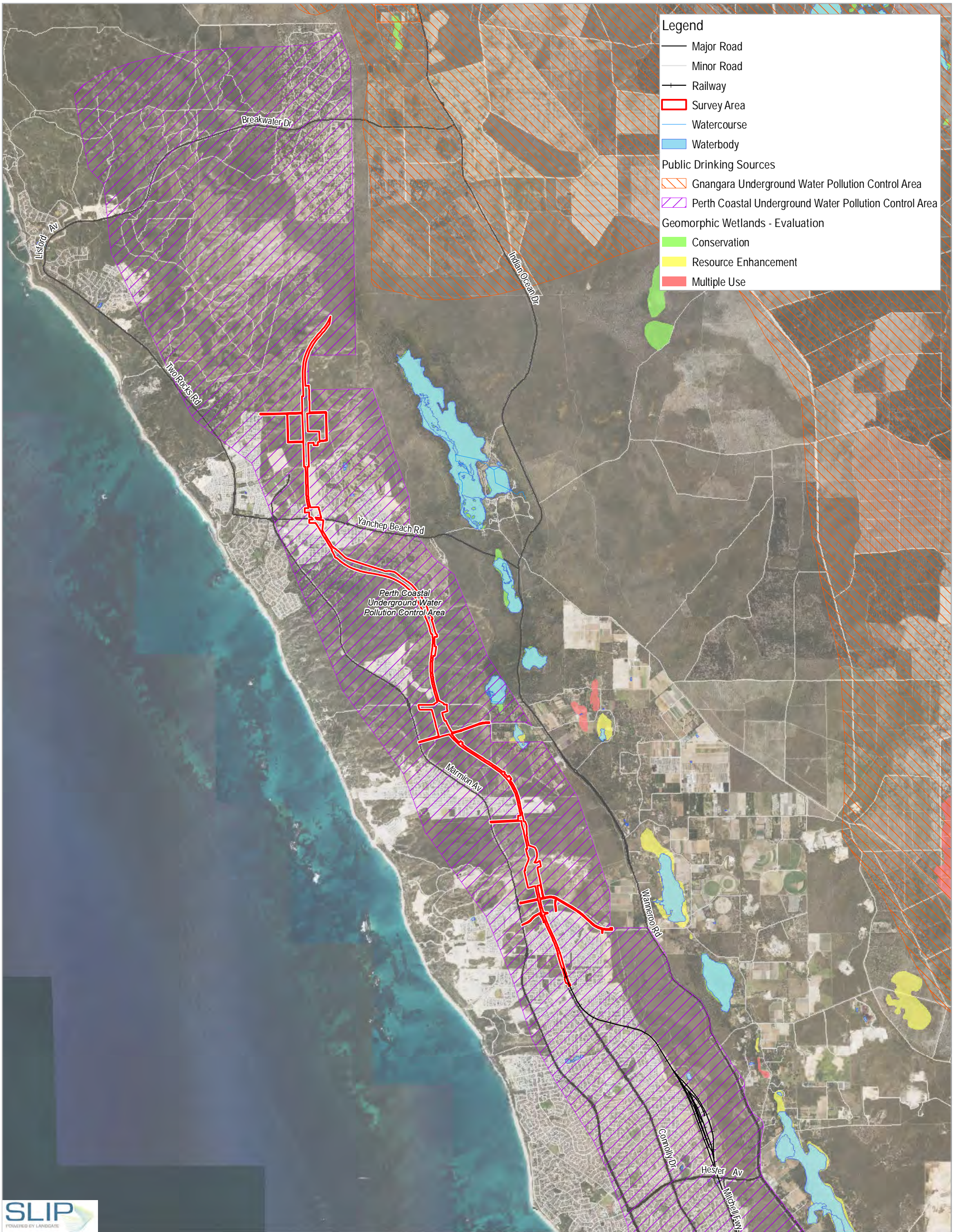


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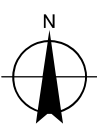
Land Use Constraints

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FIGURE 3



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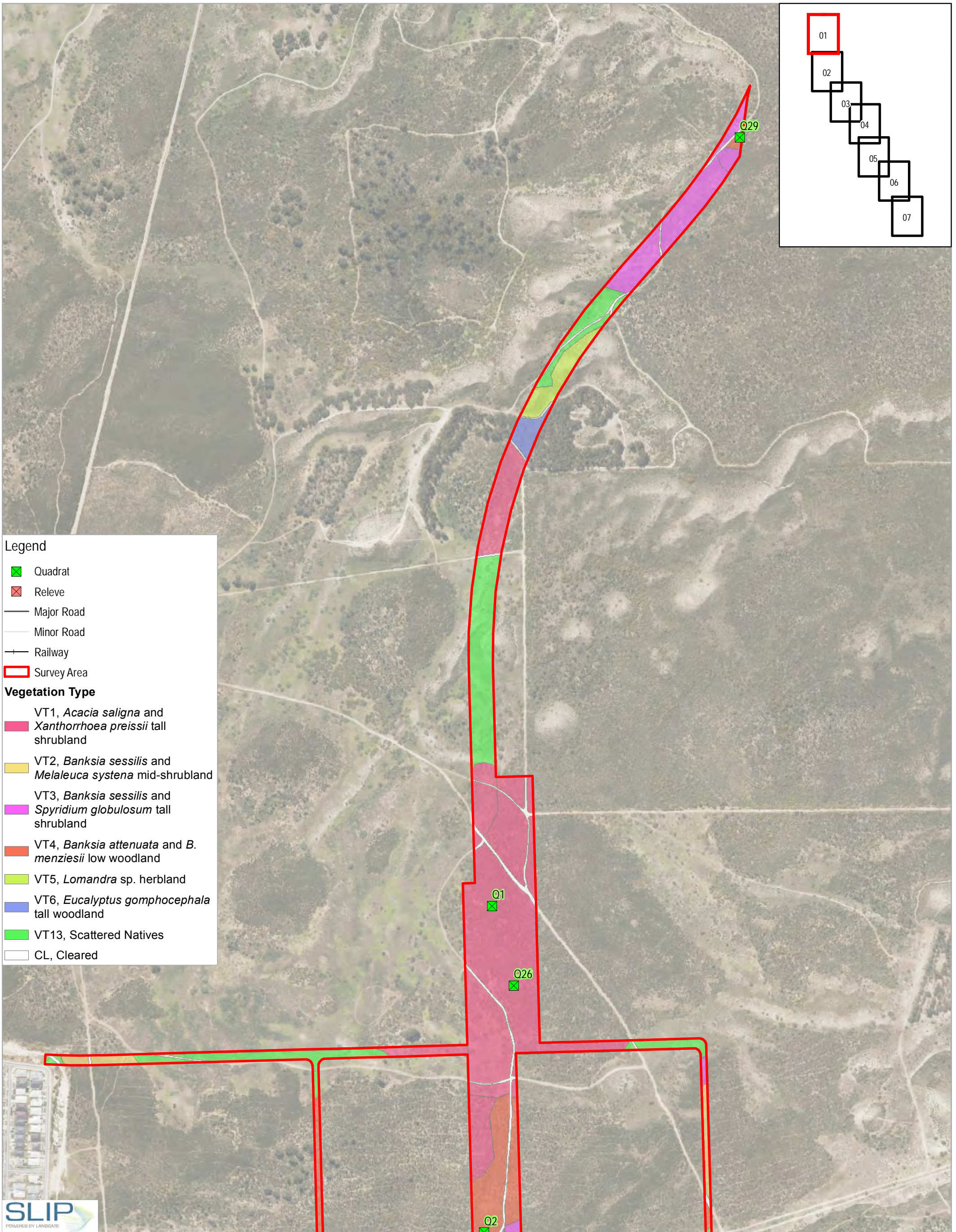


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Hydrology Constraints

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FIGURE 4

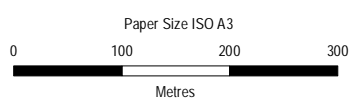


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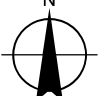
- Quadrat
- Releve
- Major Road
- Minor Road
- Railway
- Survey Area

Vegetation Type

- VT1, *Acacia saligna* and *Xanthorrhoea preissii* tall shrubland
- VT2, *Banksia sessilis* and *Melaleuca systema* mid-shrubland
- VT3, *Banksia sessilis* and *Spyridium globulosum* tall shrubland
- VT4, *Banksia attenuata* and *B. menziesii* low woodland
- VT5, *Lomandra* sp. herbland
- VT6, *Eucalyptus gomphocephala* tall woodland
- VT13, Scattered Natives
- CL, Cleared



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

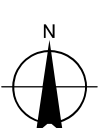
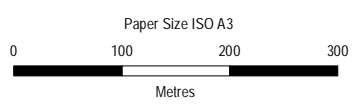
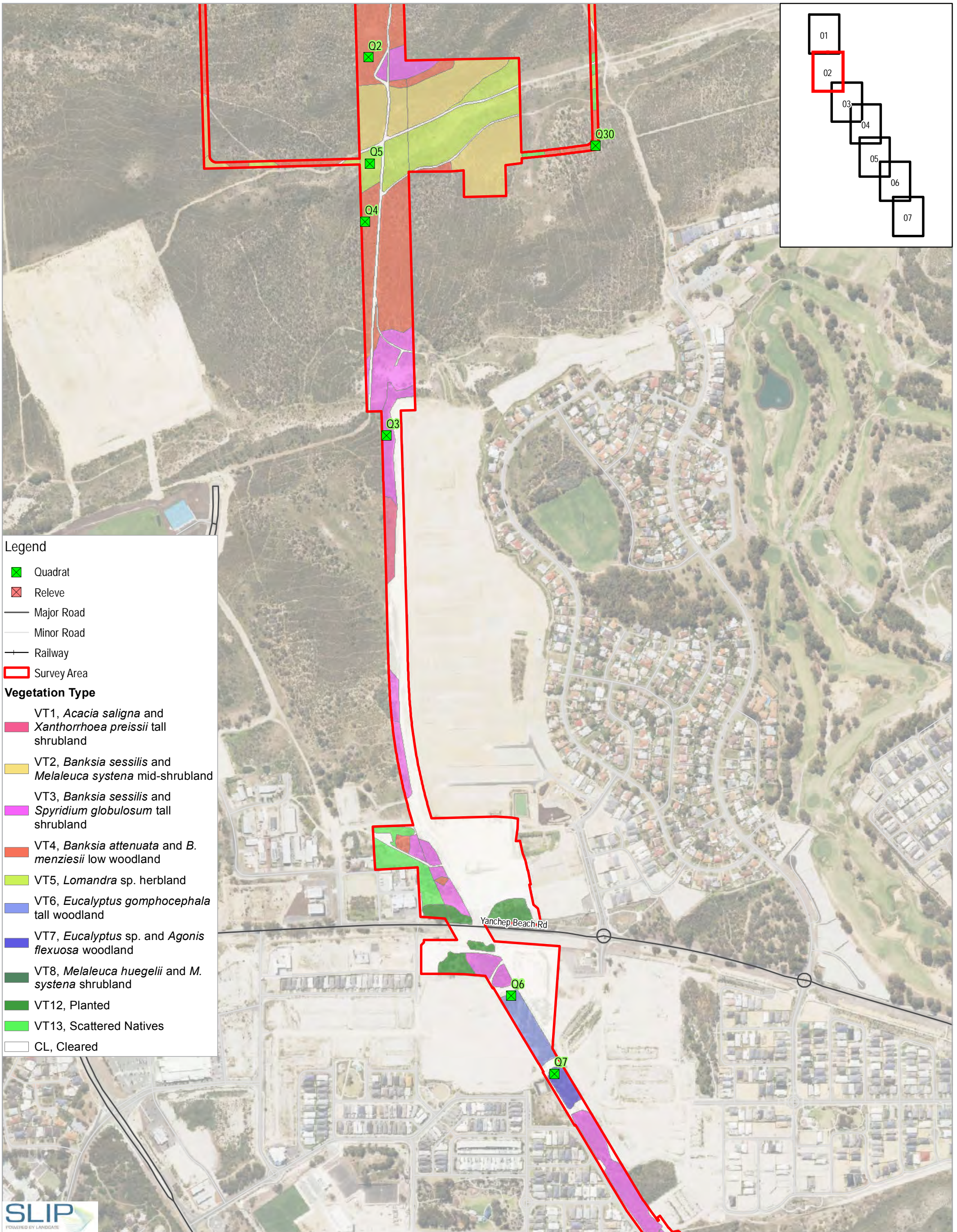


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Vegetation Type, Quadrat
 and Releve Locations

Project No. 61-36660
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FIGURE 4

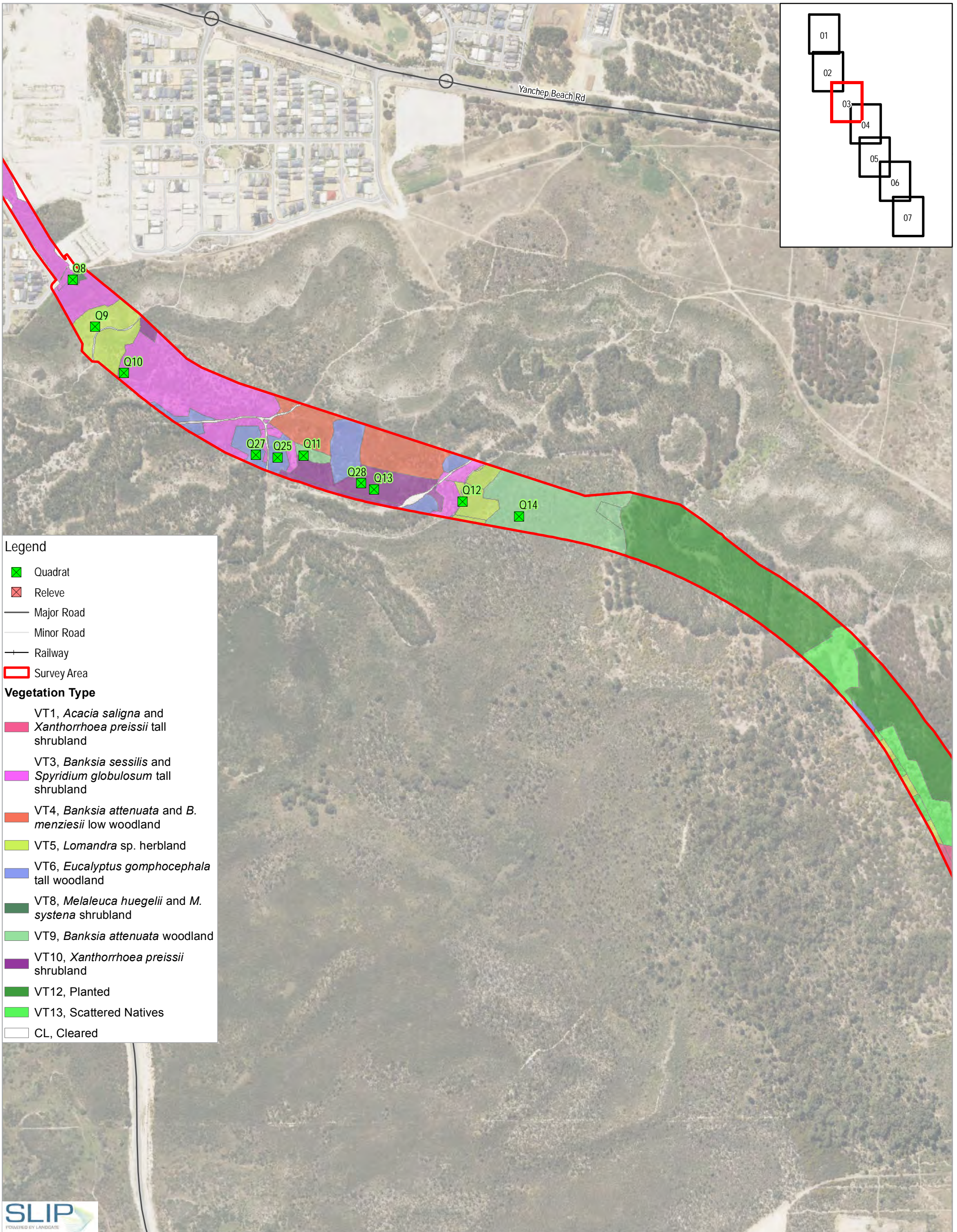


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Vegetation Type, Quadrat
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Project No. 61-36660
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FIGURE 4

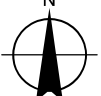
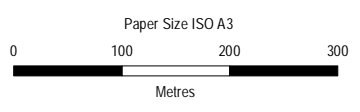


Legend

- Quadrat
- Releve
- Major Road
- Minor Road
- Railway
- Survey Area

Vegetation Type

- VT1, *Acacia saligna* and *Xanthorrhoea preissii* tall shrubland
- VT3, *Banksia sessilis* and *Spyridium globulosum* tall shrubland
- VT4, *Banksia attenuata* and *B. menziesii* low woodland
- VT5, *Lomandra* sp. herbland
- VT6, *Eucalyptus gomphocephala* tall woodland
- VT8, *Melaleuca huegelii* and *M. systema* shrubland
- VT9, *Banksia attenuata* woodland
- VT10, *Xanthorrhoea preissii* shrubland
- VT12, Planted
- VT13, Scattered Natives
- CL, Cleared

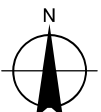
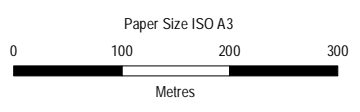
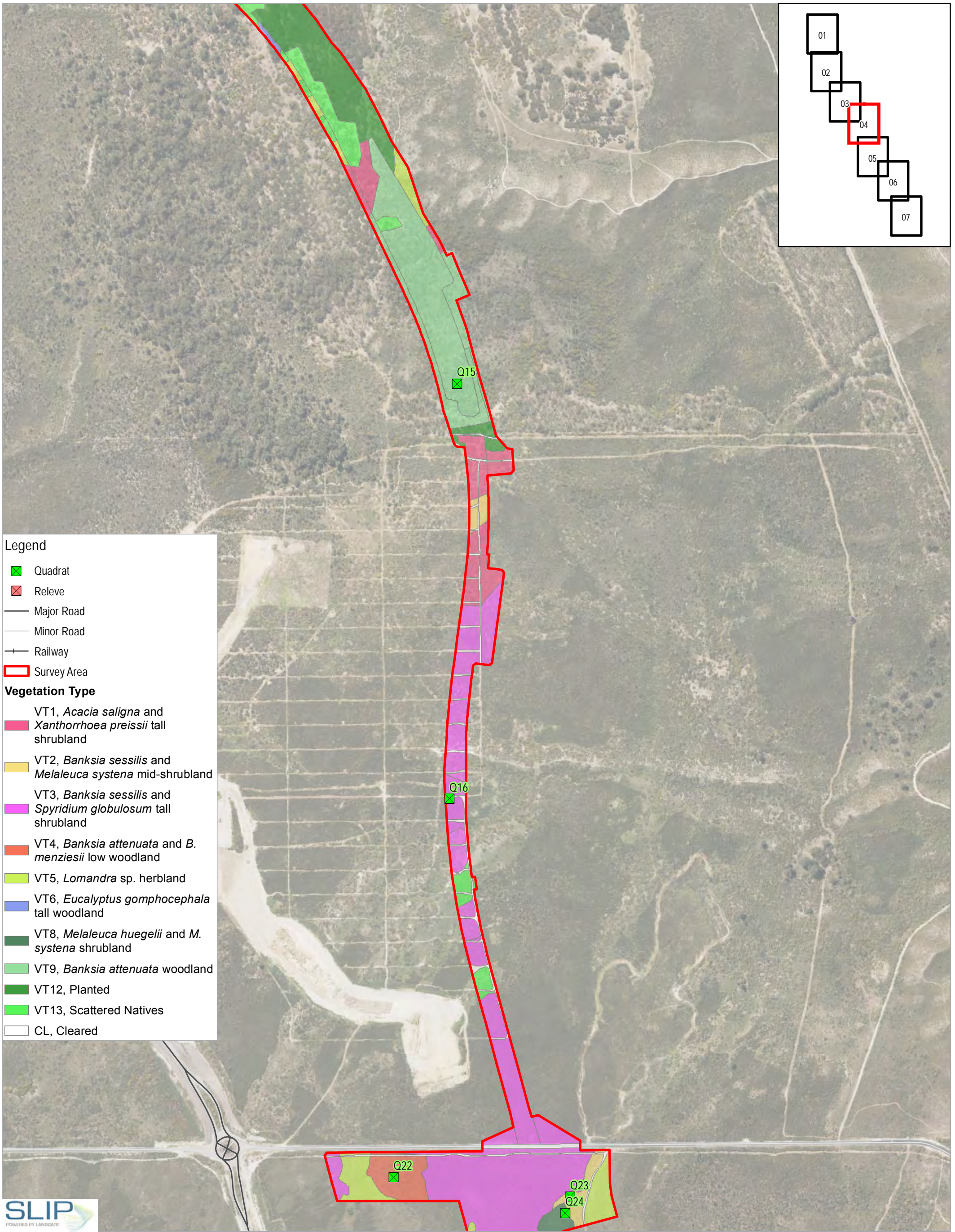


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**Vegetation Type, Quadrat
and Releve Locations**

Project No. 61-36660
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Date 18/12/2017

FIGURE 4

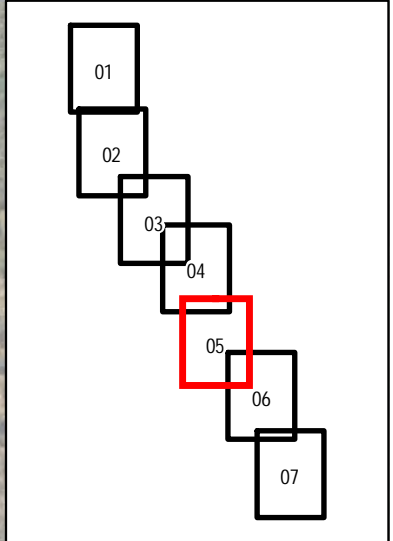
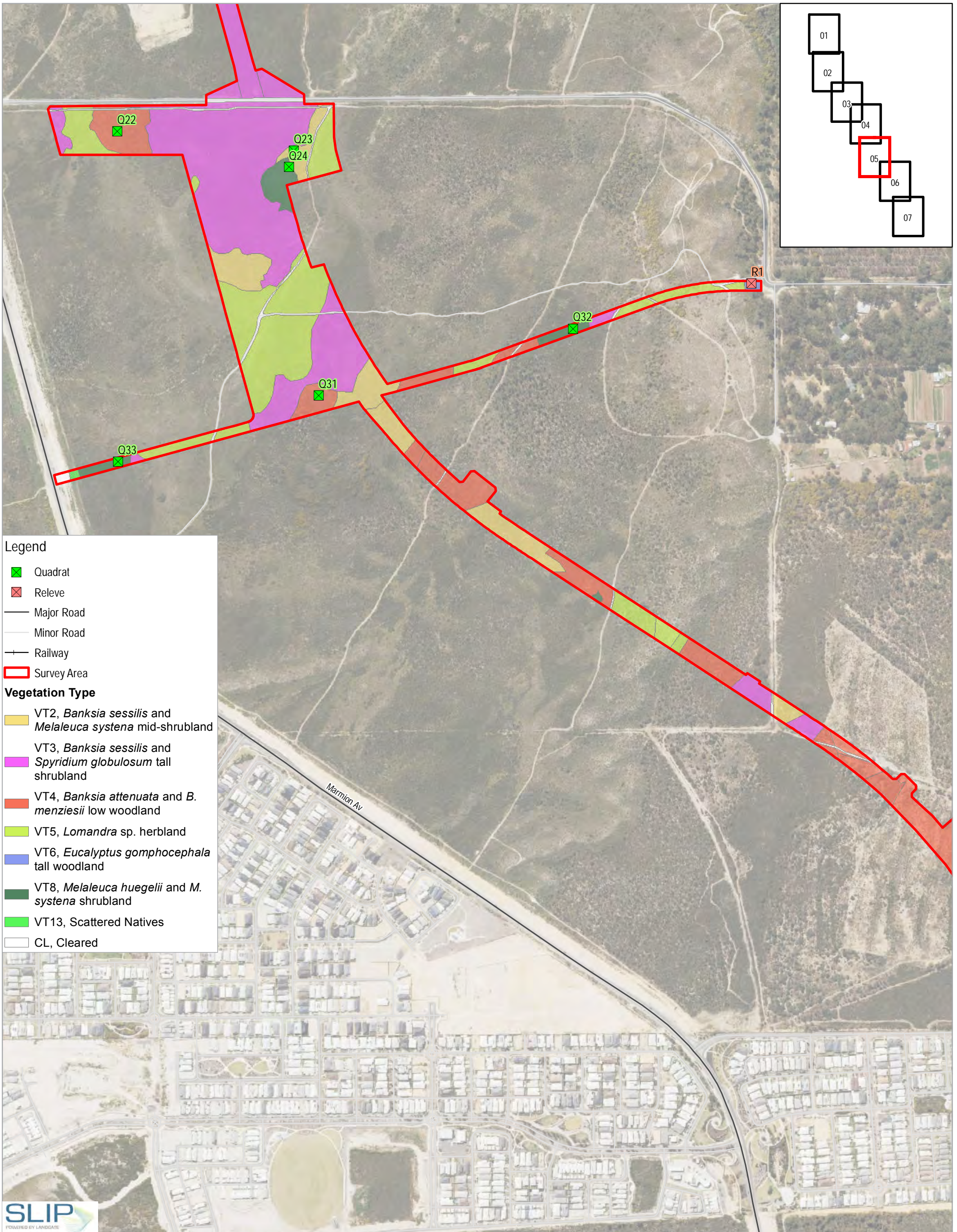


Public Transport Authority
Butler to Yancheep
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Vegetation Type, Quadrat
and Releve Locations

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FIGURE 4

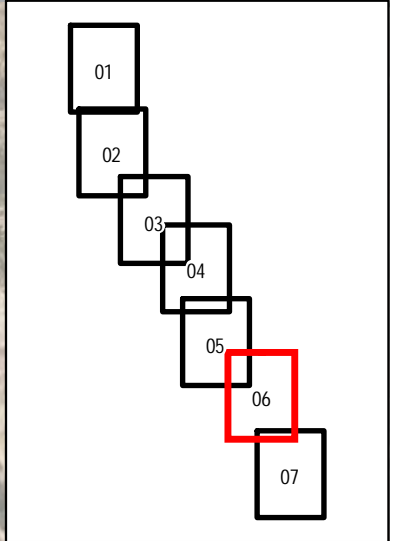
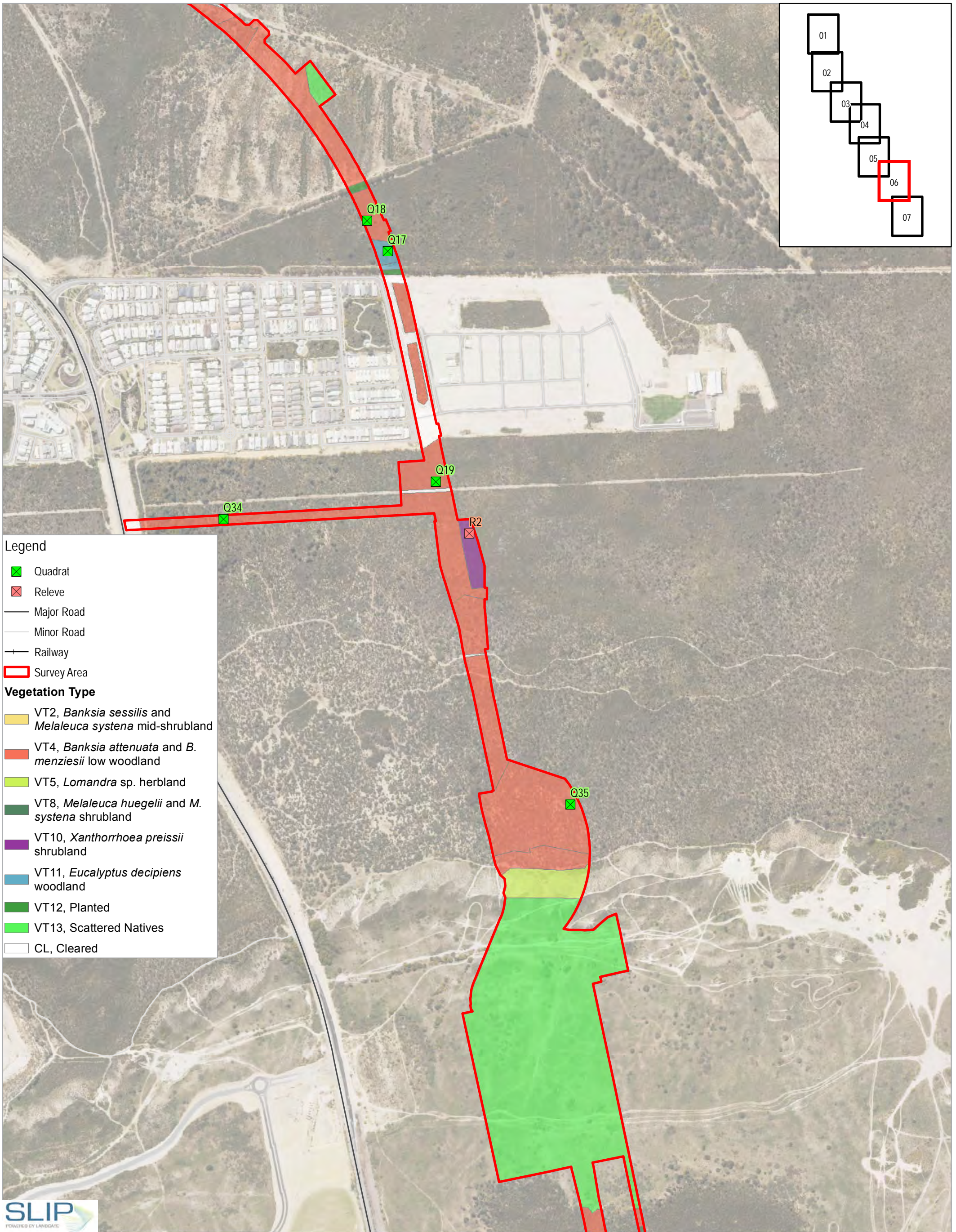


Public Transport Authority
Butler to Yancheep
Extension Flora & Fauna Survey

**Vegetation Type, Quadrat
and Releve Locations**

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FIGURE 4

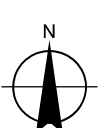
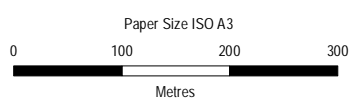
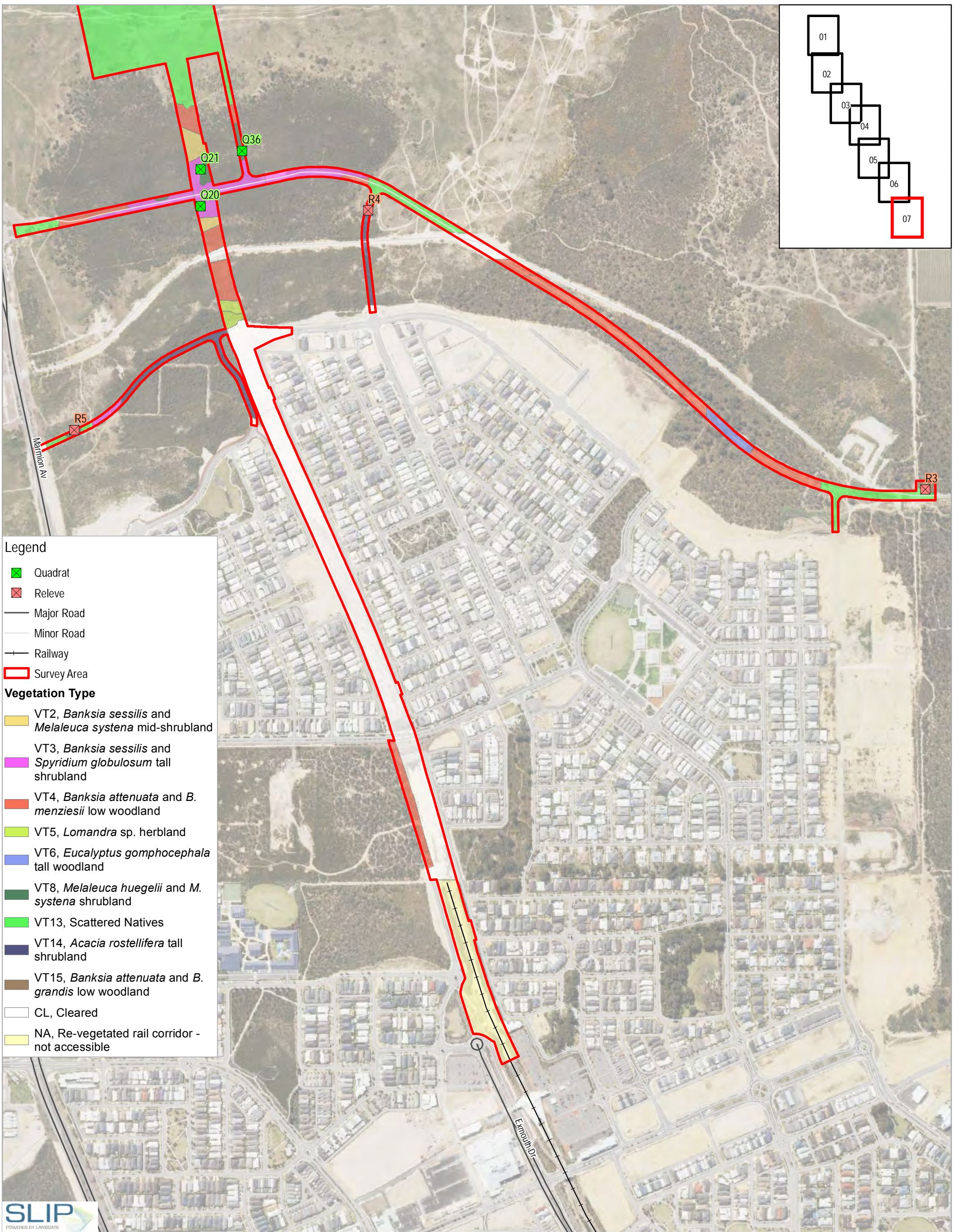


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Butler to Yancheep
Extension Flora & Fauna Survey

**Vegetation Type, Quadrat
and Releve Locations**

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FIGURE 4

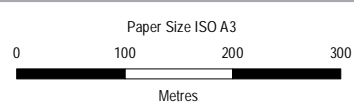
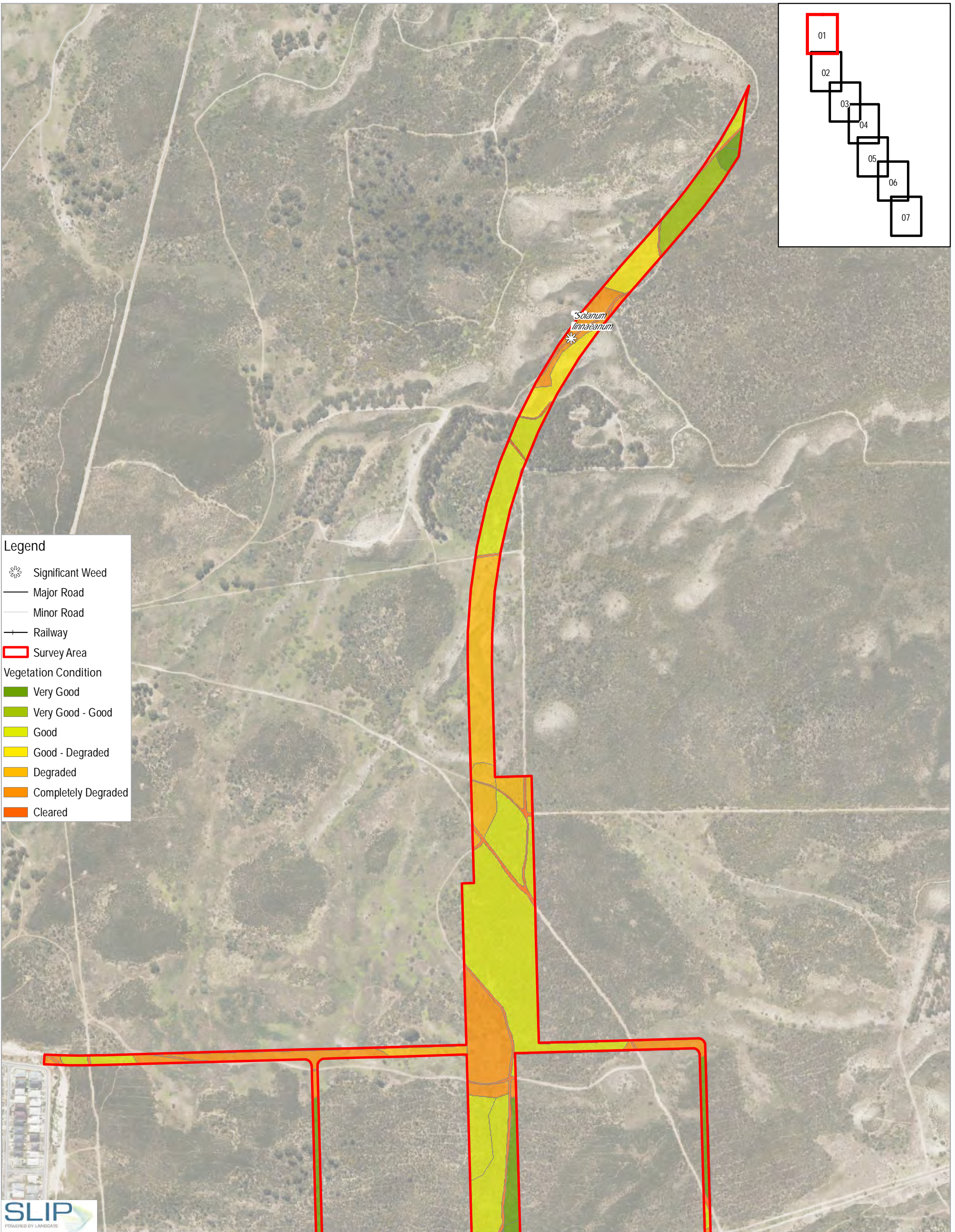


Public Transport Authority
Butler to Yankeep
Extension Flora & Fauna Survey

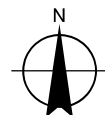
Vegetation Type, Quadrat
and Releve Locations

Project No. 61-36660
Revision No. 0
Date 18/12/2017

FIGURE 4



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

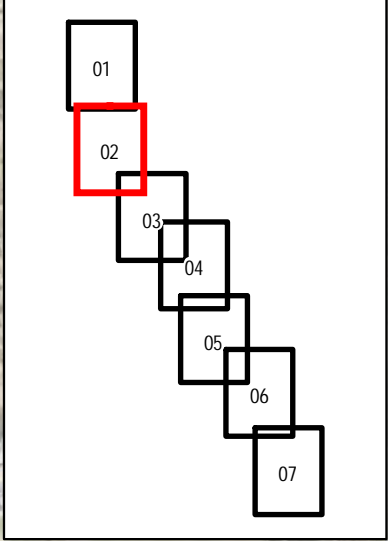
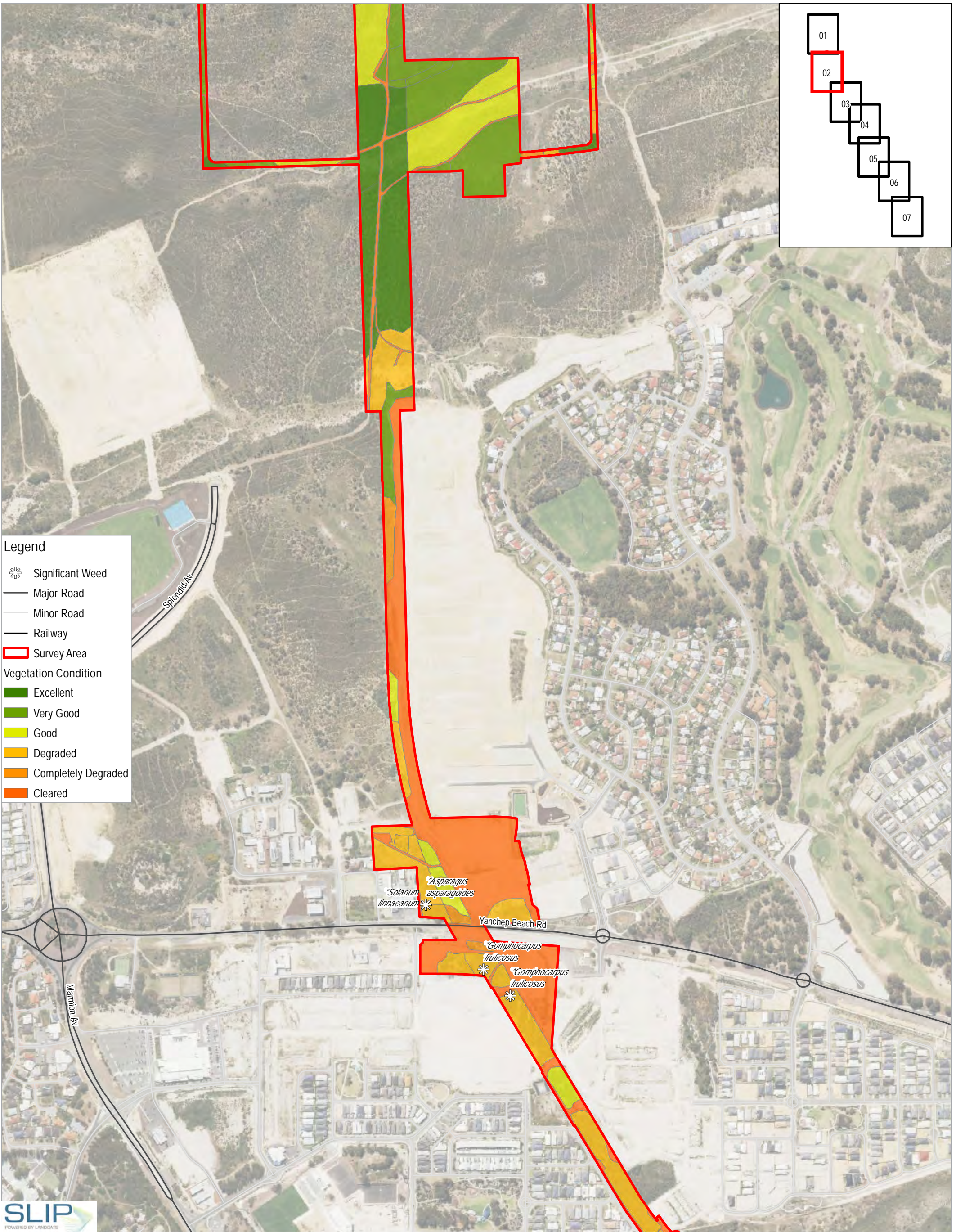


Public Transport Authority
Butler to Yanchep
Extension Flora & Fauna Survey

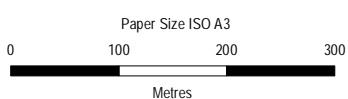
**Vegetation Condition
and Significant Weeds**

Project No. 61-36660
Revision No. 0
Date 18/12/2017

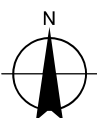
FIGURE 6



- Legend**
- Significant Weed
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Vegetation Condition**
- Excellent
 - Very Good
 - Good
 - Degraded
 - Completely Degraded
 - Cleared



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

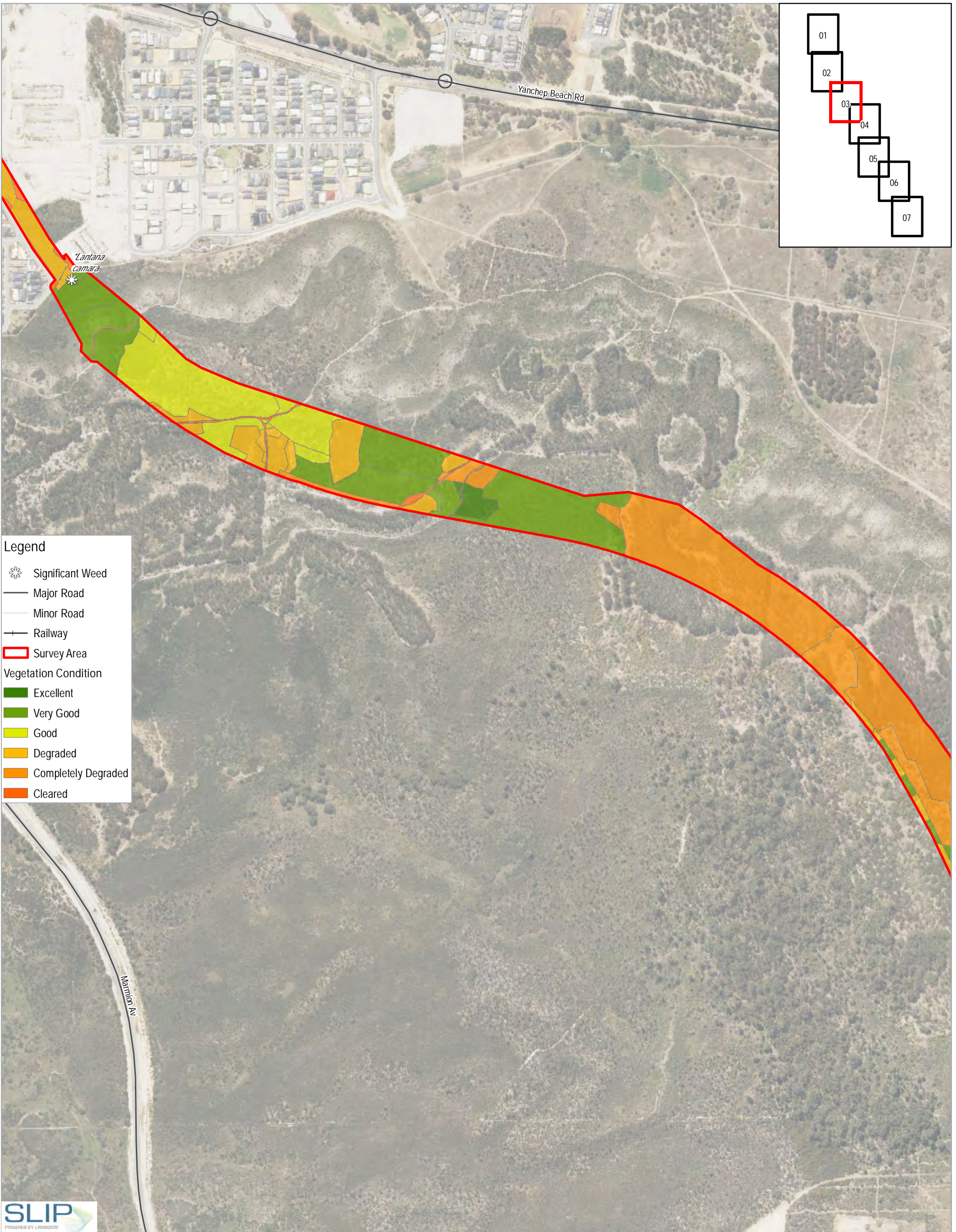


Public Transport Authority
 Butler to Yanchep
 Extension Flora & Fauna Survey

**Vegetation Condition
 and Significant Weeds**

Project No. 61-36660
 Revision No. 0
 Date 18/12/2017

FIGURE 6

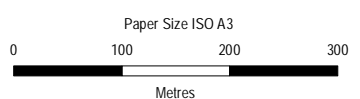


Legend

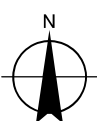
- Significant Weed
- Major Road
- Minor Road
- Railway
- Survey Area

