City Of Cockburn

City of Cockburn Jandakot Rd Infill Flora and Fauna Surveys

December 2019

Executive summary

The City of Cockburn (the City) is currently upgrading Jandakot road, which will include widening of the existing road reserve. Previous flora and fauna assessments have been conducted in 2016 (Eco Logical 2017) and 2018 (GHD 2019) over the project footprint. Due to changes in the footprint boundary additional flora and fauna surveys are required in areas that have not been previously surveyed during previous assessments.

GHD Pty Ltd (GHD) was commissioned by the City to undertake a detailed and targeted flora and vegetation survey and a Level 1 fauna survey (including a Black Cockatoo assessment) of areas not previously assessed. The City also commissioned one consolidated report including the previous survey results in order to support environmental approvals.

The survey area is located along Jandakot Road in the City of Cockburn. The total size of the survey area is 12.09 hectares (ha).

Key findings for vegetation and flora

Three vegetation types were identified and described in the survey area, not including revegetation, cleared areas such as roads, tracks and houses.

Based on the results of the desktop searches, dominant species, landform features, field observations, and coupled with the statistical analyses, one conservation significant ecological communities was identified within the survey area (VT01); *Banksia* Woodlands of the Swan Coastal Plain TEC listed as Endangered under the EPBC Act / Priority 3 PEC by DBCA - *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region.

A large proportion of the survey area is in Completely Degraded, which includes cleared areas (7.67 ha, 64 %). Other disturbance factors include weed invasion, grazing impacts (including rabbits) and proliferation of informal tracks/firebreaks. Vegetation in Very Good condition (1.34 ha, 11 %) was represented by VT01 and VT02, with intact native species structure, high diversity and low cover of introduced species.

One hundred and forty four flora taxa (including subspecies and varieties) representing 43 families and 111 genera were recorded from the survey area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys. This total comprised 95 native taxa and 49 introduced flora taxa.

No EPBC Act or BC Act listed flora or Priority listed flora by the DBCA were recorded within the survey area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys.

Key findings for fauna

Four broad fauna habitat types have been identified within the survey area, not including cleared areas such as roads, tracks and houses. These habitat types closely align with the vegetation types.

During the survey a total of 28 fauna species, including 22 birds and four mammals and two reptiles were recorded area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys.

Three conservation significant fauna species were recorded within the survey area through presence of suitable habitat and/or signs of presence. These included:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the BC Act and Endangered under the EPBC Act
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the BC Act and Vulnerable under the EPBC Act
- Southern Brown Bandicoot (*Isoodon fusciventer*) – listed as P4 by DBCA.

The three species considered likely to occur include:

- Western Brush Wallaby (*Notamacropus Irma*) – Priority 4 (DBCA listed)
- Perth Slider (*Lerista lineata*) – Priority 3 (DBCA listed)
- Black-striped Snake (*Neelaps calonotos)* – Priority 3 (DBCA listed).

Two species of Black Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo foraging habitats were recorded during the survey.

High value foraging habitat was recorded for the Banksia/Eucalypt open woodland and revegetation fauna habitat types for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. Low value foraging habitat was recorded for the Melaleuca dampland with shrubland and Eucalyptus rudis open woodland over Melaleuca dampland fauna habitat types.

A total of 14 potential breeding habitat trees with DBH greater than 500 mm were recorded from the survey area. No hollows suitable for black cockatoo use were observed from the ground based assessment.

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1. Introduction

1.1 Project background

The City of Cockburn (the City) is currently upgrading Jandakot road, which will include widening of the existing road reserve. Previous flora and fauna assessments have been conducted in 2016 (Eco Logical 2017) and 2018 (GHD 2019) over the project footprint. Due to changes in the footprint boundary additional flora and fauna surveys are required in areas that have not been previously surveyed during previous assessments.

1.2 Purpose of this report

GHD Pty Ltd (GHD) was commissioned by the City to undertake a detailed and targeted flora and vegetation survey and a Level 1 fauna survey (including a Black Cockatoo assessment) of areas not previously assessed. The City also commissioned one consolidated report including the previous survey results in order to support environmental approvals.

1.3 Survey area

The survey area is shown on Figure 1, which is located along Jandakot Road in the City of Cockburn. The red outlined polygon is the survey area. In addition Lot 97 was added to the survey area to support the development of a driveway, this is shown by a yellow outlined polygon. The total size of the survey area is 12.09 hectares (ha).

1.3.1 Study area

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

1.4 Scope of works

The scope of works was to undertake an assessment and fauna and flora survey of the survey area. The following actions were completed to fulfil the scope:

- An updated desktop assessment of the study area prior to the field survey to identify biological features and constraints, which may be in, or near the survey area
- A detailed flora and vegetation survey of the survey areas not previously surveyed, including consolidating the ELA (2017) and GHD (2019) survey results
- A targeted flora survey, including in suitable habitats of previously surveyed areas for orchids
- A Level 1 fauna survey in areas not previously surveyed
- A Black Cockatoo assessment in areas not previously surveyed
- A consolidated report (this document) for the complete footprint presenting the previous survey results ELA (2017) and GHD (2019) collectively.

1.5 Relevant legislation, conservation codes and background information

In Western Australia 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 assessment are provided in Appendix B.

1.6 Report limitations and assumptions

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

GHD otherwise disclaims responsibility to any person other than the City 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 the City of Cockburn 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 access and the location of 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 environmental aspects within the project area (Figure 1, Appendix A). Should the project 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 identity relevant environmental information pertaining to the project area and to assist in survey design. This included a review of:

- 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 2018a) (Appendix C)
- The Department of Biodiversity, Conservation and Attractions (DBCA) Threatened and Priority Ecological Communities (TEC/PEC) lists to determine the potential for TECs or PECs present within the study area
- The DBCA *NatureMap* database for flora and fauna species previously recorded within the study area (DBCA 2007–) (Appendix C)
- Existing datasets including previous vegetation mapping of the survey area (Beard 1979), aerial photography, geology/soils and hydrology information (sourced from Government of Western Australia (GoWA) 2018a) to provide background information on the variability of the environment, likely vegetation units and fauna habitats and to identify areas with the potential to contain TECs, PECs, and Threatened and Priority listed flora and fauna species.

2.2 Field survey

GHD Senior Ecologist Joel Collins completed a flora survey on 24th and 31st of October 2019 and on the 7th November 2019. Previous surveys were undertaken on 23rd November 2018 (GHD 2019) and 9th November 2016 (Eco Logical 2017) also by Joel Collins.

2.2.1 Flora and vegetation

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). The field survey was undertaken to identify and describe the dominant vegetation types, assess vegetation condition, and identify and record vascular flora taxa present at the time of survey. Opportunistic searches for conservation significant or other significant ecological communities and flora taxa were also undertaken during the field survey.

Data collection

Field survey methods involved sampling quadrats, with six non-permanent quadrats (measuring 10 x 10 m) described throughout the survey area to adequately characterise the vegetation. The location of each sampling site and targeted search transects is presented in Figure 3, Appendix A. In addition one releve was also recorded. In addition previous surveys recorded three quadrats (GHD 2019) and five releves (Eco Logical 2017) within the survey area.

Collected quadrat data included physical features (e.g. landform, soil types), a list of dominant flora from each structural layer and a list of all species (native and introduced) within the quadrat including average height and cover (using the National Vegetation Information System). A photograph of each quadrat, and other representative vegetation types and conditions were taken. The survey area was also traversed on foot to allow opportunistic collection of flora

species (native and exotic). An inventory of flora species by vegetation type was compiled from described quadrats and opportunistic records from across all the surveys. The location of any conservation significant flora taxa identified in the field were recorded using a GPS.

Vegetation types

Vegetation types were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations. Vegetation types were described based on structure, dominant taxa and cover characteristics as defined by field observations, in accordance with the EPA flora and vegetation technical guidance (EPA 2016a).

Vegetation condition

The vegetation condition of the survey area was assessed and mapped in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (EPA 2016a). This scale recognises the intactness of vegetation, which is defined by the following:

- Completeness of structural levels
- Extent of weed invasion
- Historical disturbance from tracks and other clearing or dumping of rubbish
- The potential for natural or assisted regeneration.

The scale consists of six rating levels as outlined in Appendix B.

Surveys for conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. previous surveys, aerial photography, geology, soils and topography data, EPBC Act PMST (DotEE 2018), TPFL, *NatureMap* (DBCA 2019) and the WAHERB databases search results) were reviewed to determine conservation significant flora taxa potentially present within the study area. Additionally, ecological information (e.g. habitat, associated flora taxa and phenology) was sourced from *FloraBase* (WA Herbarium 1998–2019) to provide further details.

Potential habitats and locations of previous records were searched by walking transects spaced approximately 10-15 metres (m) apart across the survey area. Where individuals were identified, the location and number of plants present were recorded using handheld GPS units/tablet. If conservation significant flora were recorded, fine scale transects and meandering was performed.

Statistical analysis

PRIMER v6 (Clarke and Gorley 2006) was used to examine the similarity between sites using collected data. A presence/absence matrix was created of all taxa (including perennials and annuals) present in the quadrats recorded within the survey area. 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 scaling analysis (MDS) was undertaken using the Bray-Curtis similarity matrix and results presented as a two dimensional scatter plot. The analysis was repeated removing all weed and singleton taxa. The outputs of the PRIMER analysis were used to inform decisions on vegetation units.

Comparison of vegetation types with regional datasets

The Swan Coastal Plain bioregion (abbreviated as SWA) dataset (accessed through NatureMap) is derived from a database compiled and maintained over many years, combining

the results of a number of floristic studies (conducted between 1990 and 1996) on plant communities of the Swan Coastal Plain bioregion, south of Moore River. Gibson et al (1994) contributes the largest sampling sites to the SWA dataset. The SWA dataset includes sampling site details, the flora collected at these sampling sites and the floristic community type (FCT) assigned to these sampling sites. The taxonomy of the flora in the SWA dataset used is current as of October 2019 (updated by GHD).

It is important to note that the Gibson et al (1994) dataset covers a large geographical area with a relatively low number of quadrats and as such the defined FCTs are broad groups. This can influence analysis results when introducing new quadrats to the dataset. In addition, Gibson et al (1994) sampled quadrats in locations that displayed the highest vegetation condition and highest diversity. When comparing quadrats in more degraded condition with lower diversity it is common that low similarities are a result and often it is difficult to assign an FCT based only on statistical analysis. Field observations and interpretation of dominant species, landform and soil type are used to compare against the expected FCT to determine the 'best match' in these scenarios.

PRIMER v6 (Clarke and Gorley 2006) was used to compare the GHD quadrats to existing data (where available) for FCTs described on the SWA. SWA site locations within a 10 km buffer of the survey area were located and the FCTs represented by these sites were identified.

The GHD quadrat data and SWA quadrat data was combined, reconciled to align nomenclature and a presence/absence matrix created of all taxa (including perennials and annuals). Singleton taxa (those occurring in only one quadrat) were removed from the matrix as well as taxa that were only identified to family or genus level. 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 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.

It is noted that PRIMER can be limited in use for this purpose as analysis is based on all species recorded in quadrats 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.

Flora identification and nomenclature

Species well known to the survey ecologist were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. Specimens collected during the field assessment 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 1998–2019) and the EPBC Act Threatened species database provided by DEE (2018b). Nomenclature used in this report follows that used by the Western Australian Herbarium as reported on *FloraBase* (WA Herbarium 1998–2019).

2.2.2 Fauna (including targeted black cockatoo)

GHD Senior Ecologist Joel Collins completed the fauna survey in conjunction with the flora and vegetation survey on 24 and 31 October 2019 and 7 November 2019. Previous surveys were undertaken on 23 November 2018 (GHD 2019) and 9 November 2016 (Eco Logical 2017) also

by Joel Collins. The purpose of the survey was to identify and describe the dominant fauna habitat types and identify and record fauna species present at the time of survey. An assessment of the likelihood of conservation significant fauna and their habitats occurring within the survey area was also undertaken.

The fauna survey was undertaken with reference to the EPA *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016b) and *Technical Guidance –Terrestrial Fauna Surveys* (EPA 2016c).

Habitat assessment

The survey area was assessed for habitat type, structural complexity, type and extent of resource availability, as well as its' value for fauna. Specifically, the assessment included:

- Habitat structure (e.g. vegetation type, presence/absence of overstorey, mid-storey, understorey, ground cover)
- Presence/absence of refuge including: fallen timber (coarse woody debris), hollow-bearing trees and stags , and the type and extent of each refuge
- Location of the habitat within the survey areas in comparison to the habitat within the surrounding landscape
- Identification and evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance, including Black Cockatoos
- 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 observations

Whilst conducting activities in the survey area, opportunistic observations were made of any other vertebrates (or signs of their presence). Fauna taxa observed or heard were noted, and indirect evidence (such as scats, tracks, diggings, nests, feathers, bones, pellets) indicating the current or recent presence of a species also noted.

Targeted Black Cockatoos habitat assessment

A targeted survey for Black Cockatoos 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 (Endangered) Calyptorhynchus baudinii and Forest Red-tailed Black Cockatoo (Vulnerable) Calyptorhynchus banksii naso* (Department of Sustainability, Environment, Water, Populations, and Communities (DSEWPaC) 2012). The assessment involved visual and aural assessment of the survey area identifying breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, roosting areas, current activity and any other signs of use by Carnaby's Black Cockatoos. For the purpose of this assessment, the DSEWPaC (2012) Black Cockatoo referral guidelines were used to define breeding, foraging and night roosting habitat. The Black Cockatoo assessment also considered the draft referral guidelines for Black Cockatoo (DEE 2017), however, these guidelines are in draft form.

The targeted habitat assessment for black cockatoos 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 diameter at breast height (DBH) of >500 millimetres (mm) for Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Tuart (*Eucalyptus gomphocephala*)

- Identifying, describing and recording the size of existing tree hollows and any evidence of use by Black Cockatoos within the survey area
- Records of any potential breeding trees which have potential or actual breeding hollows, including size of hollow (small <5 cm, medium 5-10 cm or larger >10 cm)
- Identifying potential night roosting habitat
- Identifying, recording and describing the locations of potential foraging habitat
- Records and photographs of any evidence of black cockatoo feeding or breeding use of trees, such as chew marks on nuts or edges of hollows, debris, scats and feathers in quantity below roost sites
- Co-ordinates for all relevant tree and evidence data in tabular and database (Excel and ArcGIS) form.

Fauna nomenclature

Identification of fauna species was made in the field using available field guides and electronic guides (Table 1). Where identification was not possible, photographs and specimens were collected to be later identified.