Vegetation Condition

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



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

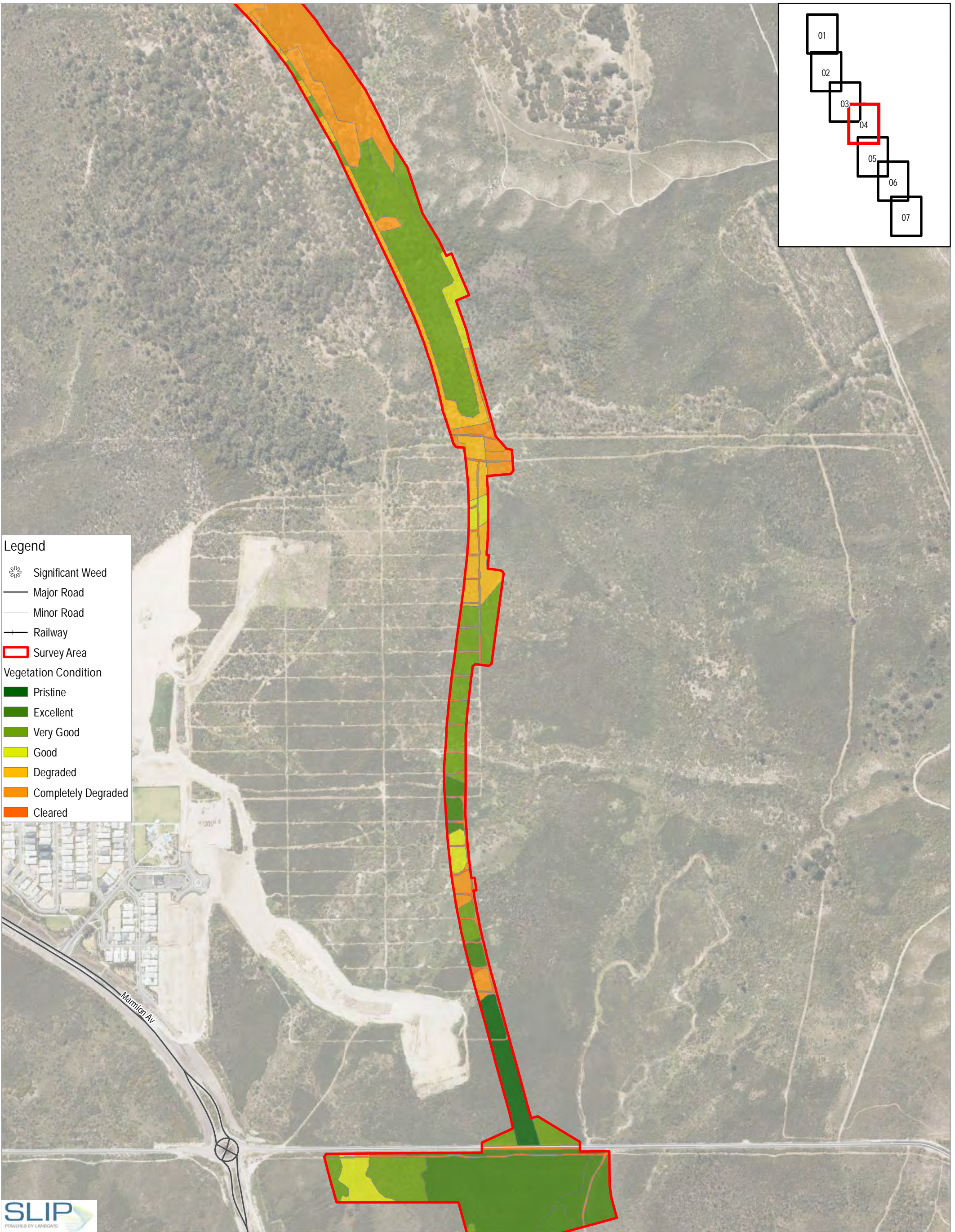


Public Transport Authority
 Butler to Yanchee
 Extension Flora & Fauna Survey

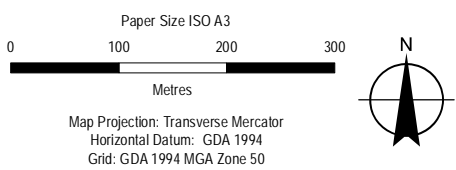
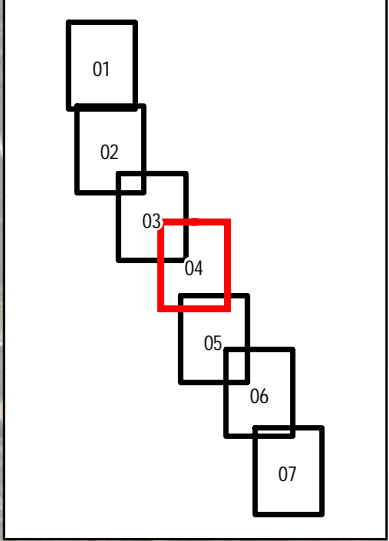
**Vegetation Condition
 and Significant Weeds**

Project No. 61-36660
 Revision No. 0
 Date 18/12/2017

FIGURE 6



- Legend**
- Significant Weed
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Vegetation Condition**
- Pristine
 - Excellent
 - Very Good
 - Good
 - Degraded
 - Completely Degraded
 - Cleared

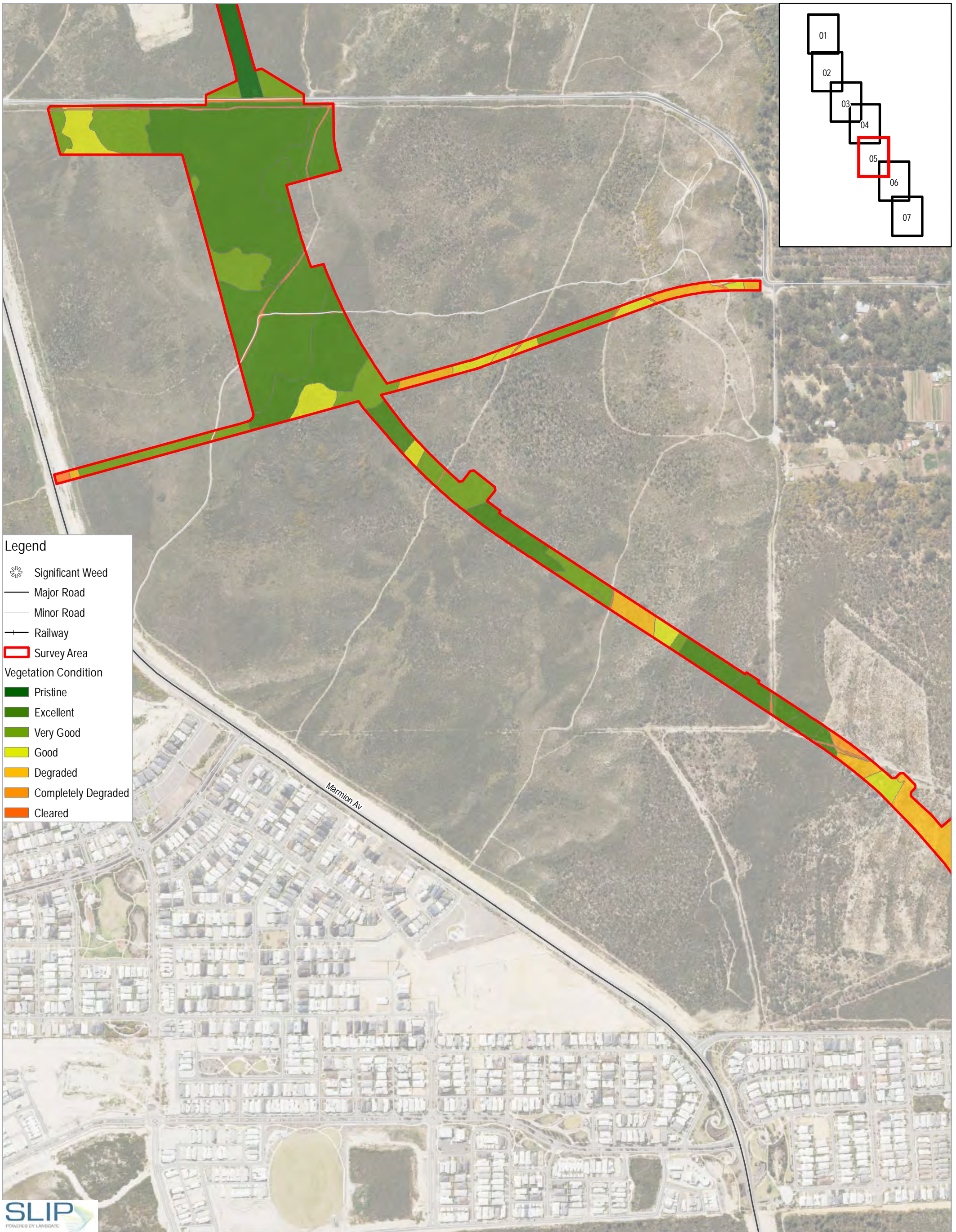


Public Transport Authority
Butler to Yankep
Extension Flora & Fauna Survey

**Vegetation Condition
and Significant Weeds**

Project No. 61-36660
Revision No. 0
Date 18/12/2017

FIGURE 6

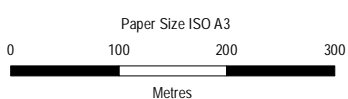
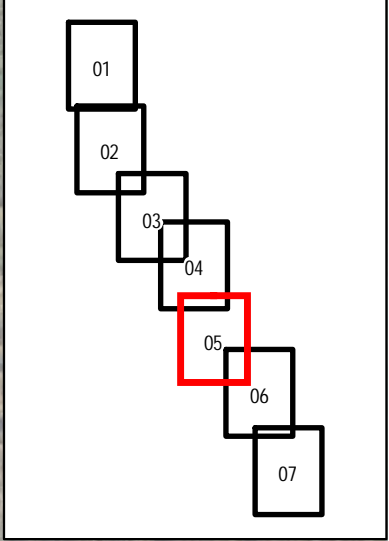


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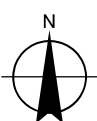
- Significant Weed
- Major Road
- Minor Road
- Railway
- Survey Area

Vegetation Condition

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



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

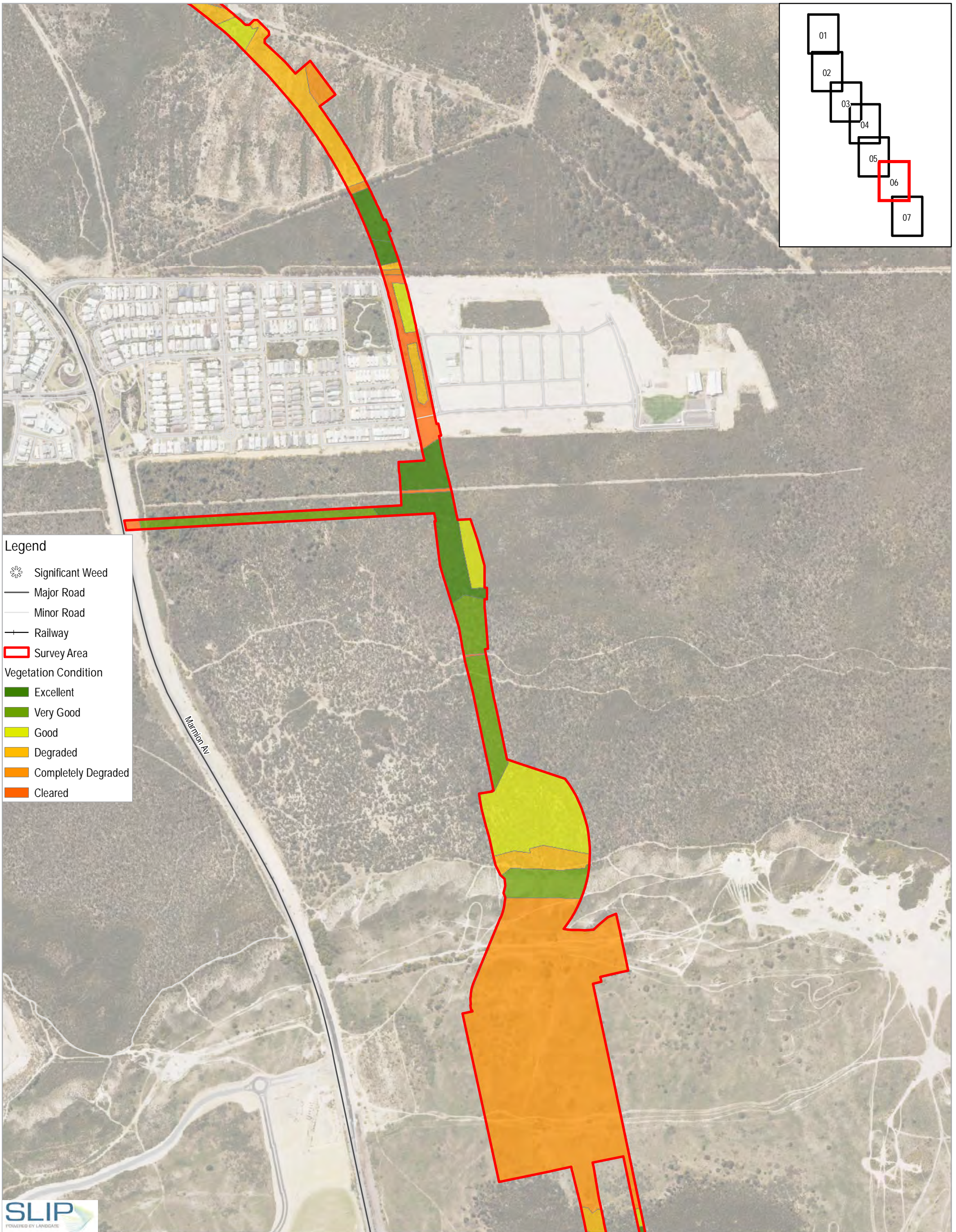


Public Transport Authority
 Butler to Yankeep
 Extension Flora & Fauna Survey

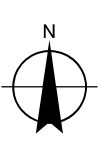
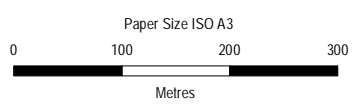
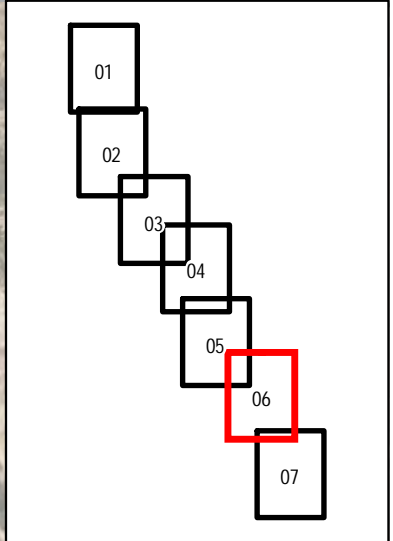
**Vegetation Condition
 and Significant Weeds**

Project No. 61-36660
 Revision No. 0
 Date 18/12/2017

FIGURE 6



- Legend**
- ✱ Significant Weed
 - Major Road
 - Minor Road
 - Railway
 - ▭ Survey Area
- Vegetation Condition**
- Excellent
 - Very Good
 - Good
 - Degraded
 - Completely Degraded
 - Cleared



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

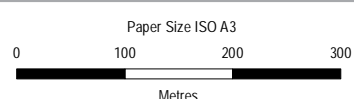
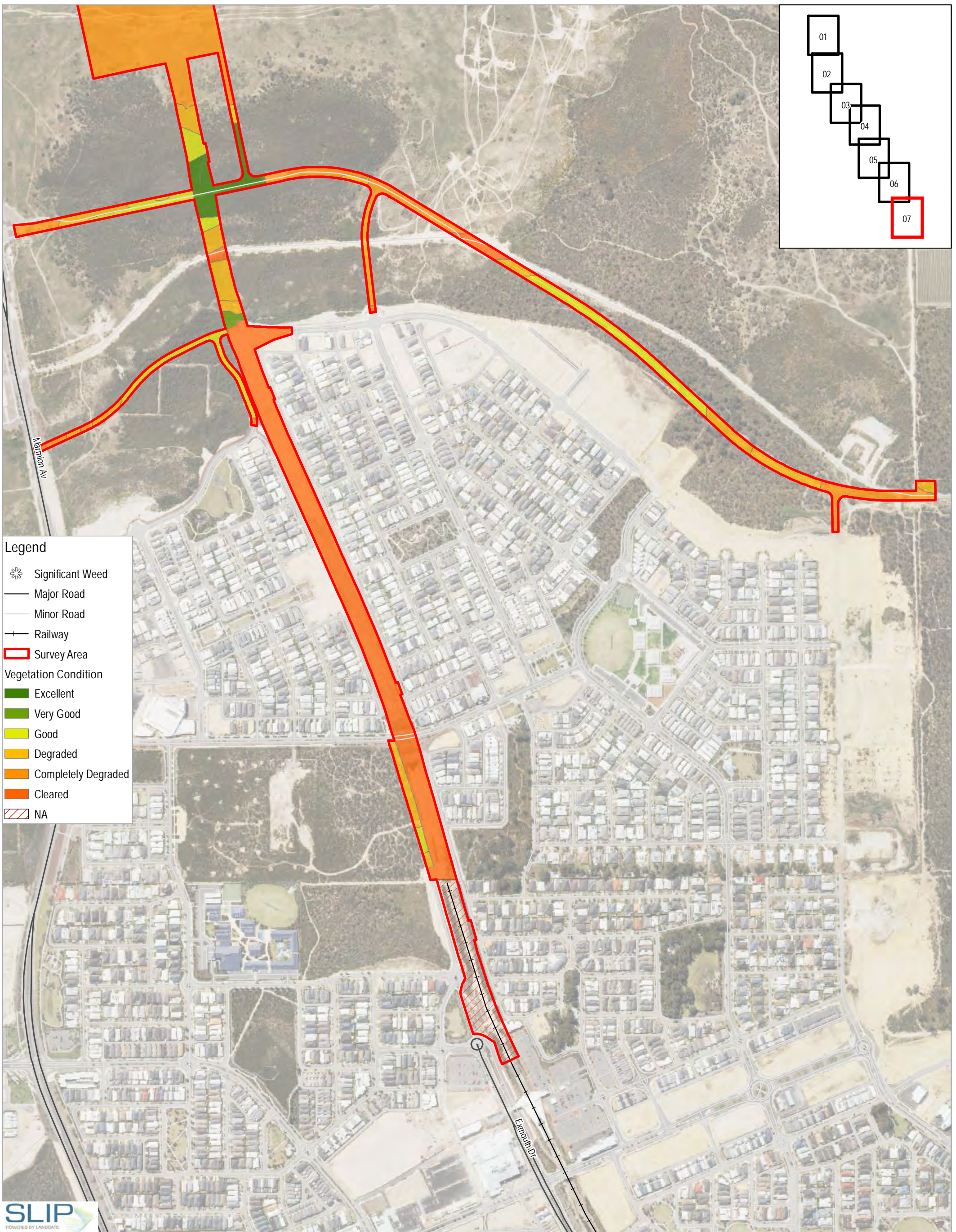


Public Transport Authority
 Butler to Yanchep
 Extension Flora & Fauna Survey

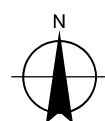
**Vegetation Condition
 and Significant Weeds**

Project No. 61-36660
 Revision No. 0
 Date 18/12/2017

FIGURE 6



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

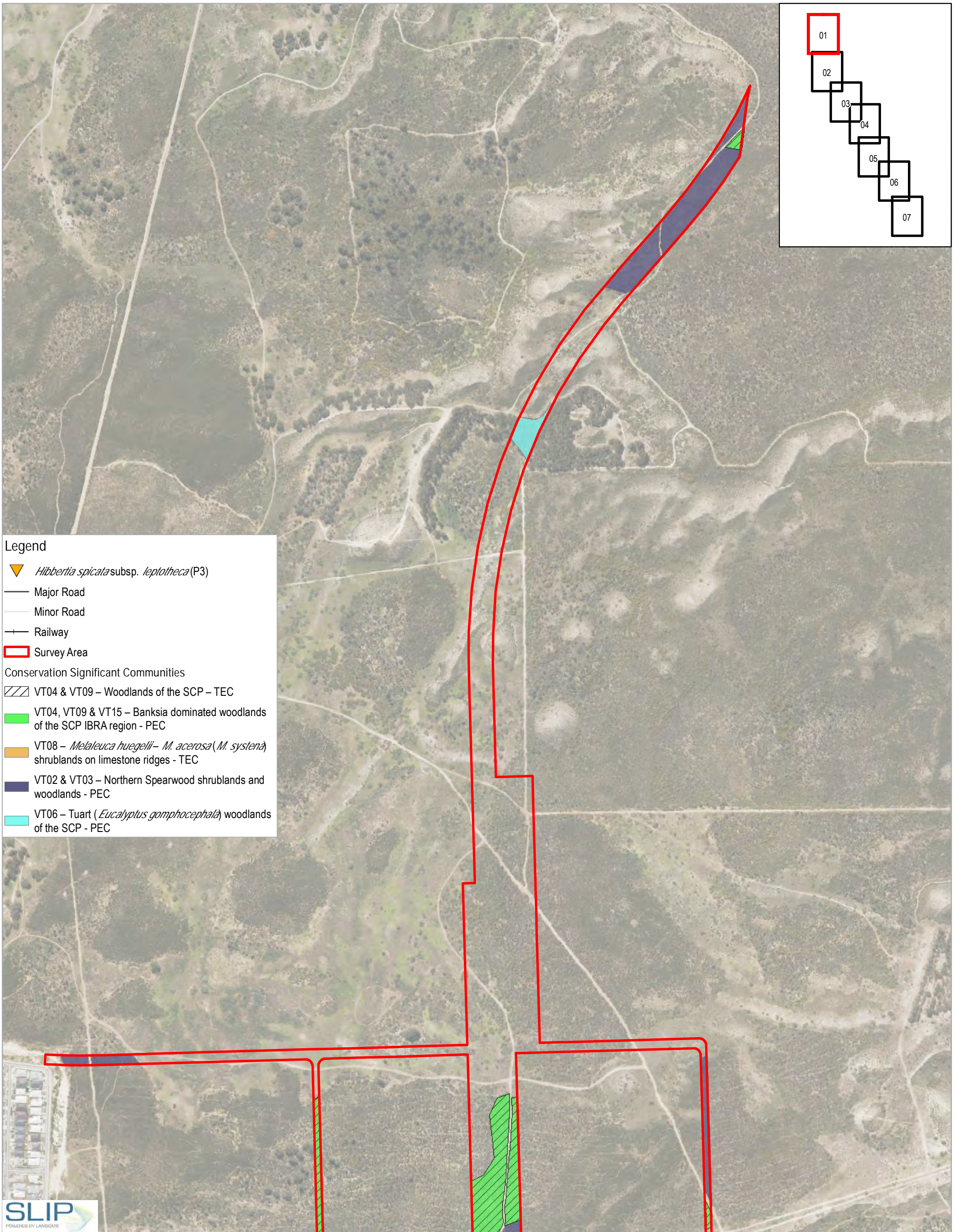


Public Transport Authority
Butler to Yanchep
Extension Flora & Fauna Survey

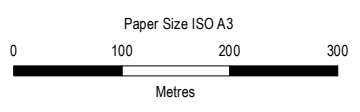
**Vegetation Condition
and Significant Weeds**

Project No. 61-36660
Revision No. 0
Date 18/12/2017

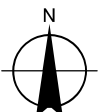
FIGURE 6



- Legend**
- Hibbertia spicata* subsp. *leptotheca* (P3)
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Conservation Significant Communities**
- VT04 & VT09 – Woodlands of the SCP – TEC
 - VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
 - VT08 – *Melaleuca huegelii*– *M. acerosa* (*M. systema*) shrublands on limestone ridges - TEC
 - VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
 - VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



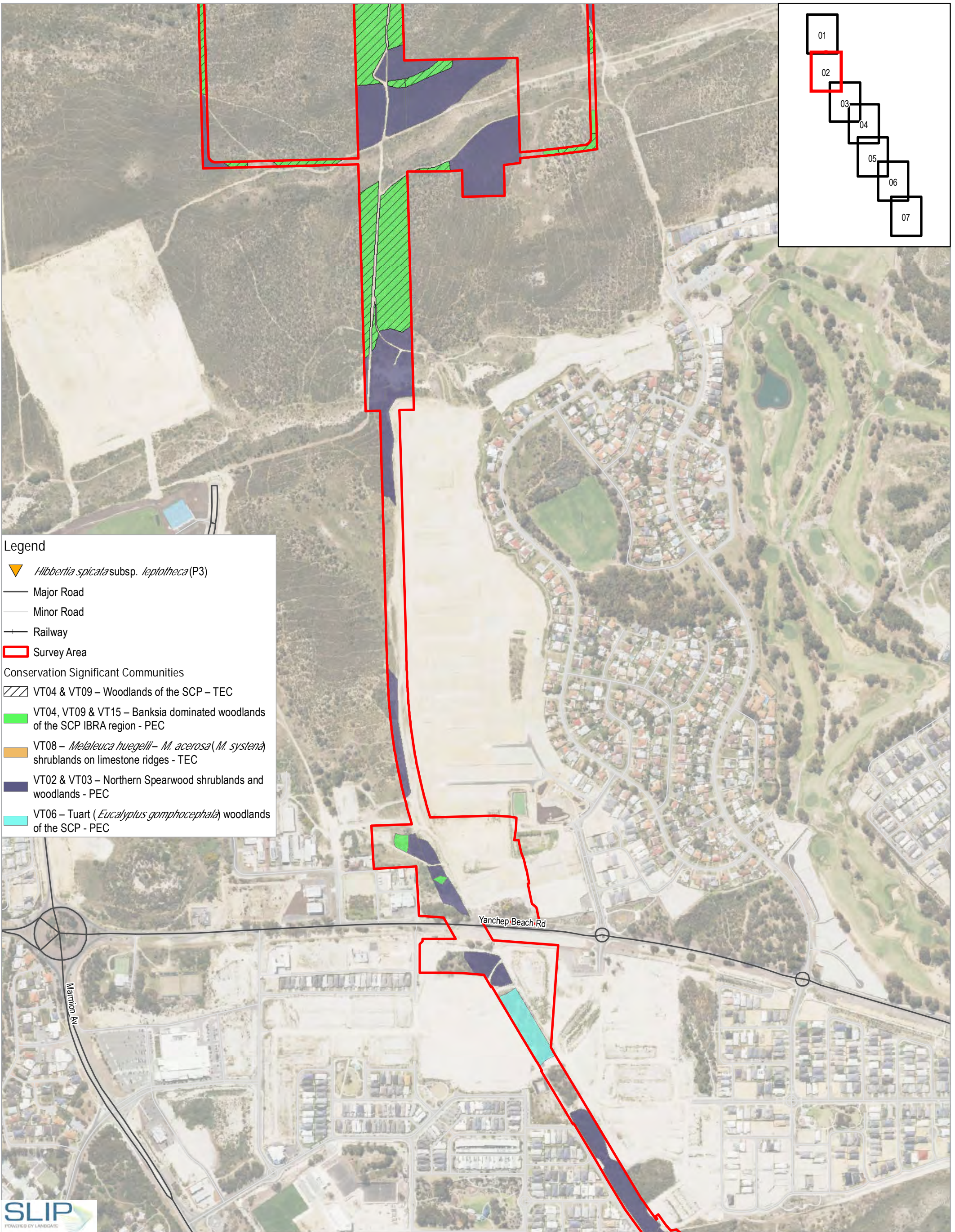
Public Transport Authority
Butler to Yankep
Extension Flora & Fauna Survey

Conservation Significant Communities and Flora

Project No. 61-36660
Revision No. 1
Date 18/12/2017

FIGURE 7

Data source: GHD: Conservation Significant Communities, Conservation Significant Flora - 20171218; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA: Survey Area - 20171214. Created by: slsney

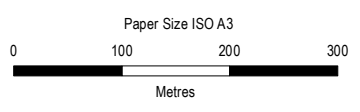


Legend

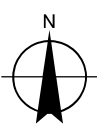
- Hibbertia spicata* subsp. *leptotheca* (P3)
- Major Road
- Minor Road
- Railway
- Survey Area

Conservation Significant Communities

- VT04 & VT09 – Woodlands of the SCP – TEC
- VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
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- VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
- VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

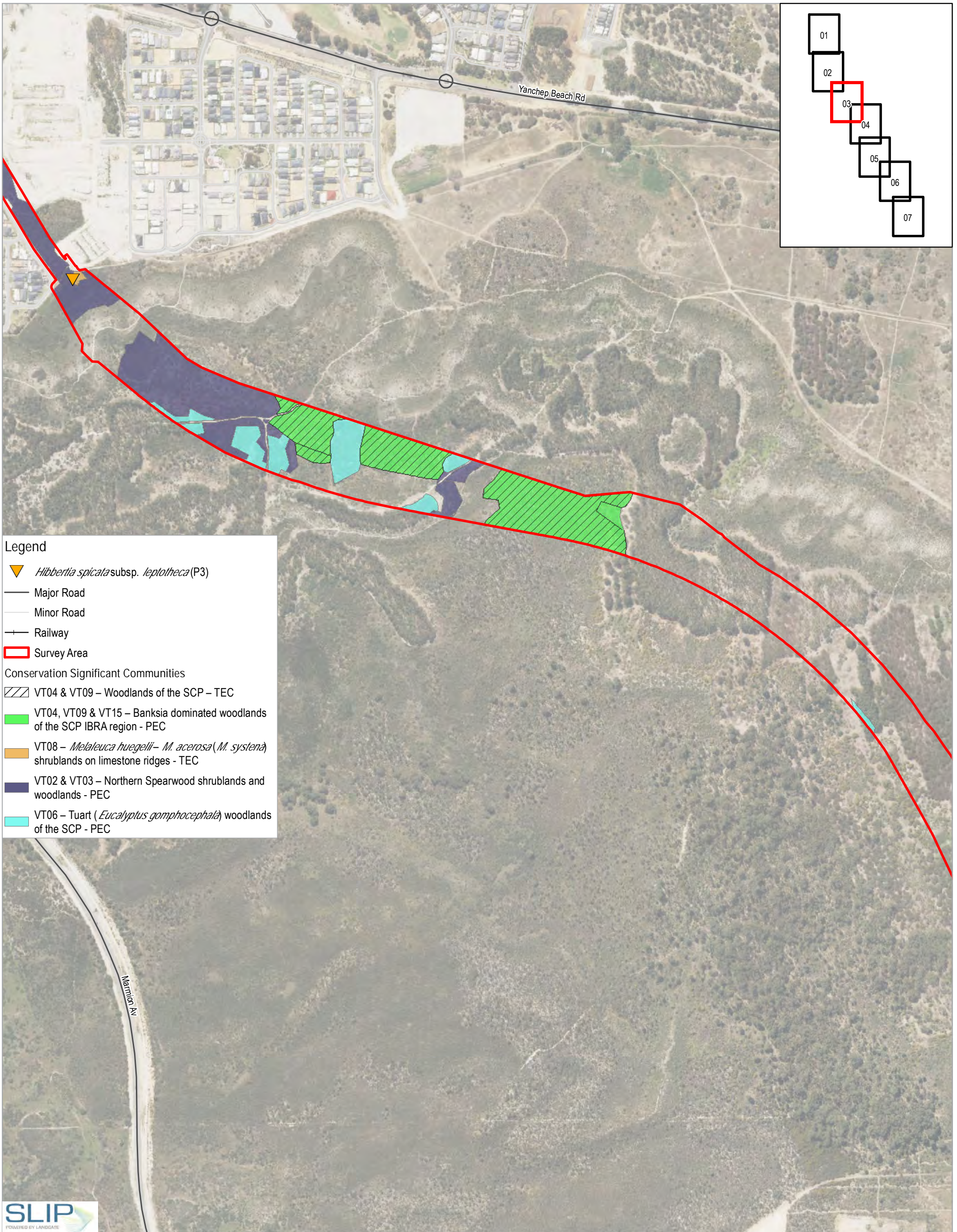


Public Transport Authority
 Butler to Yanchep
 Extension Flora & Fauna Survey

Conservation Significant Communities and Flora

Project No. 61-36660
 Revision No. 1
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FIGURE 7

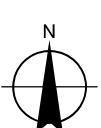
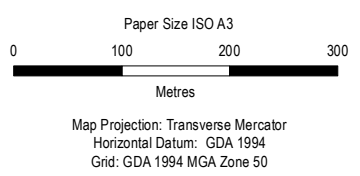


Legend

- Hibbertia spicata* subsp. *leptotheca* (P3)
- Major Road
- Minor Road
- Railway
- Survey Area

Conservation Significant Communities

- VT04 & VT09 – Woodlands of the SCP – TEC
- VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
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- VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
- VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



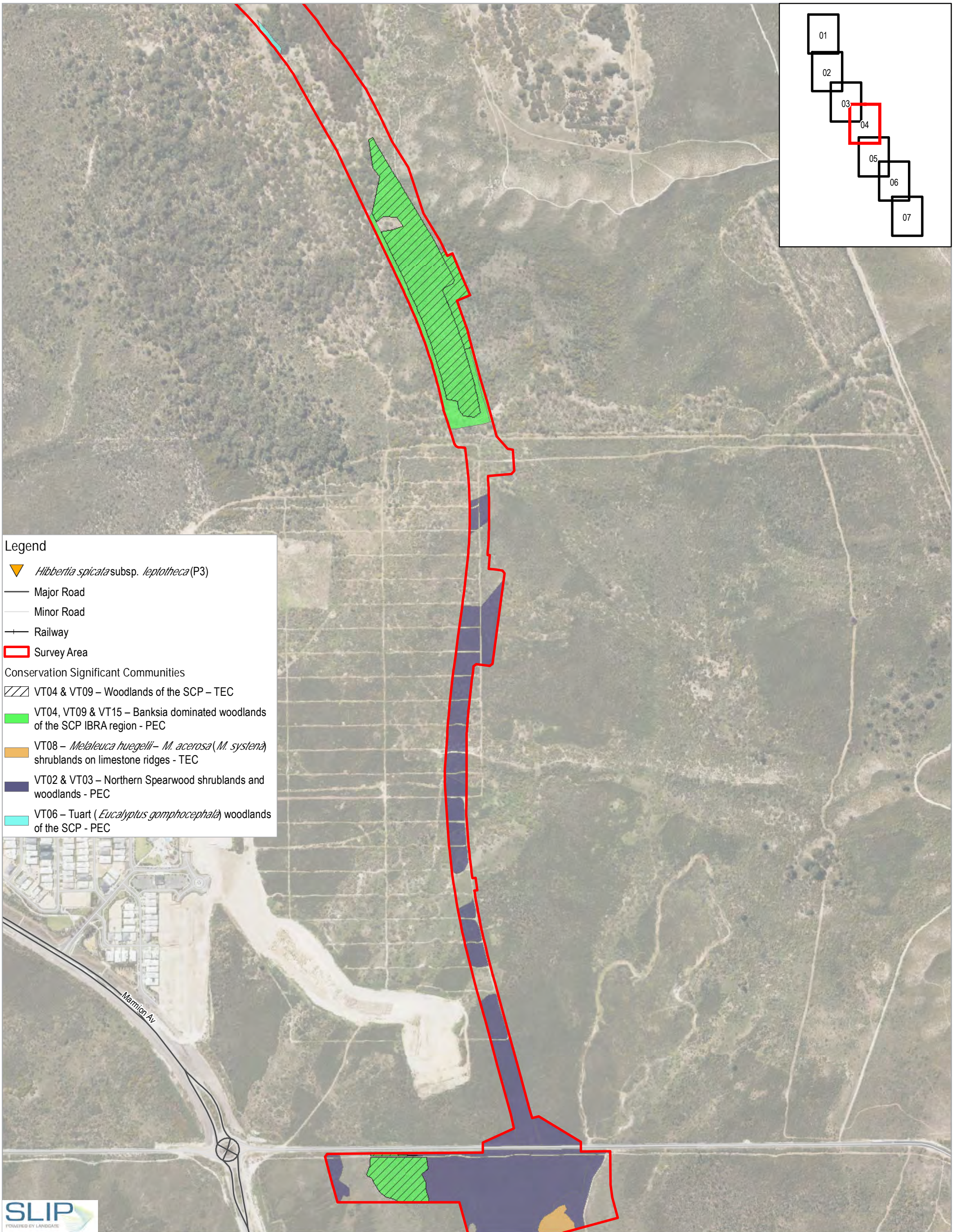
Public Transport Authority
Butler to Yanchep
Extension Flora & Fauna Survey

**Conservation Significant Communities
and Flora**






Project No. 61-36660
Revision No. 1
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FIGURE 7






Data source: GHD: Conservation Significant Communities, Conservation Significant Flora - 20171218; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA: Survey Area - 20171214. Created by: sloneey

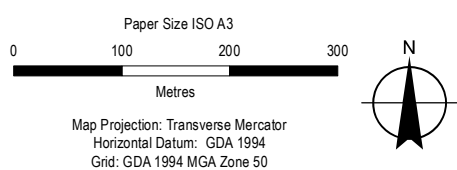
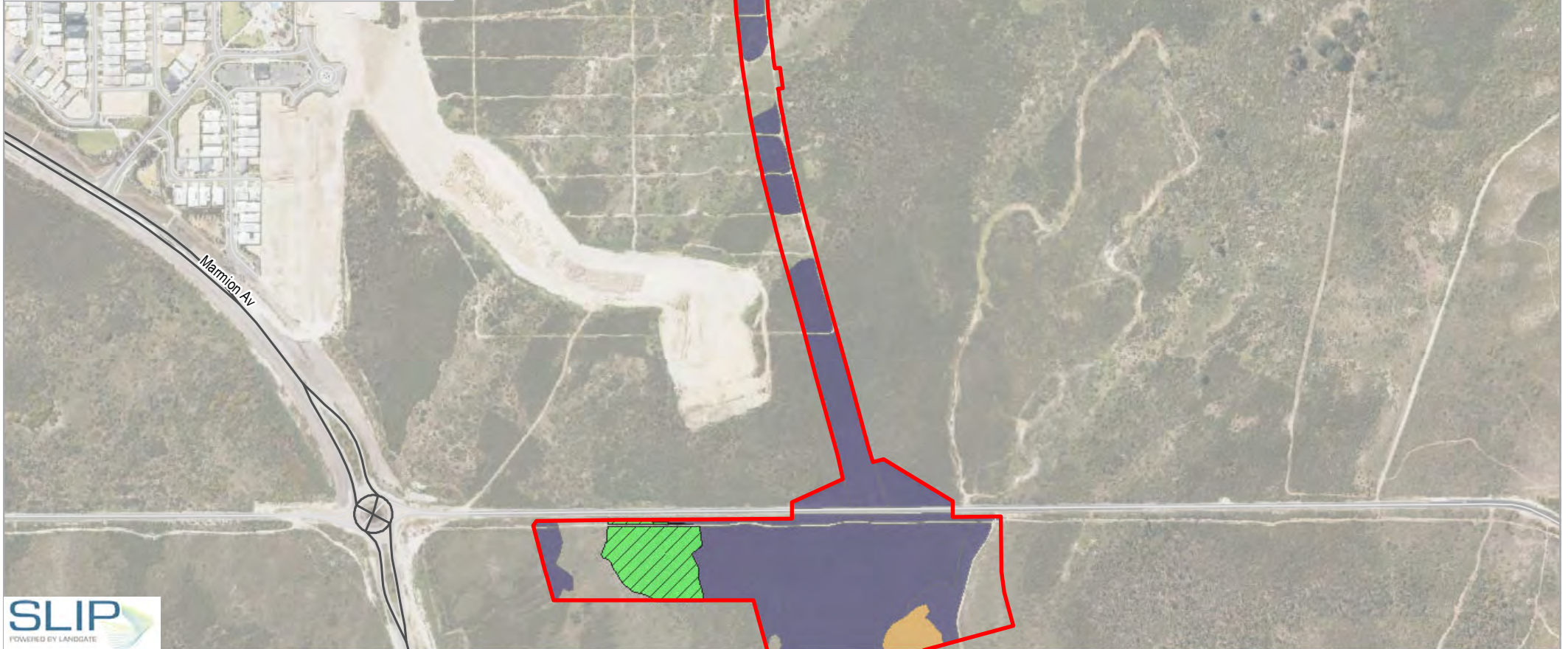


Legend

-  *Hibbertia spicata* subsp. *leptotheca* (P3)
-  Major Road
-  Minor Road
-  Railway
-  Survey Area

Conservation Significant Communities

-  VT04 & VT09 – Woodlands of the SCP – TEC
-  VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
-  VT08 – *Melaleuca huegelii*– *M. acerosa* (*M. systema*) shrublands on limestone ridges - TEC
-  VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
-  VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC

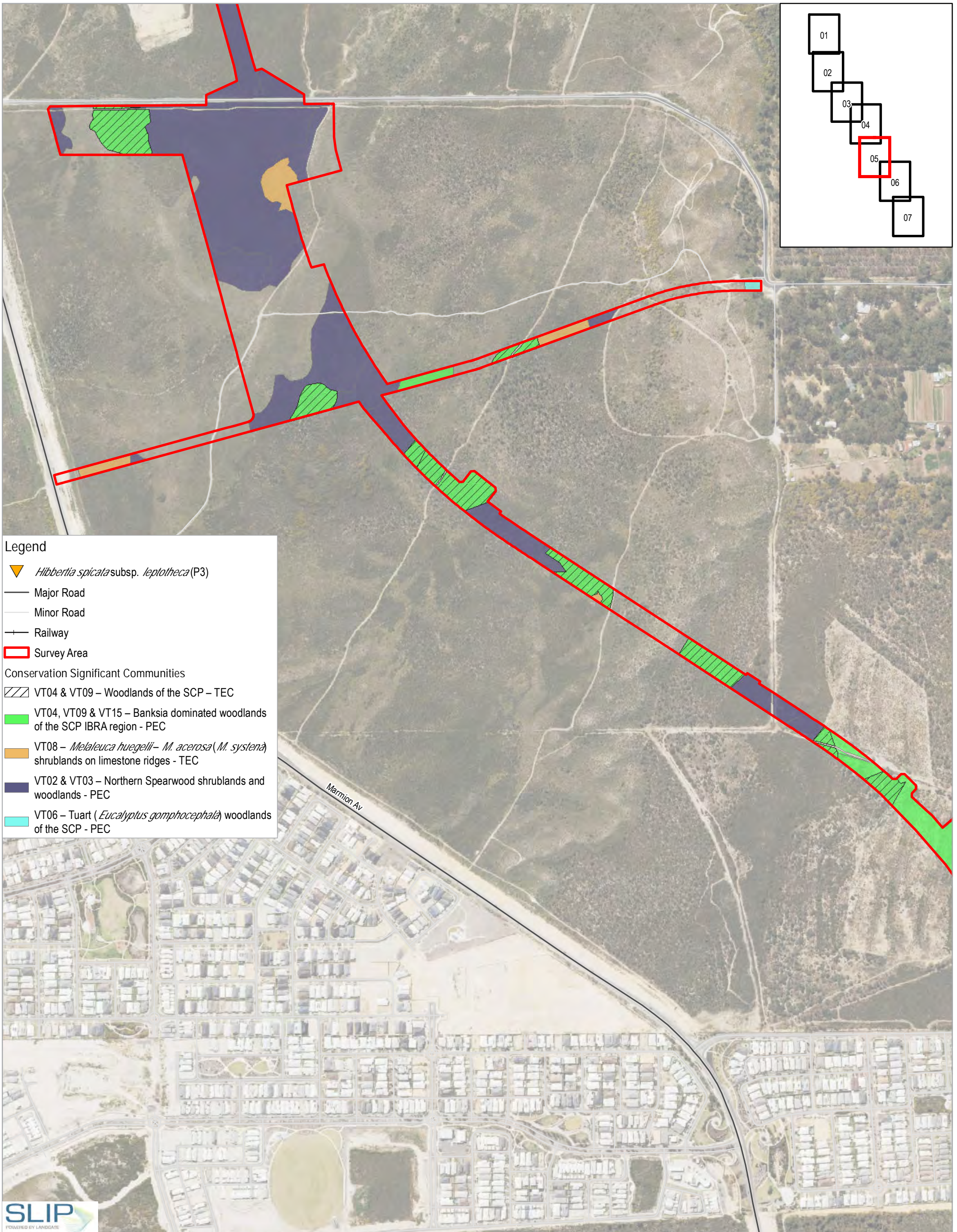


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Butler to Yanchep
Extension Flora & Fauna Survey

**Conservation Significant Communities
and Flora**

Project No. 61-36660
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FIGURE 7

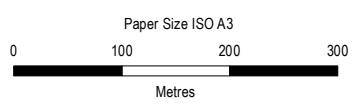


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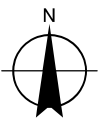
- Hibbertia spicata* subsp. *leptotheca* (P3)
- Major Road
- Minor Road
- Railway
- Survey Area

Conservation Significant Communities

- VT04 & VT09 – Woodlands of the SCP – TEC
- VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
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- VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
- VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