Table 1 Fauna references

Fauna group	Field guide
Mammals	Menkhorst and Knight (2004), Van Dyck and Strahan (2008)
Birds	Morcombe (2004), Storr (1991)
Reptiles	Wilson and Swan (2017), Storr et al. (1999), Storr et. al. (2002)
Amphibians	Tyler and Doughty (2009)

Nomenclature used in this report follows that used by the WA Museum as reported on *NatureMap*. This nomenclature is deemed the most up-to-date species information for WA fauna, with the exception of birds, which follows Christidis and Boles (2008).

2.3 Limitations

2.3.1 Desktop limitations

Desktop investigations use a variety of online resources such as the WA Museum and DBCA *NatureMap* database, and the EPBC Act PMST. 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 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.

2.3.2 Field survey limitations

The EPA (2016a, 2016b) Technical Guidelines state 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 2 .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 that have been formed.

Table 2 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information	Nil	Adequate information is available for the project area: • Broad scale (1:250,000) mapping by Beard (1979) and digitised by Shepherd et al. (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	Nil	The vegetation and flora survey was undertaken in spring 2019. The flora recorded from the field survey is detailed in 5.1.4 and a full flora species list is provided in Appendix D The portion of flora collected and identified was considered appropriate for the level of experience of the Senior Ecologist undertaking the survey. The fauna survey was undertaken in spring 2019 and targeted the species that are easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Some cryptic species may not have been identified during the survey and seasonal variation within species can require targeted surveys at particular times of year. The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the project area. No sampling for invertebrates or aquatic species occurred.
Flora determination	Nil	Flora identification was undertaken by the GHD ecologist in the field and at the WA Herbarium. All species were identifiable at the time of the survey, including annuals, which were fruiting and visible. One taxon could be identified to genus only. 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.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	All of the survey area was accessible on foot.
Mapping reliability	Minor	The vegetation was mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1979) and field data. Data was recorded in the field using hand-held GPS tools (e.g. Samsung Galaxy Tablet S2). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The GPS units used for this

Aspect	Constraint	Comment
		survey are accurate to within ±5 metres on average. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.
Timing/weather/season/cycle	Nil	The field survey was conducted 24 and 31 October 2019 and 7 November 2019. In the three months prior to the survey (August-October) the Jandakot Aero weather recording station (No. 009172, Bureau of Meteorology (BoM) 2019) recorded a total of 272.8 mm. This total is approximately 13% higher than the long-term average for the same period (August-October, 237.6 mm) (BoM 2018). The increased amount of rainfall may have benefited the detection of vascular plants by supporting growth. The timing of the flora and vegetation survey is considered the most optimal time to complete surveys on the Swan Coastal Plain (optimal time is during spring). The weather conditions recorded during the survey were considered unlikely to have impacted upon the vegetation and flora survey.
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	Much of the project area has been subjected to historical disturbance events (e.g. clearing, burning off); however, these disturbances did not impact the survey.
Intensity (in retrospect, was the intensity adequate)	Nil	The vascular flora of the project area was sampled in accordance with EPA (2016a) and terrestrial fauna sampled in accordance to EPA (2016b). The survey area was sufficiently covered by the GHD ecologist during the survey.
Resources	Nil	Adequate resources were employed during the field survey. A total of five days was spent undertaking the combined survey.
Access restrictions	Nil	The entirety of the survey area was accessible at the time of the survey.
Experience levels	Nil	The ecologist who executed the survey, Joel Collins, is suitably qualified with over 16 years' experience in undertaking ecological surveys and assessments in Western Australia. Joel has extensive experience undertaking flora and fauna assessments on the Swan Coastal Plain and has worked on a number of projects for the City of Cockburn over the last seven years.

3. Desktop assessment

3.1 Regional biogeography

The survey area is situated in the South West Botanical Province of WA (Beard 1990) within the Swan Coastal Plain (SCP) bioregion and the Perth subregion as described by the Interim Biogeographic Region of WA (IBRA).

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 costal 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).

3.2 Landform and soils

The majority of the survey area is located on the Bassendean Dune System, which is a series of shoreline deposits and coastal dunes. The system is characterised by low hills of sand with sandy swamps in depressions (swales) between the dunes.

Soil landscape mapping (DAFWA 2007) indicates that two soil landscape types occur within the survey area:

- Bassendean B2 Phase (212Bs_B2) – Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m. This Phase covers the majority of the survey area
- Bassendean B1 Phase (212Bs_B1) – Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; banksia dominant. This phase covers some of the northern boundary of the survey area.

The topography of the survey area is predoinantly flat.

3.3 Land use

3.3.1 Conservation areas and reserves

No DBCA managed lands or regional parks intersect the survey area. There are 36 DBCA managed areas within the study area, with the closest approximately 2.64 km east northeast of the survey area. There are 24 Regional Parks within the study area, with the closest located approximately 1.71 km to the west of the survey area.

3.3.2 Bush forever

The survey area does not intersect any Bust Forever sites. There are 12 Bush Forever sites located within the study area, the closest Bush Forever site (Site number 388) is located approximately 0.55 km north of the survey area.

3.3.3 Environmentally sensitive areas

No Environmentally Sensitive Areas (ESAs) intersect the survey area. A number of ESA's intersect the study area; these ESAs are associated with TEC buffers, Bush Forever sites and geomorphic wetlands.

3.4 Hydrology

3.4.1 Surface water

There are no drainage lines recorded within the survey area.

3.4.2 Wetlands

Two geomorphic wetlands intersect the survey area;

- ID 6877, Basin, Sumpland (Resource enhancement)
- ID 6881, Basin, Sumpland (Resource enhancement)

A further 161 occur within the study area.

There are no Internationally (RAMSAR) and Nationally Important wetlands within the survey area. One RAMSAR wetland occurs within the study area, Forrestdale and Thompsons Lakes, which is located approximately 4.6 km to the south-west of the project area. Forrestdale and Thompsons Lakes is also listed as a wetland of national significance. The Gibbs Road Swamp System, a wetland of national significance is located 2.02 km south and southeast of the survey area.

3.5 Flora and vegetation

3.5.1 Broad vegetation mapping

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 one vegetation association intersects the survey area:

- Low forest, woodland or low woodland with scattered trees (association 1001).

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 one vegetation complex is present within the survey area:

- Bassendean Complex – Central and South: Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - *Banksia* species to low woodland of *Melaleuca* species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* to *Eucalyptus todtiana* (Pricklybark) in the vicinity of Perth.

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 December 2018 – GoWA 2019b). As shown inTable 3. The current extent of vegetation association 1001 is less than 30% at all scales (State, IBRA bioregion, IBRA subregion and Local Government Area (LGA)).

GoWA (2018c) has assessed the vegetation complexes described and mapped by Heddle *et al.* (1980) against presumed pre-European extents within the SCP IBRA bioregion (Table 4) and the City of Cockburn (Table 5) respectively. The Bassendean Complex – Central and South has less than 30% of its pre-European extent, with the SCP IBRA bioregion and City of Cockburn.

3.5.1 Conservation significant ecological communities

The EPBC Act PMST identified two EPBC Act-listed TECs/PECs potentially occurring within the study area (Table 6).