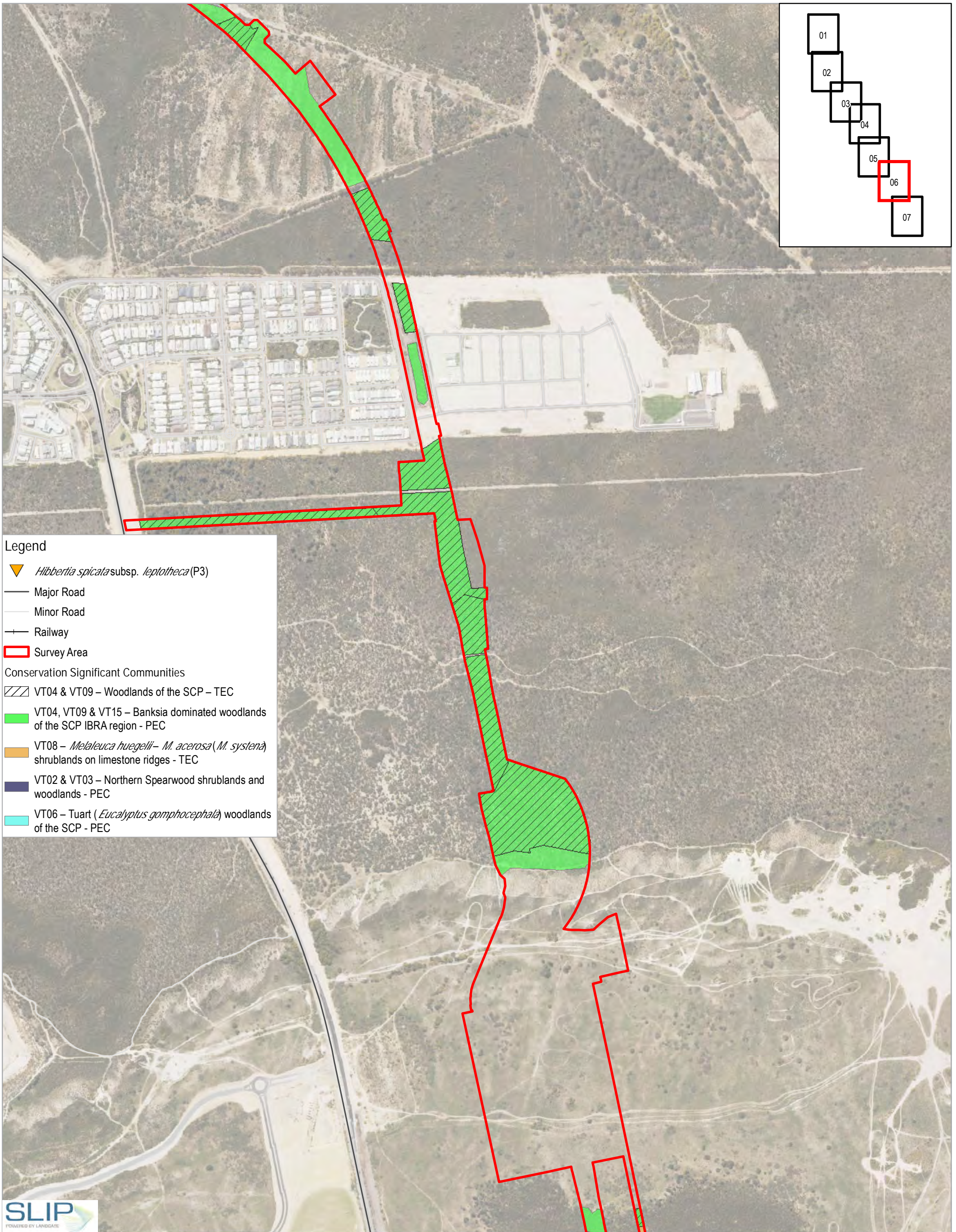
Public Transport Authority
 Butler to Yankep
 Extension Flora & Fauna Survey

Conservation Significant Communities and Flora

Project No. 61-36660
 Revision No. 1
 Date 18/12/2017

FIGURE 7

Data source: GHD: Conservation Significant Communities, Conservation Significant Flora - 20171216; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA: Survey Area - 20171214. Created by: slsney

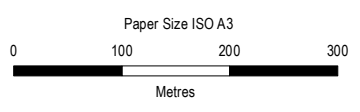
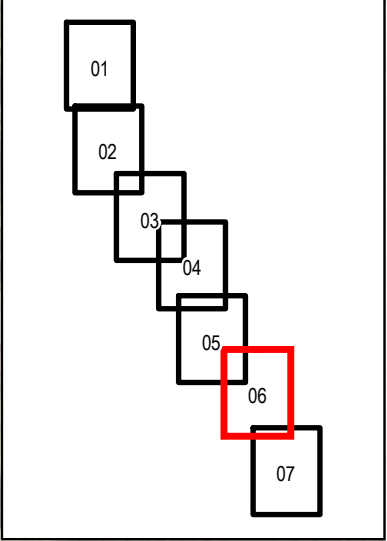


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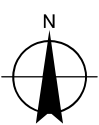
- Hibbertia spicata* subsp. *leptotheca* (P3)
- Major Road
- Minor Road
- Railway
- Survey Area

Conservation Significant Communities

- VT04 & VT09 – Woodlands of the SCP – TEC
- VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
- VT08 – *Melaleuca huegelii*– *M. acerosa* (*M. systema*) shrublands on limestone ridges - TEC
- VT02 & VT03 – Northern Spearwood shrublands and woodlands - PEC
- VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



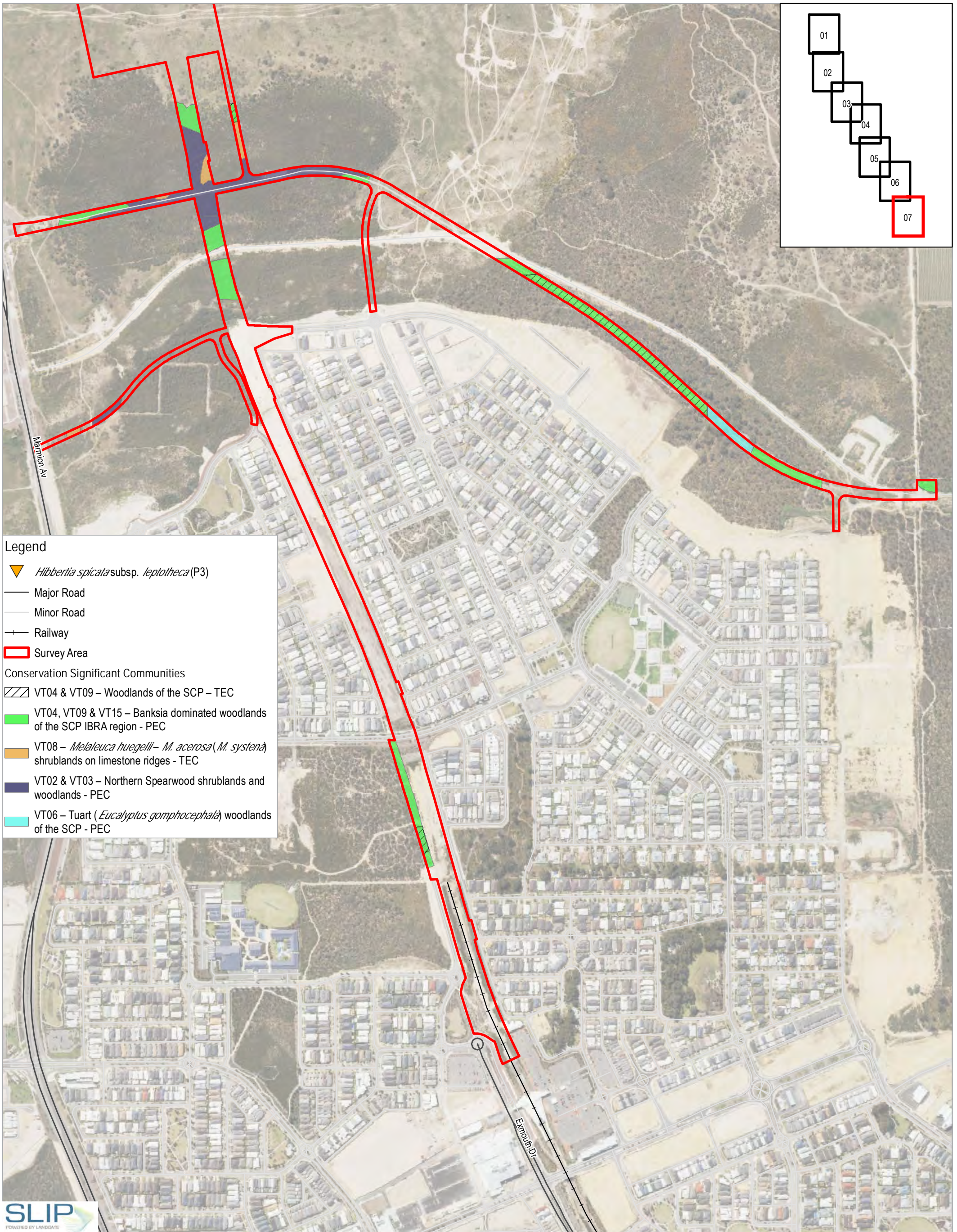
Public Transport Authority
Butler to Yanchep
Extension Flora & Fauna Survey

**Conservation Significant Communities
and Flora**

Project No. 61-36660
Revision No. 1
Date 18/12/2017

FIGURE 7

Data source: GHD: Conservation Significant Communities, Conservation Significant Flora - 20171218; Landgate: Roads - 20160617, Railway - 20170906; Imagery: PTA: Survey Area - 20171214. Created by: slsney

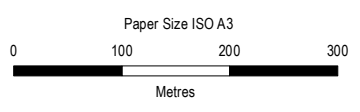


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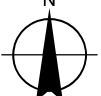
- Hibbertia spicata* subsp. *leptotheca* (P3)
- Major Road
- Minor Road
- Railway
- Survey Area

Conservation Significant Communities

- VT04 & VT09 – Woodlands of the SCP – TEC
- VT04, VT09 & VT15 – Banksia dominated woodlands of the SCP IBRA region - PEC
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- VT06 – Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP - PEC



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



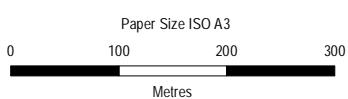
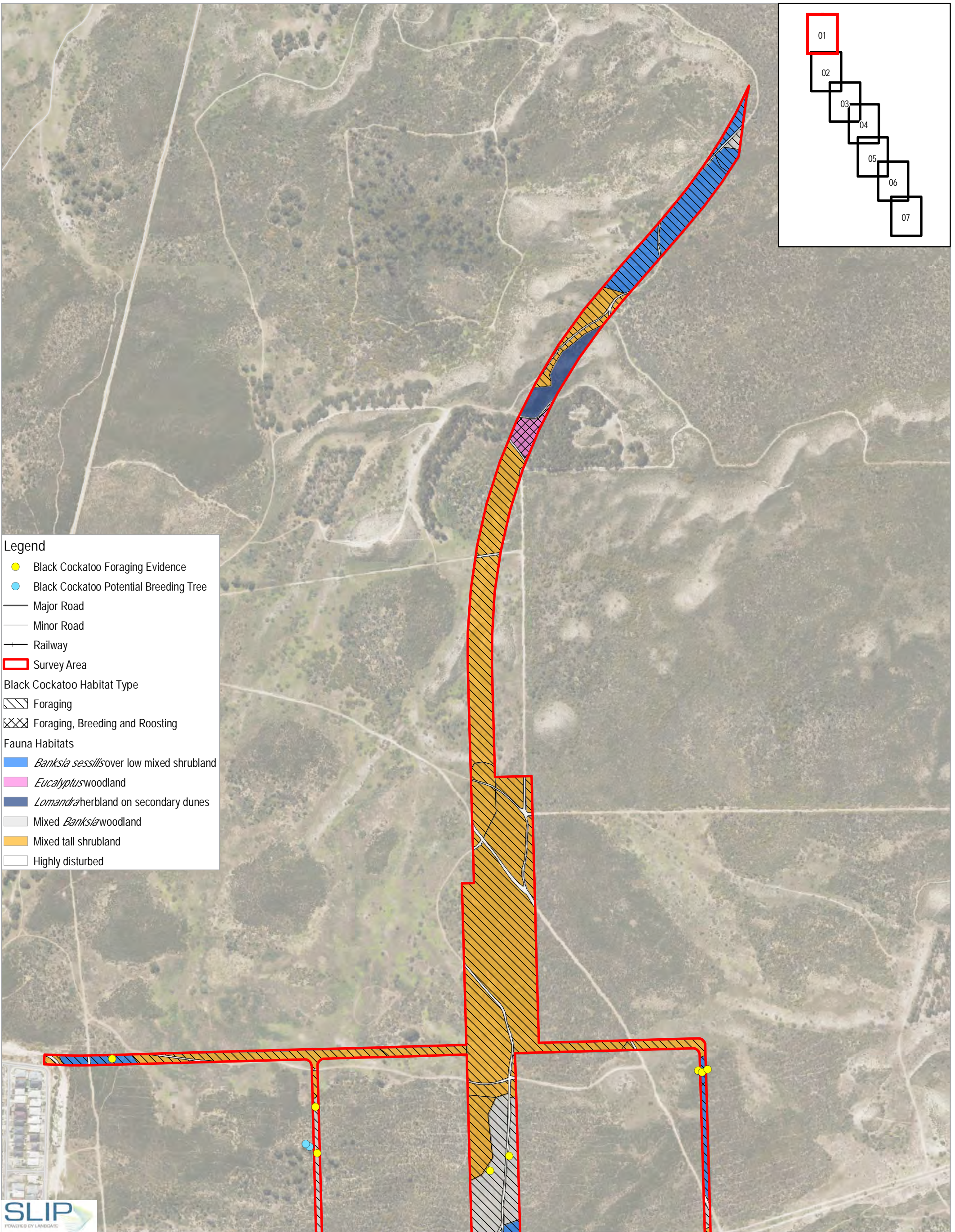
Public Transport Authority
Butler to Yankeep
Extension Flora & Fauna Survey

Conservation Significant Communities and Flora

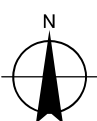
Project No. 61-36660
Revision No. 1
Date 18/12/2017

FIGURE 7

Data source: GHD: Conservation Significant Communities, Conservation Significant Flora - 20171218; Landgate: Roads - 20160617, Railway - 20170906; Imagery: PTA: Survey Area - 20171214. Created by: slsney



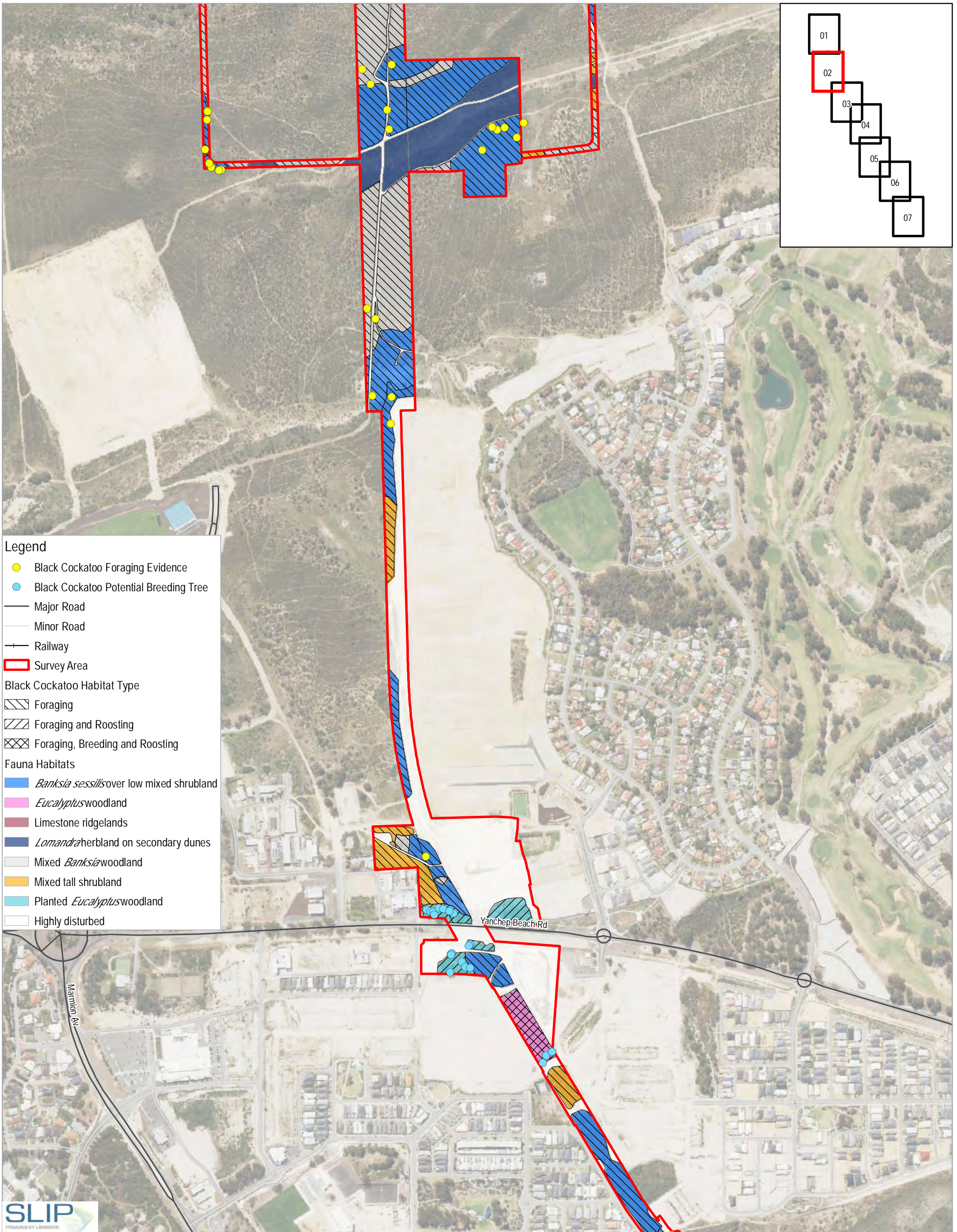
Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Public Transport Authority
 Butler to Yankeep
 Extension Flora & Fauna Survey
**Fauna Habitats and
 Black Cockatoo Habitats**

Project No. 61-36660
 Revision No. 2
 Date 18/12/2017

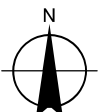
FIGURE 8



- Legend**
- Black Cockatoo Foraging Evidence
 - Black Cockatoo Potential Breeding Tree
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Black Cockatoo Habitat Type**
- Foraging
 - Foraging and Roosting
 - Foraging, Breeding and Roosting
- Fauna Habitats**
- Banksia sessilis* over low mixed shrubland
 - Eucalyptus* woodland
 - Limestone ridgelands
 - Lomandra* herbland on secondary dunes
 - Mixed *Banksia* woodland
 - Mixed tall shrubland
 - Planted *Eucalyptus* woodland
 - Highly disturbed



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

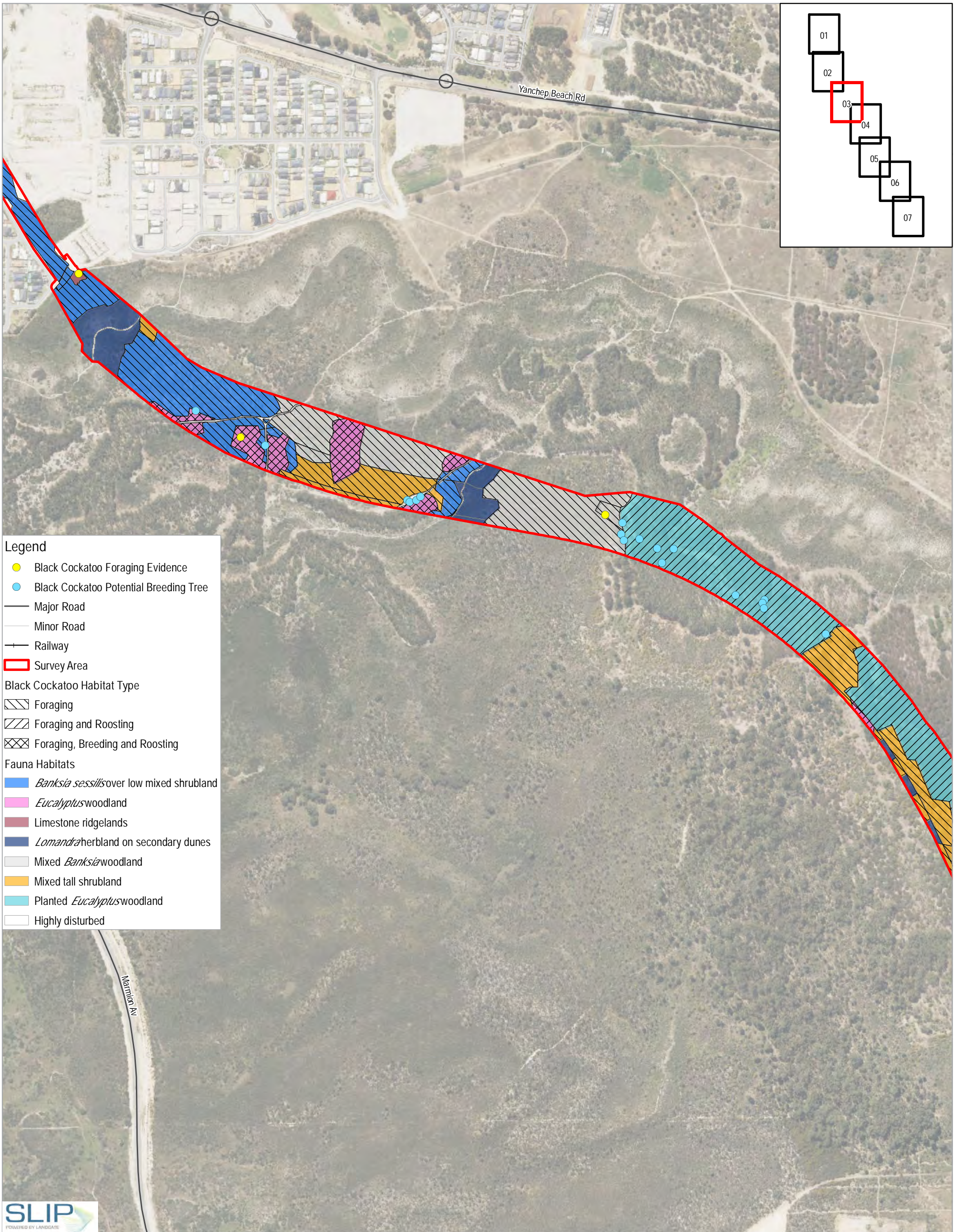


Public Transport Authority
 Butler to Yanchepl
 Extension Flora & Fauna Survey
**Fauna Habitats and
 Black Cockatoo Habitats**

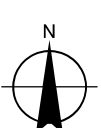
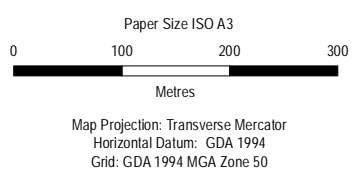
Project No. 61-36660
 Revision No. 2
 Date 18/12/2017

FIGURE 8

Data source: GHD: Black Cockatoo Habitats, Fauna Habitats, Black Cockatoo Trees - 20171218; Landgate: Roads - 20160617, Railway - 20170906; Imagery: PTA: Survey Area - 20171214. Created by: allecney



- Legend**
- Black Cockatoo Foraging Evidence
 - Black Cockatoo Potential Breeding Tree
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Black Cockatoo Habitat Type**
- Foraging
 - Foraging and Roosting
 - Foraging, Breeding and Roosting
- Fauna Habitats**
- Banksia sessilis* over low mixed shrubland
 - Eucalyptus* woodland
 - Limestone ridgeland
 - Lomandra* herbland on secondary dunes
 - Mixed *Banksia* woodland
 - Mixed tall shrubland
 - Planted *Eucalyptus* woodland
 - Highly disturbed

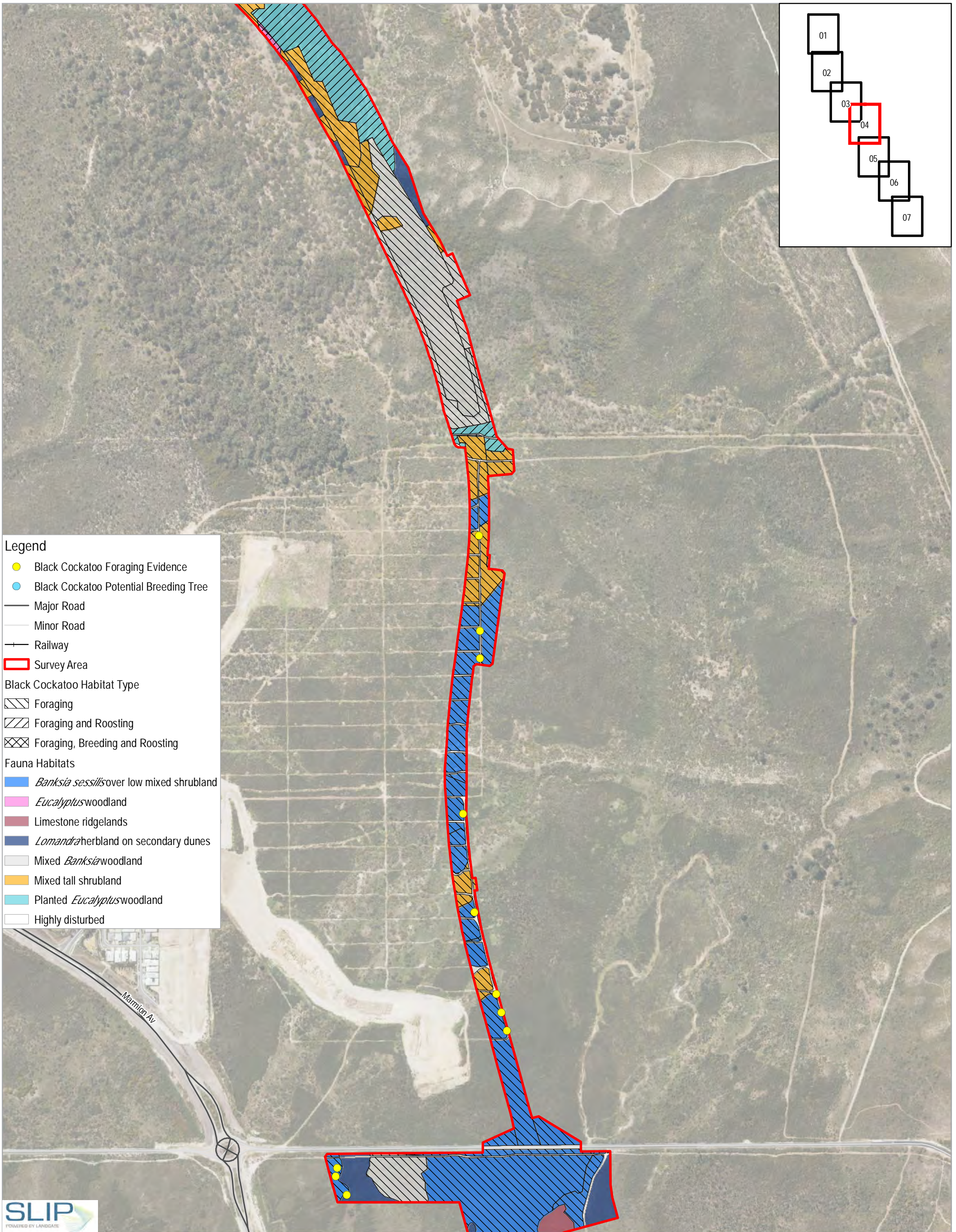


Public Transport Authority
Butler to Yanchee
Extension Flora & Fauna Survey
**Fauna Habitats and
Black Cockatoo Habitats**

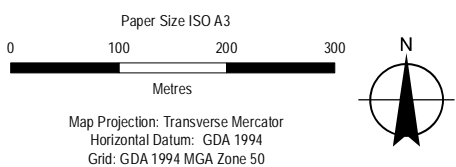
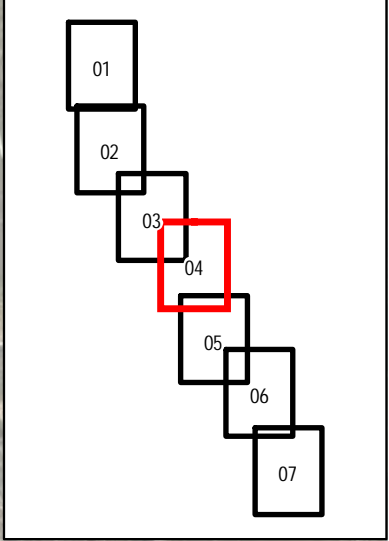
Project No. 61-36660
Revision No. 2
Date 18/12/2017

FIGURE 8

Data source: GHD: Black Cockatoo Habitats, Fauna Habitats, Black Cockatoo Trees - 20171218; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA; Survey Area - 20171214. Created by: allecney



- Legend**
- Black Cockatoo Foraging Evidence
 - Black Cockatoo Potential Breeding Tree
 - Major Road
 - Minor Road
 - Railway
 - ▭ Survey Area
- Black Cockatoo Habitat Type**
- ▨ Foraging
 - ▩ Foraging and Roosting
 - ▧ Foraging, Breeding and Roosting
- Fauna Habitats**
- *Banksia sessilis* over low mixed shrubland
 - *Eucalyptus* woodland
 - Limestone ridgeland
 - *Lomandra* herbland on secondary dunes
 - Mixed *Banksia* woodland
 - Mixed tall shrubland
 - Planted *Eucalyptus* woodland
 - Highly disturbed

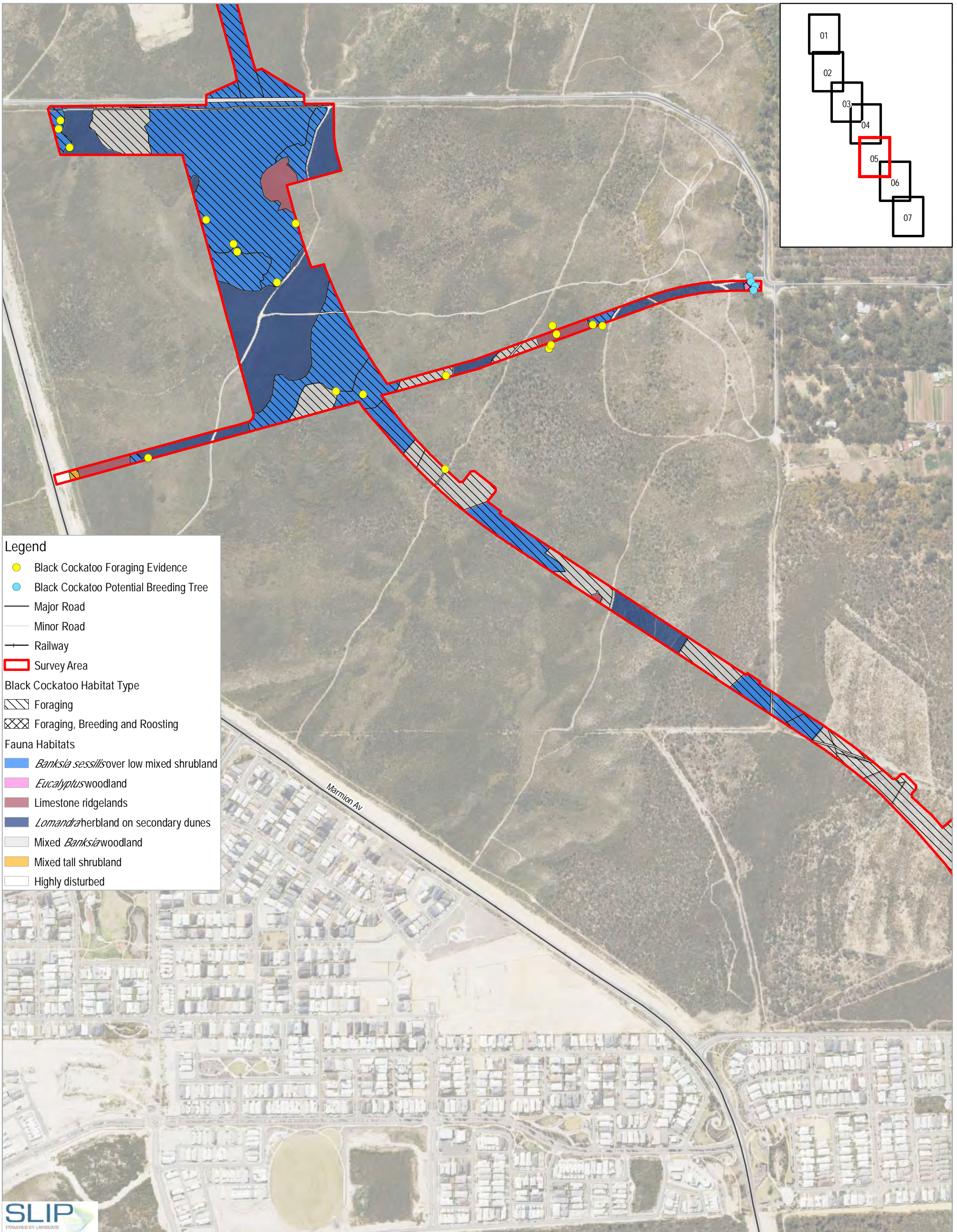


Public Transport Authority
Butler to Yankeep
Extension Flora & Fauna Survey
**Fauna Habitats and
Black Cockatoo Habitats**

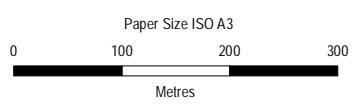
Project No. 61-36660
Revision No. 2
Date 18/12/2017

FIGURE 8

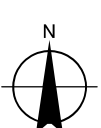
Data source: GHD: Black Cockatoo Habitats, Fauna Habitats, Black Cockatoo Trees - 20171218; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA: Survey Area - 20171214. Created by: allecney



- Legend**
- Black Cockatoo Foraging Evidence
 - Black Cockatoo Potential Breeding Tree
 - Major Road
 - Minor Road
 - Railway
 - Survey Area
- Black Cockatoo Habitat Type**
- Foraging
 - Foraging, Breeding and Roosting
- Fauna Habitats**
- Banksia sessilis* over low mixed shrubland
 - Eucalyptus* woodland
 - Limestone ridgeland
 - Lomandra* herbland on secondary dunes
 - Mixed *Banksia* woodland
 - Mixed tall shrubland
 - Highly disturbed



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

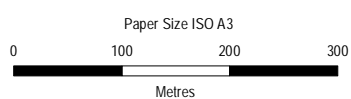
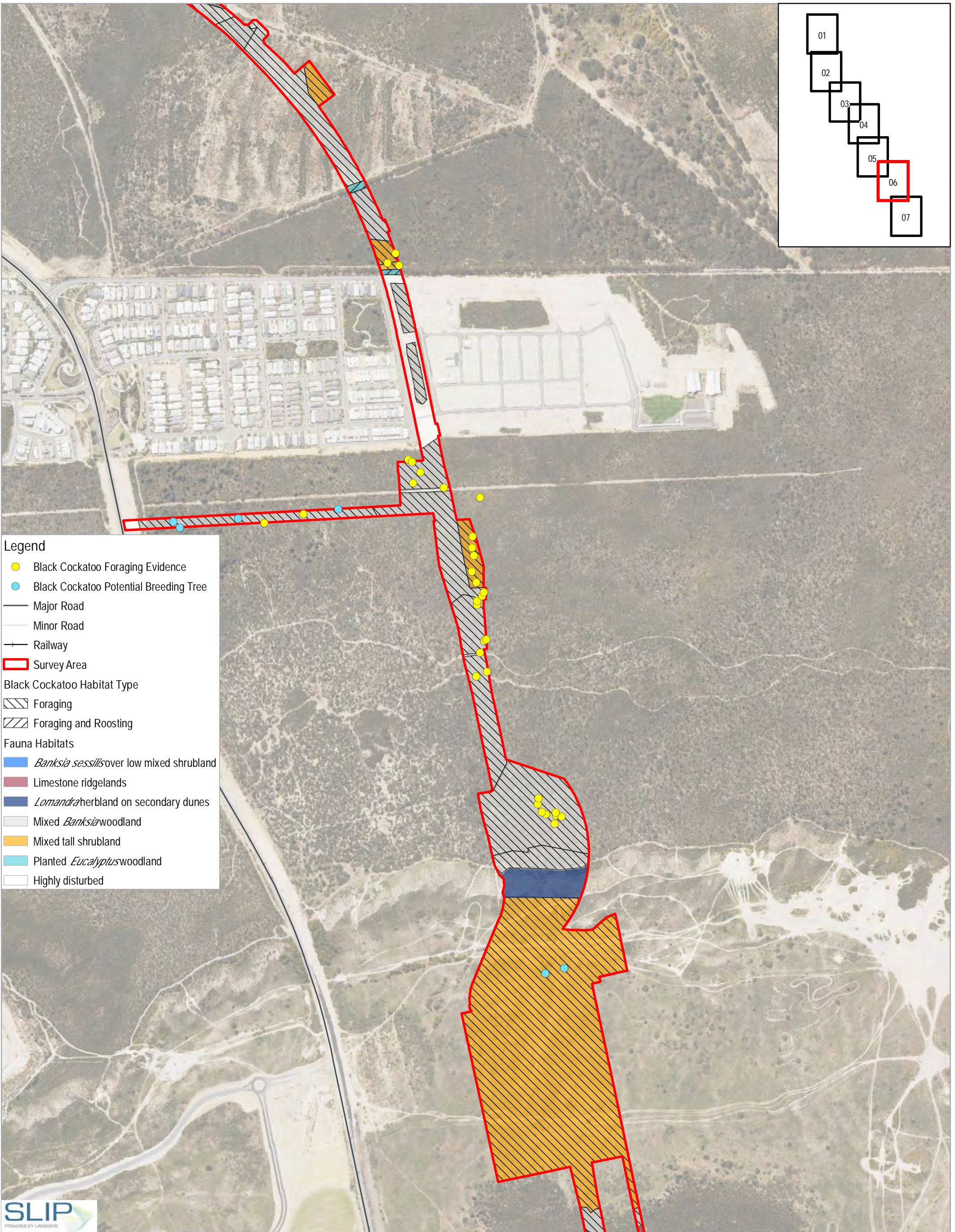


Public Transport Authority
 Butler to Yankeep
 Extension Flora & Fauna Survey
**Fauna Habitats and
 Black Cockatoo Habitats**

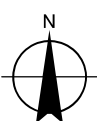
Project No. 61-36660
 Revision No. 2
 Date 18/12/2017

FIGURE 8

Data source: GHD: Black Cockatoo Habitats, Fauna Habitats, Black Cockatoo Trees - 20171218; Landgate: Roads - 20160617, Railway - 20170906, Imagery: PTA: Survey Area - 20171214. Created by: allecney



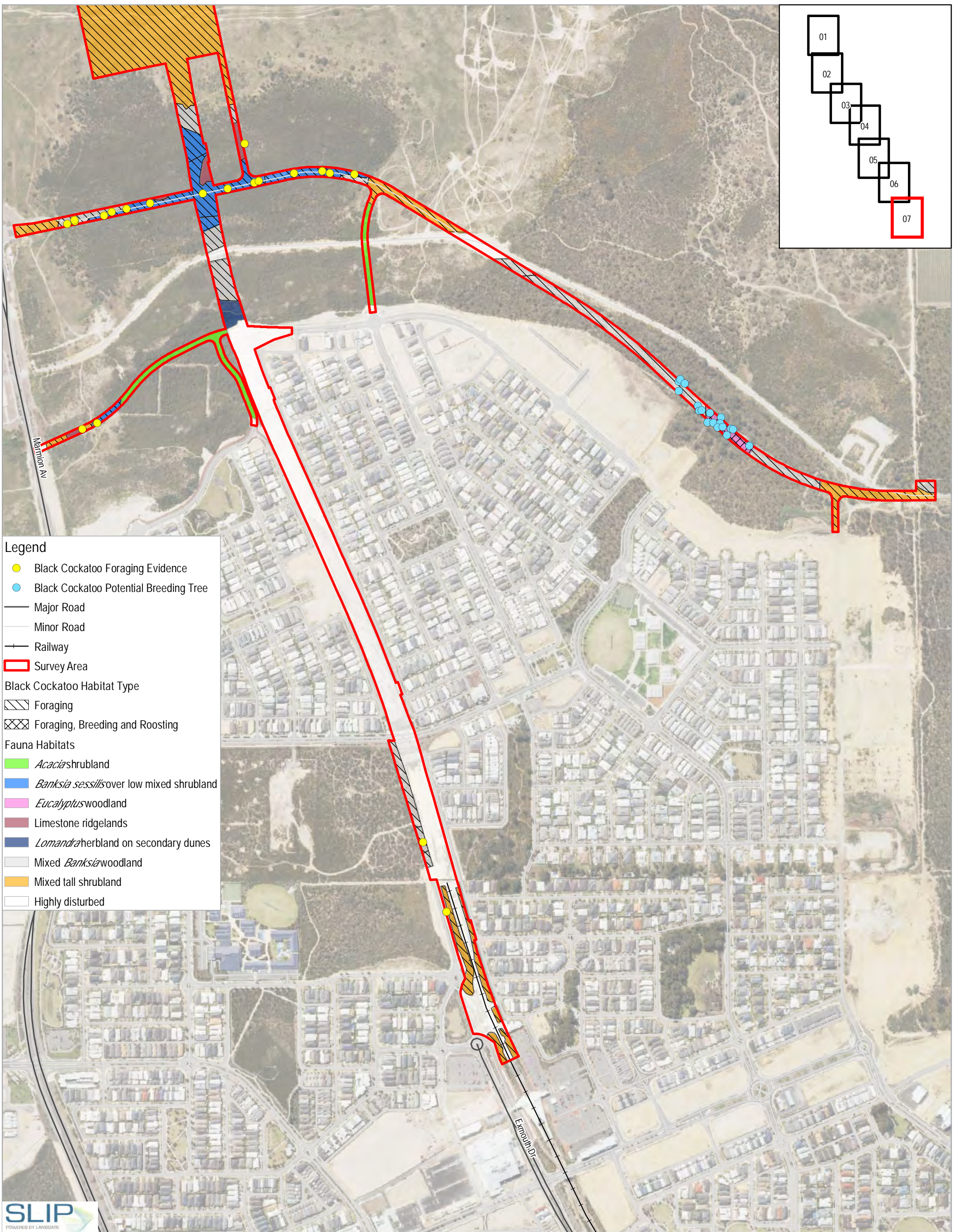
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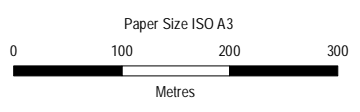
Public Transport Authority
Butler to Yanchep
Extension Flora & Fauna Survey
**Fauna Habitats and
Black Cockatoo Habitats**

Project No. 61-36660
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Date 18/12/2017

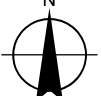
FIGURE 8



- Legend**
- Black Cockatoo Foraging Evidence
 - Black Cockatoo Potential Breeding Tree
 - Major Road
 - Minor Road
 - Railway
 - ▭ Survey Area
 - Black Cockatoo Habitat Type**
 - ▨ Foraging
 - ▩ Foraging, Breeding and Roosting
 - Fauna Habitats**
 - *Acacia* shrubland
 - *Banksia sessilis* over low mixed shrubland
 - *Eucalyptus* woodland
 - Limestone ridgelands
 - *Lomandra* herbland on secondary dunes
 - Mixed *Banksia* woodland
 - Mixed tall shrubland
 - Highly disturbed



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Public Transport Authority
 Butler to Yankeep
 Extension Flora & Fauna Survey
**Fauna Habitats and
 Black Cockatoo Habitats**

Project No. 61-36660
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FIGURE 8

Data source: GHD: Black Cockatoo Habitats, Fauna Habitats, Black Cockatoo Trees - 20171218; Landgate: Roads - 20160617, Railway - 20170906; Imagery: PTA; Survey Area - 20171214. Created by: allecney

Appendix B – Relevant legislation, conservation codes and background information

Relevant legislation

Federal Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of the Environment and Energy (DotEE).

State Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Environment Regulation (DER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a) Native vegetation should not be cleared if it comprises a high level of biodiversity.
- b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c) Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
- d) Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- h) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

- i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State Biodiversity and Conservation Act 2016

The Biodiversity Conservation Bill 2015 was introduced to State Parliament in November 2015, and passed in September 2016. The Bill became the *Biodiversity Conservation Act 2016* (BC Act) upon receiving Assent on 21 September 2016. The BC Act will eventually fully replace both the *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act).

Several parts of the BC Act were proclaimed by the State Governor in the Government Gazette and came into effect on 3 December 2016. However, provisions that replace those existing under the WC Act and Sandalwood Act (including threatened species listings and controls over the taking and keeping of native species) and their associated Regulations cannot be brought into effect until the necessary Biodiversity Conservation Regulations have been made. It is hoped the new Regulations will be completed and ready to commence by late 2017.

State Wildlife Conservation Act 1950

The WC Act provides for the conservation and protection of wildlife. It is administered by the Department of Parks and Wildlife (DPaW) and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study fauna requires a permit to do so. A permit is required under the WC Act if removal of threatened species is required.

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Agriculture and Food Western Australia (DAFWA) and replace the repealed *Agriculture and Related Resources Protection Act 1976*. The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DAFWA Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the <i>Australian Heritage Commission Act 1975</i> of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in “Bush Forever” Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the <i>Environmental Protection (Gnangara Mound Crown Land) Policy 1992</i> .
The areas covered by the <i>Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002</i> .
The areas covered by the lakes to which the <i>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992</i> (EPP Lakes) applies.
Protected wetlands as defined in the <i>Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998</i> .

Reserves and conservation areas

Bush Forever

Bush Forever, which was released in December 2000 and proclaimed in 2010, is a Government initiative aimed to retain and protect regionally significant bushland on the Swan Coastal Plain within the Perth Metropolitan Region. Bush Forever aims to protect more than 51,000 hectares of regionally significant bushland within 287 sites across the metropolitan portion of the Swan Coastal Plain (Government of Western Australia (GoWA) 2000). Bush Forever sites constitute ESAs as declared by a notice under Section 51B of the EP Act.

Department of Parks and Wildlife managed lands and waters

DPaW manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DPaW managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional

parks, nature reserves, State forest and timber reserves. DPaW managed conservation estate, is vested with the Conservation Commission of Western Australia. Access to, or through, some areas of DPaW managed lands may require a permit or could be restricted due to management activities. Proposed land use changes and development proposals that abut DPaW managed lands will generally be referred to DPaW throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil. Approximately 25 percent of the Swan Coastal Plain between Moore River and Mandurah is classified as wetland (Hill et al. 1996).

Though extensive in area, not all wetlands retain significant ecological values due to the concentration of urban and agricultural development in the region. Most wetlands have been cleared, filled or developed over, leaving only 20 percent of all the wetlands that were present on the Swan Coastal Plain prior to European settlement. Of these, an estimated 15 percent of the wetland area has retained high ecological values (Hill et al. 1996).

Ramsar Listed Wetlands

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity ... because of their ecological, botanical, zoological, limnological or hydrological importance” (DotEE 2017b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DotEE 2017b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DotEE 2017a):

- It is a good example of a wetland type occurring within a biogeographic region in Australia
- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
- The wetland supports one percent or more of the national populations of any native plant or animal taxa
- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
- The wetland is of outstanding historical or cultural significance

Lakes covered under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*

The *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) protects the environmental values of selected lakes/wetlands on the Swan Coastal Plain.

Geomorphic wetlands

Categorisation of wetlands has been conducted by Hill et al. (1996), delineating Swan Coastal Plain wetlands into levels of protection and management categories. Conservation Category Wetlands are

wetlands that support high levels of attributes and functions. Resource Enhancement Wetlands are those that have been partly modified but still support substantial functions and attributes. Multiple Use Wetlands are classified as those wetlands with few attributes that still provide important wetland functions. Multiple Use wetlands have few important ecological attributes and functions remaining.