Table 3 Extents of vegetation associations mapped within the survey area (GoWA 2019)

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Remaining within DBCA managed lands (%)	Hectares (ha) within the survey area	% of current extent within the survey area
1001	State: WA	57,410.23	12,660.76	22.05	14.19	12.09	0.10
	IBRA bioregion: Swan Coastal Plain	57,410.23	12,660.76	22.05	14.19	12.09	0.10
	Sub-region: Perth	57,410.23	12,660.76	22.05	14.19	12.09	0.10
	LGA: City of Cockburn	7,328.39	2,002.93	27.33	14.92	12.09	0.60

Table 4 Extent of vegetation complexes on the SWA mapped within the survey area (GoWA 2019c)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Remaining within DBCA managed lands (%)	Hectares (ha) within the survey area	% of current extent within the survey area
Bassendean Complex – Central and South	87,476.26	23,508.66	26.87	4,377.36	12.09	0.05

Table 5 Extent of vegetation complexes within the City of Cockburn (GoWA 2019d)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Proportion of the vegetation complex within the the LGA (%)
Bassendean Complex – Central and South	6,809.99	1,730.87	25.42	7.78

Table 6 Threatened and Priority Ecological Communities identified within the study area

Community type	EPBC Act	BC Act/ DBCA	Description	Location from the survey area
Banksia woodlands of the Swan Coastal Plain (TEC) *Banksia* Dominated Woodlands of the Swan Coastal Plain IBRA Region (PEC)	Endangered	PEC Priority 3	The ecological community is a woodland associated with the Swan Coastal Plain. A key diagnostic feature is a prominent tree layer of *Banksia*, with scattered eucalypts and other tree species often present among or emerging above the *Banksia* 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 (TSSC 2016).	Intersects survey area.
Southern *Eucalyptus gomphocephala-Agonis flexuosa* woodlands (SCP25)**	Endangered TEC (part)	PEC Priority 3	The tree canopy is dominated by tuart (*Eucalyptus gomphocephala*) trees but can also contain other tree species, commonly including: peppermint (*Agonis flexuosa*), bull banksia (*Banksia grandis*); candlestick banksia (*Banksia attenuata*), or jarrah (*Eucalyptus marginata*); less commonly, marri (*Corymbia calophylla*).	Two pockets located approximately 5 km south west and 5 km north west of the survey area

3.5.2 Flora diversity

The *NatureMap* database identified 1264 flora taxa representing 121 families and 549 genera previously recorded within the study area. This total comprised 968 native flora taxa and 296 naturalised (introduced) flora taxa.

The *NatureMap* database search is provided in Appendix C.

3.5.3 Conservation significant flora

The EPBC Act PMST, *NatureMap*, WaHERB and DBCA Threatened and Priority Flora databases identified the presence/potential presence of 45 conservation significant flora taxa within the study area (Figure 1 Appendix A). The desktop searches recorded:

- Twelve under the EPBC Act and/or as Threatened under the WC Act
- Three Priority 1 taxa
- Five Priority 2 taxa
- Thirteen Priority 3 taxa
- Twelve Priority 4 taxa.

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

3.6 Fauna

3.6.1 Fauna diversity

The *NatureMap* database identified 487 terrestrial vertebrate fauna species previously recorded within the study area. Of the 487 fauna species previously recorded, 470 are native species and 17 are naturalised (introduced) species.

The *NatureMap* database search is provided in Appendix C.

3.6.2 Conservation significant fauna

Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 47 conservation significance fauna within the study area. This total does not include those species that are exclusively marine as no marine habitat is present within the study area or indirectly impacted by the project.

4. Previous survey results

Table 7 outlines the results of two previous surveys that have been carried out within the Jandakot road reserve and surrounding private lots; Lot 11, 13 Falcon Place Jandakot Biological Assessment (GHD 2019), Level 1 Flora and Fauna Survey for the Widening of Jandakot Road (Eco Logical 2017).

Table 7 Previous survey results comparison

Item	Key findings ELA (2017)	Key findings GHD (2019)
Location	The ELA survey area comprised Jandakot Road Reserve and the following private lots: 7, 8, 20, 27, 44, 58, 72, 97, 120, 134, 135 and 103 Jandakot Road; and 8 and 13 Falcon Place.	Lot 11, 13 Falcon Place, Jandakot.
Flora diversity	40 flora taxa were identified over the surveyed area comprising 32 native and eight introduced taxa.	Sixty-one flora taxa were recorded over the surveyed area comprising 36 native and 25 introduced taxa.
Observed conservation significant flora	None detected.	None detected.
Observed Threatened or Priority Ecological Communities	The Banksia Woodlands of the Swan Coastal Plain TEC covered 18% of the surveyed road reserve and 80% of private lots surveyed.	No Commonwealth or State listed TECs or PECs were identified within the project area. This includes the Banksia Woodland of the Swan Coastal Plain detected by ELA (2017) in the surrounding areas.
Vegetation condition	Described as Degraded across private lots and ranging from Excellent to Good in some smaller areas. All vegetation surveyed along the road reserve was considered to be in Degraded condition.	Described as Degraded along the northern boundary due to historical clearing, edge-effects and lower native species diversity and Good for the remainder of the area at the time of the survey. A fire break runs along the eastern boundary which is cleared.
Fauna diversity	20 vertebrate fauna were detected during the survey comprising 16 bird, two reptile and two mammal (one native and one introduced) species.	14 fauna species were detected during the survey comprising of 12 birds and two mammals. Of these, both mammal species are introduced (rabbit and fox). All fauna species recorded are common and are known to occur in the Jandakot area.
Observed conservation significant fauna	The Quenda (Isoodoon oblesulus subsp. fusciventer) was the only conservation significant fauna observed during the survey.	None detected.

Item	Key findings ELA (2017)	Key findings GHD (2019)
Black cockatoo habitat	Five Eucalyptus camaldulensis trees (planted) were recorded as potentially suitable breeding trees for Black Cockatoos (all located on private lots). Approximately 3.28 ha of vegetation within the private properties and 0.5 ha of the road reserve was found to represent suitable foraging habitat for Black Cockatoos.	The project area lacks large emergents and Eucalyptus trees with DBH greater than 500 mm and therefore does not support actual or potential breeding habitat and roosting habitat for Black Cockatoos.

5. Survey results

5.1 Flora and vegetation

5.1.1 Vegetation types

Three vegetation types were identified and described in the survey area, not including revegetation, cleared areas such as roads, tracks and houses (Table 8 and Figure 4, Appendix A). The survey area is dominated by VT01 (28 %, 3.35 ha) *Banksia attenuata, Banksia menziesii* and *Eucalyptus marginata* subsp. *marginata* open woodland on grey sandy soil on plain. VT02 (6 %, 0.66 ha) *Melaleuca preissiana* and *Banksia ilicifolia* isolated trees to open woodland occurs on the south side of Jandakot Road with VT03 (3 %,0.38 ha) *Eucalyptus rudis* open woodland over *Melaleuca preissiana* low woodland occurring on the northern side of Jandakot road. A small area of the survey area is mature revegetation. Part of the survey area has been cleared for existing road, tracks and housing (61 %, 7.41 ha).

Floristic analysis

The similarity between the GHD quadrats from the 2019 spring survey were examined using PRIMER with all species recorded in the quadrats analysed based on presence/absence. The cluster analysis and resulting dendrogram showed VT01 quadrats (Jan01, Jan03 and Jan06) and VT02 quadrats (Jan04 and Jan05) grouped together had high similarity with each other.

The vegetation types were mapped using a combination of statistical analysis, dominant species, landforms and field observations.

The GHD quadrats were compared to the SWA dataset for sites within a 5 km buffer of the survey area to assist in FCT assignment. The similarity between GHD quadrat data and Gibson *et al.* (1994) was examined using PRIMER analysis using three scenarios:

- All species (base quadrat data)
- All species (FCT 5, FCT11, FCT21c, FCT22, FCT23a, FCT24 and FCT28 centred on Bassendean Sands quadrats only)
- Species that occur only once (singles) removed from each quadrat.

All species (base quadrat data) produced a stress value of 0.19 indicating a fair representation. The two dimensional MDS scatter plot for this scenario is illustrated in Plate 1. The MDS scatter plot shows GHD quadrats from VT01 grouping with FCT21c, FCT23a and FCT28 SWA quadrats, however, it is inconclusive on which FCT (21c, 23a or 28) has a stronger grouping.

Best matches were drawn from a combination of the statistical analysis and interpretation of FCT descriptions, dominant species and landform. Based on the presence of dominant species VT01 aligns with FCT23a Central *Banksia attenuata – B. menziesii* woodlands. Gibson *et al.* 1994 describes FCT23a as restricted to the Bassendean system and stretches from Bullsbrook to south of Woodman Point. Species richness is very high with an average of 62.8 species / plot recorded (Gibson et al. 1994). FCT23a is defined by the presence of such species as *Banksia attenuata, B. menziesii, Bossiaea eriocarpa, Gompholobium tomentosum, Pertrophile linearis, Scholtzia capitata, Burchardia congesta, Lyginia barbata and Patersonia occidentalis* that typically occur in > 75% of Gibson et al. quadrats and also occur in VT01 quadrats. Based on the presence of dominant species and land system VT01 aligns with FCT23a Central *Banksia attenuata – B. menziesii* woodlands.

VT02 grouped with high number of Gibson et al. quadrats with the resulting dendrogram being inconclusive. The cluster analysis shows VT02 quadrats (Jan04 and Jan05) clustered with

FCT5 Mixed shrub damplands quadrats. Gibson *et al.* 1994 describes FCT5 having dominants as *Banksia ilicifolia, Melaleuca preissiana* and *Kunzea glabrescens* and occurs on the Bassendean system. Based on the presence of dominant species VT02 aligns with FCT5 Mixed shrub damplands.

VT03 (Jan07) was not included in the FCT analysis as the analysis would likely not be conclusive due to the degraded condition of the vegetation and low native species diversity.

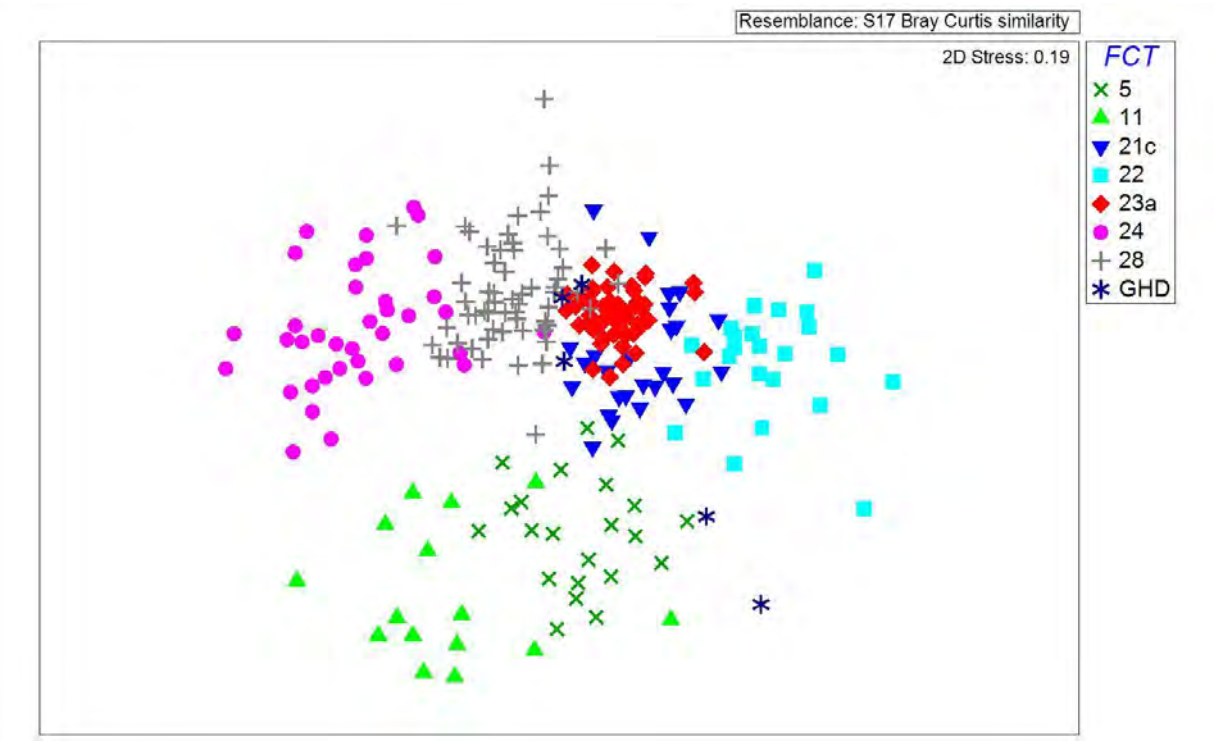


Plate 1 MDS showing GHD quadrats with SWA dataset

Table 8 Vegetation types within the survey area

Vegetation Types	Vegetation description	Landform and substrate	Extent within the survey area (ha)	Sample locations (quadrat/relevé) and FCT alignment	Representative photograph
VT01 (Described as BaBmLOW by Eco Logical 2017)	*Banksia attenuata, Banksia menziesii* and *Eucalyptus marginata* subsp. *marginata* open woodland over *Allocasuarina humilis* and *Acacia pulchella* var. *glaberrima* open shrubland over *Eremaea pauciflora* var. *pauciflora, Gompholobium tomentosum* and *Bossiaea eriocarpa* open low heath over *Mesomelaena pseudostygia* and *Desmocladus flexuosus* very open sedgeland and **Avena barbata* and **Ehrharta calycina* very open grassland over *Dasypogon bromeliifolius, *Ursinia anthemoides* subsp. *anthemoides* and **Gladiolus caryophyllaceus* very open herbland. Other common species include: *Eucalyptus todtiana*, *Nuytsia floribunda, Stirlingia latifolia, Hibbertia hypericoides* subsp. *hypericoides, Patersonia occidentalis, Laxmannia squarrosa* and *Scholtzia involucrata* (Eco Logical 2017)	Grey sandy plain with low rises	3.35 ha	Jan01, Jan03, Jan06 ELA01, ELA02, ELA03, ELA04, ELD04 (Eco Logical 2017) Represents *Banksia* woodlands of the Swan Coastal Plain (TEC) / *Banksia* Dominated Woodlands of the Swan Coastal Plain IBRA Region (PEC) FCT 23a Central *Banksia attenuata – B. menziesii* woodlands	