The Geomorphic Wetlands Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia’s Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2015), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated at least every two years.

Within the Swan Coastal Plain, EPA Position Statement No. 9 (EPA 2006) identifies vegetation complexes with 30 percent or less of their pre-clearing extent remaining in a bioregion, or 10 percent or less of their pre-clearing extent remaining in constrained areas (i.e. areas of urban development in cities and major town) on the Swan Coastal Plain, to be critical assets.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (EPA and DPaW 2015). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Vegetation condition rating scale for the South West and Interzone Botanical Provinces

Condition	South West and Interzone Botanical Provinces description
Pristine	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

Condition	South West and Interzone Botanical Provinces description
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State WC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The DPaW also maintains a list of TECs for Western Australia; some of which are also protected under the EPBC Act. TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable.

Possible TECs that do not meet survey criteria are added to the DPaW Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

[Conservation codes and definitions for TECs listed under the EPBC Act or endorsed by the WA Minister for the Environment](#)

Categories	Definition
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Endangered (EN)	An ecological community if, at that time: A) is not critically endangered; and B) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Vulnerable (VU)	An ecological community if, at that time: A) is not critically endangered or endangered; and B) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Western Australia Conservation Categories	
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

Categories	Definition
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Conservation categories and definitions for PECS as listed by the DPaW

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

Category	Description
Priority 4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
Priority 5	<p>Conservation Dependent ecological communities.</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA and DPaW (2015) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a refuge
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in 'pristine' condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range)
- Being poorly reserved

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DotEE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for Conservation of Nature (IUCN).

The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of Threatened flora and fauna has been published as Specially Protected under the WC Act, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2015 for Threatened Fauna and under Schedules 1 to 4 of the Wildlife Conservation (Rare Flora) Notice 2015 for Threatened (Declared Rare) Flora. The schedules align with the categories of the EPBC Act Threatened Fauna and Threatened Flora Lists. Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such.

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 flora or fauna.

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.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DPaW Priority species are considered conservation significant.

Conservation categories and definitions for EPBC Act listed flora and fauna species

Conservation category	Definition
Extinct	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A) A species known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or B) A species that has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A species facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Endangered	A) A species not critically endangered; and B) A species facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Conservation category	Definition
Vulnerable	A) A species not critically endangered or endangered; and B) A species facing a high risk of extinction in the wild in the medium-term, as determined in accordance with the prescribed criteria.
Conservation Dependent	A) The species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or B) The following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that Section 180 provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Conservation codes and descriptions for WC Act listed flora and fauna species

Conservation category	Schedule and definition
Threatened species (T)	Published as Specially Protected under the WC Act, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora. Threatened fauna is that subset of ‘Specially Protected Fauna’ declared to be ‘likely to become extinct’ pursuant to section 14(4) of the WC Act. Threatened flora is flora that has been declared to be ‘likely to become extinct or is rare, or otherwise in need of special protection’, pursuant to section 23F(2) of the WC Act.
Critically Endangered (CR)	Schedule 1: Threatened species considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Schedule 2: Threatened species considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Schedule 3: Threatened species considered to be facing a high risk of extinction in the wild.
Presumed Extinct (EX)	Schedule 4: Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
International Agreement (IA)	Schedule 5: Migratory birds protected under an international agreement
Conservation Dependent (CD)	Schedule 6: Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other Specially Protected (OS)	Schedule 7: Fauna otherwise in need of special protection to ensure their conservation.

Conservation codes for DPaW listed Priority flora and fauna

Priority category	Definition
Priority 1	<p>Poorly-known taxa</p> <p>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.</p>
Priority 2	<p>Poorly-known taxa</p> <p>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.</p>
Priority 3	<p>Poorly-known taxa</p> <p>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.</p>
Priority 4	<p>Rare, Near Threatened and other taxa in need of monitoring</p> <p>A. Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.</p> <p>B. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.</p>

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA and DPaW (2015) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
- Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape

- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- Being poorly reserved

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2016).

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007*.

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

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Appendix C – Database searches

EPBC Act PMST Report

NatureMap Flora Report

NatureMap Fauna Report



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 26/10/16 13:06:57

[Summary](#)

[Details](#)

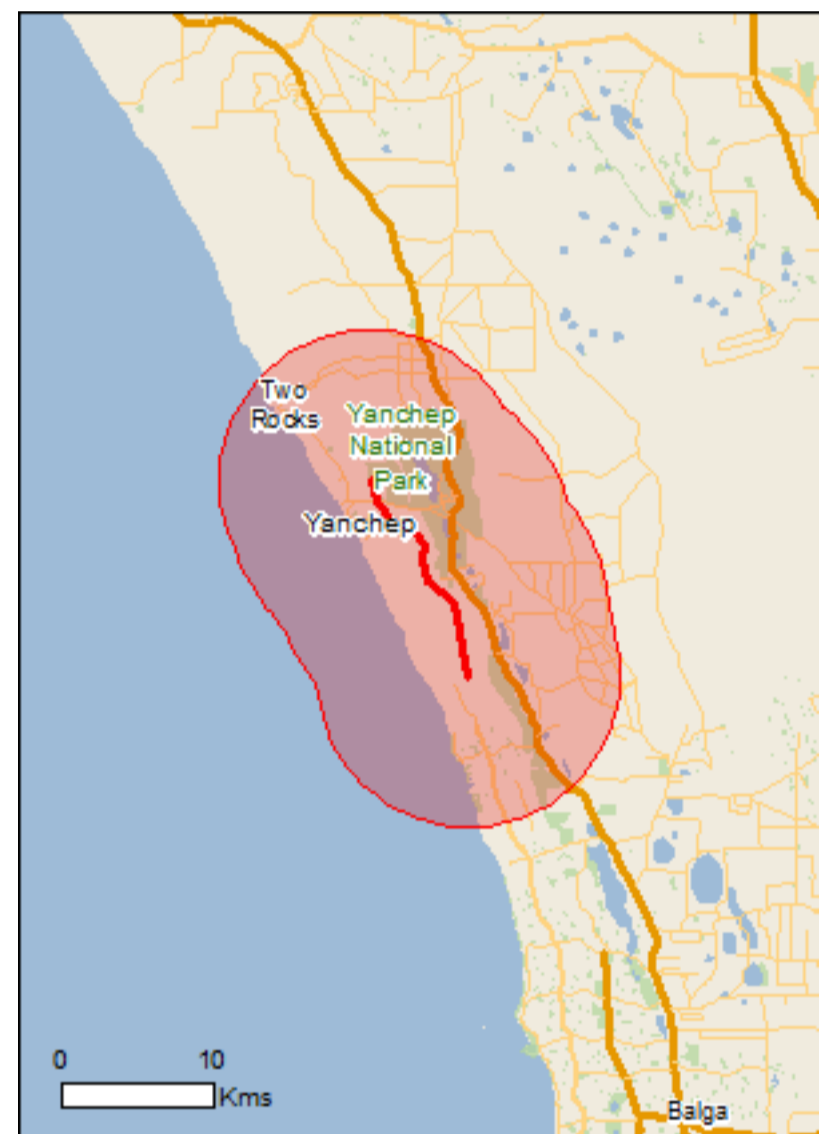
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

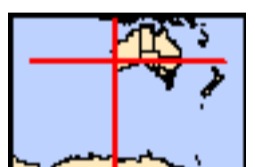
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	47
Listed Migratory Species:	39

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	67
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	1

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	38
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	2

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[\[Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Marine Regions

[\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[South-west](#)

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Aquatic Root Mat Community in Caves of the Swan Coastal Plain	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabbling Hill Mallee [24263]	Vulnerable	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known

Name	Status	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	to occur within area Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or

Name	Threatened	Type of Presence
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	related behaviour likely to occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name

Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name Threatened Type of Presence

Birds

Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
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Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
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Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
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Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species

Name	Threatened	Type of Presence
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	habitat may occur within area Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stigmatopora olivacea a pipefish [74966]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Reptiles		
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Commonwealth Reserves Marine [Resource Information]

Name	Label
Two Rocks	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Neerabup	WA
Neerabup	WA
Unnamed WA49994	WA
Yanchep	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
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Birds

<i>Acridotheres tristis</i> Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
<i>Anas platyrhynchos</i> Mallard [974]		Species or species habitat likely to occur within area
<i>Carduelis carduelis</i> European Goldfinch [403]		Species or species habitat likely to occur within area
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Passer domesticus</i> House Sparrow [405]		Species or species habitat likely to occur within area
<i>Passer montanus</i> Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
<i>Streptopelia chinensis</i> Spotted Turtle-Dove [780]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species

Name	Status	Type of Presence
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Loch McNess System		WA
Key Ecological Features (Marine)		[Resource Information]
Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.		
Name		Region
Commonwealth marine environment within and Western rock lobster		South-west South-west

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.634983 115.699612,-31.597853 115.6912,-31.58674 115.675236,-31.576357 115.671631,-31.576796 115.671631,-31.569191 115.673348,-31.561293 115.667854,-31.559245 115.655838,-31.545933 115.645538,-31.536423 115.64159

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Parks and Wildlife Commission NT, Northern Territory Government](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

NatureMap Flora Species Report

Created By Guest user on 26/10/2016

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 31° 32' 15" S,115° 38' 52" E 31° 32' 30" S,115° 38' 49" E 31° 32' 50" S,115° 38' 58" E 31° 33'
Group By 16" S,115° 39' 14" E 31° 33' 29" S,115° 39' 25" E 31° 33' 34" S,115° 39' 48" E 31° 33' 40"
 S,115° 40' 06" E 31° 34' 04" S,115° 40' 15" E 31° 34' 28" S,115° 40' 16" E 31° 34' 49" S,115°
 40' 08" E 31° 34' 53" S,115° 40' 07" E 31° 35' 18" S,115° 40' 20" E 31° 35' 29" S,115° 40' 34"
 E 31° 35' 59" S,115° 40' 44" E 31° 36' 14" S,115° 40' 51" E 31° 36' 58" S,115° 41' 24" E 31°
 38' 55" S,115° 42' 07" E
 Family

Family	Species	Records
Acrotylaceae	2	7
Aizoaceae	5	16
Alliaceae	1	1
Amaranthaceae	8	32
Anacardiaceae	1	1
Anarthriaceae	2	3
Apiaceae	10	92
Araceae	2	4
Araliaceae	8	80
Arecaceae	1	1
Areschougaceae	5	7
Asparagaceae	25	165
Asphodelaceae	1	3
Asteraceae	67	331
Aytoniaceae	1	1
Bangiaceae	1	1
Bonnemaisoniaceae	1	2
Brassicaceae	11	56
Bryaceae	5	11
Campanulaceae	9	42
Caprifoliaceae	1	4
Caryophyllaceae	9	39
Casuarinaceae	4	27
Caulerpaceae	9	13
Celastraceae	4	14
Centrolepidaceae	3	22
Ceramiaceae	9	11
Champiaceae	1	1
Chenopodiaceae	7	20
Cladophoraceae	1	1
Codiaceae	1	2
Colchicaceae	3	14
Convolvulaceae	1	2
Corallinaceae	2	2
Crassulaceae	5	19
Cucurbitaceae	2	4
Cymodoceaceae	3	3
Cyperaceae	46	215
Dasyaceae	2	2
Dasyogonaceae	2	13
Delesseriaceae	2	2
Dicranaceae	1	1
Dicranemataceae	1	1
Dilleniaceae	12	111
Ditrichaceae	2	2
Droseraceae	9	81
Elaeocarpaceae	1	3
Ericaceae	31	258
Euphorbiaceae	6	9
Fabaceae	86	473
Fabroniaceae	1	8
Faucheaceae	1	2
Frankeniaceae	1	1
Funariaceae	1	3
Geidiaceae	1	1
Gentianaceae	3	5
Geraniaceae	9	39
Gigaspermaceae	1	2
Goodeniaceae	19	72
Gracilariaceae	3	3
Gyrostemonaceae	2	7
Haemodoraceae	27	161
Halimedaaceae	1	1
Haloragaceae	5	11
Halymeniaceae	4	7
Hemercallidaceae	10	55
Hypnaceae	2	3
Iridaceae	11	60
Juncaceae	1	1

Juncaginaceae	3	10
Kallymeniaceae	2	3
Lamiaceae	9	29
Lauraceae	6	28
Lentibulariaceae	1	2
Linaceae	1	2
Loganiaceae	2	10
Loranthaceae	1	13
Lythraceae	1	1
Malvaceae	8	20
Molluginaceae	1	1
Moraceae	1	1
Mychodeaceae	1	1
Myrtaceae	70	350
Nitrariaceae	1	2
Olaceae	1	3
Oleaceae	1	1
Onagraceae	8	14
Orchidaceae	43	152
Orobanchaceae	4	13
Oxalidaceae	3	5
Papaveraceae	4	4
Passifloraceae	1	1
Peyssonneliaceae	1	1
Phacelocarpaceae	1	1
Phyllanthaceae	5	41
Phytolaccaceae	1	1
Pinaceae	1	1
Pittosporaceae	2	4
Plantaginaceae	3	6
Plocamiaceae	2	4
Poaceae	41	171
Polygalaceae	5	20
Polygonaceae	4	13
Portulacaceae	7	16
Pottiaceae	7	9
Primulaceae	2	2
Proteaceae	42	381
Pteridaceae	1	1
Racopilaceae	1	3
Ranunculaceae	3	11
Restionaceae	9	38
Rhamnaceae	7	55
Rhodomelaceae	18	38
Rhodymeniaceae	1	1
Ricciaceae	3	3
Rubiaceae	3	12
Rutaceae	6	19
Santalaceae	4	13
Sapindaceae	3	10
Schizymeniaceae	1	1
Scrophulariaceae	7	29
Solanaceae	7	35
Stylidiaceae	26	161
Tamaricaceae	1	2
Thuidiaceae	1	1
Thymelaeaceae	11	34
Typhaceae	1	1
Ulvaceae	1	1
Urticaceae	2	9
Verbenaceae	2	2
Violaceae	2	25
Vitaceae	1	1
Xanthorrhoeaceae	1	34
Zamiaceae	2	30
TOTAL	957	4574

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Acrotylaceae				
1.	26665 <i>Claviconium ovatum</i>			
2.	26915 <i>Hennedya crispa</i>			
Aizoaceae				
3.	2795 <i>Carpobrotus edulis</i> (Hottentot Fig)	Y		
4.	2798 <i>Carpobrotus virescens</i> (Coastal Pigface, Kolboko, Bain)			
5.	2801 <i>Galenia pubescens</i> (Coastal Galenia)	Y		
6.	17543 <i>Sarcozona bicarinata</i>		P3	
7.	2820 <i>Tetragonia decumbens</i> (Sea Spinach)	Y		
Alliaceae				
8.	1374 <i>Allium ampeloprasum</i>	Y		
Amaranthaceae				
9.	2668 <i>Amaranthus powellii</i> (Powell's Amaranth)	Y		
10.	2671 <i>Amaranthus viridis</i> (Green Amaranth)	Y		
11.	2718 <i>Ptilotus drummondii</i> (Narrowleaf Mulla Mulla)			
12.	11260 <i>Ptilotus drummondii</i> var. <i>drummondii</i> (Pussytail)			
13.	2742 <i>Ptilotus manglesii</i> (Pom Poms, Mulamula)			
14.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
15.	2763 <i>Ptilotus stirlingii</i> (Stirling's Mulla Mulla)			
16.	40841 <i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>			
Anacardiaceae				
17.	11027 <i>Schinus terebinthifolius</i>	Y		
Anarthriaceae				
18.	1097 <i>Lyginia barbata</i>			
19.	18049 <i>Lyginia imberbis</i>			
Apiaceae				
20.	6210 <i>Apium annuum</i>			
21.	12040 <i>Apium prostratum</i> var. <i>prostratum</i> (Sea Celery)			
22.	6214 <i>Centella asiatica</i>			
23.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
24.	6219 <i>Eryngium pinnatifidum</i> (Blue Devils)			
25.	15446 <i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i>			
26.	6221 <i>Foeniculum vulgare</i> (Fennel)	Y		
27.	6222 <i>Homalosciadium homalocarpum</i>			
28.	18355 <i>Petroselinum crispum</i> (Parsley)	Y		
29.	6289 <i>Xanthosia huegelii</i>			
Araceae				
30.	28342 <i>Landoltia punctata</i> (Thin Duckweed)			
31.	1051 <i>Lemna disperma</i> (Duckweed)			
Araliaceae				
32.	6224 <i>Hydrocotyle blepharocarpa</i>			
33.	6226 <i>Hydrocotyle callicarpa</i> (Small Pennywort)			
34.	6229 <i>Hydrocotyle diantha</i>			
35.	6232 <i>Hydrocotyle hispidula</i>			
36.	6236 <i>Hydrocotyle pilifera</i>			
37.	11546 <i>Hydrocotyle pilifera</i> var. <i>glabrata</i>			
38.	19041 <i>Trachymene coerulea</i> subsp. <i>coerulea</i>			
39.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
Arecaceae				
40.	17910 <i>Washingtonia filifera</i>	Y		
Areschougiaceae				
41.	26503 <i>Betaphycus speciosum</i>			
42.	26534 <i>Callophycus dorsifer</i>			
43.	26535 <i>Callophycus harveyanus</i>			
44.	26536 <i>Callophycus oppositifolius</i>			
45.	26821 <i>Erythroclonium muelleri</i>			
Asparagaceae				
46.	1208 <i>Acanthocarpus preissii</i>			
47.	1201 <i>Asparagus officinalis</i> (Asparagus)	Y		
48.	1280 <i>Chamaescilla corymbosa</i> (Blue Squill)			
49.	1287 <i>Dichopogon capillipes</i>			
50.	16091 <i>Lachenalia bulbifera</i>	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
51.	1308 <i>Laxmannia sessiliflora</i> (Nodding Lily)			
52.	11464 <i>Laxmannia sessiliflora</i> subsp. <i>australis</i>			
53.	1309 <i>Laxmannia squarrosa</i>			
54.	1223 <i>Lomandra caespitosa</i> (Tufted Mat Rush)			
55.	1228 <i>Lomandra hermaphrodita</i>			
56.	1231 <i>Lomandra maritima</i>			
57.	14542 <i>Lomandra micrantha</i> subsp. <i>micrantha</i>			
58.	1234 <i>Lomandra nigricans</i>			
59.	1239 <i>Lomandra preissii</i>			
60.	1243 <i>Lomandra sericea</i> (Silky Mat Rush)			
61.	1246 <i>Lomandra suaveolens</i>			
62.	1312 <i>Sowerbaea laxiflora</i> (Purple Tassels)			
63.	1319 <i>Thysanotus arenarius</i>			
64.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
65.	1339 <i>Thysanotus multiflorus</i> (Many-flowered Fringe Lily)			
66.	1343 <i>Thysanotus patersonii</i>			
67.	1348 <i>Thysanotus rectantherus</i>			
68.	1351 <i>Thysanotus sparteus</i>			
69.	1357 <i>Thysanotus thyrsoides</i>			
70.	1358 <i>Thysanotus triandrus</i>			
Asphodelaceae				
71.	1368 <i>Trachyandra divaricata</i>	Y		
Asteraceae				
72.	7818 <i>Actites megalocarpus</i> (Dune Thistle)			
73.	7838 <i>Arctotheca calendula</i> (Cape Weed)	Y		
74.	7839 <i>Arctotheca populifolia</i> (Dune Arctotheca)	Y		
75.	7840 <i>Arctotis stoechadifolia</i> (White Arctotis)	Y		
76.	7851 <i>Asteridea pulverulenta</i> (Common Bristle Daisy)			
77.	7856 <i>Blennospora drummondii</i>			
78.	7867 <i>Brachyscome bellidoides</i>			
79.	7878 <i>Brachyscome iberidifolia</i>			
80.	7909 <i>Carduus pycnocephalus</i> (Slender Thistle)	Y		
81.	7916 <i>Centaurea melitensis</i> (Maltese Cockspur)	Y		
82.	7937 <i>Cirsium vulgare</i> (Spear Thistle, Scotch Thistle)	Y		
83.	20074 <i>Conyza sumatrensis</i>	Y		
84.	7943 <i>Cotula australis</i> (Common Cotula)			
85.	7947 <i>Cotula turbinata</i> (Funnel Weed)	Y		
86.	42009 <i>Craspedia</i> sp. Yalgorup National Park (G.J. Keighery 14449)			
87.	7961 <i>Dittrichia graveolens</i> (Stinkwort)	Y		
88.	15137 <i>Euchiton sphaericus</i>			
89.	7976 <i>Galinsoga parviflora</i> (Potato Weed)	Y		
90.	16311 <i>Gazania linearis</i>	Y		
91.	8005 <i>Gnephosis uniflora</i>			
92.	29594 <i>Helichrysum luteoalbum</i> (Jersey Cudweed)			
93.	12741 <i>Hyalosperma cotula</i>			
94.	8086 <i>Hypochoeris glabra</i> (Smooth Catsear)	Y		
95.	9352 <i>Hypochoeris radicata</i> (Flat Weed)	Y		
96.	29046 <i>Lactuca serriola</i> forma <i>serriola</i>	Y		
97.	18585 <i>Lagenophora huegelii</i>			
98.	44490 <i>Leontodon rhagadioloides</i>	Y		
99.	17852 <i>Leptorhynchos scaber</i> (Lanky Buttons)			
100.	16449 <i>Leucophyta brownii</i>			
101.	8105 <i>Millotia myosotidifolia</i>			
102.	8106 <i>Millotia tenuifolia</i> (Soft Millotia)			
103.	8127 <i>Olearia axillaris</i> (Coastal Daisybush)			
104.	8149 <i>Olearia rudis</i> (Rough Daisybush)			
105.	42281 <i>Pithocarpa cordata</i>			
106.	8163 <i>Pithocarpa corymbulosa</i> (Corymbose Pithocarpa)		P3	
107.	8165 <i>Pithocarpa pulchella</i> (Beautiful Pithocarpa)			
108.	18353 <i>Pithocarpa pulchella</i> var. <i>pulchella</i>			
109.	8175 <i>Podolepis gracilis</i> (Slender Podolepis)			
110.	8177 <i>Podolepis lessonii</i>			
111.	8182 <i>Podotheca angustifolia</i> (Sticky Longheads)			
112.	8183 <i>Podotheca chrysantha</i> (Yellow Podotheca)			
113.	8184 <i>Podotheca gnaphalioides</i> (Golden Long-heads)			
114.	8195 <i>Quinetia urvillei</i>			
115.	8197 <i>Reichardia tingitana</i> (False Sowthistle)	Y		
116.	13300 <i>Rhodanthe citrina</i>			
117.	15035 <i>Rhodanthe corymbosa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
118.	45146 <i>Roebuckiella oncarpa</i>			
119.	20663 <i>Senecio multicaulis</i> subsp. <i>multicaulis</i>			
120.	20161 <i>Senecio pinnatifolius</i>			
121.	25884 <i>Senecio pinnatifolius</i> var. <i>latilobus</i>			
122.	8218 <i>Senecio ramosissimus</i> (<i>Auricled Groundsel</i>)			
123.	8220 <i>Senecio vulgaris</i> (<i>Common Groundsel</i>)	Y		
124.	8225 <i>Siloxerus humifusus</i> (<i>Procumbent Siloxerus</i>)			
125.	<i>Siloxerus</i> sp.			
126.	8230 <i>Sonchus asper</i> (<i>Rough Sowthistle</i>)	Y		
127.	9367 <i>Sonchus hydrophilus</i> (<i>Native Sowthistle</i>)			
128.	8231 <i>Sonchus oleraceus</i> (<i>Common Sowthistle</i>)	Y		
129.	8254 <i>Urospermum picroides</i> (<i>False Hawkbit</i>)	Y		
130.	8255 <i>Ursinia anthemoides</i> (<i>Ursinia</i>)	Y		
131.	38388 <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Y		
132.	13331 <i>Waitzia acuminata</i> var. <i>acuminata</i>			
133.	13328 <i>Waitzia nitida</i>			
134.	8282 <i>Waitzia suaveolens</i> (<i>Fragrant Waitzia</i>)			
135.	13333 <i>Waitzia suaveolens</i> var. <i>suaveolens</i>			
136.	10839 <i>Xanthium strumarium</i> (<i>Noogoora Burr</i>)	Y		
137.	44861 <i>Xerochrysum macranthum</i>			
138.	<i>Xerochrysum</i> sp.			
Aytoniaceae				
139.	<i>Asterella conocephala</i>			
Bangiaceae				
140.	27184 <i>Porphyra lucasii</i>			
Bonnemaisoniaceae				
141.	26486 <i>Asparagopsis taxiformis</i>			
Brassicaceae				
142.	11187 <i>Brassica barrelieri</i> subsp. <i>oxyrrhina</i> (<i>Smooth-stem Turnip</i>)	Y		
143.	3000 <i>Brassica tournefortii</i> (<i>Mediterranean Turnip</i>)	Y		
144.	3011 <i>Diplotaxis muralis</i> (<i>Wall Rocket</i>)	Y		
145.	3016 <i>Heliophila pusilla</i>	Y		
146.	3041 <i>Lepidium pseudoruderale</i>			
147.	3042 <i>Lepidium pseudotasmanicum</i>		P4	
148.	3044 <i>Lepidium rotundum</i> (<i>Veined Peppergrass</i>)			
149.	3049 <i>Matthiola incana</i> (<i>Common Stock</i>)	Y		
150.	3061 <i>Raphanus raphanistrum</i> (<i>Wild Radish</i>)	Y		
151.	19403 <i>Stenopetalum gracile</i>			
152.	3080 <i>Stenopetalum robustum</i>			
Bryaceae				
153.	32331 <i>Bryum lanatum</i>			
154.	<i>Bryum sabulosum</i>			
155.	<i>Bryum</i> sp.			
156.	32380 <i>Gemmabryum pachythecum</i>			
157.	44608 <i>Rosulabryum billardieri</i>			
Campanulaceae				
158.	37500 <i>Grammatotheca bergiana</i> var. <i>bergiana</i>	Y		
159.	7396 <i>Isotoma hypocrateriformis</i> (<i>Woodbridge Poison</i>)			
160.	9289 <i>Lobelia anceps</i> (<i>Angled Lobelia</i>)			
161.	7402 <i>Lobelia gibbosa</i> (<i>Tall Lobelia</i>)			
162.	7403 <i>Lobelia heterophylla</i> (<i>Wing-seeded Lobelia</i>)			
163.	7405 <i>Lobelia rarifolia</i>			
164.	7408 <i>Lobelia tenuior</i> (<i>Slender Lobelia</i>)			
165.	7384 <i>Wahlenbergia capensis</i> (<i>Cape Bluebell</i>)	Y		
166.	7389 <i>Wahlenbergia preissii</i>			
Caprifoliaceae				
167.	7368 <i>Scabiosa atropurpurea</i> (<i>Purple Pincushion</i>)	Y		
Caryophyllaceae				
168.	13119 <i>Cerastium balearicum</i>	Y		
169.	2889 <i>Cerastium glomeratum</i> (<i>Mouse Ear Chickweed</i>)	Y		
170.	16693 <i>Minuartia mediterranea</i>	Y		
171.	19825 <i>Petrorhagia dubia</i>	Y		
172.	2905 <i>Polycarpon tetraphyllum</i> (<i>Fourleaf Allseed</i>)	Y		
173.	2906 <i>Sagina apetala</i> (<i>Annual Pearlwort</i>)	Y		
174.	2909 <i>Silene gallica</i> (<i>French Catchfly</i>)	Y		
175.	2910 <i>Silene nocturna</i> (<i>Mediterranean Catchfly</i>)	Y		

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176.	2918 <i>Stellaria media</i> (Chickweed)	Y		
Casuarinaceae				
177.	1728 <i>Allocasuarina fraseriana</i> (Sheoak, Kondil)			
178.	1732 <i>Allocasuarina humilis</i> (Dwarf Sheoak)			
179.	13908 <i>Allocasuarina lehmanniana</i> subsp. <i>lehmanniana</i>			
180.	<i>Allocasuarina</i> sp.			
Caulerpaceae				
181.	44539 <i>Caulerpa cylindracea</i>			
182.	26560 <i>Caulerpa distichophylla</i>			
183.	26562 <i>Caulerpa fergusonii</i>			
184.	26563 <i>Caulerpa flexilis</i>			
185.	27380 <i>Caulerpa flexilis</i> var. <i>muelleri</i>			
186.	27382 <i>Caulerpa longifolia</i> forma <i>crispata</i>			
187.	26570 <i>Caulerpa obscura</i>			
188.	26571 <i>Caulerpa papillosa</i>			
189.	26573 <i>Caulerpa racemosa</i>			
Celastraceae				
190.	9069 <i>Stackhousia huegelii</i>			
191.	4733 <i>Stackhousia monogyna</i>			
192.	9070 <i>Stackhousia pubescens</i> (Downy Stackhousia)			
193.	4737 <i>Tripterococcus brunonis</i> (Winged Stackhousia)			
Centrolepidaceae				
194.	1121 <i>Centrolepis aristata</i> (Pointed Centrolepis)			
195.	1125 <i>Centrolepis drummondiana</i>			
196.	1132 <i>Centrolepis mutica</i>			
Ceramiaceae				
197.	26468 <i>Anotrichium lincophorum</i>			
198.	26471 <i>Antithamnion armatum</i>			
199.	26475 <i>Antithamnion hanovioides</i>			
200.	26511 <i>Bornetia binderiana</i>			
201.	26599 <i>Ceramium puberulum</i>			
202.	26600 <i>Ceramium pusillum</i>			
203.	26830 <i>Euptilota articulata</i>			
204.	26884 <i>Griffithsia ovalis</i>			
205.	26942 <i>Hirsutithalia loricata</i>			
Champiaceae				
206.	26621 <i>Champia zostericola</i>			
Chenopodiaceae				
207.	2452 <i>Atriplex cinerea</i> (Grey Saltbush)			
208.	2463 <i>Atriplex isatidea</i> (Coast Saltbush)			
209.	2483 <i>Chenopodium album</i> (Fat Hen)	Y		
210.	11341 <i>Rhagodia baccata</i> subsp. <i>baccata</i>			
211.	11930 <i>Rhagodia baccata</i> subsp. <i>dioica</i> (Sea Berry Saltbush)			
212.	2584 <i>Rhagodia preissii</i>			
213.	11254 <i>Rhagodia preissii</i> subsp. <i>preissii</i>			
Cladophoraceae				
214.	26607 <i>Chaetomorpha aerea</i>			
Codiaceae				
215.	26672 <i>Codium galeatum</i>			
Colchicaceae				
216.	12770 <i>Burchardia congesta</i>			
217.	12072 <i>Wurmbea dioica</i> subsp. <i>alba</i>			
218.	1398 <i>Wurmbea monantha</i>			
Convolvulaceae				
219.	11021 <i>Cuscuta planiflora</i>	Y		
Corallinaceae				
220.	27068 <i>Metagoniolithon radiatum</i>			
221.	27070 <i>Metamastophora fiabellata</i>			
Crassulaceae				
222.	3137 <i>Crassula colorata</i> (Dense Stonecrop)			
223.	11709 <i>Crassula colorata</i> var. <i>acuminata</i>			
224.	11563 <i>Crassula colorata</i> var. <i>colorata</i>			
225.	11349 <i>Crassula decumbens</i> var. <i>decumbens</i>			
226.	3140 <i>Crassula glomerata</i>			

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		Y		
Cucurbitaceae				
227.	7370 <i>Citrullus lanatus</i> (Pie Melon)	Y		
228.	25825 <i>Cucurbita pepo</i>	Y		
Cymodoceaceae				
229.	126 <i>Amphibolis antarctica</i> (Sea Nymph)			
230.	127 <i>Amphibolis griffithii</i>			
231.	<i>Amphibolis</i> sp.			
Cyperaceae				
232.	740 <i>Baumea arthropphylla</i>			
233.	741 <i>Baumea articulata</i> (Jointed Rush)			
234.	743 <i>Baumea juncea</i> (Bare Twigrush)			
235.	744 <i>Baumea laxa</i>			
236.	745 <i>Baumea preissii</i>			
237.	748 <i>Baumea vaginalis</i> (Sheath Twigrush)			
238.	753 <i>Carex appressa</i> (Tall Sedge)			
239.	755 <i>Carex fascicularis</i> (Tassel Sedge)			
240.	43241 <i>Carex thecata</i>			
241.	760 <i>Caustis dioica</i>			
242.	810 <i>Cyperus rotundus</i> (Nut Grass)	Y		
243.	816 <i>Cyperus tenuiflorus</i> (Scaly Sedge)	Y		
244.	14537 <i>Cyperus vorsteri</i>	Y		
245.	20216 <i>Ficinia nodosa</i> (Knotted Club Rush)			
246.	907 <i>Gahnia trifida</i> (Coast Saw-sedge)			
247.	910 <i>Isolepis cernua</i> (Nodding Club-rush)			
248.	20200 <i>Isolepis cernua</i> var. <i>setiformis</i>			
249.	917 <i>Isolepis marginata</i> (Coarse Club-rush)			
250.	925 <i>Lepidosperma angustatum</i>			
251.	42742 <i>Lepidosperma calcicola</i>			
252.	932 <i>Lepidosperma effusum</i> (Spreading Sword-sedge)			
253.	933 <i>Lepidosperma gladiatum</i> (Coast Sword-sedge, Kerbin)			
254.	936 <i>Lepidosperma leptostachyum</i>			
255.	937 <i>Lepidosperma longitudinale</i> (Pithy Sword-sedge)			
256.	940 <i>Lepidosperma pubisquamum</i>			
257.	944 <i>Lepidosperma scabrum</i>			
258.	<i>Lepidosperma</i> sp.			
259.	945 <i>Lepidosperma squamatum</i>			
260.	946 <i>Lepidosperma striatum</i>			
261.	955 <i>Mesomelaena pseudostygia</i>			
262.	969 <i>Schoenoplectus validus</i> (Lake Club-rush)			
263.	978 <i>Schoenus brevisetis</i>			
264.	979 <i>Schoenus caespitius</i>			
265.	982 <i>Schoenus clandestinus</i>			
266.	984 <i>Schoenus curvifolius</i>			
267.	985 <i>Schoenus discifer</i>			
268.	992 <i>Schoenus grandiflorus</i> (Large Flowered Bogrush)			
269.	997 <i>Schoenus lanatus</i> (Woolly Bog-rush)			
270.	998 <i>Schoenus latitans</i>			
271.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
272.	1006 <i>Schoenus odontocarpus</i>			
273.	1018 <i>Schoenus subfascicularis</i>			
274.	1026 <i>Schoenus unispiculatus</i>			
275.	1036 <i>Tetralix octandra</i>			
276.	43207 <i>Tricostularia exsul</i>			
277.	1038 <i>Tricostularia neesii</i>			
Dasyaceae				
278.	26735 <i>Dasya cliffonii</i>			
279.	26738 <i>Dasya elongata</i>			
Dasypogonaceae				
280.	1213 <i>Calectasia cyanea</i> (Blue Tinsel Lily)		T	
281.	19309 <i>Calectasia narragara</i>			
Delesseriaceae				
282.	26622 <i>Chauviniella coriifolia</i>			
283.	27149 <i>Platysiphonia mutabilis</i>			
Dicranaceae				
284.	32338 <i>Campylopus introflexus</i>	Y		

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Dicranemataceae				
285.	27347 <i>Tylopus obtusatus</i>			
Dilleniaceae				
286.	5112 <i>Hibbertia aurea</i>			
287.	5133 <i>Hibbertia helianthemoides</i>		P4	
288.	5134 <i>Hibbertia huegelii</i>			
289.	5135 <i>Hibbertia hypericoides</i> (Yellow Buttercups)			
290.	45534 <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>			
291.	5143 <i>Hibbertia lineata</i>			
292.	5162 <i>Hibbertia racemosa</i> (Stalked Guinea Flower)			
293.	43280 <i>Hibbertia sericosepala</i>			
294.	<i>Hibbertia</i> sp.			
295.	<i>Hibbertia</i> sp. Bankstown (R.T.Miller & C.P.Gibson s.n. 18/10/06)			
296.	11461 <i>Hibbertia spicata</i> subsp. <i>leptotheca</i>		P3	
297.	5173 <i>Hibbertia subvaginata</i>			
Ditrichaceae				
298.	32349 <i>Eccremidium exiguum</i>			
299.	32414 <i>Pleuridium nervosum</i>			
Droseraceae				
300.	3095 <i>Drosera erythrorhiza</i> (Red Ink Sundew)			
301.	3098 <i>Drosera glanduligera</i> (Pimpernel Sundew)			
302.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
303.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
304.	11853 <i>Drosera menziesii</i> subsp. <i>menziesii</i>			
305.	13216 <i>Drosera menziesii</i> subsp. <i>penicillaris</i>			
306.	3114 <i>Drosera nitidula</i> (Shining Sundew)			
307.	13188 <i>Drosera paleacea</i> subsp. <i>paleacea</i>			
308.	3118 <i>Drosera pallida</i> (Pale Rainbow)			
Elaeocarpaceae				
309.	4524 <i>Platytheca galioides</i>			
Ericaceae				
310.	6295 <i>Acrotriche cordata</i> (Coast Ground Berry)			
311.	6311 <i>Andersonia heterophylla</i>			
312.	6314 <i>Andersonia lehmanniana</i>			
313.	11471 <i>Andersonia lehmanniana</i> subsp. <i>lehmanniana</i>			
314.	6323 <i>Astroloma ciliatum</i> (Candle Cranberry)			
315.	6328 <i>Astroloma glaucescens</i>			
316.	6331 <i>Astroloma microcalyx</i> (Native Cranberry)			
317.	6334 <i>Astroloma pallidum</i> (Kick Bush)			
318.	6339 <i>Astroloma xerophyllum</i>			
319.	6347 <i>Conostephium minus</i> (Pink-tipped Pearl flower)			
320.	6348 <i>Conostephium pendulum</i> (Pearl Flower)			
321.	6349 <i>Conostephium preissii</i>			
322.	6354 <i>Leucopogon allittii</i>			
323.	6358 <i>Leucopogon assimilis</i>			
324.	6374 <i>Leucopogon conostephioides</i>			
325.	6405 <i>Leucopogon insularis</i>			
326.	40801 <i>Leucopogon maritimus</i>		P1	
327.	6416 <i>Leucopogon nutans</i> (Drooping Leucopogon)			
328.	6425 <i>Leucopogon oxycedrus</i>			
329.	6427 <i>Leucopogon parviflorus</i> (Coast Beard-heath)			
330.	6434 <i>Leucopogon polymorphus</i>			
331.	6436 <i>Leucopogon propinquus</i>			
332.	6439 <i>Leucopogon pulchellus</i> (Beard-heath)			
333.	6440 <i>Leucopogon racemosus</i>			
334.	<i>Leucopogon</i> sp.			
335.	19579 <i>Leucopogon</i> sp. Murdoch (M. Hislop 1037)			
336.	19460 <i>Leucopogon</i> sp. Yanchep (M. Hislop 1986)		P3	
337.	<i>Leucopogon</i> sp. Yanchep (M.Hislop 1986)			Y
338.	40803 <i>Leucopogon squarrosus</i> subsp. <i>squarrosus</i>			
339.	6456 <i>Lysinema ciliatum</i> (Curry Flower)			
340.	34736 <i>Lysinema pentapetalum</i>			
Euphorbiaceae				
341.	4594 <i>Beyeria cinerea</i>			
342.	34236 <i>Beyeria cinerea</i> subsp. <i>cinerea</i>		P3	
343.	4636 <i>Euphorbia paralias</i> (Sea Spurge)	Y		
344.	4638 <i>Euphorbia peplus</i> (Petty Spurge)	Y		

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345.	4648 <i>Euphorbia terracina</i> (Geraldton Carnation Weed)	Y		
346.	20537 <i>Stachystemon virgatus</i>			
Fabaceae				
347.	15430 <i>Acacia alata</i> var. <i>tetrantha</i>			
348.	15466 <i>Acacia applanata</i>			
349.	15470 <i>Acacia barbinervis</i> subsp. <i>borealis</i>			
350.	3237 <i>Acacia benthamii</i>		P2	
351.	3262 <i>Acacia cochlearis</i> (Rigid Wattle)			
352.	3282 <i>Acacia cyclops</i> (Coastal Wattle)			
353.	3374 <i>Acacia huegelii</i>			
354.	3409 <i>Acacia lasiocarpa</i> (Panjang)			
355.	11611 <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>			
356.	3470 <i>Acacia orbifolia</i>			
357.	3502 <i>Acacia pulchella</i> (Prickly Moses)			
358.	15481 <i>Acacia pulchella</i> var. <i>glaberrima</i>			
359.	15482 <i>Acacia pulchella</i> var. <i>goadbyi</i>			
360.	3525 <i>Acacia rostellifera</i> (Summer-scented Wattle)			
361.	3527 <i>Acacia saligna</i> (Orange Wattle, Kudjong)			
362.	30032 <i>Acacia saligna</i> subsp. <i>saligna</i>			
363.	3541 <i>Acacia sessilis</i>			
364.	3557 <i>Acacia stenoptera</i> (Narrow Winged Wattle)			
365.	3584 <i>Acacia truncata</i>			
366.	3602 <i>Acacia willdenowiana</i> (Grass Wattle)			
367.	3604 <i>Acacia xanthina</i> (White-stemmed Wattle)			
368.	3688 <i>Aotus gracillima</i>			
369.	3692 <i>Aotus procumbens</i>			
370.	3710 <i>Bossiaea eriocarpa</i> (Common Brown Pea)			
371.	20175 <i>Crotalaria cunninghamii</i> subsp. <i>sturtii</i>			
372.	3793 <i>Daviesia angulata</i>			
373.	3805 <i>Daviesia decurrens</i> (Prickly Bitter-pea)			
374.	19747 <i>Daviesia decurrens</i> subsp. <i>decurrens</i>			
375.	3807 <i>Daviesia divaricata</i> (Marno)			
376.	18560 <i>Daviesia divaricata</i> subsp. <i>divaricata</i>			
377.	3815 <i>Daviesia horrida</i> (Prickly Bitter-pea)			
378.	15505 <i>Daviesia incrassata</i> subsp. <i>incrassata</i>			
379.	3824 <i>Daviesia nudiflora</i>			
380.	16585 <i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>			
381.	3832 <i>Daviesia physodes</i>			
382.	3833 <i>Daviesia podophylla</i>			
383.	3837 <i>Daviesia quadrilatera</i>			
384.	3845 <i>Daviesia triflora</i>			
385.	20475 <i>Gastrolobium capitatum</i>			
386.	20483 <i>Gastrolobium linearifolium</i>			
387.	20482 <i>Gastrolobium nervosum</i>			
388.	3945 <i>Gompholobium aristatum</i>			
389.	10909 <i>Gompholobium confertum</i>			
390.	3950 <i>Gompholobium knightianum</i>			
391.	19295 <i>Gompholobium pungens</i>			
392.	11083 <i>Gompholobium scabrum</i>			
393.	3956 <i>Gompholobium shuttleworthii</i>			
394.	3957 <i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
395.	3961 <i>Hardenbergia comptoniana</i> (Native Wisteria)			
396.	3966 <i>Hovea pungens</i> (Devil's Pins, Puyenak)			
397.	3967 <i>Hovea stricta</i>			
398.	3968 <i>Hovea trisperma</i> (Common Hovea)			
399.	12859 <i>Hovea trisperma</i> var. <i>trisperma</i>			
400.	3992 <i>Isotropis cuneifolia</i> (Granny Bonnets)			
401.	19700 <i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>			
402.	14783 <i>Jacksonia calcicola</i>			
403.	4010 <i>Jacksonia floribunda</i> (Holly Pea)			
404.	4012 <i>Jacksonia furcellata</i> (Grey Stinkwood)			
405.	4027 <i>Jacksonia sericea</i> (Waldjumi)		P4	
406.	4029 <i>Jacksonia sternbergiana</i> (Stinkwood, Kapur)			
407.	4042 <i>Kennedia nigricans</i> (Black Kennedia)			
408.	4044 <i>Kennedia prostrata</i> (Scarlet Runner)			
409.	4066 <i>Lupinus cosentinii</i>	Y		
410.	4067 <i>Lupinus luteus</i> (Yellow Lupin)	Y		
411.	4075 <i>Medicago littoralis</i> (Strand Medic)	Y		
412.	4085 <i>Melilotus indicus</i>	Y		
413.	4100 <i>Mirbelia spinosa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
414.	4155 <i>Psoralea pinnata</i> (African Scurfpea)	Y		
415.	4181 <i>Pultenaea reticulata</i>			
416.	19183 <i>Retama raetam</i>	Y		
417.	20348 <i>Sphaerolobium calcicola</i>		P3	
418.	17551 <i>Sphaerolobium drummondii</i>			
419.	4207 <i>Sphaerolobium medium</i>			
420.	4256 <i>Templetonia retusa</i> (Cockies Tongues)			
421.	4291 <i>Trifolium arvense</i> (Hare's Foot Clover)	Y		
422.	17542 <i>Trifolium arvense</i> var. <i>arvense</i>	Y		
423.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
424.	17763 <i>Trifolium campestre</i> var. <i>campestre</i> (Hop Clover)	Y		
425.	4295 <i>Trifolium dubium</i> (Suckling Clover)	Y		
426.	4297 <i>Trifolium glomeratum</i> (Cluster Clover)	Y		
427.	4298 <i>Trifolium hirtum</i> (Rose Clover)	Y		
428.	4309 <i>Trifolium scabrum</i> (Rough Clover)	Y		
429.	4310 <i>Trifolium spumosum</i> (Bladder Clover)	Y		
430.	4322 <i>Vicia sativa</i> (Common Vetch)	Y		
431.	11474 <i>Vicia sativa</i> subsp. <i>nigra</i>	Y		
432.	4325 <i>Viminaria juncea</i> (Swishbush, Koweda)			
Fabroniaceae				
433.	20162 <i>Fabronia hampeana</i>		P2	
Faucheaceae				
434.	27362 <i>Webervanbossea splachnoides</i>			
Frankeniaceae				
435.	5209 <i>Frankenia pauciflora</i> (Seaheath)			
Funariaceae				
436.	32370 <i>Funaria hygrometrica</i>			
Gelidiaceae				
437.	27206 <i>Ptilophora prolifera</i>			
Gentianaceae				
438.	6539 <i>Centaurium erythraea</i> (Common Centaury)	Y		
439.	17800 <i>Centaurium pulchellum</i>	Y		
440.	6542 <i>Centaurium tenuiflorum</i>	Y		
Geraniaceae				
441.	4332 <i>Erodium botrys</i> (Long Storksbill)	Y		
442.	4333 <i>Erodium cicutarium</i> (Common Storksbill)	Y		
443.	4335 <i>Erodium cygnorum</i> (Blue Heronsbill)			
444.	4336 <i>Erodium moschatum</i> (Musky Crowfoot)	Y		
445.	4339 <i>Geranium molle</i> (Dove's Foot Cranesbill)	Y		
446.	4340 <i>Geranium retrorsum</i>			
447.	4342 <i>Pelargonium australe</i> (Wild Geranium)			
448.	4343 <i>Pelargonium capitatum</i> (Rose Pelargonium)	Y		
449.	4346 <i>Pelargonium littorale</i>			
Gigaspermaceae				
450.	32384 <i>Gigaspermum repens</i>			
Goodeniaceae				
451.	7451 <i>Dampiera lavandulacea</i>			
452.	7454 <i>Dampiera linearis</i> (Common Dampiera)			
453.	7538 <i>Goodenia pulchella</i>			
454.	19286 <i>Goodenia pulchella</i> subsp. <i>Coastal Plain A</i> (M. Hislop 634)			
455.	7568 <i>Lechenaultia biloba</i> (Blue Leschenaultia)			
456.	7574 <i>Lechenaultia floribunda</i> (Free-flowering Leschenaultia)			
457.	7577 <i>Lechenaultia hirsuta</i> (Hairy Leschenaultia)			
458.	7580 <i>Lechenaultia linarioides</i> (Yellow Leschenaultia)			
459.	7586 <i>Lechenaultia stenosepala</i> (Narrow-sepaled Leschenaultia)			
460.	7603 <i>Scaevola canescens</i> (Grey Scaevola)			
461.	7606 <i>Scaevola crassifolia</i> (Thick-leaved Fan-flower)			
462.	7614 <i>Scaevola globulifera</i>			
463.	7626 <i>Scaevola nitida</i> (Shining Fanflower)			
464.	12585 <i>Scaevola repens</i>			
465.	13181 <i>Scaevola repens</i> var. <i>angustifolia</i>			
466.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
467.	7647 <i>Scaevola thesioides</i>			
468.	13152 <i>Scaevola thesioides</i> subsp. <i>thesioides</i>			
469.	7666 <i>Verreauxia reinwardtii</i> (Common Verreauxia)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Gracilariaceae				
470.	26711 <i>Curdiea irvineae</i>			
471.	26871 <i>Gracilaria flagelliformis</i>			
472.	26876 <i>Gracilaria verrucosa</i>			
Gyrostemonaceae				
473.	2784 <i>Gyrostemon ramulosus</i> (Corkybark)			
474.	2791 <i>Tersonia cyathiflora</i> (Button Creeper)			
Haemodoraceae				
475.	1409 <i>Anigozanthos humilis</i> (Catspaw)			
476.	11434 <i>Anigozanthos humilis</i> subsp. <i>humilis</i>			
477.	1411 <i>Anigozanthos manglesii</i> (Mangles Kangaroo Paw, Kurulbrang)			
478.	11261 <i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>			
479.	1418 <i>Conostylis aculeata</i> (Prickly Conostylis)			
480.	11826 <i>Conostylis aculeata</i> subsp. <i>aculeata</i>			
481.	11414 <i>Conostylis aculeata</i> subsp. <i>breviflora</i>			
482.	11552 <i>Conostylis aculeata</i> subsp. <i>bromelioides</i>			
483.	11513 <i>Conostylis aculeata</i> subsp. <i>cygnorum</i>			
484.	12109 <i>Conostylis aculeata</i> subsp. <i>preissii</i>			
485.	1425 <i>Conostylis bracteata</i>		P3	
486.	1427 <i>Conostylis candicans</i> (Grey Cottonhead)			
487.	12027 <i>Conostylis candicans</i> subsp. <i>calcicola</i>			
488.	11438 <i>Conostylis candicans</i> subsp. <i>candicans</i>			
489.	1436 <i>Conostylis juncea</i>			
490.	1443 <i>Conostylis pauciflora</i> (Dawesville Conostylis)			
491.	11388 <i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i>		P4	
492.	11657 <i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>		P4	
493.	1454 <i>Conostylis setigera</i> (Bristly Cottonhead)			
494.	11597 <i>Conostylis setigera</i> subsp. <i>setigera</i>			
495.	11543 <i>Conostylis teretifolia</i> subsp. <i>planescens</i>			
496.	11870 <i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>			
497.	1468 <i>Haemodorum laxum</i>			
498.	1470 <i>Haemodorum paniculatum</i> (Mardja)			
499.	1475 <i>Haemodorum spicatum</i> (Mardja)			
500.	1477 <i>Macropidia fuliginosa</i> (Black Kangaroo Paw)			
501.	1478 <i>Phlebocarya ciliata</i>			
Halimedaceae				
502.	26890 <i>Halimeda cuneata</i>			
Haloragaceae				
503.	33620 <i>Glischrocaryon angustifolium</i>			
504.	6143 <i>Glischrocaryon aureum</i> (Common Popflower)			
505.	6161 <i>Gonocarpus pithyoides</i>			
506.	41180 <i>Haloragis</i> sp. Parrot Ridge (G.J. Keighery 11563)		P1	Y
507.	34676 <i>Meionectes brownii</i> (Swamp Raspwort)			
Halymeniaceae				
508.	26709 <i>Cryptonemia undulata</i>			
509.	26850 <i>Gelinaria ulvoidea</i>			
510.	37640 <i>Halymenia floresii</i>			
511.	37641 <i>Halymenia floresii</i> subsp. <i>harveyana</i>			
Hemerocallidaceae				
512.	1264 <i>Arnocrinum preissii</i>			
513.	1276 <i>Caesia micrantha</i> (Pale Grass Lily)			
514.	1285 <i>Corynotheca micrantha</i> (Sand Lily)			
515.	11283 <i>Corynotheca micrantha</i> var. <i>micrantha</i>			
516.	1259 <i>Dianella revoluta</i> (Blueberry Lily)			
517.	11636 <i>Dianella revoluta</i> var. <i>divaricata</i>			
518.	1293 <i>Hensmania turbinata</i>			
519.	1260 <i>Stypantra glauca</i> (Blind Grass)			
520.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
521.	1363 <i>Tricoryne tenella</i>			
Hypneaceae				
522.	35898 <i>Hypnea musciformis</i>			
523.	26971 <i>Hypnea ramentacea</i>			
Iridaceae				
524.	1515 <i>Ferraria crispa</i> (Black Flag)	Y		
525.	1520 <i>Gladiolus caryophyllaceus</i> (Wild Gladiolus)	Y		
526.	19179 <i>Moraea flaccida</i> (One-leaf Cape Tulip)	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
527.	1537 <i>Orthrosanthus laxus</i> (Morning Iris)			
528.	11749 <i>Orthrosanthus laxus</i> var. <i>laxus</i> (Morning Iris)			
529.	1550 <i>Patersonia occidentalis</i> (Purple Flag, Koma)			
530.	30472 <i>Patersonia occidentalis</i> var. <i>occidentalis</i>			
531.	1552 <i>Patersonia rudis</i> (Hairy Flag)			
532.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
533.	11544 <i>Romulea rosea</i> var. <i>australis</i> (Guildford Grass)	Y		
534.	1558 <i>Sparaxis bulbifera</i>	Y		
Juncaceae				
535.	1188 <i>Juncus pallidus</i> (Pale Rush)			
Juncaginaceae				
536.	33276 <i>Triglochin isingiana</i>			
537.	18587 <i>Triglochin nana</i>			
538.	152 <i>Triglochin trichophora</i>			
Kallymeniaceae				
539.	26990 <i>Kallymenia cribrosa</i>			
540.	27329 <i>Thamnophyllis lacerata</i>			
Lamiaceae				
541.	16933 <i>Hemiandra glabra</i>			
542.	6639 <i>Hemiandra pungens</i> (Snakebush)			
543.	<i>Hemiandra</i> sp.			
544.	38320 <i>Hemiandra</i> sp. <i>Jurien</i> (B.J. Conn & M.E. Tozer BJC 3885)			
545.	6671 <i>Hemigenia sericea</i> (Silky Hemigenia)			
546.	41020 <i>Hemiphora bartlingii</i> (Woolly Dragon)			
547.	6886 <i>Mentha x piperita</i>	Y		
548.	15994 <i>Mentha x piperita</i> var. <i>citrata</i>	Y		
549.	6939 <i>Westringia dampieri</i>			
Lauraceae				
550.	2951 <i>Cassytha flava</i> (Dodder Laurel)			
551.	2952 <i>Cassytha glabella</i> (Tangled Dodder Laurel)			
552.	11501 <i>Cassytha glabella</i> forma <i>casuarinae</i>			
553.	2956 <i>Cassytha pomiformis</i> (Dodder Laurel)			
554.	2957 <i>Cassytha racemosa</i> (Dodder Laurel)			
555.	11799 <i>Cassytha racemosa</i> forma <i>racemosa</i>			
Lentibulariaceae				
556.	7125 <i>Utricularia australis</i>			
Linaceae				
557.	4362 <i>Linum marginale</i> (Wild Flax)			
Loganiaceae				
558.	6515 <i>Logania vaginalis</i> (White Spray)			
559.	16177 <i>Phyllangium paradoxum</i>			
Loranthaceae				
560.	2401 <i>Nuytsia floribunda</i> (Christmas Tree, Mudja)			
Lythraceae				
561.	5281 <i>Lythrum hyssopifolia</i> (Lesser Loosestrife)	Y		
Malvaceae				
562.	4906 <i>Alyogyne huegelii</i> (Lilac Hibiscus)			
563.	<i>Alyogyne</i> sp.			
564.	5011 <i>Guichenotia ledifolia</i>			
565.	5033 <i>Lasiopetalum floribundum</i> (Free Flowering Lasiopetalum)			
566.	5038 <i>Lasiopetalum membranaceum</i>		P3	
567.	31351 <i>Malva preissiana</i>			
568.	5077 <i>Thomasia cognata</i>			
569.	5105 <i>Thomasia triphylla</i>			
Molluginaceae				
570.	2838 <i>Macarthuria apetala</i>			
Moraceae				
571.	1747 <i>Ficus carica</i> (Common Fig)	Y		
Mychodeaceae				
572.	27081 <i>Mychodea gracilaria</i>			
Myrtaceae				
573.	5316 <i>Agonis flexuosa</i> (Peppermint, Wonil)			
574.	20283 <i>Astartea scoparia</i>			

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575.	<i>Astartea</i> sp.			
576.	5365 <i>Baeckea robusta</i>			
577.	34161 <i>Baeckea</i> sp. Limestone (N. Gibson & M.N. Lyons 1425)		P1	
578.	5382 <i>Beaufortia elegans</i>			
579.	5411 <i>Calothamnus hirsutus</i>			
580.	5415 <i>Calothamnus lateralis</i>			
581.	5426 <i>Calothamnus quadrifidus</i> (One-sided Bottlebrush, Kwoondjard)			
582.	35816 <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			
583.	5429 <i>Calothamnus sanguineus</i> (Silky-leaved Blood flower, Pindak)			
584.	5439 <i>Calytrix angulata</i> (Yellow Starflower)			
585.	5458 <i>Calytrix flavescens</i> (Summer Starflower)			
586.	5460 <i>Calytrix fraseri</i> (Pink Summer Calytrix)			
587.	5476 <i>Calytrix sapphirina</i>			
588.	5479 <i>Calytrix strigosa</i>			
589.	5498 <i>Chamelaucium uncinatum</i> (Geraldton Wax)			
590.	17104 <i>Corymbia calophylla</i> (Marri)			
591.	13949 <i>Eremaea asterocarpa</i>			
592.	13950 <i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>			
593.	5540 <i>Eremaea fimbriata</i>			
594.	5541 <i>Eremaea pauciflora</i>			
595.	14104 <i>Eremaea pauciflora</i> var. <i>pauciflora</i>			
596.	5542 <i>Eremaea purpurea</i>			
597.	<i>Eremaea</i> sp.			
598.	13091 <i>Eucalyptus argutifolia</i> (Wabling Hill Mallee)		T	
599.	5615 <i>Eucalyptus decipiens</i> (Limestone Marlock, Moit)			
600.	5643 <i>Eucalyptus falcata</i> (Silver Mallet, Dulyumuk)			
601.	5649 <i>Eucalyptus foecunda</i> (Narrow-leaved Red Mallee)			
602.	5659 <i>Eucalyptus gomphocephala</i> (Tuart, Duart)			
603.	5708 <i>Eucalyptus marginata</i> (Jarrah, Djara)			
604.	13547 <i>Eucalyptus marginata</i> subsp. <i>marginata</i> (Jarrah)			
605.	20808 <i>Eucalyptus petiolaris</i>	Y		
606.	13541 <i>Eucalyptus petrensis</i>			
607.	5763 <i>Eucalyptus rudis</i> (Flooded Gum, Kulurda)			
608.	13511 <i>Eucalyptus rudis</i> subsp. <i>rudis</i>			
609.	5790 <i>Eucalyptus todtiana</i> (Coastal Blackbutt)			
610.	5825 <i>Hypocalymma robustum</i> (Swan River Myrtle)			
611.	5832 <i>Kunzea ericifolia</i> (Spearwood, Pondil)			
612.	15498 <i>Kunzea glabrescens</i> (Spearwood)			
613.	5847 <i>Leptospermum erubescens</i> (Roadside Teatree)			
614.	5850 <i>Leptospermum laevigatum</i> (Coast Teatree)	Y		
615.	5857 <i>Leptospermum spinescens</i>			
616.	5887 <i>Melaleuca cardiophylla</i> (Tangling Melaleuca)			
617.	5920 <i>Melaleuca huegelii</i> (Chenille Honey myrtle)			
618.	13271 <i>Melaleuca huegelii</i> subsp. <i>huegelii</i>			
619.	5922 <i>Melaleuca lanceolata</i> (Rottnest Teatree, Moonah)			
620.	18394 <i>Melaleuca parviceps</i>			
621.	5952 <i>Melaleuca preissiana</i> (Moonah)			
622.	5959 <i>Melaleuca raphiophylla</i> (Swamp Paperbark)			
623.	33022 <i>Melaleuca</i> sp. Wanneroo (G.J. Keighery 16705)		P1	Y
624.	18598 <i>Melaleuca systema</i>			
625.	5978 <i>Melaleuca teretifolia</i> (Banbar)			
626.	5983 <i>Melaleuca trichophylla</i>			
627.	5986 <i>Melaleuca urceolaris</i>			
628.	6006 <i>Pericalymma ellipticum</i> (Swamp Teatree)			
629.	6012 <i>Regelia ciliata</i>			
630.	6014 <i>Regelia inops</i>			
631.	6033 <i>Scholtzia involucreta</i> (Spiked Scholtzia)			
632.	6057 <i>Thryptomene hyporhytis</i>			
633.	12388 <i>Verticordia acerosa</i> var. <i>preissii</i>			
634.	12402 <i>Verticordia chrysanthella</i>			
635.	12411 <i>Verticordia densiflora</i> var. <i>cespitosa</i>			
636.	15432 <i>Verticordia densiflora</i> var. <i>densiflora</i>			
637.	15433 <i>Verticordia huegelii</i> var. <i>huegelii</i>			
638.	6101 <i>Verticordia nitens</i> (Morrison Featherflower, Kodjeningara)			
639.	10822 <i>Verticordia nobilis</i>			
640.	6102 <i>Verticordia oculata</i>			
641.	6103 <i>Verticordia ovalifolia</i>			
642.	6109 <i>Verticordia picta</i> (Painted Featherflower)			
Nitrariaceae				
643.	4366 <i>Nitraria billardierei</i> (Nitre Bush)			

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Olacaceae				
644.	2365 <i>Olox benthamiana</i>			
Oleaceae				
645.	<i>Jasminum sp.</i>			
Onagraceae				
646.	11570 <i>Epilobium billardioreanum</i> subsp. <i>billardioreanum</i> (Smooth Willow Herb)			
647.	11992 <i>Epilobium billardioreanum</i> subsp. <i>intermedium</i>			
648.	6132 <i>Epilobium ciliatum</i>	Y		
649.	6133 <i>Epilobium hirtigerum</i> (Hairy Willow Herb)			
650.	14289 <i>Epilobium tetragonum</i> subsp. <i>tetragonum</i>	Y		
651.	16390 <i>Oenothera drummondii</i> subsp. <i>drummondii</i>	Y		
652.	6139 <i>Oenothera glazioviana</i> (Evening Primrose)	Y		
653.	20052 <i>Oenothera jamesii</i>	Y		
Orchidaceae				
654.	15330 <i>Caladenia arenicola</i>			
655.	11038 <i>Caladenia bicallata</i>			
656.	1586 <i>Caladenia discoidea</i> (Dancing Orchid)			
657.	1592 <i>Caladenia flava</i> (Cowslip Orchid)			
658.	15348 <i>Caladenia flava</i> subsp. <i>flava</i>			
659.	15352 <i>Caladenia georgei</i>			
660.	1595 <i>Caladenia hirta</i> (Sugar Candy Orchid)			
661.	1599 <i>Caladenia latifolia</i> (Pink Fairy Orchid)			
662.	15360 <i>Caladenia longicauda</i> subsp. <i>borealis</i>			
663.	15361 <i>Caladenia longicauda</i> subsp. <i>calcigena</i>			
664.	15365 <i>Caladenia longicauda</i> subsp. <i>longicauda</i>			
665.	15377 <i>Caladenia reptans</i> subsp. <i>reptans</i>			
666.	<i>Caladenia sp.</i>			
667.	15114 <i>Cyanicula gemmata</i>			
668.	10916 <i>Cyrtostylis huegelii</i>			
669.	19649 <i>Disa bracteata</i>	Y		
670.	11049 <i>Diuris corymbosa</i>			
671.	1635 <i>Diuris longifolia</i> (Common Donkey Orchid)			
672.	12939 <i>Diuris magnifica</i>			
673.	1643 <i>Elythranthera brunonis</i> (Purple Enamel Orchid)			
674.	1644 <i>Elythranthera emarginata</i> (Pink Enamel Orchid)			
675.	1646 <i>Eriochilus dilatatus</i> (White Bunny Orchid)			
676.	1653 <i>Leporella fimbriata</i> (Hare Orchid)			
677.	15418 <i>Leptoceras menziesii</i>			
678.	34158 <i>Microtis alboviridis</i>			
679.	15419 <i>Microtis media</i> subsp. <i>media</i>			
680.	20460 <i>Pheladenia deformis</i>			
681.	15425 <i>Prasophyllum calcicola</i>			
682.	1672 <i>Prasophyllum fimbria</i> (Fringed Leek Orchid)			
683.	1680 <i>Prasophyllum parvifolium</i> (Autumn Leek Orchid)			
684.	<i>Pterostylis aff. nana</i>			
685.	15426 <i>Pterostylis aspera</i>			
686.	17267 <i>Pterostylis brevisejala</i>			
687.	11118 <i>Pterostylis pyramidalis</i> (Snail Orchid)			
688.	1693 <i>Pterostylis recurva</i> (Jug Orchid)			
689.	12217 <i>Pterostylis sanguinea</i>			
690.	<i>Pterostylis sp.</i>			
691.	18645 <i>Pterostylis sp. limestone</i> (B.J. Keighery & G.J. Keighery 65)			
692.	18658 <i>Pterostylis sp. short sepals</i> (W. Jackson BJ259)			
693.	1698 <i>Pterostylis vittata</i> (Banded Greenhood)			
694.	16367 <i>Pyrorchis nigricans</i> (Red beaks, Elephants ears)			
695.	1705 <i>Thelymitra crinita</i> (Blue Lady Orchid)			
696.	1708 <i>Thelymitra fuscolutea</i> (Chestnut Sun Orchid)			
Orobanchaceae				
697.	15037 <i>Bartsia trixago</i>	Y		
698.	7122 <i>Orobanche minor</i> (Lesser Broomrape)	Y		
699.	7089 <i>Parentucellia latifolia</i> (Common Bartsia)	Y		
700.	7090 <i>Parentucellia viscosa</i> (Sticky Bartsia)	Y		
Oxalidaceae				
701.	4349 <i>Oxalis corniculata</i> (Yellow Wood Sorrel)	Y		
702.	30375 <i>Oxalis exilis</i>			
703.	4356 <i>Oxalis pes-caprae</i> (Soursob)	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Papaveraceae				
704.	2969 <i>Fumaria capreolata</i> (Whiteflower Fumitory)	Y		
705.	2971 <i>Fumaria muralis</i> (Wall Fumitory)	Y		
706.	31532 <i>Fumaria muralis</i> subsp. <i>muralis</i>	Y		
707.	2967 <i>Romneya coulteri</i> (California Tree Poppy)	Y		
Passifloraceae				
708.	5225 <i>Passiflora filamentosa</i>	Y		
Peyssonneliaceae				
709.	44731 <i>Sonderophycus capensis</i>			
Phacelocarpaceae				
710.	27135 <i>Phacelocarpus sessilis</i>			
Phyllanthaceae				
711.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
712.	<i>Phyllanthus</i> sp.			
713.	4688 <i>Poranthera drummondii</i>			
714.	4689 <i>Poranthera ericoides</i> (Heath Poranthera)			
715.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
Phytolaccaceae				
716.	2793 <i>Phytolacca octandra</i> (Red Ink Plant)	Y		
Pinaceae				
717.	88 <i>Pinus radiata</i> (Radiata Pine)	Y		
Pittosporaceae				
718.	25788 <i>Billardiera fraseri</i> (Elegant Pronaya)			
719.	25819 <i>Marianthus paralius</i>		T	
Plantaginaceae				
720.	7303 <i>Plantago lanceolata</i> (Ribwort Plantain)	Y		
721.	7109 <i>Veronica calycina</i> (Cup Speedwell)			
722.	7110 <i>Veronica distans</i>			
Plocamiaceae				
723.	27155 <i>Plocamium cartilagineum</i>			
724.	27156 <i>Plocamium mertensii</i>			
Poaceae				
725.	184 <i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
726.	185 <i>Aira cupaniana</i> (Silvery Hairgrass)	Y		
727.	198 <i>Amphipogon laguroides</i>			
728.	226 <i>Arundo donax</i> (Giant Reed)	Y		
729.	17234 <i>Austrostipa compressa</i>			
730.	17240 <i>Austrostipa flavescens</i>			
731.	231 <i>Avellinia michelii</i>	Y		
732.	233 <i>Avena barbata</i> (Bearded Oat)	Y		
733.	244 <i>Briza maxima</i> (Blowfly Grass)	Y		
734.	245 <i>Briza minor</i> (Shivery Grass)	Y		
735.	247 <i>Bromus arenarius</i> (Sand Brome)			
736.	249 <i>Bromus diandrus</i> (Great Brome)	Y		
737.	250 <i>Bromus hordeaceus</i> (Soft Brome)	Y		
738.	253 <i>Bromus rubens</i> (Red Brome)	Y		
739.	13685 <i>Catapodium rigidum</i> (Rigid Fescue)	Y		
740.	283 <i>Cynodon dactylon</i> (Couch)	Y		
741.	306 <i>Dichelachne crinita</i> (Longhair Plumegrass)			
742.	347 <i>Ehrharta calycina</i> (Perennial Veldt Grass)	Y		
743.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
744.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
745.	444 <i>Holcus lanatus</i> (Yorkshire Fog)	Y		
746.	445 <i>Holcus setiger</i> (Annual Fog)	Y		
747.	20019 <i>Lachnagrostis filiformis</i>			
748.	467 <i>Lagurus ovatus</i> (Hare's Tail Grass)	Y		
749.	8682 <i>Lolium loliaceum</i> (Stiff Ryegrass)	Y		
750.	476 <i>Lolium perenne</i> (Perennial Ryegrass)	Y		
751.	478 <i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
752.	485 <i>Microlaena stipoides</i> (Weeping Grass)			
753.	532 <i>Paspalum urvillei</i> (Vasey Grass)	Y		
754.	573 <i>Poa drummondiana</i> (Knotted Poa)			
755.	578 <i>Poa porphyroclados</i>			
756.	<i>Poa</i> sp.			
757.	582 <i>Polypogon monspeliensis</i> (Annual Beardgrass)	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
758.	10970 <i>Rostraria cristata</i>	Y		
759.	40426 <i>Rytidosperma occidentale</i>			
760.	625 <i>Spinifex longifolius</i> (<i>Beach Spinifex</i>)			
761.	10874 <i>Thinopyrum distichum</i>	Y		
762.	708 <i>Triticum aestivum</i> (<i>Wheat</i>)	Y		
763.	716 <i>Urochloa mutica</i>	Y		
764.	724 <i>Vulpia myuros</i> (<i>Rat's Tail Fescue</i>)	Y		
765.	33101 <i>Vulpia myuros forma myuros</i>	Y		
Polygalaceae				
766.	4550 <i>Comesperma calymega</i> (<i>Blue-spike Milkwort</i>)			
767.	4552 <i>Comesperma confertum</i>			
768.	4554 <i>Comesperma flavum</i>			
769.	4555 <i>Comesperma integerrimum</i>			
770.	4564 <i>Comesperma virgatum</i> (<i>Milkwort</i>)			
Polygonaceae				
771.	2415 <i>Muehlenbeckia polybotrya</i>			
772.	13911 <i>Persicaria decipiens</i>			
773.	2433 <i>Rumex crispus</i> (<i>Curled Dock</i>)	Y		
774.	2440 <i>Rumex pulcher</i> (<i>Fiddle Dock</i>)	Y		
Portulacaceae				
775.	2845 <i>Calandrinia brevipedata</i> (<i>Short-stalked Purslane</i>)			
776.	2848 <i>Calandrinia corrigioloides</i> (<i>Strap Purslane</i>)			
777.	2854 <i>Calandrinia granulifera</i> (<i>Pygmy Purslane</i>)			
778.	2856 <i>Calandrinia liniflora</i> (<i>Parakeelya</i>)			
779.	44226 <i>Calandrinia oraria</i>		P3	
780.	<i>Calandrinia</i> sp.			
781.	40827 <i>Calandrinia tholiformis</i>			
Pottiaceae				
782.	42800 <i>Acaulon granulosum</i>			
783.	32315 <i>Barbula calycina</i>			
784.	32345 <i>Didymodon australasiae</i>			
785.	32346 <i>Didymodon torquatus</i>			
786.	<i>Tortula antarctica</i>			
787.	<i>Tortula</i> sp.			
788.	32450 <i>Trichostomum eckelianum</i>			
Primulaceae				
789.	36375 <i>Lysimachia arvensis</i> (<i>Pimpernel</i>)	Y		
790.	6483 <i>Samolus junceus</i>			
Proteaceae				
791.	1775 <i>Adenanthos cygnorum</i> (<i>Common Woollybush</i>)			
792.	1800 <i>Banksia attenuata</i> (<i>Slender Banksia, Piara</i>)			
793.	32580 <i>Banksia dallanneyi</i> var. <i>dallanneyi</i>			
794.	1819 <i>Banksia grandis</i> (<i>Bull Banksia, Pulgarla</i>)			
795.	1822 <i>Banksia ilicifolia</i> (<i>Holly-leaved Banksia</i>)			
796.	11386 <i>Banksia leptophylla</i> var. <i>melletica</i>			
797.	1830 <i>Banksia littoralis</i> (<i>Swamp Banksia, Pungura</i>)			
798.	1834 <i>Banksia menziesii</i> (<i>Firewood Banksia</i>)			
799.	32203 <i>Banksia nivea</i> subsp. <i>nivea</i>			
800.	1842 <i>Banksia prionotes</i> (<i>Acorn Banksia</i>)			
801.	32076 <i>Banksia sessilis</i> (<i>Parrot Bush, Pudjak</i>)			
802.	32077 <i>Banksia sessilis</i> var. <i>cygnorum</i>			
803.	15607 <i>Conospermum acerosum</i> subsp. <i>acerosum</i>			
804.	15513 <i>Conospermum boreale</i> subsp. <i>boreale</i>			
805.	1859 <i>Conospermum brachyphyllum</i>			
806.	15041 <i>Conospermum canaliculatum</i>			
807.	15516 <i>Conospermum canaliculatum</i> subsp. <i>canaliculatum</i>			
808.	1864 <i>Conospermum crassinervium</i> (<i>Summer Smokebush</i>)			
809.	1868 <i>Conospermum distichum</i>			
810.	1876 <i>Conospermum incurvum</i> (<i>Plume Smokebush</i>)			
811.	<i>Conospermum</i> sp.			
812.	1882 <i>Conospermum stoechadis</i> (<i>Common Smokebush</i>)			
813.	15611 <i>Conospermum stoechadis</i> subsp. <i>stoechadis</i> (<i>Common Smokebush</i>)			
814.	1885 <i>Conospermum triplinervium</i> (<i>Tree Smokebush</i>)			
815.	15839 <i>Grevillea preissii</i> subsp. <i>preissii</i>			
816.	2119 <i>Grevillea vestita</i>			
817.	12824 <i>Grevillea vestita</i> subsp. <i>vestita</i>			
818.	2146 <i>Hakea costata</i> (<i>Ribbed Hakea</i>)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
819.	2175 <i>Hakea lissocarpha</i> (Honey Bush)			
820.	2197 <i>Hakea prostrata</i> (Harsh Hakea)			
821.	2203 <i>Hakea ruscifolia</i> (Candle Hakea)			
822.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
823.	2258 <i>Persoonia comata</i>			
824.	2273 <i>Persoonia saccata</i> (Snottygobble)			
825.	20368 <i>Petrophile axillaris</i>			
826.	2286 <i>Petrophile brevifolia</i>			
827.	2299 <i>Petrophile linearis</i> (Pixie Mops)			
828.	2301 <i>Petrophile macrostachya</i>			
829.	2309 <i>Petrophile serruriae</i>			
830.	2316 <i>Stirlingia latifolia</i> (Blueboy)			
831.	2329 <i>Synaphea spinulosa</i>			
832.	15532 <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>			
Pteridaceae				
833.	45 <i>Pteris vittata</i> (Chinese Brake)			
Racopilaceae				
834.	32480 <i>Racopilum cuspidigerum</i> var. <i>convolutaceum</i>			
Ranunculaceae				
835.	10804 <i>Clematis linearifolia</i>			
836.	2932 <i>Ranunculus colonorum</i> (Common Buttercup)			
837.	2933 <i>Ranunculus muricatus</i> (Sharp Buttercup)	Y		
Restionaceae				
838.	1056 <i>Alexgeorgea nitens</i>			
839.	17663 <i>Desmocladus asper</i>			
840.	17691 <i>Desmocladus fasciculatus</i>			
841.	16595 <i>Desmocladus flexuosus</i>			
842.	1070 <i>Hypolaena exsulca</i>			
843.	17841 <i>Hypolaena pubescens</i>			
844.	1075 <i>Lepidobolus preissianus</i>			
845.	18074 <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i>			
846.	1090 <i>Lepyrodia muirii</i>			
Rhamnaceae				
847.	4802 <i>Cryptandra mutila</i>			
848.	4809 <i>Cryptandra pungens</i>			
849.	4810 <i>Cryptandra scoparia</i>			
850.	4828 <i>Spyridium globulosum</i> (Basket Bush)			
851.	15066 <i>Stenanthemum notiale</i> subsp. <i>chamelum</i>			
852.	11665 <i>Trymalium ledifolium</i> var. <i>ledifolium</i>			
853.	33418 <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>			
Rhodomelaceae				
854.	26688 <i>Coeloclonium tasmanicum</i>			
855.	26689 <i>Coeloclonium umbellula</i>			
856.	26752 <i>Dasyclonium incisum</i>			
857.	26761 <i>Dictyomenia harveyana</i>			
858.	26762 <i>Dictyomenia sonderi</i>			
859.	26763 <i>Dictyomenia tridens</i>			
860.	26919 <i>Herposiphonia rostrata</i>			
861.	26922 <i>Herposiphonia versicolor</i>			
862.	26995 <i>Kuetzingia canaliculata</i>			
863.	26998 <i>Laurencia brongniartii</i>			
864.	27001 <i>Laurencia filiformis</i>			
865.	27011 <i>Lenormandia latifolia</i>			
866.	27013 <i>Lenormandia spectabilis</i>			
867.	27107 <i>Osmundaria prolifera</i>			
868.	27108 <i>Osmundaria spiralis</i>			
869.	27162 <i>Pollexfenia pedicellata</i>			
870.	27173 <i>Polysiphonia decipiens</i>			
871.	27190 <i>Protokuetzingia australasica</i>			
Rhodymeniaceae				
872.	27015 <i>Leptosomia rosea</i>			
Ricciaceae				
873.	<i>Riccia bifurca</i>			
874.	<i>Riccia sorocarpa</i>			
875.	<i>Riccia</i> sp.			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rubiaceae				
876.	7323 <i>Galium murale</i> (Small Goosegrass)	Y		
877.	7348 <i>Opercularia hispidula</i> (Hispid Stinkweed)			
878.	18255 <i>Opercularia vaginata</i> (Dog Weed)			
Rutaceae				
879.	17665 <i>Boronia purdieana</i> subsp. <i>purdieana</i>			
880.	11381 <i>Boronia ramosa</i> subsp. <i>anethifolia</i>			
881.	44593 <i>Coleonema pulchellum</i>	Y		
882.	4453 <i>Diplolaena angustifolia</i> (Yancheep Rose)			
883.	18529 <i>Philotheca spicata</i> (Pepper and Salt)			
884.	18547 <i>Rhadinothamnus anceps</i>			
Santalaceae				
885.	10765 <i>Exocarpos sparteus</i> (Broom Ballart, Djuk)			
886.	2344 <i>Leptomeria empetriformis</i>			
887.	2350 <i>Leptomeria pauciflora</i> (Sparse-flowered Currant Bush)			
888.	2352 <i>Leptomeria preissiana</i>			
Sapindaceae				
889.	4746 <i>Diplopeltis huegelii</i>			
890.	18541 <i>Diplopeltis huegelii</i> subsp. <i>huegelii</i>			
891.	4754 <i>Dodonaea aptera</i> (Coast Hop-bush)			
Schizymeniaceae				
892.	27144 <i>Platoma cyclocolpum</i>			
Scrophulariaceae				
893.	7054 <i>Dischisma arenarium</i>	Y		
894.	7215 <i>Eremophila glabra</i> (Tar Bush)			
895.	17175 <i>Eremophila glabra</i> subsp. <i>albicans</i>			
896.	7289 <i>Myoporum caprarioides</i> (Slender Myoporum)			
897.	7291 <i>Myoporum insulare</i> (Blueberry Tree, boobialla)			
898.	7295 <i>Myoporum tetrandrum</i> (Boobialla)			
899.	7107 <i>Verbascum virgatum</i> (Twiggy Mullein)	Y		
Solanaceae				
900.	11725 <i>Anthocercis ilicifolia</i> subsp. <i>ilicifolia</i>			
901.	6949 <i>Anthocercis littorea</i> (Yellow Tailflower)			
902.	6983 <i>Physalis peruviana</i> (Cape Gooseberry)	Y		
903.	7020 <i>Solanum linnaeanum</i> (Apple of Sodom)	Y		
904.	7022 <i>Solanum nigrum</i> (Black Berry Nightshade)	Y		
905.	9259 <i>Solanum nodiflorum</i> (Glossy Nightshade)			
906.	7037 <i>Solanum symonii</i>			
Stylidiaceae				
907.	7676 <i>Levenhookia pusilla</i> (Midget Stylewort)			
908.	7677 <i>Levenhookia stipitata</i> (Common Stylewort)			
909.	7679 <i>Stylidium adpressum</i> (Trigger-on-stilts)			
910.	30278 <i>Stylidium androsaceum</i>			
911.	30276 <i>Stylidium bicolor</i>			
912.	7693 <i>Stylidium brunonianum</i> (Pink Fountain Triggerplant)			
913.	7694 <i>Stylidium bulbiferum</i> (Circus Triggerplant)			
914.	7696 <i>Stylidium calcaratum</i> (Book Triggerplant)			
915.	7708 <i>Stylidium crassifolium</i> (Thick-leaved Triggerplant)			
916.	7709 <i>Stylidium crossocephalum</i> (Posy Triggerplant)			
917.	7710 <i>Stylidium cygnorum</i>			
918.	7713 <i>Stylidium dichotomum</i> (Pins-and-needles)			
919.	7716 <i>Stylidium diuroides</i> (Donkey Triggerplant)			
920.	7717 <i>Stylidium divaricatum</i> (Daddy-long-legs)			
921.	25801 <i>Stylidium hesperium</i>			
922.	7745 <i>Stylidium junceum</i> (Reed Triggerplant)			
923.	13127 <i>Stylidium maritimum</i>		P3	
924.	25829 <i>Stylidium neurophyllum</i> (Coastal Plain Triggerplant)			
925.	7774 <i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
926.	25837 <i>Stylidium purpureum</i> (Purple Fountain Triggerplant)			
927.	7785 <i>Stylidium repens</i> (Matted Triggerplant)			
928.	20521 <i>Stylidium rigidulum</i>			
929.	25806 <i>Stylidium scariosum</i>			
930.	7798 <i>Stylidium schoenoides</i> (Cow Kicks)			
931.	<i>Stylidium</i> sp.			
932.	7803 <i>Stylidium striatum</i> (Fan-leaved Triggerplant)		P4	
Tamaricaceae				

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
933.	15741 <i>Tamarix aphylla</i> (Athe! Tree)	Y		
Thuidiaceae				
934.	32486 <i>Thuidium sparsum</i> var. <i>hastatum</i>			
Thymelaeaceae				
935.	5232 <i>Pimelea argentea</i> (Silvery Leaved Pimelea)			
936.	5237 <i>Pimelea calcicola</i>		P3	
937.	5243 <i>Pimelea ferruginea</i>			
938.	5244 <i>Pimelea floribunda</i>			
939.	5251 <i>Pimelea imbricata</i>			
940.	11402 <i>Pimelea imbricata</i> var. <i>piligera</i>			
941.	5254 <i>Pimelea leucantha</i>			
942.	18117 <i>Pimelea rosea</i> subsp. <i>rosea</i>			
943.	5268 <i>Pimelea sulphurea</i> (Yellow Banjine)			
944.	5269 <i>Pimelea sylvestris</i>			
945.	5272 <i>Pimelea villifera</i>			
Typhaceae				
946.	99 <i>Typha orientalis</i> (Bulrush, Cumbungi)	Y		
Ulvaceae				
947.	27352 <i>Ulva lactuca</i>			
Urticaceae				
948.	12670 <i>Parietaria cardiostegia</i>			
949.	1762 <i>Parietaria debilis</i> (Pellitory)			
Verbenaceae				
950.	18197 <i>Phyla nodiflora</i>	Y		
951.	6734 <i>Phyla nodiflora</i> var. <i>nodiflora</i>	Y		
Violaceae				
952.	5216 <i>Hybanthus calycinus</i> (Wild Violet)			
953.	12007 <i>Hybanthus floribundus</i> subsp. <i>floribundus</i>			
Vitaceae				
954.	17042 <i>Vitis vinifera</i>	Y		
Xanthorrhoeaceae				
955.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
Zamiaceae				
956.	85 <i>Macrozamia riedlei</i> (Zamia, Djiridji)			
957.	<i>Macrozamia</i> sp.			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Fauna Species Report

Created By Guest user on 26/10/2016

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 31° 32' 15" S,115° 38' 46" E 31° 32' 43" S,115° 38' 51" E 31° 33' 21" S,115° 39' 14" E 31° 33'
Group By 36° S,115° 39' 47" E 31° 34' 06" S,115° 40' 09" E 31° 34' 30" S,115° 40' 14" E 31° 34' 54"
 S,115° 40' 06" E 31° 35' 41" S,115° 40' 31" E 31° 36' 07" S,115° 40' 39" E 31° 37' 02" S,115°
 41' 24" E 31° 37' 21" S,115° 41' 30" E 31° 38' 52" S,115° 42' 05" E
 Species Group

Species Group	Species	Records
Amphibian	9	366
Bird	209	3748
Fish	77	105
Invertebrate	203	978
Mammal	43	301
Reptile	61	863
TOTAL	602	6361

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amphibian				
1.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
2.	<i>Crinia</i> sp.			
3.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
4.	25412 <i>Heleioporus psammophilus</i> (Sand Frog)			
5.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
6.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
7.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
8.	25420 <i>Myobatrachus gouldii</i> (Turtle Frog)			
9.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
Bird				
10.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
11.	<i>Acanthiza</i> (<i>Acanthiza</i>) <i>apicalis</i> subsp. <i>apicalis</i>			
12.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
13.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
14.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
15.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
16.	<i>Accipiter</i> (<i>Paraspizias</i>) <i>cirrocephalus</i> subsp. <i>cirrocephalus</i>			
17.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
18.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
19.	24282 <i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
20.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
21.	24831 <i>Acrocephalus australis</i> subsp. <i>gouldi</i> (Australian Reed Warbler)			
22.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
23.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
24.	24310 <i>Anas castanea</i> (Chestnut Teal)			
25.	24312 <i>Anas gracilis</i> (Grey Teal)			
26.	24313 <i>Anas platyrhynchos</i> (Mallard)			
27.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
28.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
29.	25553 <i>Anhinga melanogaster</i> (Darter)			
30.	<i>Anhinga novaehollandiae</i>			
31.	24506 <i>Anous tenuirostris</i> subsp. <i>melanops</i> (Australian Lesser Noddy)		T	
32.	<i>Anthochaera</i> (<i>Anthochaera</i>) <i>carunculata</i>			
33.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
34.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
35.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
36.	25554 <i>Apus pacificus</i> (Fork-tailed Swift)		IA	

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
37.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
38.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
39.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
40.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
41.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
42.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
43.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
44.	24318 <i>Aythya australis</i> (Hardhead)			
45.	<i>Barnardius zonarius</i>			
46.	24319 <i>Biziura lobata</i> (Musk Duck)			
47.	24721 <i>Cacatua galerita</i> subsp. <i>galerita</i> (Sulphur-crested Cockatoo)	Y		
48.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
49.	25715 <i>Cacatua roseicapilla</i> (Galah)			
50.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
51.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
52.	<i>Cacatua</i> sp.			
53.	24729 <i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
54.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
55.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
56.	24780 <i>Calidris alba</i> (Sanderling)		IA	
57.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
58.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
59.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
60.	<i>Calyptorhynchus</i> sp.			
61.	24373 <i>Charadrius melanops</i> (Black-fronted Dotterel)			
62.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
63.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
64.	<i>Cheramoeca leucosterna</i>			
65.	24488 <i>Cheramoeca leucosternus</i> (White-backed Swallow)			
66.	<i>Chroicocephalus novaehollandiae</i>			
67.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
68.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
69.	24834 <i>Cincloramphus mathewsi</i> (Rufous Songlark)			
70.	24288 <i>Circus approximans</i> (Swamp Harrier)			
71.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
72.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
73.	24613 <i>Colluricincla harmonica</i> subsp. <i>rufiventris</i> (Grey Shrike-thrush)			
74.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
75.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
76.	24416 <i>Corvus bennetti</i> (Little Crow)			
77.	25592 <i>Corvus coronoides</i> (Australian Raven)			
78.	24417 <i>Corvus coronoides</i> subsp. <i>perplexus</i> (Australian Raven)			
79.	<i>Corvus</i> sp.			
80.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
81.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			
82.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
83.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
84.	24422 <i>Cracticus tibicen</i> subsp. <i>dorsalis</i> (White-backed Magpie)			
85.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
86.	24424 <i>Cracticus torquatus</i> subsp. <i>torquatus</i> (Grey Butcherbird)			
87.	24322 <i>Cygnus atratus</i> (Black Swan)			
88.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
89.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
90.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
91.	30908 <i>Diomedea chlororhynchus</i> (Yellow-nosed Albatross)		T	
92.	24468 <i>Diomedea chrysostoma</i> (Grey-headed Albatross)		T	
93.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
94.	<i>Egretta garzetta</i>			
95.	<i>Egretta novaehollandiae</i>			
96.	<i>Elanus axillaris</i>			
97.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
98.	<i>Eolophus roseicapillus</i>			
99.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
100.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
101.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
102.	24818 <i>Eudyptula minor</i> subsp. <i>novaehollandiae</i> (Little Penguin)			
103.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
104.	25621 <i>Falco berigora</i> (Brown Falcon)			
105.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
106.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
107.	25623 <i>Falco longipennis</i> (Australian Hobby)			
108.	25727 <i>Fulica atra</i> (Eurasian Coot)			
109.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
110.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
111.	24763 <i>Gallinula tenebrosa</i> subsp. <i>tenebrosa</i> (Dusky Moorhen)			
112.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
113.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
114.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
115.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
116.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
117.	24689 <i>Halobaena caerulea</i> (Blue Petrel)			
118.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
119.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
120.	25629 <i>Hirundo nigricans</i> (Tree Martin)			
121.	<i>Hydroprogne caspia</i>			
122.	24348 <i>Ixobrychus minutus</i> subsp. <i>dubius</i> (Australian Little Bittern)		P4	
123.	<i>Lalage (Lalage) sueurii</i>			
124.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
125.	24511 <i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
126.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
127.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
128.	24690 <i>Macronectes giganteus</i> (Southern Giant Petrel)			
129.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
130.	24544 <i>Malurus lamberti</i> subsp. <i>assimilis</i> (Variegated Fairy-wren)			
131.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
132.	24549 <i>Malurus leucopterus</i> subsp. <i>leuconotus</i> (White-winged Fairy-wren)			
133.	<i>Malurus</i> sp.			
134.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
135.	24552 <i>Malurus splendens</i> subsp. <i>splendens</i> (Splendid Fairy-wren)			
136.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
137.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
138.	24838 <i>Megalurus gramineus</i> subsp. <i>gramineus</i> (Little Grassbird)			
139.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
140.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
141.	<i>Microcarbo melanoleucos</i>			
142.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
143.	<i>Morus serrator</i>			
144.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
145.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
146.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
147.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
148.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
149.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
150.	24623 <i>Pachycephala pectoralis</i> subsp. <i>fuliginosa</i> (Golden Whistler)			
151.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
152.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
153.	24692 <i>Pachyptila belcheri</i> (Slender-billed Prion)			
154.	24693 <i>Pachyptila desolata</i> (Antarctic Prion)			
155.	24696 <i>Pachyptila turtur</i> (Fairy Prion)			
156.	<i>Pandion cristatus</i>			
157.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
158.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
159.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
160.	24642 <i>Passer montanus</i> (Eurasian Tree Sparrow)	Y		
161.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
162.	<i>Petroica (Petroica) multicolor</i>			
163.	24658 <i>Petroica cucullata</i> (Hooded Robin)			
164.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
165.	25695 <i>Petroica multicolor</i> (Scarlet Robin)			
166.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
167.	25698 <i>Phalacrocorax melanoleucos</i> (Little Pied Cormorant)			
168.	24666 <i>Phalacrocorax melanoleucos</i> subsp. <i>melanoleucos</i> (Little Pied Cormorant)			
169.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
170.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
171.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
172.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
173.	25669 <i>Phylidonyris nigra</i> (White-cheeked Honeyeater)			
174.	24595 <i>Phylidonyris nigra</i> subsp. <i>gouldii</i> (White-cheeked Honeyeater)			
175.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
177.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
178.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
179.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
180.	24750 <i>Platycercus zonarius subsp. semitorquatus</i> (Twenty-eight Parrot)			
181.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
182.	24679 <i>Podargus strigoides subsp. brachypterus</i> (Tawny Frogmouth)			
183.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
184.	24681 <i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
185.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
186.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
187.	24767 <i>Porphyrio porphyrio subsp. bellus</i> (Purple Swamphen)			
188.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
189.	24702 <i>Pterodroma brevirostris</i> (Kerguelen Petrel)			
190.	24712 <i>Puffinus carneipes</i> (Fleshy-footed Shearwater)		P4	
191.	24716 <i>Puffinus pacificus</i> (Wedge-tailed Shearwater)		IA	
192.	<i>Purpureicephalus spurius</i>			
193.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
194.	25613 <i>Rhipidura fuliginosa</i> (Grey Fantail)			
195.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
196.	24454 <i>Rhipidura leucophrys subsp. leucophrys</i> (Willie Wagtail)			
197.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
198.	24279 <i>Sericornis frontalis subsp. maculatus</i> (White-browed Scrubwren)			
199.	30948 <i>Smicromis brevirostris</i> (Weebill)			
200.	24522 <i>Sterna bergii</i> (Crested Tern)			
201.	24524 <i>Sterna dougallii subsp. gracilis</i> (Roseate Tern)		IA	
202.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
203.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
204.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
205.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
206.	24682 <i>Tachybaptus novaehollandiae subsp. novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
207.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
208.	<i>Thalasseus bergii</i>			
209.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
210.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
211.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
212.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
213.	24808 <i>Tringa nebularia</i> (Common Greenshank)		IA	
214.	24851 <i>Turnix velox</i> (Little Button-quail)			
215.	25762 <i>Tyto alba</i> (Barn Owl)			
216.	24855 <i>Tyto novaehollandiae subsp. novaehollandiae</i> (Masked Owl (southern subsp))		P3	
217.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
218.	24856 <i>Zosterops lateralis subsp. gouldi</i> (Grey-breasted White-eye)			