Vegetation Types	Vegetation description	Landform and substrate	Extent within the survey area (ha)	Sample locations (quadrat/relevé) and FCT alignment	Representative photograph
VT02 (Described as MpBi by GHD 2019)	*Melaleuca preissiana* and *Banksia ilicifolia* isolated trees to open woodland over *Kunzea glabrescens* and *Astartea scoparia* shrubland to sparse shrubland over *Lechenaultia floribunda, Boronia crenulata* subsp. *viminea* and *Hypocalymma angustifolium* heathland over **Avena barbata, *Vulpia myuros* and **Ehrharta calycina* isolated grasses over *Dasypogon bromeliifolius, Phlebocarya ciliata* and **Gladiolus caryophyllaceus* open forbland	Seasonal dampland with black peaty soil over clay	0.66 ha	Jan04, Jan05 Q1, Q2, Q3 (GHD 2018) FCT5 Mixed shrub damplands	
VT03 (ErMp)	*Eucalyptus rudis* open woodland over *Melaleuca preissiana* low woodland over **Acacia longifolia* subsp. *longifolia* and **Leptospermum laevigatum* open shrubland over **Ehrharta longiflora* and **Briza maxima* grassland	Seasonal dampland and low lying plain on grey sand	0.38 ha	Jan07 FCT analysis not undertake due to degraded condition	

Vegetation Types	Vegetation description	Landform and substrate	Extent within the survey area (ha)	Sample locations (quadrat/relevé) and FCT alignment	Representative photograph
Revegetation	Mature revegetation area of *Corymbia calophylla, Eucalyptus rudis, Agonis flexuosa* trees over introduced grasses	Grey sand plain	0.29 ha	Jan02	
Cleared areas	Nil	Nil	7.41	Nil	

5.1.2 Conservation significant ecological communities

Based on the results of the desktop searches, dominant species, landform features, field observations, and coupled with the statistical analyses, one conservation significant ecological communities was identified within the survey area (VT01); *Banksia* Woodlands of the Swan Coastal Plain TEC listed as Endangered under the EPBC Act / Priority 3 PEC by DBCA - *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region.

Banksia Woodlands of the Swan Coastal Plain (TEC)

The Banksia Woodlands of the Swan Coastal Plain was listed in September 2016 as an Endangered TEC under the EPBC Act. FCT23a Central *Banksia attenuata - Eucalyptus marginata* woodlands is considered a component of the *Banksia* Woodlands of the Swan Coastal Plain Commonwealth TEC (TSSC 2016). FCT23a is not listed under the BC Act as a TEC. This patch occurs over 3.35 ha within the survey area with the TEC extent mapped in Figure 4 , Appendix A. The TSSC (2016) provides guidance for determining whether the TEC is present including key diagnostic characteristics. VT01 was assessed as meeting the key diagnostic characteristics for the *Banksia* Woodlands of the SCP TEC. Table 9 provides the key diagnostic assessment results for VT01.

Table 9 Banksia woodlands of the Swan Coastal Plain TEC key diagnostic characteristics

Key Diagnostic Characteristics	Survey Area
Landform and soils	
Primarily occurs in the Swan Coastal Plain IBRA bioregion.	Located on the Swan Coastal Plain bioregion.
Typically occurs on Bassendean and Spearwood sands.	Located on Bassendean sands on uplands that are well drained.
Community Structure	
• A distinctive upper sclerophyllous layer of low trees typically dominated or co--dominated by one or more of the *Banksia* species identified below.	VT01 is dominated in the upper layer by *Banksia Banksia attenuata* and *B. menziesii* as open woodland.
• Emergent trees of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may sometimes be present above the *Banksia* canopy.	Occasionally *Eucalyptus marginata* is emergent at >10 m in height.
• An often highly species-rich understorey that consists of layers of sclerophyllous shrubs and a herbaceous ground layer of cord rushes and sedges.	Native understorey between 20-80% cover with an average of 27 taxa per quadrat, species diversity ranged from 9 to 50.
Composition	
The patch must include at least one of the following diagnostic species: • *Banksia attenuata* (candlestick banksia) • *Banksia menziesii* (firewood banksia) • *Banksia prionotes* (acorn banksia) • *Banksia ilicifolia* (holly-leaved banksia).	*Banksia attenuata* and *B. menziesii* is present.

Key Diagnostic Characteristics	Survey Area
If present, the emergent tree layer often includes *Corymbia calophylla* (marri), *Eucalyptus marginata* (jarrah), or less commonly E. *gomphocephala* (Tuart).	Occasionally *Eucalyptus marginata* is emergent at >10 m in height.
Other trees of a medium height that may be present, and may be co-dominant with the *Banksia* species across a patch.	*Nuytsia floribunda* (Western Australian Christmas tree) are present.
Weed cover (%) and dominant weed species.	Average 2%-20% weed species cover, **Ursinia anthemoides*, **Hypochaeris glabra, **Ehrharta longiflora* and **Ehrharta calycina.*
Condition threshold	
To be considered as part of the TEC, a patch must be in Good or better condition: • Pristine (zero/ almost no weeds) – no minimum patch size applies • Excellent (<10% weed cover) – 0.5 ha • Very Good (5-20% weed cover) – 1 ha • Good (5-50% weed cover) – 2 ha.	VT01 occurs over 3.35 ha within the survey area with the vegetation condition mapped as: • Completely Degraded: 0.22 ha • Degraded: 0.59 ha • Good: 1.40 ha • Very Good: 1.15 ha. As the patch is continuous outside the survey area to the south and contains areas in at least Very Good condition it therefore meets the condition threshold.
Patch Size	
A patch is a discrete and mostly continuous area of the TEC. A patch may include small-scale (<30 m) variations, gaps and disturbances (e.g tracks, paths or breaks). A break in native vegetation cover (e.g. permanent structures, wide roads, water bodies >30m wide), from the edge of the tree canopy >30 m, indicates a separate patch	The survey area contains one patch as the gap for Jandakot road is less than 20 m. The patch also is continuous outside of the survey area to the south with no gap in vegetation cover and is in Good-Very Good condition.

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. Similar to the TEC, this PEC was associated with VT01. This PEC differs from the TEC in that it has no minimum condition or patch size thresholds.

5.1.3 Vegetation condition

The condition of the vegetation within the survey area ranged from Very Good to Completely Degraded. The extents of the vegetation condition within the survey area are detailed in Table 10 and mapped in Figure 5, Appendix A.

A large proportion of the survey area is in Completely Degraded, which includes cleared areas (7.67 ha, 64 %). Other disturbance factors include weed invasion, grazing impacts (including rabbits) and proliferation of informal tracks/firebreaks. Vegetation in Very Good condition (1.34 ha, 11 %) was represented by VT01 and VT02, with intact native species structure, high diversity and low cover of introduced species.

Table 10 Vegetation condition ratings within the survey area

Vegetation Condition	Extent in the survey area (ha) (%)
Completely Degraded (inc. cleared)	7.67 ha (64 %)
Degraded	1.14 ha (10.3 %)
Good	1.83 ha (15 %)
Very Good	1.34 ha (11 %)

5.1.4 Flora diversity

One hundred and forty four flora taxa (including subspecies and varieties) representing 43 families and 111 genera were recorded from the survey area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys. This total comprised 95 native taxa and 49 introduced flora taxa.

Dominant families recorded from the survey area included:

- Myrtaceae (27 taxa)
- Fabaceae (22 taxa)
- Poaceae (13 taxa each).

Based on described GHD quadrats from the spring 2019 survey, species diversity ranged from 9 to 50 (average 27) taxa per 1,000 m².

The full list of flora identified within the survey area complied by quadrat and species inventory by family is provided in Appendix D.