Fish

219.	<i>Acanthistius pardalotus</i>			
220.	<i>Acanthistius serratus</i>			
221.	<i>Aetapcus maculatus</i>			
222.	<i>Anoplocapros robustus</i>			
223.	<i>Aracana aurita</i>			
224.	<i>Aulohalaelurus labiosus</i>			
225.	<i>Batrachomoeus rubricephalus</i>			
226.	<i>Beliops xanthokrossos</i>			
227.	<i>Bodianus vulpinus</i>			
228.	<i>Bostockia porosa</i>			
229.	34034 <i>Carcharias taurus</i> (Grey Nurse Shark)		T	
230.	<i>Centroberyx australis</i>			
231.	<i>Centroberyx lineatus</i>			
232.	<i>Centrolophus niger</i>			
233.	<i>Cheilodactylus gibbosus</i>			
234.	<i>Cheilodactylus rubrolabiatus</i>			
235.	<i>Chelidonichthys kumu</i>			
236.	<i>Chelmonops curiosus</i>			
237.	<i>Cirrhimuraena calamus</i>			
238.	<i>Cleidopus gloriamaris</i>			
239.	<i>Coris auricularis</i>			
240.	<i>Cybiosarda elegans</i>			
241.	<i>Edelia vittata</i>			
242.	<i>Engraulis australis</i>			
243.	<i>Fistularia petimba</i>			

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244.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
245.	<i>Gambusia affinis</i>			
246.	<i>Girella tephraeops</i>			
247.	<i>Glaucosoma hebraicum</i>			
248.	<i>Gymnocranius grandoculis</i>			
249.	<i>Gymnothorax prasinus</i>			
250.	<i>Gymnothorax</i> sp.			
251.	<i>Helcogramma decurrens</i>			
252.	<i>Heteroclinus heptaeolus</i>			
253.	<i>Heterodontus portusjacksoni</i>			
254.	<i>Hippocampus</i> sp.			
255.	<i>Hippocampus tuberculatus</i>			
256.	<i>Lactoria concatenatus</i>			
257.	<i>Lactoria gibbosus</i>			
258.	<i>Lagocephalus sceleratus</i>			
259.	<i>Lethrinus genivittatus</i>			
260.	<i>Metavelifer multiradiatus</i>			
261.	<i>Meuschenia freycineti</i>			
262.	<i>Mustelus antarcticus</i>			
263.	<i>Neatypus obliquus</i>			
264.	<i>Nelusetta ayraudi</i>			
265.	<i>Neopataecus waterhousii</i>			
266.	<i>Neosebastes bougainvillii</i>			
267.	<i>Neosebastes nigropunctatus</i>			
268.	<i>Neosebastes pandus</i>			
269.	<i>Notolabrus parilus</i>			
270.	<i>Odax cyanomelas</i>			
271.	<i>Orectolobus ornatus</i>			
272.	<i>Parablennius postocolomaculatus</i>			
273.	<i>Paraplesiops meleagris</i>			
274.	<i>Parascyllium variolatum</i>			
275.	<i>Parma victoriae</i>			
276.	<i>Parupeneus chrysopleuron</i>			
277.	<i>Parupeneus spilurus</i>			
278.	<i>Pempheris klunzingeri</i>			
279.	<i>Pentapodus vitta</i>			
280.	34039 <i>Phycodurus eques</i> (Leafy Sea Dragon)		P2	
281.	<i>Phyllopteryx taeniolatus</i>			
282.	<i>Platycephalus longispinis</i>			
283.	<i>Plectorhinchus flavomaculatus</i>			
284.	<i>Pomatomus saltatrix</i>			
285.	<i>Pseudocaranx dentex</i>			
286.	<i>Pseudogobius olorum</i>			
287.	<i>Schuettea woodwardi</i>			
288.	<i>Scorpaena sumptuosa</i>			
289.	<i>Seriola hippos</i>			
290.	<i>Seriola lalandi</i>			
291.	<i>Sillago schomburgkii</i>			
292.	<i>Torquigener vicinus</i>			
293.	<i>Trachinotus coppingeri</i>			
294.	<i>Upeneichthys lineatus</i>			
295.	<i>Upeneichthys stotti</i>			
Invertebrate				
296.	<i>Acanthopleura gemmata</i>			
297.	<i>Acerella falcipes</i>			
298.	<i>Aganippe raphiduca</i>			
299.	<i>Akamptogonus novarae</i>			
300.	<i>Alaba opiniosa</i>			
301.	<i>Alaba</i> sp.			
302.	<i>Amblychilepas nigrita</i>			
303.	<i>Amblychilepas oblonga</i>			
304.	<i>Amblyomma triguttatum</i>			
305.	<i>Amitermes conformis</i>			
306.	<i>Amitermes heterognathus</i>			
307.	<i>Anachis atkinsoni</i>			
308.	<i>Aname mainae</i>			
309.	<i>Aname tepperi</i>			
310.	<i>Ancorina</i> sp.			
311.	<i>Antichiropus whistleri</i>			
312.	<i>Aplidium</i> sp.			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
313.	<i>Aplysia gigantea</i>			
314.	<i>Araneus cyphoxis</i>			
315.	<i>Araneus senicaudatus</i>			
316.	<i>Archaeosynthemis occidentalis</i>			
317.	<i>Archiargiolestes pusillus</i>			
318.	<i>Arkys alticephala</i>			
319.	<i>Arkys walckenaeri</i>			
320.	<i>Arrenurus sp.</i>			
321.	<i>Austracantha minax</i>			
322.	<i>Australocamptus hamondi</i>			Y
323.	<i>Australoeucyclops darwini</i>			
324.	<i>Australoeucyclops sp.</i>			Y
325.	<i>Australomimetus djuka</i>			
326.	<i>Australomimetus ovidi</i>			
327.	<i>Australothis rubescens</i>			
328.	<i>Austrochiltonia sp.</i>			
329.	<i>Austrochthonius australis</i>			
330.	33971 <i>Austroconops mcmillani</i> (biting midge)		P2	
331.	33973 <i>Austrosaga spinifer</i> (cricket)		P3	
332.	<i>Austrothemis nigrescens</i>			
333.	<i>Baclozygum brachypterum</i>			Y
334.	<i>Baiami tegenarioides</i>			
335.	<i>Baiami volucripes</i>			
336.	<i>Bothriembryon</i> (<i>Bothriembryon</i>) <i>bullae</i>			
337.	<i>Bothriembryon</i> (<i>Bothriembryon</i>) <i>kendricki</i>			
338.	34057 <i>Bothriembryon perobesus</i> (land snail)		P1	
339.	<i>Brachidontes erosus</i>			
340.	<i>Bulla quoyii</i>			
341.	<i>Cacozeliana granarium</i>			
342.	<i>Cacozeliana icarus</i>			
343.	<i>Cantharidus sp.</i>			
344.	<i>Castiarina decemguttata</i>			
345.	<i>Castiarina recta</i>			
346.	<i>Castiarina simulata</i>			
347.	<i>Cephrenes augiades</i> subsp. <i>sperthias</i>			Y
348.	<i>Cercophonius granulatus</i>			
349.	<i>Cercophonius sulcatus</i>			
350.	<i>Cherax quinquecarinatus</i>			
351.	<i>Cochlicella acuta</i>			
352.	<i>Cominella</i> (<i>Cominella</i>) <i>eburnea</i>			
353.	<i>Conus anemone</i>			
354.	<i>Coptotermes acinaciformis</i>			
355.	<i>Coptotermes acinaciformis</i> subsp. <i>raffrayi</i>			
356.	<i>Coptotermes michaelsoni</i>			
357.	<i>Cormocephalus aurantipes</i>			
358.	<i>Cormocephalus novaehollandiae</i>			
359.	<i>Cormocephalus rubriceps</i>			
360.	<i>Cormocephalus turneri</i>			
361.	<i>Coscinasterias muricata</i>			
362.	<i>Cosmetalepas concatenatus</i>			
363.	<i>Cryptops sp.</i>			
364.	<i>Cyclosa trilobata</i>			
365.	<i>Daphnia carinata</i>			
366.	<i>Dicathais orbita</i>			
367.	<i>Dingosa serrata</i>			
368.	<i>Dolichoderus ypsilon</i>			
369.	<i>Donax</i> (<i>Deltachion</i>) <i>electilis</i>			
370.	<i>Donax</i> (<i>Tentidonax</i>) <i>francisensis</i>			
371.	<i>Ecnomus pansus</i>			
372.	<i>Elaphoidella bidens</i>			Y
373.	<i>Eriophora biapicata</i>			
374.	<i>Ethmostigmus rubripes</i>			
375.	<i>Euplica sp.</i>			
376.	<i>Exomyocara trispinosum</i>			Y
377.	<i>Gomphina</i> (<i>Gomphina</i>) <i>undulosa</i>			
378.	<i>Haliotis rubra</i> subsp. <i>rubra</i>			
379.	<i>Hednota crypsichroa</i>			
380.	<i>Hednota longipalpella</i>			
381.	<i>Hednota pedionoma</i>			
382.	<i>Helicoverpa punctigera</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
383.	<i>Heliocidaris erythrogramma</i>			
384.	<i>Heterotermes platycephalus</i>			
385.	<i>Hydrophilus (Hydrophilus) pedipalpus</i>			
386.	33977 <i>Hylaeus globuliferus</i> (bee)		P3	
387.	<i>Idiommata blackwalli</i>			
388.	<i>Indolpium</i> sp.			
389.	<i>Iridomyrmex bicknelli</i>			
390.	<i>Isopeda leishmanni</i>			
391.	<i>Isopeda leishmanni</i> subsp. <i>hoggi</i>			
392.	<i>Kapu westralica</i>			
393.	<i>Kawanaphila nartee</i>			
394.	<i>Kinnecaris eberhardi</i>			Y
395.	<i>Lampona cylindrata</i>			
396.	<i>Lampona yanchep</i>			
397.	<i>Latreductus hasseltii</i>			
398.	<i>Lepas (Anatifa) anserifera</i>			Y
399.	<i>Limnoxenus zealandicus</i>			
400.	<i>Lycosa godeffroyi</i>			
401.	<i>Lycosa</i> sp.			
402.	<i>Maconellicoccus lanigerus</i>			
403.	<i>Macroceps moorei</i>			Y
404.	<i>Macrocyclops albidus</i>			
405.	<i>Mactra (Mactra) australis</i>			
406.	<i>Maratus pavonis</i>			
407.	<i>Masasteron sampeyae</i>			
408.	<i>Melobasis wannera</i>			
409.	<i>Meridiastra gunnii</i>			
410.	<i>Meridiastra occidens</i>			
411.	<i>Mesocyclops brooksi</i>			
412.	<i>Metaballus frontalis</i>			
413.	<i>Microcerotermes distinctus</i>			
414.	<i>Microcerotermes newmani</i>			
415.	<i>Microfragum</i> sp.			
416.	<i>Missulena granulosa</i>			
417.	<i>Missulena occatoria</i>			
418.	<i>Mitra (Mitra) carbonaria</i>			
419.	<i>Mitrella (Dentimitrella) austrina</i>			
420.	<i>Mixocyclops mortoni</i>			
421.	<i>Myrmecia</i> sp.			
422.	<i>Nebalia</i> sp.			
423.	<i>Neotemnopteryx douglasi</i>			
424.	<i>Nephila edulis</i>			
425.	<i>Nitocra lacustris</i> subsp. <i>pacifica</i>			Y
426.	<i>Notalina fulva</i>			
427.	<i>Occasitermes occasus</i>			
428.	<i>Occiperipatooides gilesii</i>			
429.	<i>Odontothripiella fasciatipennis</i>			Y
430.	<i>Oecobius navus</i>			
431.	<i>Ommatoiulus moreletii</i>			
432.	<i>Onthophagus ferox</i>			
433.	<i>Onthophagus flavoapicalis</i>			
434.	<i>Onthophagus haagi</i>			
435.	<i>Oratemnus curtus</i>			
436.	<i>Orcus australasiae</i>			
437.	<i>Oxidus gracilis</i>			
438.	<i>Paracapritermes kraepelinii</i>			
439.	<i>Paracymus pygmaeus</i>			
440.	<i>Paramphisopus</i> sp.			
441.	<i>Paranitocrella bastiani</i>			Y
442.	<i>Paraplectanoides crassipes</i>			
443.	<i>Patella (scutellastra)</i>			
444.	<i>Patelloida alticostata</i>			
445.	<i>Pericharax</i> sp.			
446.	<i>Perthia</i> sp.			
447.	<i>Pescecylops amaudi</i>			Y
448.	<i>Phasianella ventricosa</i>			
449.	<i>Pholcus phalangioides</i>			
450.	<i>Phyllotocus</i> sp.			
451.	<i>Pinkfloydia harveii</i>			
452.	<i>Piona murleyi</i>			

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453.	<i>Prietocella barbara</i>			
454.	<i>Prionosternum scutatum</i>			
455.	<i>Protochelifer cavernarum</i>			
456.	<i>Psacadonotus diurnus</i>			
457.	<i>Psammocinia halmiformis</i>			
458.	<i>Pyrene bidentata</i>			
459.	<i>Raveniella arenacea</i>			
460.	<i>Raveniella cirrata</i>			
461.	<i>Raveniella peckorum</i>			
462.	<i>Rhantus simulans</i>			
463.	<i>Rissoina (Rissoina) nivea</i>			
464.	<i>Rosopaella galonda</i>			
465.	<i>Sabia australis</i>			
466.	<i>Schedorhinotermes reticulatus</i>			
467.	<i>Scolopendra laeta</i>			
468.	<i>Siphonaria zelandica</i>			
469.	<i>Sitona discoideus</i>			
470.	<i>Spheciospongia papillosa</i>			
471.	<i>Spirula spirula</i>			
472.	<i>Stephonyx sp.</i>			Y
473.	<i>Strepsicrates ejectana</i>			
474.	<i>Stylopallene tubirostris</i>			
475.	<i>Succinea (Succinea) contenta</i>			
476.	<i>Succinea sp.</i>			
477.	<i>Sunetta vaginalis</i>			
478.	33992 <i>Synemon gratiosa (Graceful Sunmoth)</i>		P4	
479.	<i>Tamopsis perthensis</i>			
480.	<i>Taphiassa robertsi</i>			
481.	<i>Tasmanicosa leuckartii</i>			
482.	<i>Tawera gallinula</i>			
483.	<i>Teia athlophora</i>			
484.	<i>Theba pisana</i>			
485.	<i>Themiste (Lagenopsis) dehamata</i>			
486.	<i>Trichiocercus mesomelas</i>			
487.	<i>Triplectides niveipennis</i>			
488.	<i>Tropocyclops confinis</i>			Y
489.	<i>Tryphosella sp.</i>			Y
490.	<i>Turbo (Ninella) torquatus</i>			
491.	<i>Urodacus novaehollandiae</i>			
492.	<i>Venator immansueta</i>			
493.	<i>Venator koyuga</i>			
494.	<i>Venatrix pullastra</i>			
495.	34113 <i>Westralunio carteri (Carter's Freshwater Mussel)</i>		T	
496.	<i>Westrapyrgus sp.</i>			
497.	<i>Westrarchaea spinosa</i>			
498.	<i>Xylochomitermes tomentosus</i>			

Mammal

499.	24208 <i>Arctocephalus forsteri (New Zealand Fur Seal)</i>		S	
500.	24161 <i>Bettongia lesueur subsp. graii (Boodie, Burrowing Bettong)</i>			
501.	24162 <i>Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)</i>		T	
502.	24251 <i>Bos taurus (European Cattle)</i>	Y		
503.	24254 <i>Camelus dromedarius (Dromedary, Camel)</i>	Y		
504.	25454 <i>Canis lupus (Dog, Dingo)</i>	Y		
505.	24086 <i>Cercartetus concinnus (Western Pygmy-possum, Mundarda)</i>			
506.	24186 <i>Chalinolobus gouldii (Gould's Wattled Bat)</i>			
507.	24187 <i>Chalinolobus morio (Chocolate Wattled Bat)</i>			
508.	24092 <i>Dasyurus geoffroii (Chuditch, Western Quoll)</i>		T	
509.	24043 <i>Eubalaena australis (Southern Right Whale)</i>		T	
510.	24041 <i>Felis catus (Cat)</i>	Y		
511.	24215 <i>Hydromys chrysogaster (Water-rat)</i>		P4	
512.	25478 <i>Isodon obesulus (Southern Brown Bandicoot)</i>		P5	
513.	24153 <i>Isodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)</i>		P5	
514.	24132 <i>Macropus fuliginosus (Western Grey Kangaroo)</i>			
515.	24133 <i>Macropus ima (Western Brush Wallaby)</i>		P4	
516.	<i>Macropus sp.</i>			
517.	24051 <i>Megaptera novaeangliae (Humpback Whale)</i>		T	
518.	24076 <i>Mesoplodon bowdoini (Andrew's Beaked Whale)</i>			
519.	24223 <i>Mus musculus (House Mouse)</i>	Y		
520.	24042 <i>Mustela putorius (European Polecat, Ferret)</i>	Y		
521.	24210 <i>Neophoca cinerea (Australian Sea Lion)</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
			S	
522.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
523.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
524.	34016 <i>Ovis aries</i> (Sheep)			
525.	24154 <i>Perameles bougainville</i> subsp. <i>bougainville</i> (Western Barred Bandicoot, Marl (Shark Bay))		T	
526.	24155 <i>Perameles eremiana</i> (Desert Bandicoot)		X	
527.	24156 <i>Petaurus breviceps</i> subsp. <i>ariel</i> (Sugar Glider)			
528.	24142 <i>Petrogale lateralis</i> subsp. <i>lateralis</i> (Black-flanked Rock-wallaby, Black-footed Rock-wallaby)		T	
529.	24073 <i>Physeter macrocephalus</i> (Sperm Whale)		P4	
530.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
531.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
532.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
533.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
534.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
535.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
536.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
537.	24157 <i>Trichosurus vulpecula</i> subsp. <i>arnhemensis</i> (Northern Brushtail Possum)			
538.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
539.	24069 <i>Tursiops truncatus</i> (Bottlenose Dolphin)			
540.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
541.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		

Reptile

542.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
543.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
544.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
545.	42373 <i>Brachyuropis fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			
546.	42380 <i>Brachyuropis fasciolatus</i> subsp. <i>fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			
547.	42381 <i>Brachyuropis semifasciatus</i> (Southern Shovel-nosed Snake)			
548.	25335 <i>Caretta caretta</i> (Loggerhead Turtle)		T	
549.	43380 <i>Chelodina colliei</i> (Oblong Turtle)			
550.	25336 <i>Chelonia mydas</i> (Green Turtle)		T	
551.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
552.	24918 <i>Crenadactylus ocellatus</i> subsp. <i>ocellatus</i> (Clawless Gecko)			
553.	30893 <i>Cryptoblepharus buchananii</i>			
554.	25020 <i>Cryptoblepharus plagiocephalus</i>			
555.	30899 <i>Ctenophorus adelaidensis</i> (Southern Heath Dragon, Western Heath Dragon)			
556.	25027 <i>Ctenotus australis</i>			
557.	25039 <i>Ctenotus fallens</i>			
558.	25087 <i>Cyclodomorphus celatus</i> (Western Slender Blue-tongue)			
559.	30906 <i>Delma concinna</i> (Javelin Legless Lizard)			
560.	30905 <i>Delma concinna</i> subsp. <i>concinna</i> (Javelin Legless Lizard)			
561.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
562.	24999 <i>Delma grayii</i>			
563.	25296 <i>Demansia psammophis</i> subsp. <i>reticulata</i> (Yellow-faced Whipsnake)			
564.	25346 <i>Dermochelys coriacea</i> (Leatherback Turtle)		T	
565.	24939 <i>Diplodactylus polyophthalmus</i>			
566.	25251 <i>Echiopsis curta</i> (Bardick)			
567.	25096 <i>Egernia kingii</i> (King's Skink)			
568.	25100 <i>Egernia napoleonis</i>			
569.	25119 <i>Hemiergis quadrilineata</i>			
570.	43384 <i>Hydrophis platurus</i> (Yellow-bellied Seasnake)			
571.	25128 <i>Lerista christinae</i>			
572.	25131 <i>Lerista distinguenda</i>			
573.	25133 <i>Lerista elegans</i>			
574.	25148 <i>Lerista lineopunctulata</i>			
575.	25165 <i>Lerista praepedita</i>			
576.	25005 <i>Lialis burtonis</i>			
577.	25184 <i>Menetia greyii</i>			
578.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
579.	25191 <i>Morethia lineocellata</i>			
580.	25192 <i>Morethia obscura</i>			
581.	25248 <i>Neelaps bimaculatus</i> (Black-naped Snake)			
582.	25249 <i>Neelaps calonotos</i> (Black-striped Snake)		P3	
583.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
584.	25253 <i>Parasuta gouldii</i>			
585.	25007 <i>Pletholax gracilis</i> subsp. <i>gracilis</i> (Keeled Legless Lizard)			
586.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
587.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
588.	25511 <i>Pseudonaja affinis</i> (Dugite)			
589.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
590.	25258 <i>Pseudonaja affinis</i> subsp. <i>exilis</i> (Rottnest Dugite)		T	
591.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
592.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
593.	<i>Simoselaps semifasciatus</i>			
594.	25518 <i>Strophurus spinigerus</i>			
595.	24943 <i>Strophurus spinigerus</i> subsp. <i>inomatus</i>			
596.	24942 <i>Strophurus spinigerus</i> subsp. <i>spinigerus</i>			
597.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
598.	25519 <i>Tiliqua rugosa</i>			
599.	25204 <i>Tiliqua rugosa</i> subsp. <i>aspera</i>			
600.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
601.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
602.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			

Conservation Codes

T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix D – Flora data

Floristic analysis results Q01-Q29 (dendrogram)

Floristic analysis results Q30-Q36 (dendrogram)

Floristic analysis Q01–Q29 (cluster)

Floristic analysis Q30-Q36 (cluster)

Floristic analysis SSI Q08 (cluster)

Floristic analysis SSI Q21 (cluster)

Floristic analysis SSI Q24 (cluster)

Floristic analysis SSI Q32 (cluster)

Floristic analysis SSI Q33 (cluster)

Floristic analysis SSI Q36 (cluster)

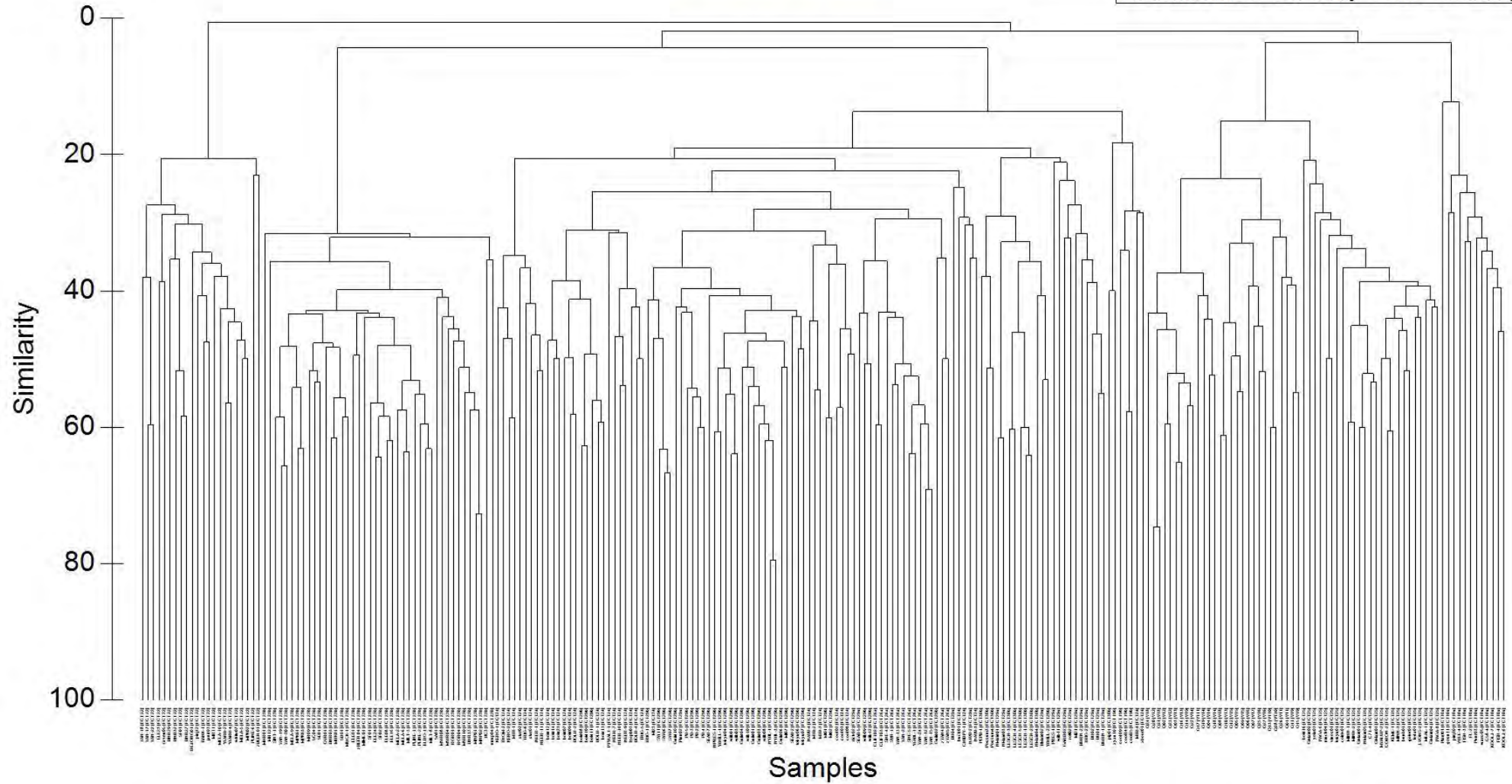
Flora species list

Flora likelihood of occurrence assessment guidelines

Flora likelihood of occurrence assessment

Group average

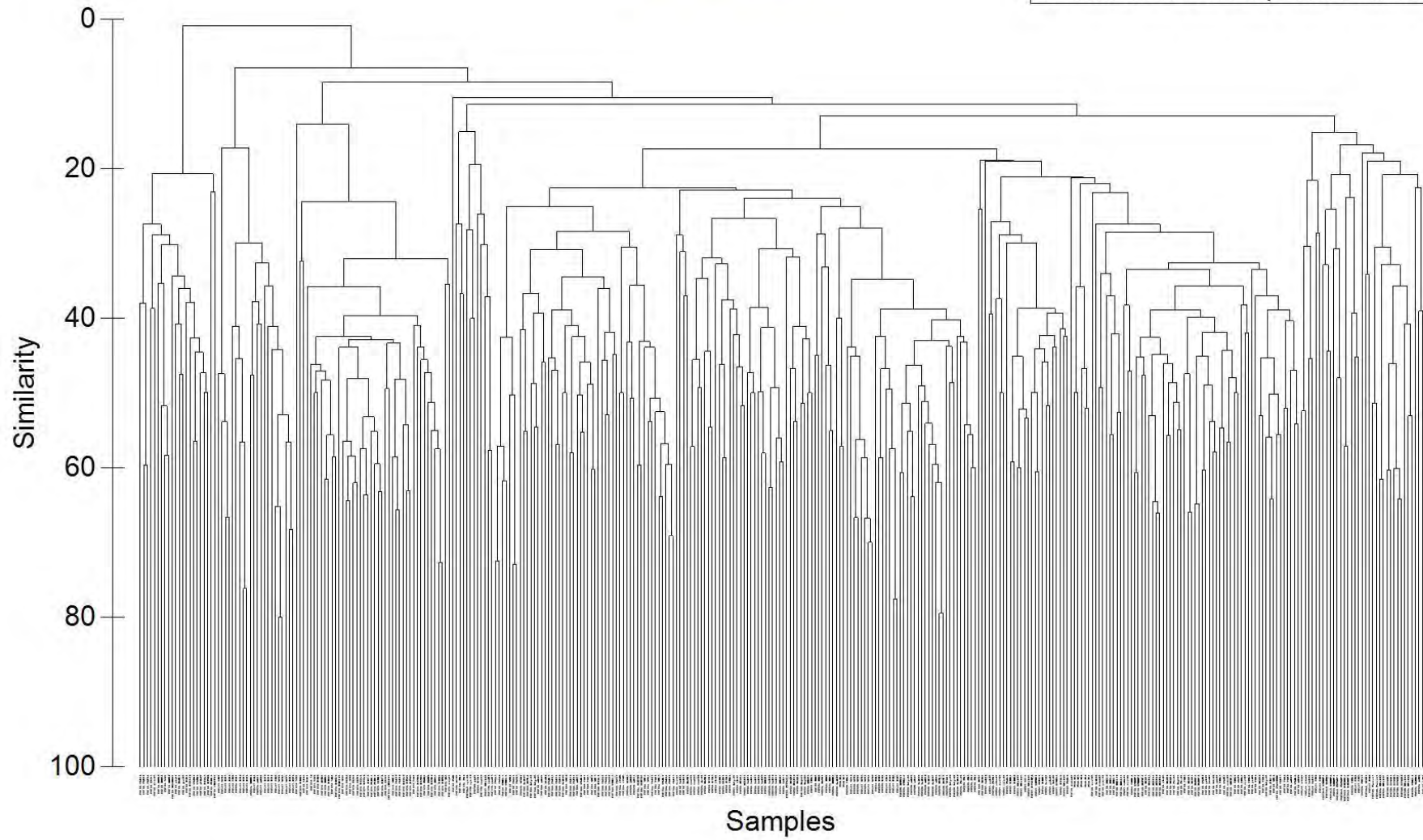
Resemblance: S17 Bray Curtis similarity



Q01-Q29

Group average

Resemblance: S17 Bray Curtis similarity

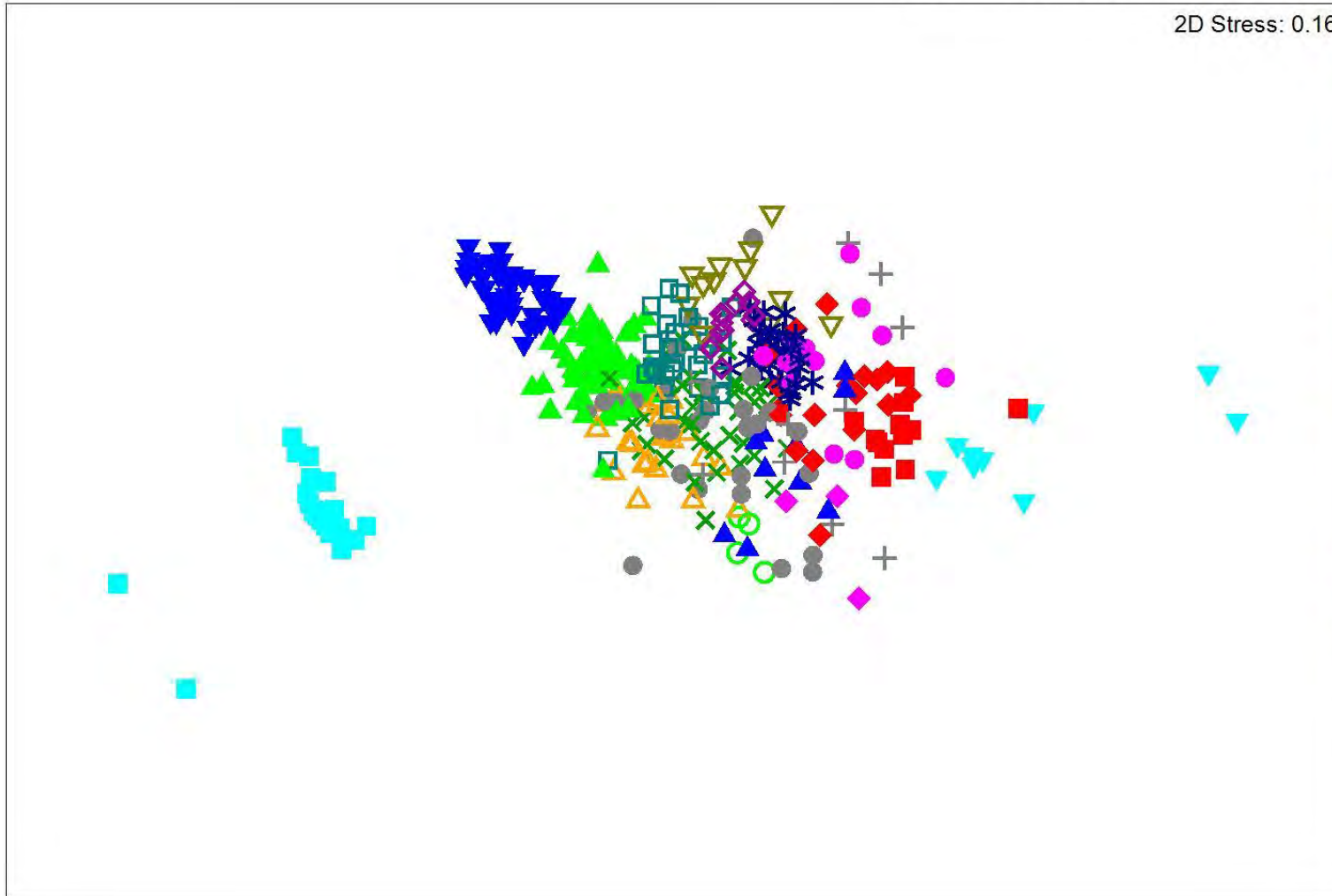


Q30-Q36

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.16

- FCT*
- ◆ 19a
 - 19b
 - 22
 - ▼ 23b
 - × 24
 - △ 25
 - ◇ 26a
 - 26b
 - ▽ 27
 - ▲ 28
 - ◆ 29a
 - * 29b
 - + 30a2
 - ▲ 30b
 - s11
 - s13
 - ▼ s14
 - GHD



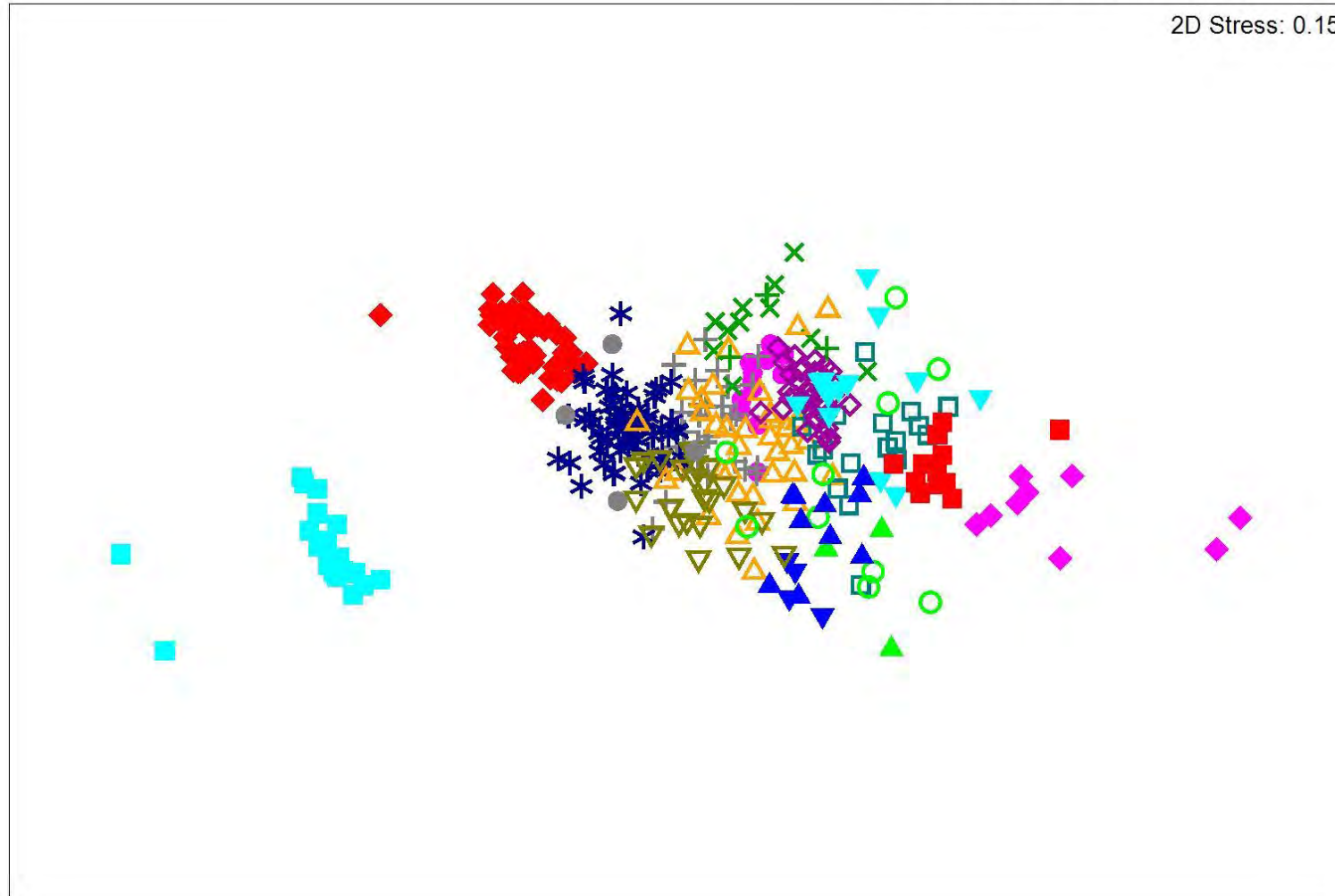
Multiple Site Floristic Analysis Q01-Q29

Resemblance: S17 Bray Curtis similarity

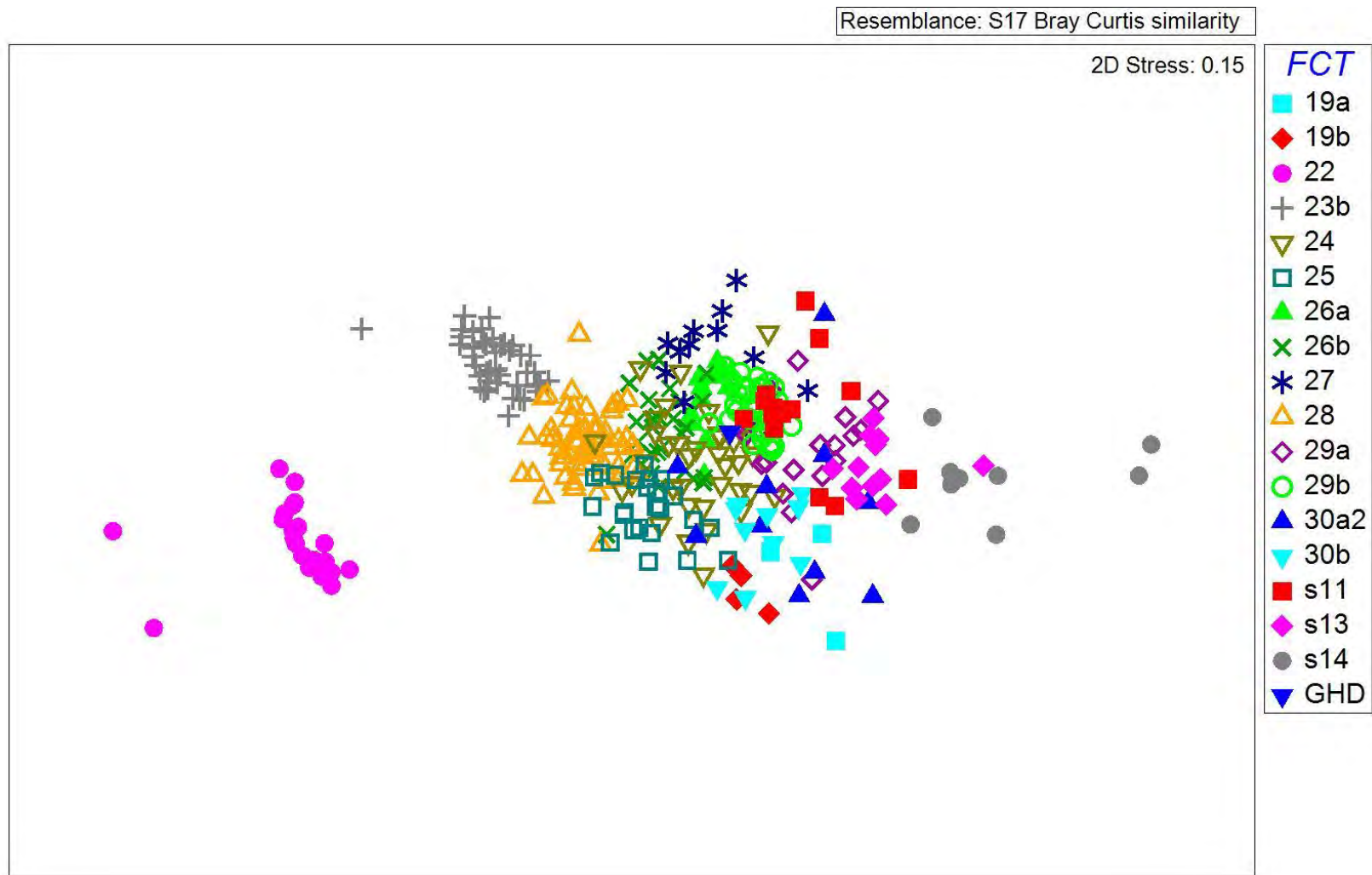
2D Stress: 0.15

FCT

- ▲ 19a
- ▼ 19b
- 22
- ◆ 23b
- 26a
- + 26b
- × 27
- * 28
- △ 24
- ▽ 25
- 29a
- ◇ 29b
- 30a2
- ▲ 30b
- ▼ s11
- s13
- ◆ s14
- GHD VT04
- + GHD VT08



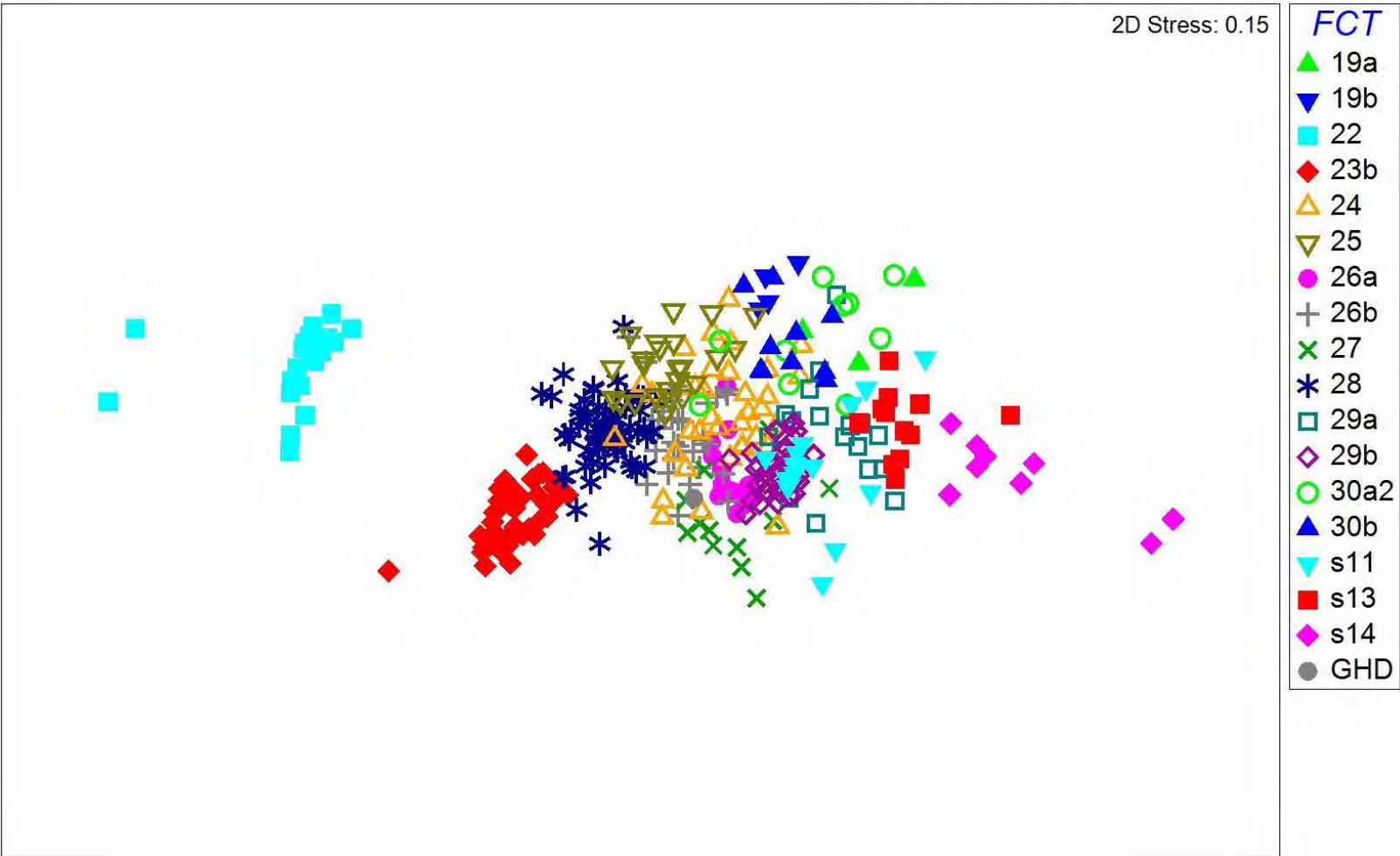
Multiple Site Floristic Analysis Q30-Q36