5.1.5 Introduced flora

Forty nine introduced flora species were recorded from the survey area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys. No introduced flora species recorded are listed as Declared Pests under the *Biosecurity and Management Act 2007* or WoNS. All introduced flora species recorded are considered environmental weeds and all have been previously recorded on the Swan Coastal Plain and in the City of Cockburn.

5.1.6 Conservation significant flora

No EPBC Act or BC Act listed flora or Priority listed flora by the DBCA were recorded within the survey area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys.

Likelihood of Occurrence assessment

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.

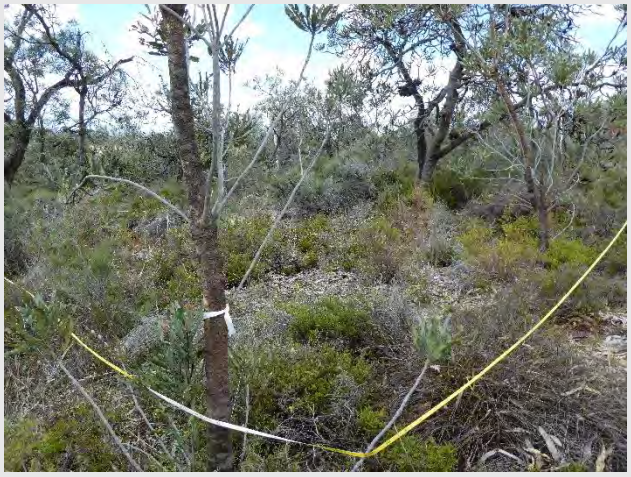
The likelihood of occurrence assessment post-field survey concluded that all species are considered highly unlikely to unlikely to occur in the survey area post survey.

5.2 Fauna

5.2.1 Fauna habitat

Four broad fauna habitat types have been identified within the survey area, not including cleared areas such as roads, tracks and houses. These habitat types closely align with the vegetation types described in section 5.1.1. The fauna habitats recorded in the survey area are described in Table 11.

Table 11 Fauna habitat types with the survey area

Fauna habitat	Representative photograph
Banksia/Eucalypt open woodland This habitat type is associated with the grey sandplain and low rises and consists of *Banksia attenuata, Banksia menziesii* and *Eucalyptus marginata* subsp. *marginata* open woodland over mixed shrubs, sedges, annuals and grasses. This habitat type contains good structural diversity and a variety of micro-habitat types including patches of thick leaf litter, fallen logs and branches. This habitat type aligns with VT01. Provides likely habitat for conservation listed species Black Cockatoo, Western Brush Wallaby, Quenda, Perth Slider and Black-striped snake. High foraging value for Forest Red-tailed and Carnaby's Black Cockatoo (Groom 2011). 3.35 ha	
Melaleuca dampland with shrubland This habitat type is associated with winter wet damplands dominated by *Melaleuca preissiana* and *Banksia ilicifolia* isolated trees to open woodland over shrubs, herbs and grasses. The dominant soil type was peaty black soil with seasonal waterlogging providing habitat for amphibians, which may burrow during the dryer months. This habitat type aligns with VT02. Provides likely habitat for conservation listed species Western Brush Wallaby and Quenda.	

Fauna habitat	Representative photograph
Low foraging value Forest Red-tailed and Carnaby's Black Cockatoo (Groom 2011). 0.66 ha	
***Eucalyptus rudis* open woodland over Melaleuca dampland** This habitat type is associated with winter wet damplands dominated by *Melaleuca preissiana* with Flooded Gum (*Eucalyptus rudis*) open woodland over shrubs, herbs and grasses. The dominant soil type was peaty black soil and grey sandy loam with seasonal waterlogging providing habitat for amphibians, which may burrow during the dryer months. This habitat type aligns with VT03. Provides likely habitat for conservation listed species Black Cockatoo, Western Brush Wallaby and Quenda. Low foraging value Forest Red-tailed and Carnaby's Black Cockatoo (Groom 2011). 0.38 ha	
Revegetation This habitat type consists of mature rehabilitated sand plain of *Eucalyptus, Corymbia* and *Agonis* over introduced grasses. This habitat type aligns with VT04. Provides likely habitat for conservation listed species Black Cockatoo, Western Brush Wallaby and Quenda. High foraging value for Forest Red-tailed and Carnaby's Black Cockatoo (Groom 2011). 0.29 ha	

Fauna habitat	Representative photograph
Cleared areas 7.41 ha	

5.2.2 Fauna diversity

During the survey a total of 28 fauna species, including 22 birds and four mammals and two reptiles were recorded area during this current spring 2019 survey and from GHD (2019) and Eco Logical (2017) field surveys. Of these, three mammal species are introduced (rabbit, cat and fox). A full list of fauna recorded during the survey is provided in Appendix E.

5.2.3 Conservation significant fauna

Three conservation significant fauna species were recorded within the survey area through presence of suitable habitat and/or signs of presence. These included:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the BC Act and Endangered under the EPBC Act
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the BC Act and Vulnerable under the EPBC Act
- Southern Brown Bandicoot (*Isoodon fusciventer*) – listed as P4 by DBCA.

Likelihood of occurrence assessment

GHD undertook a likelihood of occurrence assessment post-survey of all conservation significant fauna species identified in the desktop assessment. This assessment took into account previous records, species biology and habitat requirements. The likelihood of occurrence assessment concluded that three species are likely to occur and the remaining 41 species are unlikely or highly unlikely to occur within the project footprint (Appendix E). Due to the proximity of the project area to large wetlands such as Forrestdale and Thompsons Lakes (RAMSAR wetland) many species of migratory birds listed under the EPBC Act have been identified as occurring locally from the database searches, even though the project area lacks suitable large permenant wetland habitat for these birds.

The three species considered likely to occur include:

- Western Brush Wallaby (*Notamacropus Irma*) – Priority 4 (DBCA listed)
- Perth Slider (*Lerista lineata*) – Priority 3 (DBCA listed)

- Black-striped Snake (*Neelaps calonotos)* – Priority 3 (DBCA listed).

Western Brush Wallaby, Perth Slider and Black-striped Snake are still considered likely to occur within the survey area. Although not detected during the survey, and no direct evidence was found to support their current use of the survey area, the habitat is still considered suitable to support these species. No species of conservation significance are likely to be solely dependent on the habitat present within the survey area.

Targeted Black Cockatoo Habitat Assessment

Two species of Black Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo foraging habitats were recorded during the survey.

Carnaby's Cockatoo is endemic to the south-west of Western Australia with a wide-spread distribution. Carnaby's Cockatoo nest in hollows of live or dead eucalypts, primarily smooth-barked Salmon Gum and Wandoo (Saunders 1979, 1982) though breeding has been reported in other wheatbelt tree species and some tree species on the Swan Coastal Plain and jarrah forest (Saunders 1979, 1982; Storr 1991; Johnstone and Storr 2004). Success in breeding is dependent on the quality and proximity of feeding habitat within 12 km of nesting sites (Saunders 1977, 1986; Saunders and Ingram 1987). Along with the trees that provide nest hollows, the protection, management and increase of this feeding habitat that supports the breeding of Carnaby's Cockatoo is a critical requirement for the conservation of the species.