Q08 SSI analysis

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.15

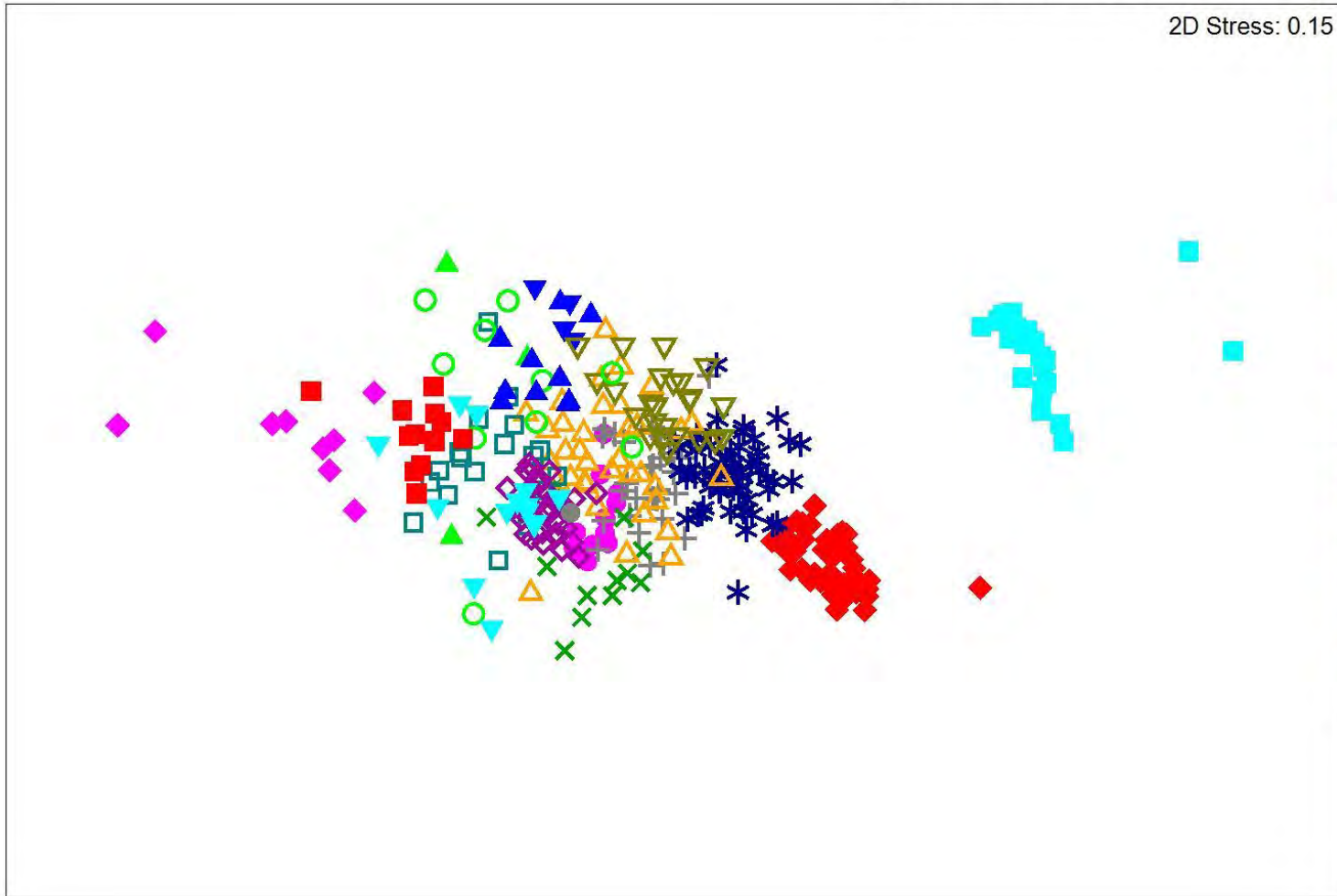


Q21 SSI Analysis

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.15

- FCT*
- ▲ 19a
 - ▼ 19b
 - 22
 - ◆ 23b
 - △ 24
 - ▽ 25
 - 26a
 - + 26b
 - × 27
 - * 28
 - 29a
 - ◇ 29b
 - 30a2
 - ▲ 30b
 - ▼ s11
 - s13
 - ◇ s14
 - GHD



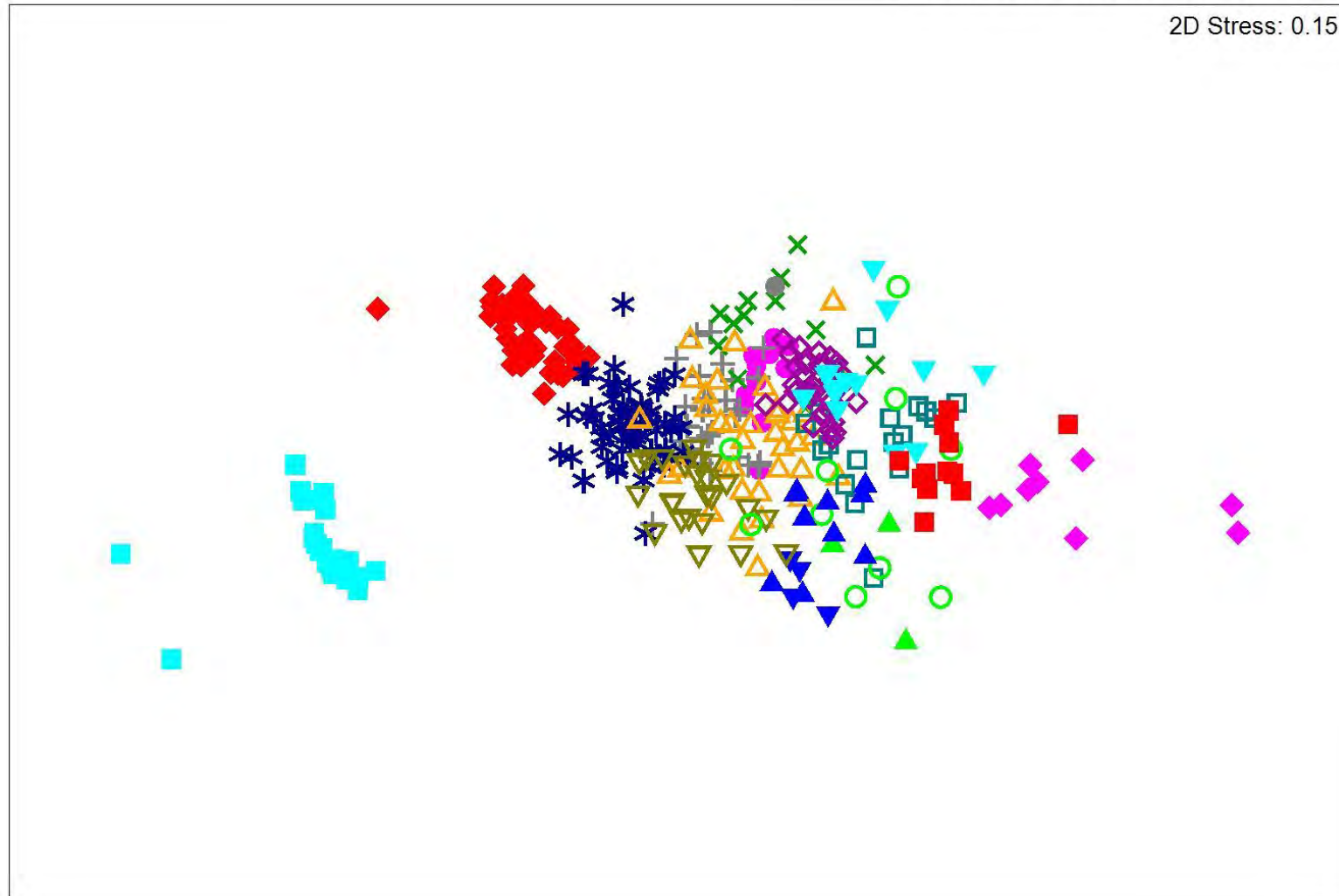
Q24 SSI Analysis

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.15

FCT

- ▲ 19a
- ▼ 19b
- 22
- ◆ 23b
- 26a
- + 26b
- × 27
- * 28
- △ 24
- ▽ 25
- 29a
- ◇ 29b
- 30a2
- ▲ 30b
- ▼ s11
- s13
- ◆ s14
- GHD VT08



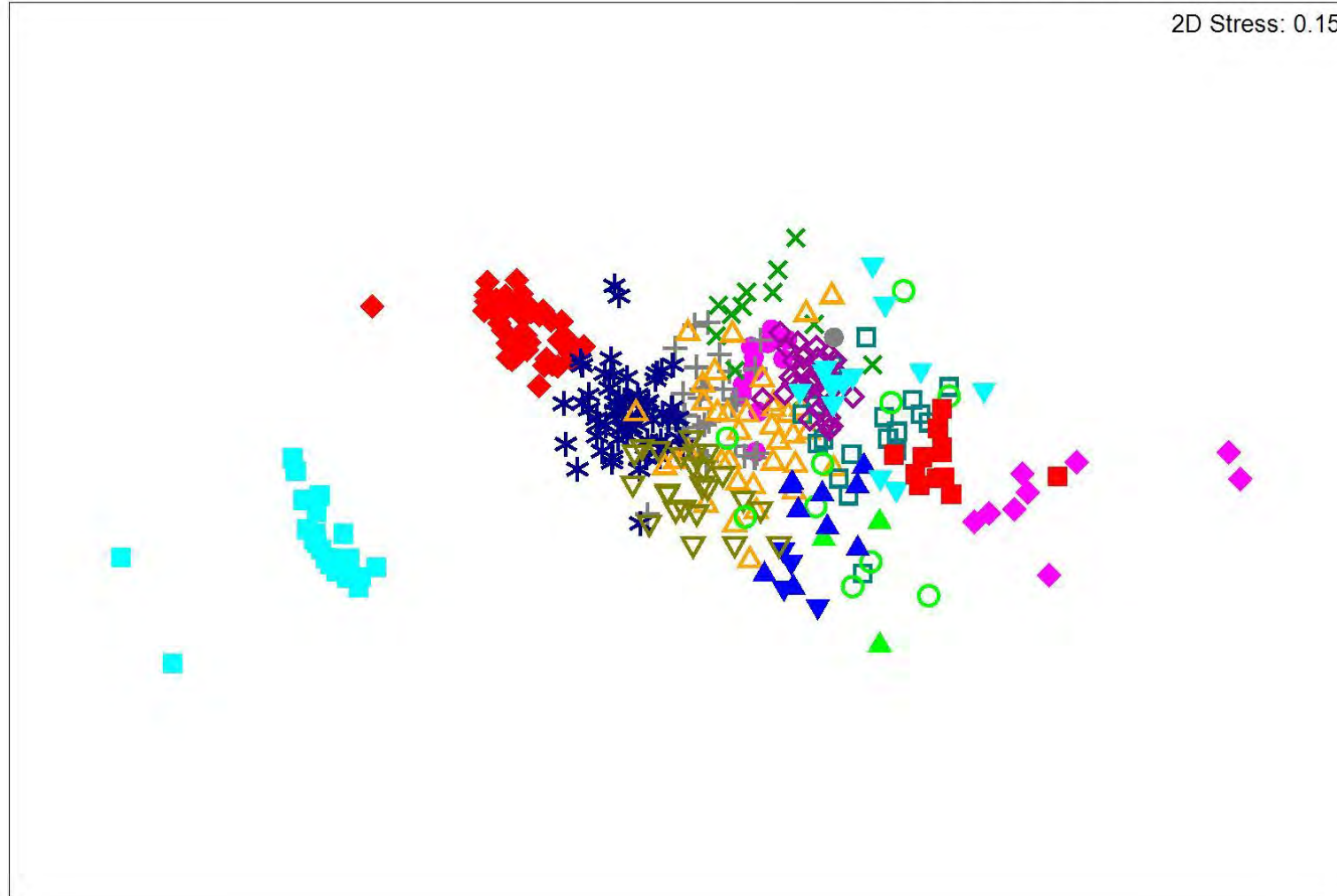
Q32 SSI Analysis

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.15

FCT

- ▲ 19a
- ▼ 19b
- 22
- ◆ 23b
- 26a
- + 26b
- × 27
- * 28
- △ 24
- ▽ 25
- 29a
- ◇ 29b
- 30a2
- ▲ 30b
- ▼ s11
- s13
- ◆ s14
- GHD VT08



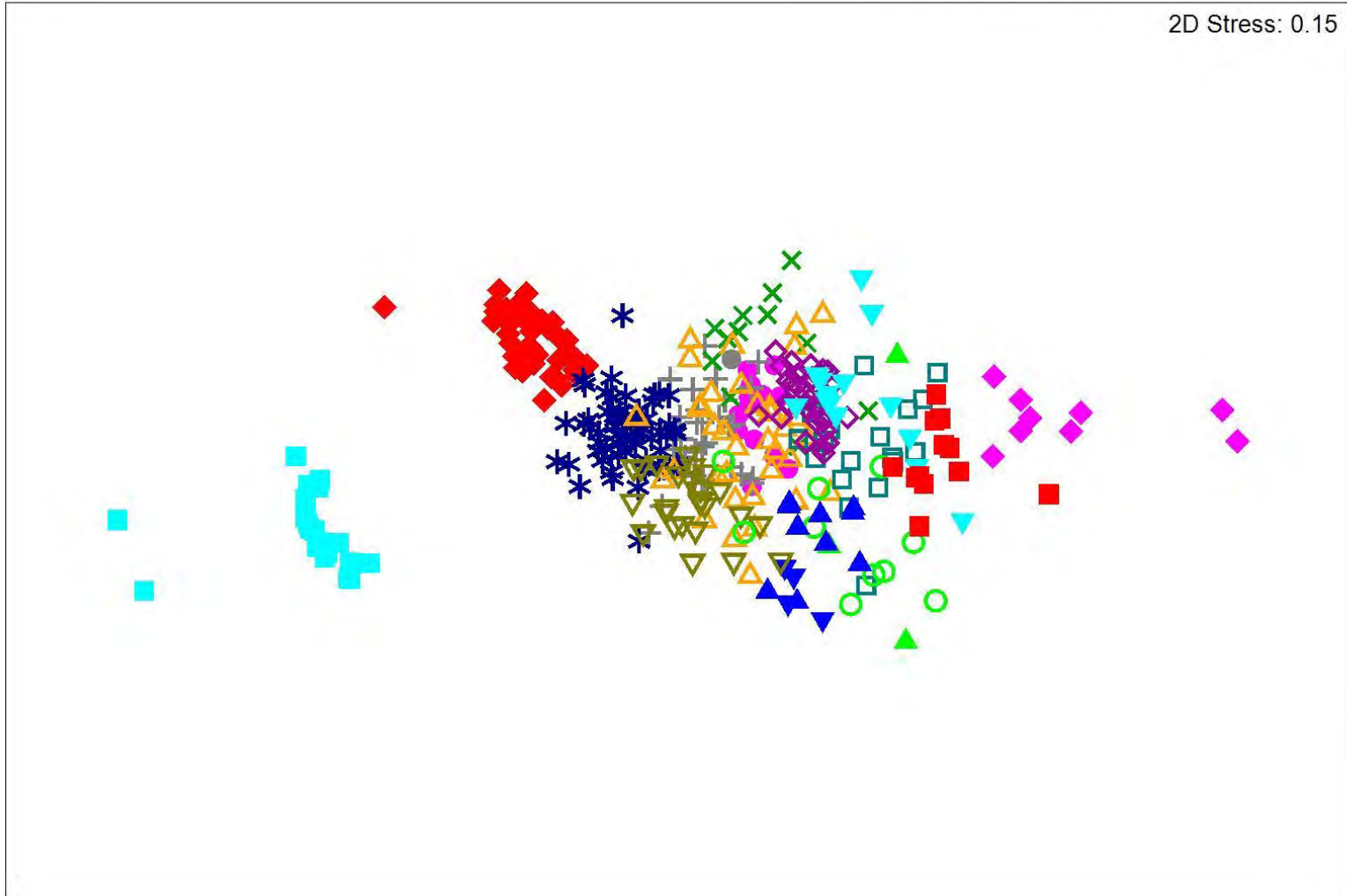
Q33 SSI Analysis

Resemblance: S17 Bray Curtis similarity

2D Stress: 0.15

FCT

- ▲ 19a
- ▼ 19b
- 22
- ◆ 23b
- 26a
- + 26b
- × 27
- * 28
- △ 24
- ▽ 25
- 29a
- ◇ 29b
- 30a2
- ▲ 30b
- ▼ s11
- s13
- ◆ s14
- GHD VT08



Q36 SSI Analysis

Flora species list

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Aizoaceae	<i>Carpobrotus edulis</i>	*	X	X	X	X		X		X	X	X					X
Amaranthaceae	<i>Ptilotus drummondii</i>						X			X							
Amaranthaceae	<i>Ptilotus drummondii</i> var. <i>drummondii</i>										X						
Amaranthaceae	<i>Ptilotus manglesii</i>		X														
Amaranthaceae	<i>Ptilotus polystachyus</i>											X					
Amaranthaceae	<i>Ptilotus</i> sp. (insufficient material)										X						
Anacardiaceae	<i>Schinus terebinthifolius</i>	*						X		X						X	
Anarthriaceae	<i>Lyginia barbata</i>				X												
Apiaceae	<i>Daucus glochidiatus</i>			X	X	X				X	X						
Apiaceae	<i>Eryngium pinnatifidum</i>				X												
Apiaceae	<i>Foeniculum vulgare</i>	*						X									
Apiaceae	<i>Homalosciadium homalocarpum</i>				X												
Apiaceae	<i>Trachymene coerulea</i>															X	
Apiaceae	<i>Trachymene pilosa</i>		X	X	X	X	X			X	X		X				
Apiaceae	<i>Xanthosia huegelii</i>				X												
Apocynaceae	<i>Gomphocarpus fruticosus</i>	*DP						X								X	
Asparagaceae	<i>Acanthocarpus preissii</i>			X	X	X	X	X	X								
Asparagaceae	<i>Asparagus asparagoides</i>	*DP & WONS						X									
Asparagaceae	<i>Lomandra maritima</i>		X	X	X	X	X	X	X	X	X	X					

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Asparagaceae	<i>Lomandra</i> sp. (insufficient material)					X											
Asparagaceae	<i>Sowerbaea laxiflora</i>												X				
Asparagaceae	<i>Thysanotus arenarius</i>		X	X	X	X											
Asparagaceae	<i>Thysanotus manglesii/ patersonii</i>			X		X											
Asphodelaceae	<i>Asphodelus fistulosus</i>	*	X	X		X	X	X			X						
Asphodelaceae	<i>Trachyandra divaricata</i>	*		X								X		X		X	
Asteraceae	<i>Arctotheca calendula</i>	*	X			X											
Asteraceae	<i>Asteraceae</i> sp. (insufficient material)			X							X						
Asteraceae	<i>Hyalosperma cotula</i>					X					X						
Asteraceae	<i>Hypochaeris glabra</i>	*	X	X	X	X						X		X			
Asteraceae	<i>Millotia myosotidifolia</i>			X		X					X	X					
Asteraceae	<i>Olearia axillaris</i>		X	X	X	X	X	X			X	X					
Asteraceae	<i>Podolepis lessonii</i>						X										
Asteraceae	<i>Podotheca chrysantha</i>					X											
Asteraceae	<i>Podotheca gnaphalioides</i>			X		X	X					X					
Asteraceae	<i>Senecio pinnatifolius</i>			X			X										
Asteraceae	<i>Senecio vulgaris</i>	*				X											
Asteraceae	<i>Siloxerus humifusus</i>					X					X						
Asteraceae	<i>Sonchus oleraceus</i>	*	X	X	X	X	X	X	X	X	X	X					
Asteraceae	<i>Ursinia anthemoides</i>	*		X	X	X					X	X		X			
Asteraceae	<i>Waitzia acuminata</i> var. <i>acuminata</i>						X										
Asteraceae	<i>Waitzia suaveolens</i> var. <i>suaveolens</i>			X		X					X	X					
Brassicaceae	<i>Brassica</i> sp. (insufficient material)	*									X						
Brassicaceae	<i>Brassica tournefortii</i>	*		X	X	X	X	X	X				X				

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Campanulaceae	<i>Lobelia</i> sp. (insufficient material)											X					
Campanulaceae	<i>Lobelia tenuior</i>			X							X						
Campanulaceae	<i>Wahlenbergia capensis</i>	*			X												
Caryophyllaceae	<i>Cerastium glomeratum</i>	*											X				
Caryophyllaceae	<i>Petrorhagia dubia</i>	*		X	X	X	X				X	X	X				
Caryophyllaceae	<i>Silene gallica</i>	*			X								X				
Casuarinaceae	<i>Allocasuarina fraseriana</i>				X												X
Casuarinaceae	<i>Allocasuarina humilis</i>			X	X						X		X				
Casuarinaceae	<i>Allocasuarina</i> sp. (insufficient material)										X						
Chenopodiaceae	<i>Rhagodia baccata</i> subsp. <i>baccata</i>		X		X	X	X	X	X	X	X	X					
Colchicaceae	<i>Burchardia congesta</i>				X									X			
Crassulaceae	<i>Crassula colorata</i>			X	X	X					X	X					
Crassulaceae	<i>Crassula glomerata</i>	*			X												
Crassulaceae	<i>Crassula</i> sp. (insufficient material)		X	X	X		X				X	X	X				
Cucurbitaceae	<i>Citrullus lanatus</i>	*									X						
Cyperaceae	<i>Isolepis marginata</i>	*		X	X		X										
Cyperaceae	<i>Lepidosperma leptostachyum</i>				X	X								X			
Cyperaceae	<i>Lepidosperma pubisquamum</i>			X			X				X						
Cyperaceae	<i>Lepidosperma</i> sp. (insufficient material)			X	X	X	X				X		X				

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cyperaceae	<i>Lepidosperma squamatum</i>					X				X							
Cyperaceae	<i>Mesomelaena pseudostygia</i>			X	X	X				X			X				
Cyperaceae	<i>Schoenus grandiflorus</i>									X							
Cyperaceae	<i>Schoenus lanatus</i>				X												
Cyperaceae	<i>Tetraria octandra</i>		X	X	X	X						X					
Dilleniaceae	<i>Hibbertia hypericoides</i>			X		X	X			X			X				
Dilleniaceae	<i>Hibbertia racemosa</i>			X			X			X							
Dilleniaceae	<i>Hibbertia</i> sp. (insufficient material)			X													
Dilleniaceae	<i>Hibbertia spicata</i> subsp. <i>leptothea</i>	P3								X							
Droseraceae	<i>Drosera</i> sp. (insufficient material)					X	X										
Ericaceae	<i>Astroloma pallidum</i>					X											
Ericaceae	<i>Astroloma</i> sp. (insufficient material)					X				X							
Ericaceae	<i>Conostephium pendulum</i>					X											
Ericaceae	<i>Leucopogon ?propinquus</i>										X		X				
Ericaceae	<i>Leucopogon insularis</i>				X		X	X	X	X		X					
Ericaceae	<i>Leucopogon parviflorus</i>				X	X		X	X	X		X					
Ericaceae	<i>Leucopogon</i> sp. (insufficient material)					X											
Ericaceae	<i>Leucopogon squarrosus</i> subsp. <i>squarrosus</i>					X											
Ericaceae	<i>Lysinema pentapetalum</i>					X											
Euphorbiaceae	<i>Euphorbia peplus</i>	*	X						X		X						X
Euphorbiaceae	<i>Euphorbia terracina</i>	*	X	X	X	X	X	X	X	X	X			X			
Euphorbiaceae	<i>Ricinus communis</i>	*													X		

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fabaceae	<i>Acacia cochlearis</i>						X										
Fabaceae	<i>Acacia cyclops</i>			X			X	X	X	X							
Fabaceae	<i>Acacia huegelii</i>				X				X								
Fabaceae	<i>Acacia pulchella</i>		X	X	X		X		X	X		X					
Fabaceae	<i>Acacia rostellifera</i>				X				X							X	
Fabaceae	<i>Acacia saligna</i>		X		X	X	X	X	X		X			X			
Fabaceae	<i>Acacia truncata</i>								X								
Fabaceae	<i>Bossiaea eriocarpa</i>		X		X				X								
Fabaceae	<i>Daviesia divaricata</i>											X					
Fabaceae	<i>Daviesia physodes</i>				X												
Fabaceae	<i>Desmodium</i> sp. (insufficient material)				X												
Fabaceae	<i>Gastrolobium capitatum</i>				X					X							
Fabaceae	<i>Gastrolobium nervosum</i>			X		X			X		X						
Fabaceae	<i>Gompholobium tomentosum</i>		X	X	X	X			X			X					
Fabaceae	<i>Hardenbergia comptoniana</i>		X	X	X	X	X	X	X	X	X		X				
Fabaceae	<i>Jacksonia calcicola</i>		X	X	X	X			X	X	X						
Fabaceae	<i>Jacksonia furcellata</i>		X	X	X												
Fabaceae	<i>Jacksonia sternbergiana</i>		X		X					X							
Fabaceae	<i>Kennedia prostrata</i>				X	X		X	X		X						
Fabaceae	<i>Lupinus angustifolius</i>	*	X						X								
Fabaceae	<i>Medicago polymorpha</i>	*	X						X								
Fabaceae	<i>Melilotus indicus</i>	*			X												
Fabaceae	<i>Templetonia retusa</i>								X								
Fabaceae	<i>Trifolium arvense</i>	*	X	X	X												
Fabaceae	<i>Trifolium campestre</i>	*			X												
Fabaceae	<i>Trifolium</i> sp. (insufficient material)	*		X	X		X	X	X	X	X						

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Gentianaceae	<i>Centaurium</i> sp. (insufficient material)	*											X				
Geraniaceae	<i>Erodium</i> sp. (insufficient material)		X														
Geraniaceae	<i>Geranium</i> sp. (insufficient material)				X							X					
Geraniaceae	<i>Pelargonium capitatum</i>	*	X		X	X	X	X	X	X		X					X
Goodeniaceae	<i>Dampiera linearis</i>			X	X	X	X				X	X					
Goodeniaceae	<i>Lechenaultia linarioides</i>			X		X	X										
Goodeniaceae	<i>Scaevola canescens</i>			X	X	X											
Goodeniaceae	<i>Scaevola globulifera</i>			X													
Gyrostemonaceae	<i>Gyrostemon ramulosus</i>															X	
Haemodoraceae	<i>Anigozanthos</i> sp. (insufficient material)				X												
Haemodoraceae	<i>Conostylis aculeata</i>			X		X					X	X	X	X			
Haemodoraceae	<i>Conostylis aculeata</i> subsp. <i>cygnorum</i>													X			
Haemodoraceae	<i>Conostylis candicans</i>		X	X	X	X	X	X			X						
Haemodoraceae	<i>Conostylis candicans</i> subsp. <i>calcicola</i>						X				X	X	X				
Haemodoraceae	<i>Conostylis candicans</i> subsp. <i>candicans</i>					X											
Haemodoraceae	<i>Conostylis setigera</i>					X								X			
Haemodoraceae	<i>Conostylis</i> sp. (insufficient material)		X		X	X											
Haemodoraceae	Haemodoraceae sp. (insufficient material)					X											
Hemerocallidaceae	<i>Corynotheca micrantha</i>		X	X		X						X					
Hemerocallidaceae	<i>Corynotheca</i> sp. (insufficient material)					X											
Hemerocallidaceae	<i>Dianella revoluta</i>		X	X	X	X	X	X			X	X					
Hemerocallidaceae	<i>Tricoryne elatior</i>			X	X					X	X	X		X			

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Iridaceae	<i>Gladiolus caryophyllaceus</i>	*		X	X	X					X	X		X			
Iridaceae	<i>Romulea rosea</i>	*			X	X	X	X		X	X	X					
Iridaceae	<i>Watsonia</i> sp. (insufficient material)	*						X									
Lamiaceae	<i>Hemiandra glabra</i>						X										
Lamiaceae	<i>Hemiandra pungens</i>							X									
Lauraceae	<i>Cassytha pomiformis</i>			X	X		X			X				X			
Loranthaceae	<i>Nuytsia floribunda</i>					X								X			
Myrtaceae	<i>Agonis flexuosa</i>									X							
Myrtaceae	<i>Calothamnus quadrifidus</i>			X	X	X					X			X			
Myrtaceae	<i>Calytrix angulata</i>					X											
Myrtaceae	<i>Calytrix flavescens</i>					X											
Myrtaceae	<i>Chamelaucium uncinatum</i>							X									
Myrtaceae	<i>Corymbia citriodora</i>	* (planted)						X							X		
Myrtaceae	<i>Eremaea pauciflora</i> var. <i>pauciflora</i>					X											
Myrtaceae	<i>Eucalyptus decipiens</i>													X			
Myrtaceae	<i>Eucalyptus erythrocorys</i>	* (planted)						X									
Myrtaceae	<i>Eucalyptus foecunda</i>										X						
Myrtaceae	<i>Eucalyptus gomphocephala</i>					X		X	X								
Myrtaceae	<i>Eucalyptus petrensis</i>								X								
Myrtaceae	<i>Eucalyptus todtiana</i>					X								X			
Myrtaceae	<i>Leptospermum laevigatum</i>	*						X									
Myrtaceae	<i>Leptospermum spinescens</i>					X											

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Myrtaceae	<i>Melaleuca huegelii</i>				X						X						
Myrtaceae	<i>Melaleuca nesophila</i>	* (planted)							X					X			
Myrtaceae	<i>Melaleuca systema</i>		X	X	X	X	X	X	X	X	X	X	X	X		X	
Myrtaceae	<i>Verticordia nitens</i>					X											
Myrtaceae	<i>Eucalyptus leucoxydon</i> var. <i>rosea</i>	* (planted)													X		
Myrtaceae	<i>Eucalyptus</i> sp. (insufficient material)	* (planted)													X		
Orchidaceae	<i>Caladenia</i> sp. (insufficient material)			X		X					X						
Orobanchaceae	<i>Orobanche minor</i>	*		X		X							X				
Oxalidaceae	<i>Oxalis</i> sp. (insufficient material)	*	X										X				
Phyllanthaceae	<i>Phyllanthus calycinus</i>			X	X	X	X	X	X	X	X				X		
Phyllanthaceae	<i>Poranthera drummondii</i>			X									X		X		
Plantaginaceae	<i>Plantago</i> sp. (insufficient material)	*									X						
Poaceae	<i>Aristida</i> sp. (insufficient material)		X		X						X						
Poaceae	<i>Austrostipa flavescens</i>				X			X		X							
Poaceae	<i>Austrostipa</i> sp. (insufficient material)							X									
Poaceae	<i>Avena barbata</i>	*	X		X	X	X	X	X	X	X	X	X				X
Poaceae	<i>Briza maxima</i>	*		X	X	X		X		X	X			X			
Poaceae	<i>Briza minor</i>	*			X	X											
Poaceae	<i>Bromus diandrus</i>	*				X											
Poaceae	<i>Bromus</i> sp. (insufficient material)	*	X	X	X	X	X	X		X	X	X					
Poaceae	<i>Cynodon dactylon</i>	*									X						

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Poaceae	<i>Ehrharta calycina</i>	*			X		X	X			X						
Poaceae	<i>Ehrharta calycinus</i>	*				X		X									
Poaceae	<i>Ehrharta longiflora</i>	*	X	X	X	X		X		X	X						
Poaceae	<i>Ehrharta</i> sp. (insufficient material)									X							
Poaceae	<i>Eragrostis curvula</i>	*															X
Poaceae	<i>Eragrostis</i> sp. (insufficient material)							X									
Poaceae	<i>Eriachne</i> sp. (insufficient material)							X									
Poaceae	<i>Hordeum</i> sp. (insufficient material)	*							X								
Poaceae	<i>Lagurus ovatus</i>	*		X	X			X	X	X	X		X				X
Poaceae	<i>Lolium rigidum</i>	*	X		X			X	X	X	X	X	X				
Poaceae	<i>Pentameris airoides</i>	*		X		X					X						
Poaceae	<i>Poa drummondii</i>					X					X						
Poaceae	Poaceae sp. (insufficient material)					X					X		X				
Poaceae	<i>Rytidosperma compressa</i>					X	X	X			X						
Poaceae	<i>Rytidosperma macalpinei</i>			X		X					X						
Poaceae	<i>Rytidosperma occidentale</i>			X		X	X				X						
Poaceae	<i>Rytidosperma</i> sp. (insufficient material)						X										
Poaceae	<i>Vulpia myuros</i>	*		X	X	X	X	X		X	X						X
Portulacaceae	<i>Calandrinia liniflora</i>			X							X	X					
Portulacaceae	<i>Calandrinia tholiformis</i>			X													
Primulaceae	<i>Lysimachia arvensis</i>	*		X	X	X	X	X		X	X		X				
Proteaceae	<i>Banksia attenuata</i>		X		X	X					X						X
Proteaceae	<i>Banksia dallanneyi</i>		X	X	X	X					X	X	X				
Proteaceae	<i>Banksia grandis</i>																X

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Proteaceae	<i>Banksia menziesii</i>					X											
Proteaceae	<i>Banksia sessilis</i>		X	X	X	X					X	X		X			
Proteaceae	<i>Conospermum incurvum</i>					X											
Proteaceae	<i>Conospermum integerrimum</i>			X													
Proteaceae	<i>Conospermum</i> sp. (insufficient material)			X													
Proteaceae	<i>Conospermum stoechadis</i> subsp. <i>stoechadis</i>			X													
Proteaceae	<i>Grevillea preissii</i>										X						
Proteaceae	<i>Grevillea preissii</i> subsp. <i>preissii</i>			X	X						X						
Proteaceae	<i>Grevillea vestita</i>					X											
Proteaceae	<i>Hakea lissocarpha</i>		X	X	X	X					X						
Proteaceae	<i>Hakea prostrata</i>		X			X							X				
Proteaceae	<i>Hakea ruscifolia</i>					X											
Proteaceae	<i>Hakea trifurcata</i>			X		X					X			X			
Proteaceae	<i>Persoonia comata</i>					X											
Proteaceae	<i>Petrophile axillaris</i>		X	X		X						X					
Proteaceae	<i>Petrophile brevifolia</i>					X											
Proteaceae	<i>Petrophile linearis</i>					X											
Proteaceae	<i>Petrophile macrostachya</i>					X											
Proteaceae	<i>Petrophile serruriae</i>											X					
Proteaceae	<i>Stirlingia latifolia</i>					X											
Proteaceae	<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>					X											
Restionaceae	<i>Desmocladus flexuosus</i>		X	X	X	X	X				X	X	X	X			
Restionaceae	<i>Lyginia barbata</i>					X											
Rhamnaceae	<i>Cryptandra mutila</i>			X			X				X						
Rhamnaceae	<i>Spyridium globulosum</i>		X	X	X	X	X	X	X	X	X	X		X	X		X

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rhamnaceae	<i>Stenanthemum notiale</i> subsp. <i>notiale</i>			X													
Rubiaceae	<i>Opercularia vaginata</i>				X	X	X				X						
Santalaceae	<i>Exocarpos sparteus</i>											X					
Santalaceae	<i>Santalum acuminatum</i>						X										
Scrophulariaceae	<i>Eremophila glabra</i>						X										
Scrophulariaceae	<i>Myoporum insulare</i>			X													
Solanaceae	<i>Anthocercis littorea</i>											X					
Solanaceae	<i>Solanum nigrum</i>	*									X						
Solanaceae	<i>Solanum linnaeanum</i>	*						X									
Stylidiaceae	<i>Levenhookia stipitata</i>					X								X			
Stylidiaceae	<i>Stylidium brunonianum</i>					X											
Stylidiaceae	<i>Stylidium carnosum</i>					X											
Stylidiaceae	<i>Stylidium repens</i>					X											
Thymelaeaceae	<i>Pimelea rosea</i>			X													
Verbenaceae	<i>Lantana camara</i>	*									X						
Violaceae	<i>Hybanthus calycinus</i>				X		X				X		X				
Xanthorrhoeaceae	<i>Xanthorrhoea gracilis</i>					X											
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>		X	X	X	X					X	X	X				X

Family	Taxon	Status	Vegetation Types														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Zamiaceae	<i>Macrozamia riedlei</i>		X		X	X						X					
Total			45	83	75	142	63	51	25	97	66	30	35	9	5	7	8

* denotes an introduced species

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within study area from field survey results.
Likely	Species previously recorded within 2 km and large areas of suitable habitat occur in the study area.
Possible	Species previously recorded within 2 km and areas of suitable habitat occur/may occur in the study area.
Unlikely	Species previously recorded within 2 km, but suitable habitat does not occur in the study area.
Highly unlikely	Species not previously recorded within 2 km, suitable habitat does not occur in the study area and/or the study area is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches

PMST – DotE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within the study area

DBCA – DBCA (2007–) records of threatened flora, database search within the study area (accessed November 2016)

NM – DBCA NatureMap (accessed November 2016)

Flora likelihood of occurrence assessment for conservation significant flora

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
Ericaceae	<i>Andersonia gracilis</i>	T	En	Slender erect or open straggly shrub, 0.1-0.5 m high. Flowers white-pink-purple from September to November. White/grey	Highly unlikely - there is no suitable habitat within the survey area and the	PMST

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
				sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	closest record of this species is >50 km from the survey area	
Orchidaceae	<i>Diuris drummondii</i>	T	Vu	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow, Nov to Dec or Jan. Low-lying depressions, swamps.	Highly unlikely - there is no suitable habitat within the survey area and the closest record of this species is >40 km from the survey area	DBCA
Myrtaceae	<i>Eucalyptus argutifolia</i>	T	Vu	Mallee, 1.5-4 m high, bark smooth. Fl. white, Mar to Apr. Shallow soils over limestone. Slopes or gullies of limestone ridges, outcrops	Unlikely – while suitable habitat was found within the survey, this species is distinctive and would not likely to have been overlooked in these areas.	NM, PMST, DBCA
Proteaceae	<i>Grevillea elongata</i>	T	Vu	Shrub, 1.5-2 m high. Fl. white-cream, Oct. Gravelly clay, sandy clay, sand. Road verges, swamps, creek banks	Highly unlikely - there is no suitable habitat within the survey area and the closest record of this species is >100 km from the survey area	DBCA
Pittosporaceae	<i>Marianthus paralius</i>	T	-	Almost prostrate, eventually scandent, woody shrub. Fl. red, Sep to Nov. White sand over limestone. Low coastal cliffs.	Unlikely – no coastal cliffs were found within the survey area.	PMST
Proteaceae	<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	T	Cr	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Highly unlikely - there is no suitable habitat within the survey area and the	DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
					closest record of this species is >20 km from the survey area	
Orchidaceae	<i>Thelymitra stellata</i>	T	En	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam	Unlikely – there is no suitable habitat present within the survey area. This species is cryptic, but the survey was undertaken during the reported flowering period.	DBCA
Haemodoraceae	<i>Anigozanthos viridis</i> subsp. <i>terraspectans</i>	T	Vu	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green/yellow-green, Aug to Sep. Grey sand, clay loam. Winter-wet depressions.	Highly unlikely - there is no suitable habitat within the survey area and the closest record of this species is >45 km from the survey area	EPBC PMST
Myrtaceae	<i>Eucalyptus x mundijongensis</i>	P1	-	Tree, to 25 m high, bark fibrous, fissured, grey; branchlets smooth. Loam. Paddock	Unlikely – there is suitable habitat present within the survey area, but this species is not cryptic.	DBCA
Proteaceae	<i>Grevillea evanescens</i>	P1	-	Erect, robust shrub, to 4 m high. Red flowers Jul-Nov. Brown Spearwood sand. Winter wet flats	Unlikely – there is no suitable habitat present within the survey area. This species is not cryptic and the survey was undertaken during the reported flowering period.	DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
Haloragaceae	<i>Haloragis</i> sp. Parrot Ridge (G.J. Keighery 11563)	P1	-	Erect, ? perennial soft shrub or herb to 30 cm. Black sand over limestone	Unlikely – there is no suitable habitat present within the survey area. This species is not cryptic and the survey was undertaken during the reported flowering period.	NM
Ericaceae	<i>Leucopogon maritimus</i>	P1	-	Low, spreading shrub to 0.4 m high, to 0.6 m wide. Fl. Pink. Deep, calcareous sands on the mid to upper slopes of dunes or in shallows and over limestone.	Possible – suitable habitat was found within the survey area.	NM
Myrtaceae	<i>Melaleuca</i> sp. Wanneroo (G.J. Keighery 16705)	P1	-	Erect to spreading shrub, 2.5 m high to 2 m wide. Fl. Pink, Nov to Dec. On sand to sandy loam soils on limestone ridges, outcropping.	Unlikely – while suitable habitat was found within the survey, this species is distinctive and would not likely to have been overlooked in these areas.	NM
Amaranthaceae	<i>Ptilotus sericostachyus</i> subsp. <i>roseus</i>	P1	-	Prostrate to ascending perennial, herb. Fl. pink-white, Sep to Dec	Unlikely - habitat requirements unknown. However this species is not cryptic and the closest know record of this species is >40 km from the survey area.	DBCA
Fabaceae	<i>Acacia benthamii</i>	P2	-	Shrub, ca 1 m high. Fl. yellow, Aug to Sep. Sand. Typically on limestone breakaways.	Possible – there is some suitable habitat present within the survey area. This	NM, DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
					species is not cryptic, but the survey was outside of the reported flowering period.	
Dasygogonaceae	<i>Calectasia elegans</i>	P2	-	Compact shrub to 30 cm high and 30 cm wide. Flowers purple to blue. Grey/yellow sand	Unlikely – there is suitable habitat present within the survey area. However this species is not cryptic and the survey was undertaken during the reported flowering time.	DBCA
Dasygogonaceae	<i>Calectasia palustris</i>	P2	-	Stilt-rooted herb (undershrub), stems to 0.7 m high. Fl. blue, Jul to Oct. White or grey sand. Seasonally inundated swamplands.	Highly unlikely - there is no suitable habitat within the survey area and the closest record of this species is >100 km from the survey area	DBCA
Apiaceae	<i>Eryngium pinnatifidum</i> subsp. <i>umbraphilum</i> (G.J. Keighery 13967)	P2	-	Tuberous herb. Flowers white; in flower. Winter wet flats. Grey sandy clay/ Black sand	Unlikely – there is no suitable habitat present within the survey area. This species is not cryptic and the survey was undertaken during the reported flowering period.	DBCA
Proteaceae	<i>Grevillea manglesii</i> subsp. <i>ornithopoda</i>	P2	-	Spreading, virgate shrub, 1-3(-5) m high, up to 3 m wide. Fl. Sep to Nov.	Unlikely – there is no suitable habitat present within the survey area. The	DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
					closest know record of this species is >35 km from the survey area	
Ramalinaceae	<i>Lecania turicensis</i>	P2	-	No description available	Possible – as no description is available for this species, we are unable to overlook the occurrence of this species.	
Cyperaceae	<i>Tetraria</i> sp. Chandala (G.J. Keighery 17055)	P2	-	Rhizomatous herb 1.6 m high, 1 m wide. Along swamp edges. Black peaty sand	Unlikely – there is no suitable habitat present within the survey area.	DBCA
Euphorbiaceae	<i>Beyeria cinerea</i> subsp. <i>cinerea</i>	P3	-	Shrub to 1 m high. Fl. Sep to Oct. Slopes, grey sand.	Likely – suitable habitat was found within the survey area.	NM
Portulacaceae	<i>Calandrinia oraria</i>	P3	-	Annual herb 10 cm, pink flowers. Stable coastal dunes, over limestone	Possible – suitable habitat was found within the survey area.	NM
Haemodoraceae	<i>Conostylis bracteata</i>	P3	-	Rhizomatous, tufted or shortly proliferous perennial, grass-like or herb, 0.2-0.45 m high. Fl. yellow, Aug to Sep. Sand, limestone. Consolidated sand dunes.	Possible – suitable habitat was found within the survey area.	NM
Cyperaceae	<i>Cyathochaeta teretifolia</i>	P3	-	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown. Grey sand, sandy clay. Swamps, creek edges.	Unlikely – there is no suitable habitat present within the survey area	DBCA
Fabaceae	<i>Dillwynia dillwynioides</i>	P3	-	Decumbent or erect, slender shrub, 0.3-1.2 m high. Fl. red & yellow/orange, Aug	Unlikely – there is no suitable habitat	DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
				to Dec. Sandy soils. Winter-wet depressions	present within the survey area	
Dilleniaceae	<i>Hibbertia spicata</i> subsp. <i>leptotheca</i>	P3	-	Erect or spreading shrub, 0.2-0.5 m high. Fl. yellow, Jul to Oct. Sand. Near-coastal limestone ridges, outcrops & cliffs.	Known	NM, DBCA
Fabaceae	<i>Jacksonia gracillima</i>	P3	-	Decumbent open shrub, 100 cm high x 150 cm wide. Grey sand, wetland edges	Unlikely – there is no suitable habitat present within the survey area	DBCA
Malvaceae	<i>Lasiopetalum membranaceum</i>	P3	-	Multi-stemmed shrub, 0.2-1 m high. Fl. pink-blue-purple, Sep to Dec. Sand over limestone	Possible – suitable habitat was found within the survey area.	NM
Ericaceae	<i>Leucopogon</i> sp. <i>Yanchep</i> (M. Hislop 1986)	P3	-	Erect shrub, 0.15-1 m high, to 0.6 m wide. Fl. white/pink, Apr to Jun or Sep. Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	Possible – suitable habitat was found within the survey area.	NM, DBCA
Haloragaceae	<i>Meionectes tenuifolia</i>	P3	-	Annual semi aquatic herb. Swamp edges	Unlikely – there is no suitable habitat present within the survey area	
Thymelaeaceae	<i>Pimelea calcicola</i>	P3	-	Erect to spreading shrub, 0.2-1 m high. Fl. pink, Sep to Nov. Sand. Coastal limestone ridges.	Possible – suitable habitat was found within the survey area.	NM
Asteraceae	<i>Pithocarpa corymbulosa</i>	P3	-	Erect to scrambling perennial, herb, 0.5-1 m high. Fl. white, Jan to Apr. Gravelly or sandy loam. Amongst granite outcrops.	Highly Unlikely – suitable habitat is not recorded within the survey area.	NM
Aizoaceae	<i>Sarcozona bicarinata</i>	P3	-	Shrub, ca 0.1 m high. Fl. white, Aug. White sand	Possible – suitable habitat was found within the survey area.	

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
Cyperaceae	<i>Schoenus benthamii</i>	P3	-	Tufted perennial, grass-like or herb (sedge), 0.15-0.45 m high. Fl. brown, Oct to Nov. White, grey sand, sandy clay. Winter-wet flats, swamps.	Unlikely – there is no suitable habitat present within the survey area	DBCA
Fabaceae	<i>Sphaerolobium calcicola</i>	P3	-	Slender, multi-stemmed, scandent or erect shrub, to 1.5 m high. Fl. -orange-red, Jun or Sep to Nov. White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas	Possible – some suitable habitat was found within the survey area.	NM
Stylidiaceae	<i>Stylidium maritimum</i>	P3	-	Caespitose perennial, herb, 0.3-0.7 m high, Leaves tufted, linear to narrowly oblanceolate, 10-40 cm long, 1-5.5 mm wide, apex acute to mucronate, margin involute, glabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/purple, Sep to Nov. Sand over limestone. Dune slopes and flats. Coastal heath and shrubland, open Banksia woodland.	Possible – suitable habitat was found within the survey area.	NM, DBCA
Elaeocarpaceae	<i>Tetratheca pilifera</i>	P3	-	Spreading shrub, 0.1-0.3 m high. Fl. purple, Aug to Oct. Gravelly soils	Unlikely – there is no suitable habitat present within the survey area	DBCA
Aponogetonaceae	<i>Aponogeton hexatepalus</i>	P4	-	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green-white, Jul to Oct. Mud. Freshwater: ponds, rivers, claypans	Highly Unlikely – suitable habitat is not recorded within the survey area.	DBCA
Haemodoraceae	<i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i>	P4	-	Rhizomatous, stoloniferous perennial herb, 0.06-0.18 m high. Flowers yellow from August to October. White, grey or yellow sand. Consolidated dunes.	Likely – suitable habitat was found within the survey area.	NM DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
Haemodoraceae	<i>Conostylis pauciflora</i> subsp. <i>pauciflora</i>	P4	-	Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 m high. Fl. yellow, Aug to Oct. Grey sand, limestone. Hillslopes, consolidated dunes.	Likely – suitable habitat was found within the survey area.	NM, DBCA
Droseraceae	<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	P4	-	Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white, Nov to Dec. Sandy & clayey soils. Swamps & wet depressions	Unlikely – there is no suitable habitat present within the survey area	DBCA
Dilleniaceae	<i>Hibbertia helianthemoides</i>	P4	-	Spreading to erect, low or prostrate shrub, to 0.3 m high. Fl. yellow, Jul or Sep to Oct. Clayey sand over sandstone or loam over quartzite. Hills and scree slopes.	Unlikely – suitable habitat was not found within the survey area.	NM
Fabaceae	<i>Jacksonia sericea</i>	P4	-	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.	Possible – suitable habitat was found within the survey area	NM
Brassicaceae	<i>Lepidium pseudotasmanicum</i>	P4	-	Erect annual or biennial, herb, 0.2-0.4(-1) m high. Fl. white-green, Feb or Dec. Loam, sand.	Possible – suitable habitat was found within the survey area.	NM, DBCA
Orchidaceae	<i>Microtis quadrata</i>	P4	-	Erect herb with tuber, 40 cm high. Greenish flowers. Swampy areas	Unlikely – there is no suitable habitat present within the survey area	DBCA
Polygonaceae	<i>Rumex drummondii</i>	P4	-	Erect perennial, herb, 0.6-0.9 m high. Winter-wet disturbed areas	Unlikely – there is no suitable habitat present within the survey area	DBCA
Cyperaceae	<i>Schoenus natans</i>	P4	-	Aquatic annual, grass-like or herb (sedge), 0.3 m high. Fl. brown, Oct. Winter-wet depressions	Unlikely – there is no suitable habitat present within the survey area	DBCA

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DotE 2015)	Likelihood of Occurrence	Source
		WCAct	EPBC Act			
Stylidiaceae	<i>Stylidium striatum</i>	P4	-	Rosetted perennial, herb, 0.15-0.55 m high, Leaves erect, oblanceolate to spatulate, 1.5-4 cm long, 1.5-6 mm wide, apex acute to acuminate, margin entire, glabrous, striate. Scape sparingly glandular on inflorescence axis, glabrous below. Inflorescence racemose. Fl. yellow, Oct to Nov. Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.	Unlikely – suitable habitat was not recorded within the survey area	NM

Appendix E – Fauna data

Fauna species list

Fauna likelihood of occurrence guidelines

Fauna likelihood of occurrence assessment

Species recorded in the survey area in 2012 and during the current survey

Family	Scientific Name	Common Name	Status	2012 Survey	Current 2016/2017 survey
Birds					
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill		X	6
Acanthizidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		X	8
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone		X	5
Acanthizidae	<i>Smicromnis brevirostris</i>	Weebill		X	4
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk		X	1
Accipitridae	<i>Aquila audax</i>	Wedge-tailed Eagle		X	1
Accipitridae	<i>Elanus caeruleus</i>	Black-shouldered Kite		X	
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite		X	1
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite			2
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie		X	3
Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird		X	1
Cacatuidae	<i>Cacatua sanguinea</i>	Little Corella			11
Cacatuidae	<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	En, En	X	16
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah		X	10
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		X	3
Campephagidae	<i>Lalage sueurii</i>	White-winged Triller		X	1
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu		X	1 + scats
Columbidae	<i>Columba livia</i>	Feral Pigeon			4
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon		X	2
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing		X	1
Corvidae	<i>Corvus coronoides</i>	Australian Raven		X	4
Cuculidae	<i>Cacomantis flabelliformis</i>	Fantail Cuckoo			2
Cuculidae	<i>Chalcites lucidus</i>	Shining Bronze Cuckoo		X	
Falconidae	<i>Falco berigora</i>	Brown Falcon			1
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel		X	3
Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	int	X	4
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow		X	6
Hirundinidae	<i>Petrochelidon ariel</i>	Fairy Martin			2
Maluridae	<i>Malurus leucopterus</i>	White-winged Fairy-wren		X	8
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-wren		X	9
Megaluridae	<i>Cincloramphus mathewsi</i>	Rufous Songlark		X	1
Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird		X	3
Meliphagidae	<i>Anthochaera lunulata</i>	Western Wattlebird			1

Meliphagidae	<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater		X	
Meliphagidae	<i>Lichenostomus leucotis</i>	White-eared Honeyeater		X	
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater		X	2
Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater		X	10
Meliphagidae	<i>Phylidonyris niger</i>	White-cheeked Honeyeater		X	4
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	IA	X	8
Monarchidae	<i>Grallina cyanoleuca</i>	Mudlark		X	4
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit			1
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush			1
Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden Whistler		X	
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler		X	1
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		X	3
Petroicidae	<i>Microeca fascinans</i>	Jacky Winter		X	
Petroicidae	<i>Petroica goodenovii</i>	Red-capped Robin		X	1
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck		X	6
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail		X	1
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail		X	1
Timaliidae	<i>Zosterops lateralis</i>	Silvereeye		X	15
Columbidae	<i>Streptopelia senegalensis</i>	Laughing Dove	int		1
Maluridae	<i>Malurus lamberti</i>	Variegated Fairy-wren			4
Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird			1
Artamidae	<i>Artamus cyanopterus</i>	Dusky Woodswallow			6
Hirundinidae	<i>Cheramoeca leucosterna</i>	White-backed Swallow			3
Falconidae	<i>Falco longipennis</i>	Australian Hobby			3
Reptiles					
Agamidae	<i>Pogona minor</i>	Western Bearded Dragon			4
Elapidae	<i>Pseudonaja affinis</i>	Dugite		X	tracks
Gekkonidae	<i>Strophurus s. spinigerus</i>	Spiny-tailed Gecko		X	
Pygopodidae	<i>Lialis burtonis</i>	Burton's Legless Lizard		X	
Scincidae	<i>Cryptoblepharus buchananii</i>	Common Fence Skink		X	
Scincidae	<i>Ctenotus fallens</i>	West-coast Laterite Ctenotus		X	1
Scincidae	<i>Cyclodomorphus celatus</i>	Western Slender Blue-tongue			2
Scincidae	<i>Hemiergus quadrilineata</i>	Two-toed Mulch Skink		X	

Scincidae	<i>Menetia greyii</i>	Common Dwarf Skink		X	
Scincidae	<i>Morethia obscura</i>	Shrubland Morethia Skink			1
Scincidae	<i>Tiliqua occipitalis</i>	Western Blue-tongued Skink			prints
Scincidae	<i>Tiliqua rugosa</i>	Shingleback		X	11
Varanidae	<i>Varanus gouldii</i>	Gould's Monitor		X	digs
Mammals					
Canidae	<i>Vulpes vulpes</i>	Red Fox	int	X	prints, scats
Canidae	<i>Canis domesticus</i>	Dog	int		prints
Felidae	<i>Felis catus</i>	Cat	int	X	prints
Leporidae	<i>Oryctolagus cuniculus</i>	European Rabbit	int	X	prints, digs, scats, warren
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo		X	26
Macropodidae	<i>Macropus irma</i>	Western Brush Wallaby	P4		1
Muridae	<i>Mus musculus</i>	House Mouse	int	X	nest
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Echidna		X	digs
Suidae	<i>Sus scrofa</i>	Pig	int		scats
Invertebrate					
Tettigoniidae	<i>Pachysaga munggai / strobila</i>	Pachysaga	P3 / P1	X	
Castniidae	<i>Synemon gratiosa</i>	Graceful Sun-moth	P4	X	

En – Endangered listing under EPBC Act

En – Endangered Listing under BC Act

P1, P3, P4 – Priority listed Species under DBCA

int – Introduced species to WA.

Parameters of fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the survey area.
Likely	Species are likely to occur in the survey area where there is suitable habitat within the survey area and there are recent records of occurrence of the species in close proximity to the survey area. OR Species known distribution overlaps with the survey area and there is suitable habitat within the survey area.
Unlikely	Species assessed as unlikely include those species previously recorded within 10 km of the survey area however: <ul style="list-style-type: none"> • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the survey area. • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area. OR Those species that have a known distribution overlapping with the survey area however: <ul style="list-style-type: none"> • There is limited habitat in the survey area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area.
Highly unlikely	Species that are considered highly unlikely to occur in the survey area include: <ul style="list-style-type: none"> • Those species that have no suitable habitat within the survey area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the survey area.

Definitions

Term	Description
study area	a 10 km buffer around the survey area
survey area	the area subject to the current survey
locality	the area within an approximate 20 km radius of the survey area

Fauna likelihood of occurrence assessment

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
Birds							
<i>Apus pacificus</i> (Fork-tailed Swift)	Mi	IA	X	X		<p>The fork-tailed Swift is a migratory species that follows large storm fronts and are almost exclusively areal species. In WA, there are sparsely scattered records of the Fork-tailed Swift along the south coast, ranging from near the Eyre Bird Observatory and west to Denmark. They are widespread in coastal and subcoastal areas between Augusta and Carnarvon, including some on nearshore and offshore islands. Scattered records are present in the Perth region.</p> <p>Records are scattered throughout WA including the Pilbara, Kimberley, Wheatbelt, Gascoyne and Isolated records occur at Neale Junction in the Great Victoria Desert and on the Nullarbor Plain (Higgins 1999).</p>	Unlikely. Although this species may periodically occur in the region the species is exclusively areal in nature and not utilise terrestrial habitats.
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	En	En		X		<p>The Australasian Bittern prefers densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands. In the southwest of WA, the Bittern is found in beds of tall rush mixed with or near short fine sedge or open pools. It also occurs around swamps, lakes, pools, rivers and channels fringed with <i>Lignum muehlenbeckia</i>, canegrass (<i>Eragrostis spp.</i>) or other dense vegetation. It occasionally ventures into areas of open water or onto banks (DotE 2015).</p>	Highly unlikely, there is no suitable habitat within the survey area.
<i>Cacatua pastinator pastinator</i> (Muir's Corella)	Vu	CD			X	<p>Muir's Corella is now confined to a small region from Boyup Brook, McAlinden and Qualeup, south to Lake Muir and the lower Perup River, and east to Frankland and Rocky Gully (DEC 2008). However, was once more widespread into the Perth Region. Muir's Corella occurs in eucalyptus woodlands that are dominated by Wandoo (<i>Eucalyptus wandoo</i>), Marri, (<i>Corymbia calophylla</i>), or Jarrah, (<i>E. marginata</i>). Most suitable woodland habitat for this species now consists of remnant patches. These patches occur in or adjacent to farmland, or along roadsides, paddock boundaries or</p>	Highly unlikely. This species is not known from the survey area. The nearest record is over 20 km to the south and was recorded in 1999. This species may be considered locally extinct

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
						watercourses, and sometimes as a few, isolated shade trees in otherwise cleared paddocks (Garnett & Crowley 2000).	
<i>Calidris ferruginea</i> (Curlew Sandpiper)	MiWCr	Vu, IA		X		Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (DotE 2016).	Highly unlikely , there is no suitable habitat within the survey area.
<i>Calyptorhynchus banksii subsp. naso</i> (Forest Red-tailed Black Cockatoo)	Vu	Vu	X	X	X	Forest Red-tailed Black Cockatoo typically occurs in dense Jarrah (<i>Eucalyptus marginata</i>), Karri (<i>E. diversicolor</i>) and Marri (<i>Corymbia calophylla</i>) forests, however the species also occurs in a range of other forest and woodland types, including Blackbutt (<i>E. patens</i>), Wandoo (<i>E. wandoo</i>), Tuart (<i>E. gomphocephala</i>), Albany Blackbutt, Yate (<i>E. cornuta</i>), and Flooded Gum (<i>E. rudis</i>) (DSEWPaC, 2012). Habitats also tend to have an understorey of <i>Banksia spp.</i> , <i>Persoonia spp.</i> , <i>Allocasuarina spp.</i> The Forest red-tailed Black Cockatoo generally nests in hollows in live or dead trees of Marri, Karri, Wandoo, Bullich, Blackbutt, Tuart and Jarrah (DSEWPaC 2012).	Unlikely , the habitat within the survey area is not the preferred habitat for this species, however they may opportunistically enter the survey area to forage. The nearest record is located approximately 20 km to the south.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo)	Vu	En			X	Baudin's Black Cockatoo occurs in high-rainfall areas, usually at sites that are heavily forested and dominated by Marri (<i>Corymbia calophylla</i>) and Eucalyptus species, especially Karri (<i>E. diversicolor</i>) and Jarrah (<i>E. marginata</i>). The species also occurs in woodlands of Wandoo (<i>E. wandoo</i>), Blackbutt (<i>E. patens</i>), Flooded Gum (<i>E. rudis</i>), and Yate (<i>E. cornuta</i>). Baudin's Black Cockatoo breeds in the Jarrah, Marri and Karri forests of the deep south-west in areas averaging more than 750 mm of rainfall annually. The range of the species extends from Albany to Gidgegannup and Mundaring (east of Perth), and inland to the Stirling Ranges and near Boyup Brook. Preferred roosts are in areas with a dense canopy close to permanent water sources, that provide the birds with protection from weather conditions (DSEWPaC, 2012).	Unlikely , the habitat within the survey area is not the preferred habitat for this species, however they may opportunistically enter the survey area to forage. The nearest record is located approximately 10 km to the south of the survey area.
<i>Calyptorhynchus latirostris</i> (Carnaby's Black Cockatoo)	En	En	X	X	X	This species mainly occurs in uncleared or remnant native Eucalyptus woodlands and in shrubland or kwongan heathland dominated by <i>Hakea</i> , <i>Banksia</i> and <i>Grevillea</i> species. The species also occurs in forests containing Marri (<i>Corymbia calophylla</i>), Jarrah (<i>Eucalyptus marginata</i>) or Karri (<i>E. diversicolor</i>). Breeding usually occurs in the western Wheatbelt region of WA, with flocks moving to the higher rainfall coastal area to forage after the breeding season. Feeds on the seeds of a variety of native plants, including <i>Allocasuarina</i> , <i>Banksia</i> , <i>Eucalyptus</i> , <i>Grevillea</i> and <i>Hakea</i> , and some introduced plants (DSEWPaC, 2012).	Present , species recorded within survey area
<i>Falco peregrinus</i> (Peregrine Falcon)		S			X	The Peregrine Falcon is seen occasionally anywhere in the south-west of WA. It is found everywhere from woodlands to open grasslands and coastal cliffs - though less frequently in desert regions. The species nests primarily on ledges of cliffs, shallow tree hollows, and ledges of building in cities. (Morcombe, 2004).	Likely , the nearest record is within 10 km of the survey area.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Leipoa ocellata</i> (Malleefowl)	Vu	Vu		X		The Malleefowl generally occurs in semi-arid areas of WA, from Carnarvon to south east of the Eyre Bird Observatory (south-east WA). It occupies shrublands and low woodlands that are dominated by mallee vegetation, as well as native pine (<i>Callitris</i> spp.) woodlands, Acacia shrublands, Broombush (<i>Melaleuca uncinata</i>) vegetation or coastal heathlands. The nest is a large mound of sand or soil and organic matter (Jones and Goth 2008; Morcombe, 2004). Few records are present on the SCP and are historical observations.	Highly unlikely , the nearest record is located over 40 km away and was recorded in 1972. This species is no longer known in this area.
<i>Limosa lapponica</i> (Bar-tailed Godwit)	MiWVu	Vu, IA		X		The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh (Morcombe 2004). They usually forage near the edge of water or in shallow water, mainly in tidal estuaries and harbours and roost on sandy beaches, sandbars, spits and also in near-coastal saltmarshes (Marchant & Higgins 1993).	Highly unlikely , there is no suitable habitat within the survey area.
<i>Merops ornatus</i> (Rainbow Bee-eater)		IA	X		X	The Rainbow Bee-eater is found throughout the state except in desert regions, particularly in open forests and woodlands, with sandy, loamy soil, but also sand ridges, sandpits, riverbanks, mangroves, rainforest shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. They also inhabit sand dune systems in coastal areas and at inland sites that are in close proximity to water (Morcombe 2004; Pizzey and Knight 2012). They dig out nests in open areas where there is relatively soft but firm sands, either on flat ground or in the side of a sandy bank (Nevill 2013).	Present , recorded within survey area and the species was recorded during field survey
<i>Motacilla cinerea</i> (Grey Wagtail)	MiT	IA		X		The non-breeding habitat for the Grey Wagtail is strongly associated with water, particularly rocky substrates along water courses but also lakes and marshes (DotE 2016)	Unlikely , some habitat is present for this species however they are migratory and rarely found on the

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
							SCP. Use maybe periodic and opportunistic.
<i>Ninox connivens connivens</i> (Barking Owl Southern subsp.)		P2			X	The southwest subspecies of the Barking Owl is found in the lower south-west region and is very scarce. There is little known about the subspecies (Nevill 2008). Barking Owls are found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat. They are usually found in habitats that are dominated by eucalyptus species, particularly Marri. They prefer woodlands and forests with a high density of large trees and particularly sites with hollows that are used by the owls as well as their prey. Habitat preference is strongly biased towards areas that provide a high density of large trees greater than 60 cm diameter and a high density of hollow trees of a range of sizes, including large hollows greater than 15 cm diameter which are suitable nesting places. Roost sites are often located near waterways or wetlands.	Unlikely , there is no suitable habitat within the survey area. The nearest record is located approximately 40 km east of the survey area.
<i>Numenius madagascariensis</i> (Eastern Curlew)	MiWCr	Vu, IA		X		The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Marchant & Higgins 1993).	Highly unlikely , there is no suitable habitat within the survey area.
<i>Oxyura australis</i> (Blue-billed Duck)		P4	X		X	The blue-billed Duck is a small Australian almost entirely aquatic duck, with both the male and female growing to a length of 40 cm. The male has a slate-blue bill which changes to bright-blue during the breeding season (Morcombe 2004). The Blue-billed Duck is endemic to Australia's temperate regions, ranging from the south west of WA, extending to southern Queensland, through New South Wales and Victoria, to Tasmania. The species is readily seen on freshwater lakes and billabongs where deep fresh water is present (Morcombe 2004).	Highly unlikely , there is no suitable habitat within the survey area. There is a record present within the survey area from 1992 however this is likely to be an error.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Pandion haliaetus</i> (Osprey)	MiW	IA		X	X	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range but may also occur on low sandy, muddy or rocky shores and over coral cays. They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging (DotE 2016)	Highly unlikely , there is no suitable habitat within the survey area. The nearest record is located approximately 20 km away on the coast.
<i>Tringa nebularia</i> (Common Greenshank)	MiW	IA	x	X	X	The Common Greenshank does not breed in Australia; however, the species occurs in all types of wetland and has the widest distribution of any shorebird in Australia. The Common Greenshank is generally absent from the Western Deserts although there are a few records from the Great Sandy Desert and the Nullarbor Plain. It occurs around most of the coast from Cape Arid in the south to Carnarvon in the north-west. In the Kimberley's it is recorded in the south-west and the north-east, with isolated records from the Bonaparte Archipelago (DotE 2016).	Highly unlikely , there is no suitable habitat within the survey area. The nearest records are from Carabooda Lake and Lake Nowergup to the east of the survey area.
<i>Tyto novaehollandiae</i> <i>subsp. novaehollandiae</i> (Masked Owl southern subsp.)		P3	x		X	The Masked Owl is found across a range of habitats from wet sclerophyll forest, dry sclerophyll forest, non eucalypt dominated forest, scrub and cleared land with remnant old growth trees. There are however several aspects of habitat preference which appear to be common: the Masked Owl requires large hollows in old growth eucalypts for nesting; it often favours areas with dense understorey or ecotones comprising dense and sparse ground cover, they are often recorded foraging within 100-300 m of the boundary of two vegetation types (Bell & Mooney, 2002).	Unlikely , the habitat within the survey area is not the preferred habitat for this species. The nearest record is just north of Yanchep Beach Road in the Yanchep National Park.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
Mammals							
<i>Bettongia penicillata subsp. ogilbyi</i> (Woylie, Brush-tailed Bettong)	En	Cr	X		X	Preferred habitat for the Woylie includes dense undergrowth, logs and rock-cavities and occasionally in burrows (Burbidge 2004). Scattered Woylie populations may be found throughout the Jarrah forest in the south-west corner of WA. Extant naturally occurring populations of the species are restricted to three small wheatbelt reserves in WA – Dryandra Woodland, Tutanning Nature Reserve and Perup Forest. All are characterised by the presence of thickets of the plant <i>Gastrolobium</i> (Van Dyck and Strahan 2008). The species historically occurred in a wide variety of habits, however is now restricted to areas where predation has been controlled (or excluded).	Highly unlikely , the species is no longer known from the area. There are records within 10 km of the survey area however the specimens collected were bones and likely represent historic occurrence in the area. The species is likely extinct in the region.
<i>Dasyurus geoffroii</i> (Western Quoll, Chuditch)	Vu	Vu	X	X		The Chuditch inhabits eucalypt forest (especially Jarrah, <i>Eucalyptus marginata</i>), dry woodland and mallee shrublands. In Jarrah forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest. Most diurnal resting sites in sclerophyll forest consist of hollow logs or earth burrows (Van Dyke & Strahan, 2008). The species can travel large distances, has a large home range and is sparsely populated through a large portion of its range.	Likely , there are records present within 10 km of the survey area and the habitat is suitable for this species.
<i>Falsistrellus mackenziei</i> (Western False Pipistrelle)		P4			X	The Western False Pipistrelle occurs in wet sclerophyll forest dominated by Karri (<i>Eucalyptus diversicolor</i>), and in the high rainfall zones of the Jarrah (<i>E. marginata</i>) and Tuart (<i>E. gomphocephala</i>) forests. The species is restricted to areas in or adjacent to stands of old growth forest. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (<i>E. calophylla</i>), Sheoak (<i>Casuarina heugeliana</i>) and Peppermint (<i>Agonis flexuosa</i>) trees are often co-dominant at its collection localities (Churchill 2008).	Unlikely , the nearest record is located over 30 km away to the south east.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Hydromys chrysogaster</i> (Water Rat)		P4	X		X	Water-rats live primarily in a wide variety of freshwater habitats, from sub-alpine streams and other inland waterways to lakes, swamps, farm dams and irrigation channels and are thought to be one of the few native species to have at least partially benefited from human encroachment (Gardner and Serena, 1995).	Highly unlikely , there is no suitable habitat (creeks or rivers) within the survey area. The nearest record is located approximately 2 km away.
<i>Isoodon obesulus subsp. fusciventer</i> (Quenda, Southern Brown Bandicoot)		P4	X		X	The Quenda prefers dense scrubby, often swampy, vegetation with dense cover up to one metre high. However, it also occurs in woodlands, and may use less ideal habitat where this habitat occurs adjacent to the thicker, more desirable vegetation. The species often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover (Van Dyck and Strahan, 2008).	Likely , the habitat within the survey area is suitable for this species. There are records present within the survey area.
<i>Macropus eugenii derbianus</i> (Tammar Wallaby)		P4			X	The Tammar Wallaby inhabits dense, low vegetation for daytime shelter and open grassy areas for feeding. Inhabits coastal scrub, heath, dry sclerophyll (leafy) forest and thickets in mallee and woodland The tammar wallaby is currently known to inhabit three islands in the Houtman Abrolhos group, Garden Island near Perth, Middle and North Twin Peak Islands in the Archipelago of the Recherche, and at least nine sites on the mainland including, Dryandra, Boyagin, Tutanning, Batalling (reintroduced) Perup, private property near Pingelly, Jaloran Road timber reserve near Wagin, Hopetown, Stirling Range National Park, and Fitzgerald River National Park (Van Dyck and Strahan 2008).	Unlikely , the habitat within the survey area is suitable for this species however they are heavily impacted by predation from foxes and therefore unlikely to be present in the survey area.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Macropus irma</i> (Western Brush Wallaby)		P4	X			The Western Brush Wallaby is a grazer found primarily in open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest. This species was once very common in the south-west of WA but has undergone a reduction in range and a significant decline in abundance in its current habitat. (Van Dyke & Strahan, 2008).	Present , recorded within survey area and the species was recorded during field survey
<i>Myrmecobius fasciatus</i> (Numbat)	Vu	En			X	The numbat's distribution once encompassed a number of habitat types, including Eucalyptus forest, Eucalyptus woodland, Acacia woodland and Triodia grasslands. Current populations occupy several different habitat types: upland Jarrah forest, open eucalypt woodland, banksia woodland and tall closed shrubland. There are currently two remnant native populations at Dryandra and Perup, WA and several reintroduced populations including Boyagin, Tutanning, Batalling and Karroun Hill Nature Reserves. Habitats usually have an abundance of termites in the soil, hollow logs and branches for shelter (Friend 2008).	Highly unlikely , the species is locally extinct.
<i>Petrogale lateralis subsp. lateralis</i> (Black-footed Rock-wallaby)	Vu	En	X		X	The Black-flanked Rock-wallaby has undergone a large range restriction, formerly being known from suitable habitat across central and southern WA. The current known populations remain restricted to suitable habitat in the Little Sandy Desert, Cape Range, Wheatbelt, Barrow and Salisbury Islands. In the south-west, colonies are largely confined to large scattered granite outcrops in remnants vegetation surrounded by cleared agricultural land. The habitat of Black-flanked Rock-wallaby varies between colonies but always involves grassland feeding habitat for feeding in close proximity to cliff, rock-pile, talus or escarpment refuge habitat. Rock cliffs or other steep substrates with adequate shelter and refuge are essential for breeding. (Van Dyck and Strahan, 2008).	Highly unlikely , there is no suitable habitat within the survey area and the species is susceptible to predation by foxes. The nearest record is located approximately 6 km to the east (in the Darling Range) and was recorded in 2001.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Phascogale tapoatafa</i> subsp. (WAM M434) (South western Brush-tailed Phascogale)		Vu			X	The South western Brush-tailed Phascogale prefers dry sclerophyll forests and open woodlands with a generally sparse ground-storey, which contain suitable nesting resources such as tree hollows, rotted stumps and tree cavities (Van Dyck and Strahan, 2008). The species range extends from just north of Perth and into the south west (Van Dyck and Strahan, 2008).	Unlikely , although a small amount of habitat is present it is isolated and fragmented and unlikely to support a population of this species.
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)	Vu	En			X	The Western Ringtail Possum occurs in and near coastal Peppermint Tree (<i>Agonis flexuosa</i>) forest and Tuart (<i>Eucalyptus gomphocephala</i>) dominated forest with a Peppermint Tree understorey from Bunbury to Albany. Also occurs in Jarrah (<i>Eucalyptus marginata</i>) forest and Jarrah-Marri (<i>Corymbia calophylla</i>) forest associated with Peppermint Tree (Van Dyck and Strahan, 2008).	Highly unlikely , there is no suitable habitat within the survey area and the species is not known from the SCP.
<i>Setonix brachyurus</i> (Quokka)	Vu	Vu			X	The Quokka prefer dense forests and thickets, streamside vegetation, heaths and shrublands of <i>Agonis linearifolia</i> -dominated swamps in the Jarrah (<i>Eucalyptus marginata</i>) forest. The northern extent of the current distribution on the mainland is in the Jarrah forest immediately south-east of the Perth metropolitan area, to southward through the southern Jarrah, Marri and Karri forests to the south coast, but largely confined throughout to areas receiving an annual rainfall of 1,000 millimetres or more (Van Dyck and Strahan, 2008).	Highly unlikely , the species is locally extinct.
Reptiles							
<i>Acanthophis antarcticus</i> (Southern Death Adder)		P3			X	Locally restricted to the Darling Range between Mount Helena and Jarrahdale, preferring woodlands adjacent to granite outcrops and densely vegetated creeks (Bush et al. 2010; Wilson and Swan, 2013).	Highly unlikely , the species is not known from the survey area and is restricted to the Darling Range.

Species Name	Status		Desktop Search			Description and habitat requirements	Likelihood
	EPBC Act Status	WA Status	NM	PMST	DBCA – SCP		
<i>Ctenotus gemmula</i> (SCP subpop.) (Jewelled south-west Ctenotus)		P3			X	The Jewelled South-West Ctenotus occurs on pale sandplains supporting heaths in association with <i>Banksia</i> or mallee woodlands (Wilson and Swan, 2013, Kay and Keogh 2012). The species is known from the Ellenbrook area to Peirce airbase and Melaleuca Park to the east of the survey area.	Likely , the habitat within the survey area is suitable for this species. There are no records from the survey area however this is likely due to a lack of current data for this species.
<i>Neelaps calonotos</i> (Black-striped Snake)		P3	X		X	This Black-striped Snake is restricted to the sandy coastal strip near Perth, between Mandurah and Lancelin. It occurs on dunes and sand-plains vegetated with heaths and <i>Eucalyptus/Banksia</i> woodlands. This species is seriously threatened by increasing development within its restricted distribution (Wilson and Swan, 2013).	Likely , the habitat within the survey area is suitable for this species. There are multiple records within 5 km of the survey area.

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Appendix F - Ten clearing principles assessment

Principle	Assessment	Outcome	Data sources
<p>a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.</p>	<p>The survey area is situated in the South West Botanical Province of WA, within the SCP IBRA bioregion and Perth IBRA subregion. The flora of the Perth sub-region is diverse with 3,255 native vascular flora taxa recorded.</p> <p>The survey area comprised remnant vegetation in varying condition, historically and recently cleared areas, and existing infrastructure such as roads and tracks. Fifteen vegetation types were identified from the survey area. The vegetation types included six mixed shrubland types, three <i>Banksia</i> woodland types, three <i>Eucalyptus</i> woodland types, one Herbland type and two modified vegetation types. There is 110.48 ha of native vegetation, 9.98 ha of planted vegetation, 24.73 ha of scatter natives and 20.73 ha of previously cleared / not rated areas within the survey area (total: 165.13 ha).</p> <p>Vegetation that was rated as Degraded, Completely Degraded and cleared areas accounted for 44.68 ha (45%) of the overall survey area. A patch (1.25 ha) of Pristine vegetation was recorded in part of VT03.</p> <p>The survey area is linear and is surrounded by remnant native vegetation and areas of residential housing in the northern and southern parts. The survey area does not contain areas of native vegetation that are in better condition, or offer a higher floristic value than the surrounding environment.</p> <p>Desktop searches identified five TECs, and seven PECs within 10 km of the survey area, four of the PECs are also part of a TEC. The vegetation within the survey aligned with three PECs and two TECs:</p> <ul style="list-style-type: none"> • <i>Banksia</i> Woodlands of the SCP TEC, which is listed as Endangered under the EPBC Act • <i>Banksia</i> dominated woodlands of the SCP IBRA region PEC, which is listed at Priority 3 by DBCA • Tuart (<i>Eucalyptus gomphocephala</i>) woodlands of the SCP PEC, listed as Priority 3 by DBCA • Northern Spearwood shrublands and woodlands (24), PEC, listed as Priority 3 by DBCA • <i>Melaleuca huegelii</i> – <i>M. acerosa</i> [<i>M. systema</i>] shrublands on limestone ridges (26a) TEC, which is listed as Endangered by DBCA. <p>There is 29.71 ha of the <i>Banksia</i> Woodlands of the SCP TEC within the survey area. There is 36.18 ha of the <i>Banksia</i> dominated woodlands of the SCP IBRA region PEC present within the survey area (this total includes 29.71 ha which also aligns with the <i>Banksia</i> Woodlands of the SCP TEC). There is 3.38 ha of the Tuart (<i>Eucalyptus gomphocephala</i>) woodlands of the SCP PEC, 37.16 ha Northern Spearwood shrublands and woodlands PEC and 1.28 ha <i>Melaleuca huegelii</i>-<i>Melaleuca systema</i> shrublands of limestone ridges TEC present within the survey area.</p>	<p>Likely to be at variance to this Principle</p>	<p>Beard (1990) Beard (1979) DEE (2017b) DEE (2016a) DBCA (2007–) DBCA TEC and PEC databases DBCA TPFL and WAHERB WA Herbarium (1998–)</p>

Principle	Assessment	Outcome	Data sources
	<p>Seven hundred and eighty nine native flora taxa have been previously recorded within 10 km of the survey area (DBCA 2007–). The field survey recorded 240 flora taxa representing 57 families and 151 genera. This total comprised 179 native flora taxa, 61 introduced taxa. The survey area is considered to have moderate floral diversity.</p> <p>Desktop searches identified the presence/potential presence of 49 conservation significant flora taxa within 10 km of the survey area. No EPBC Act or WC Act listed flora taxa were recorded within the survey area, however, one DBCA-listed Priority 3 taxon, <i>Hibbertia spicata subsp. leptotheca</i> was recorded during the field survey. A likelihood of occurrence assessment conducted post-field survey concluded that in addition to the recorded <i>H. spicata subsp. leptotheca</i> three taxa are likely to occur, 13 taxa may possibly occur and the remaining 32 taxa identified in desktop searches are considered unlikely or highly unlikely to occur in the survey area.</p> <p>Nine broad fauna habitat types were recorded from the survey area including highly disturbed areas. Four of these habitat types provide high value habitat for fauna.</p> <p>A search of the <i>NatureMap</i> database (DBCA 2007–) identified 602 fauna species that have been previously recorded within 10 km of the study area. This total included 209 birds, 61 reptiles, nine amphibians and 43 mammals. The remainder of species are marine fish and invertebrates.</p> <p>The fauna surveys recorded 79 vertebrate fauna species, including 57 birds, 13 reptiles and nine mammals. This included three conservation significant species:</p> <ul style="list-style-type: none"> • Carnaby’s Black Cockatoo (<i>Calyptorhynchus latirostris</i>) – listed as Endangered under EPBC Act and Threatened under WC Act • Western Brush Wallaby (<i>Macropus Irma</i>) – Listed as P4 by DBCA • Rainbow Bee-eater (<i>Merops ornatus</i>) – Listed as IA under the WC Act <p>The survey area contains a number of vegetation and habitat types, conservation significant vegetation and supports a range of flora and fauna species, including conservation significant species. Whilst the survey area does not contain areas of native vegetation that are in better condition, or offer a higher floristic value than the surrounding environment, it supports approximately 50 ha of native vegetation in Good or better condition in a largely cleared/degraded landscape.</p>		
b) – Native vegetation should not be cleared if it comprises the whole or a part of,	<p>Nine broad fauna habitats were recorded within the survey area, including: <i>Eucalyptus</i> woodland, <i>Banksia sessilis</i> over low mixed shrubland, mixed <i>Banksia</i> woodland, mixed tall shrubland, <i>Lomandra</i> herb lands on secondary dunes, planted <i>Eucalyptus</i> woodland, <i>Acacia</i> shrubland, limestone ridgelines and highly disturbed areas. Four of these habitat types provide high value habitat for fauna. These four habitat types cover approximately 75% of the total</p>	Likely to be at variance to this Principle	DotEE (2016a) DBCA (2007–) Beard (1979)

Principle	Assessment	Outcome	Data sources
<p>or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA</p>	<p>survey area demonstrating the overall high value of the area. The remaining 25% includes medium to low value habitat for fauna.</p> <p>All of the habitat types are well represented at a local and regional scale, and overall the survey area retains relatively high local and regional connectivity to remnant vegetation to the east (including Yanchep National Park).</p> <p>Six hundred and two native fauna species have been previously recorded within 10 km of the survey area (DBCA 2007–). This total included 209 birds, 61 reptiles, nine amphibians and 43 mammals. The remainder of species are marine fish and invertebrates. The field surveys recorded 79 vertebrate fauna species, including 57 birds, 13 reptiles and nine mammals.</p> <p>During the field survey, three conservation significant fauna species were recorded:</p> <ul style="list-style-type: none"> • Carnaby’s Black Cockatoo – listed as Endangered under EPBC Act and WC Act • Western Brush Wallaby listed as Priority 4 by DBCA • Rainbow Bee-eater listed as IA under the WC Act <p>A further five conservation significant species were assessed as likely to occur within the survey area, including:</p> <ul style="list-style-type: none"> • Southern Brown Bandicoot / Quenda (<i>Isodon obesulus fusciventer</i>) – Priority 4 listed by DBCA • Peregrine Falcon (<i>Falco peregrinus</i>) – Listed as other specially protected fauna by DBCA • Western Quoll (<i>Dasyurus geoffroyi</i>) – Listed as Vulnerable by the EPBC Act and DBCA • Jewelled South West Ctenotus (<i>Ctenotus gemmula</i>) – Listed as Priority 3 by DBCA • Black Striped Snake (<i>Neelaps calonotos</i>) – Listed as Priority 3 by DBCA. <p>Carnaby’s Black Cockatoo were observed in several small groups foraging and flying over the survey area. There is 128.39 ha of suitable foraging habitat and 67 potential breeding trees for the species within the survey area. It is likely that the species utilises the survey area for foraging. The native vegetation within the survey area comprises significant habitat for Carnaby’s Black Cockatoo.</p>		
<p>(c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.</p>	<p>Desktop searches identified the presence/potential presence of eight EPBC Act and/or WC Act listed flora taxa within 10 km of the survey area. A likelihood of occurrence assessment, which takes into account the habitats present, known species distribution and previous records and intensity of field surveys and season, was completed for the Threatened flora taxa identified in desktop searches. This assessment determined that no Threatened taxa are likely or may possibly occur within the survey area.</p> <p>Searches for conservation significant flora taxa were undertaken during the field survey. No Threatened flora taxa were recorded from the survey area during the field surveys. Given the survey effort dual season survey and reconnaissance survey if populations of Threatened flora taxa were present it is expected they would have been identified in the field.</p>	<p>Unlikely to be at variance to this Principle.</p>	<p>DotEE (2016a) DBCA (2007–) DBCA TPFL and WAHERB WA Herbarium (1998–)</p>

Principle	Assessment	Outcome	Data sources
d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	<p>Desktop searches identified the presence/potential presence of four TECs within 10 km of the survey area, including:</p> <ul style="list-style-type: none"> • Aquatic Root Mat Community in Caves of the SCP (TEC) (Caves SCP01) – Endangered EPBC Act listed TEC and Critically Endangered State listed TEC • Sedgeland in Holocene dune swales of the southern SCP (TEC) (SCP19) – Endangered EPBC Act listed TEC and Critically Endangered State listed TEC • <i>Melaleuca huegelii</i> – <i>M. acerosa</i> (<i>M. systema</i>) shrublands on limestone ridges (TEC) (SCP26a) – Endangered State listed TEC • <i>Banksia</i> Woodlands of the SCP – Endangered EPBC Act listed TEC <p>An assessment of the vegetation types described within the survey area, based on dominant species and general field observations determined that three vegetation types within the survey aligned with two TECs:</p> <ul style="list-style-type: none"> • <i>Banksia</i> Woodlands of the SCP TEC, which is listed as Endangered under the EPBC Act • <i>Melaleuca huegelii</i> – <i>M. acerosa</i> [<i>M. systema</i>] shrublands on limestone ridges (26a) TEC, which is listed as Endangered by DBCA <p>There is 29.71 ha of the <i>Banksia</i> Woodlands of the SCP TEC within the survey area. There is 1.28 ha <i>Melaleuca huegelii</i>-<i>Melaleuca systema</i> shrublands of limestone ridges</p>	Likely to be at variance to this Principle.	DEE (2016a) DBCA TEC and PEC databases
(e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	<p>The survey area is located within the SCP IBRA Bioregion, which has approximately 39% of its pre-European extent remaining.</p> <p>Regional vegetation mapping has been undertaken by Heddle <i>et al.</i> (1980). This mapping identified four vegetation complexes within the survey area: Quindalup complex, Cottesloe complex – north, Cottesloe complex central and south and Herdsman complex.</p> <p>The vegetation complexes described and mapped by Heddle <i>et al.</i> (1980) have been assessed against presumed pre-European extents within the SCP IBRA bioregion and the City of Wanneroo (GoWA 2017). The current extent of all complexes within the SCP IBRA bioregion and the City of Wanneroo is greater than 31% of their calculated pre-European extents.</p>	Unlikely to be at variance to this Principle.	Heddle <i>et al.</i> (1980) GoWA (2016) GoWA (2017)
(f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	<p>Desktop searches identified one nationally important wetland within 5 km of the survey area, the Loch McNess System (Yanchep Lake). This wetland system, which is also a conservation category wetland occurs approximately 1.5 km east of the survey area. Vegetation clearing for the Project is not expected to impact this wetland.</p> <p>There are no drainage lines or wetlands within the survey area, nor is the vegetation within the survey area considered to grow in association with a wetland or watercourse.</p>	Unlikely to be at variance to this Principle.	DEE (2015a) DoWER (2015)

Principle	Assessment	Outcome	Data sources
(g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	<p>The survey area is located on the Quindalup Dunes and Spearwood Dunes landforms. The Quindalup Dunes comprises dunes and ridges generally oriented parallel to the present coast, composed of unconsolidated (calcareous) sands and shell fragments. The Spearwood Dunes lie landward of the Quindalup Dunes and consist of mainly brown and yellow sands of varying depths over limestone (Tamala Limestone).</p> <p>A review of Acid Sulfate Soils (ASS) risk mapping provided by DER indicates that the survey area is mapped as having ‘no known risk’ of ASS occurring within 3 m of natural soil surface. Any clearing of native vegetation within the survey area has the potential to cause water and wind erosion in areas with lighter-texture soils (e.g. sandy soils). The high sand content of the soils and ease with which these materials can be transported by the wind means there is a high risk of wind erosion in this area. However, given these soils are porous and well-drained and the survey area is linear in nature, the risk of water erosion is low.</p> <p>Overall, due to the long and linear nature of the native vegetation to be cleared, clearing for the Project is unlikely to cause substantial land degradation.</p>	Unlikely to be at variance to this Principle.	DAFWA (2007) DER ASS risk mapping Natural Resource Management SLIP (GoWA 2016)
(h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	<p>No DBCA-managed estates are located within the survey area. The closest DBCA-managed conservation area is Yanchep National Park (R 9868, Class A), located adjacent to the northern extent of the survey area (east side). The survey area is connected to this National Park by native vegetation; however the small and linear nature of the proposed clearing reduces the likelihood for impacts to this conservation area.</p> <p>The majority of the survey area lies with an Environmentally Sensitive Area (ESA). This ESA likely aligns with the presence of TECs and their buffer zones within the survey area. Three Bush Forever sites also intersect the survey area:</p> <ul style="list-style-type: none"> • Bush Forever site 289 (Ningana Bushland, Yanchep/ Eglington) intersects the middle of the survey area • Bush Forever site 288 (Yanchep National Park and Adjacent Bushland) intersects the northern extent of the survey area • Bush Forever site 130 (Link between Yanchep and Neerabup National Parks) intersects one of the eastern extensions. <p>The survey area intersects pockets of residential development. As a result sections of the survey area have been historically cleared or otherwise highly modified (e.g. by roads, dirt tracks, housing). Sixty one percent of the native vegetation that remains in the survey area is in Good or better condition, with the majority of this vegetation recorded within Bush Forever</p>	Likely to be at variance to this Principle.	DBCA Estate spatial dataset

Principle	Assessment	Outcome	Data sources
	<p>sites. Bush Forever site 289 consists of a large remnant that provides a valuable ecological corridor from the coast (Bush Forever site 397) to Yanchep National Park. Clearing part of Bush Forever site 289 will remove the ecological link between Yanchep National Park and Bush Forever site 397 – Coastal strip from Wilbinga to Mindarie.</p>		
<p>(i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.</p>	<p>The survey area is located in the RIWI Act listed Yanchep Groundwater Area and the Perth Coastal and Gwelup Underground Water Pollution Control Area Public Drinking Water Source Area (PDWSA), which is a Priority 3 Protection Zone. Priority 3 areas are declared over land where water supply sources need to coexist with other land uses such as residential, commercial and light industrial developments. Vegetation clearing for the project is considered unlikely to impact upon groundwater quality.</p> <p>No rivers or surface water bodies listed under the RIWI Act were identified within the survey area (DWER 2016). There are no drainage lines, lakes or wetlands in the survey area (DWER 2016). It is unlikely that the proposed works will disturb or interrupt any natural drainage and surface run-off patterns due to the deep sandy soils present in the area.</p> <p>There are no Environmental Protection Policy (EPP) lakes protected under the <i>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992</i> within or in immediate proximity to the survey area. The nearest EPP lake is located approximately 2.4 km east of the survey area, and therefore no direct impacts are expected to occur to any EPP lakes as a result of the proposed project.</p> <p>There are no watercourses or wetlands within the survey area. It is unlikely that any clearing of the vegetation within the survey area will result in any indirect impacts to this wetland, such as changes to hydrology and changes to surface water flows to this wetland.</p>	<p>Unlikely to be at variance to this Principle.</p>	<p>DWER (2016) Natural Resource Management SLIP (GoWA 2016)</p>
<p>(j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding</p>	<p>The soils of the survey area are sandy and porous and the area is generally well-drained. No wetlands, watercourses or areas subject to inundation are located within the survey area.</p> <p>It is unlikely that the removal of vegetation proposed for this project would cause or exacerbate the incidence or intensity of flooding in the local area.</p> <p>The survey area is unlikely to be susceptible to waterlogging due to the highly porous nature of the soils in the area and clearing is unlikely to cause or exacerbate waterlogging within the survey area.</p>	<p>Unlikely to be at variance to this Principle.</p>	

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