The Forest Red-tailed Black Cockatoo is endemic to the south-west humid and sub-humid zones of Western Australia (Mawson and Johnstone 1997). It inhabits the dense Jarrah, Karri (*E. diversicolor*) and Marri forests receiving more than 600 mm of annual average rainfall. The current distribution is north of Perth and east to Mount Helena, Christmas Tree Well, North Banister, Mt Saddleback, Rocky Gully and the upper King River (Johnstone 1997). More recently the species has been utilising and persisting on the northern portions of the Swan Coastal Plain and is now considered a regular sighting (Johnstone et al 2017). Habitats in which the Forest Red-tailed Black Cockatoo occurs at Bungendore Park and Jarrahdale, have an understorey of Bull Banksia (*Banksia grandis)*, Snottygobble (*Persoonia longifolia)*, Sheoak (*Allocasuarina fraseriana)* and *Banksia* spp., with scattered Blackbutt (*E. patens)* and Wandoo (*E. wandoo)* (Johnstone and Kirkby 1999). The Forest Red-tailed Black Cockatoo roosts in Jarrah-Marri-Blackbutt habitat on road-sides, paddocks or forest blocks. While the Forest Red-tailed Black Cockatoo feeds on the seeds of other species, around 90 per cent of its diet is made up of the seeds from Marri and Jarrah fruits.

High value foraging habitat was recorded for the Banksia/Eucalypt open woodland and revegetation fauna habitat types for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. Low value foraging habitat was recorded for the Melaleuca dampland with shrubland and Eucalyptus rudis open woodland over Melaleuca dampland fauna habitat types.

A total of 14 potential breeding habitat trees with DBH greater than 500 mm were recorded from the survey area. No hollows suitable for black cockatoo use were observed from the ground based assessment. The habitat tree DBH and species name data is presented in Appendix E.

Black cockatoo foraging habitat value for each fauna habitat type is presented in Figure 7.

Quenda/Southern Brown Bandicoot (*Isoodon obesulus fusciventer*)

The Quenda, or Southern Brown Bandicoot, is listed as a Priority 4 by the DBCA. This species is widely distributed in the south west of the state from Guilderton, north of Perth, to east of Esperance. They are patchily distributed through the Swan Coastal Plain where they are often associated with wetlands. Quenda inhabit scrubby, often swampy, vegetation with dense cover up to 1 m high and often feed in adjacent forest and woodland (Van Dyck and Strahan, 2008).

Suspected diggings were observed in the survey area (Plate 2). All four fauna habitat types are suitable for utilisation by Quenda, with wetland and shrubland habitats preferred. The Banksia woodlands provide some suitable habitat for Quenda, particularly areas with a dense understorey.

Plate 2 Potential Quenda digging

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Appendices

Appendix A - Figures

Figure 1 Locality

Figure 2 Ecological constraints

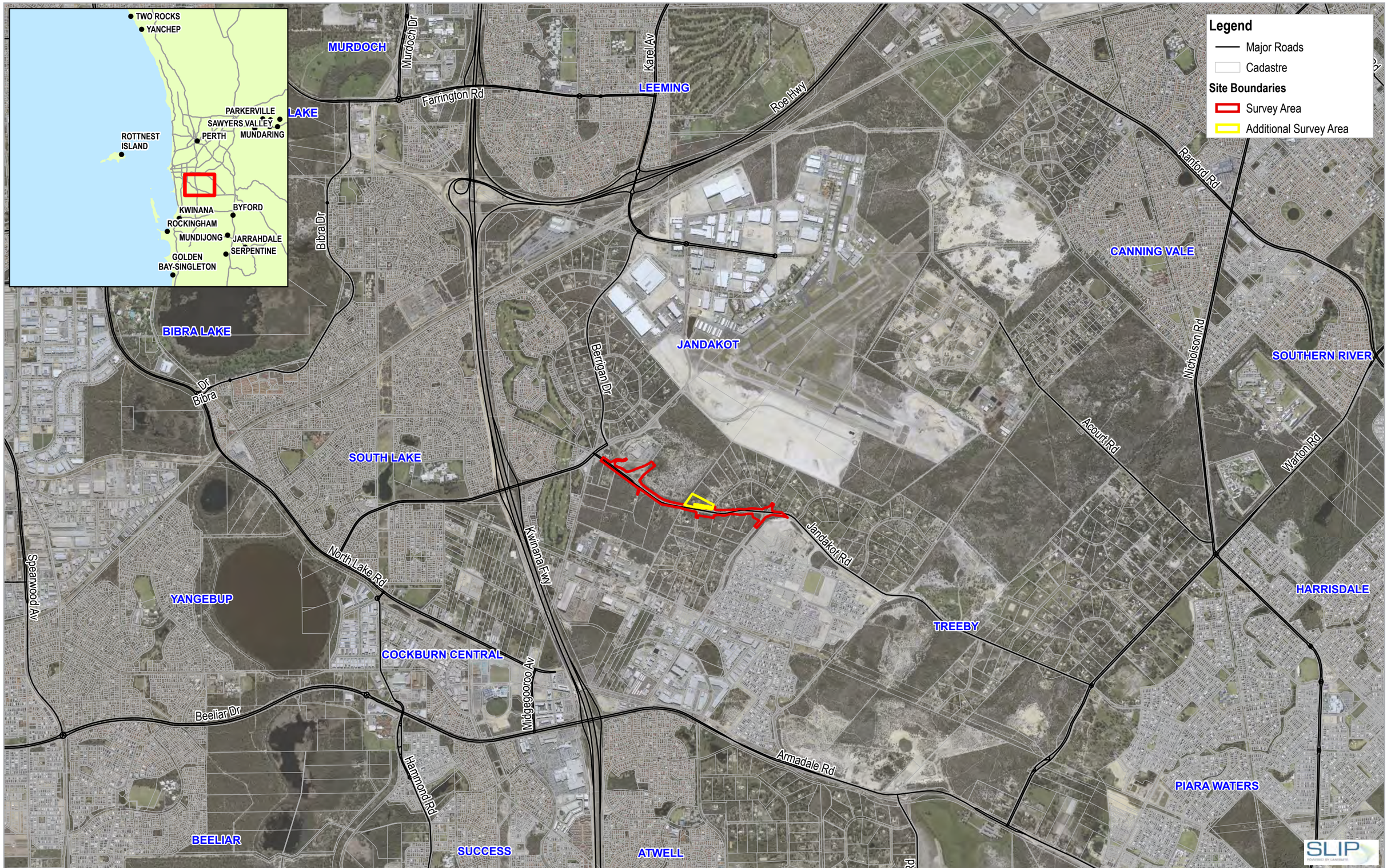
Figure 3 Survey methods

Figure 4 Vegetation type

Figure 5 Vegetation condition

Figure 6 Fauna habitats

Figure 7 Black cockatoo habitat



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N

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Locality Map

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 1

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Print date: 16 Dec 2019 - 15:43

Data source: GHD: Survey Area, Additional Survey Area - 20191203; Landgate: Cadastre, Main Roads, Localities - 20191203, Imagery - August 2019. Created by: bmorgan

Legend

DBCA flora Database search

- Threatened Species (T)
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Other Specially Protected Species (OS)
- Priority 1 (P1)
- Priority 3 (P3)
- Priority 4 (P4)
- Vulnerable Species (VU)

Fauna Conservation Categories

- Critically endangered species (CR) Protected under International Agreement (IA)
- Endangered Species (EN)
- Migratory Species Protected under International Agreement (IA)

TEC/PEC

- Priority Ecological Community

Site Boundaries

- Survey Area
- Additional Survey Area

Paper Size ISO A3

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Metres

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

N

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Ecological Constraints

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 2

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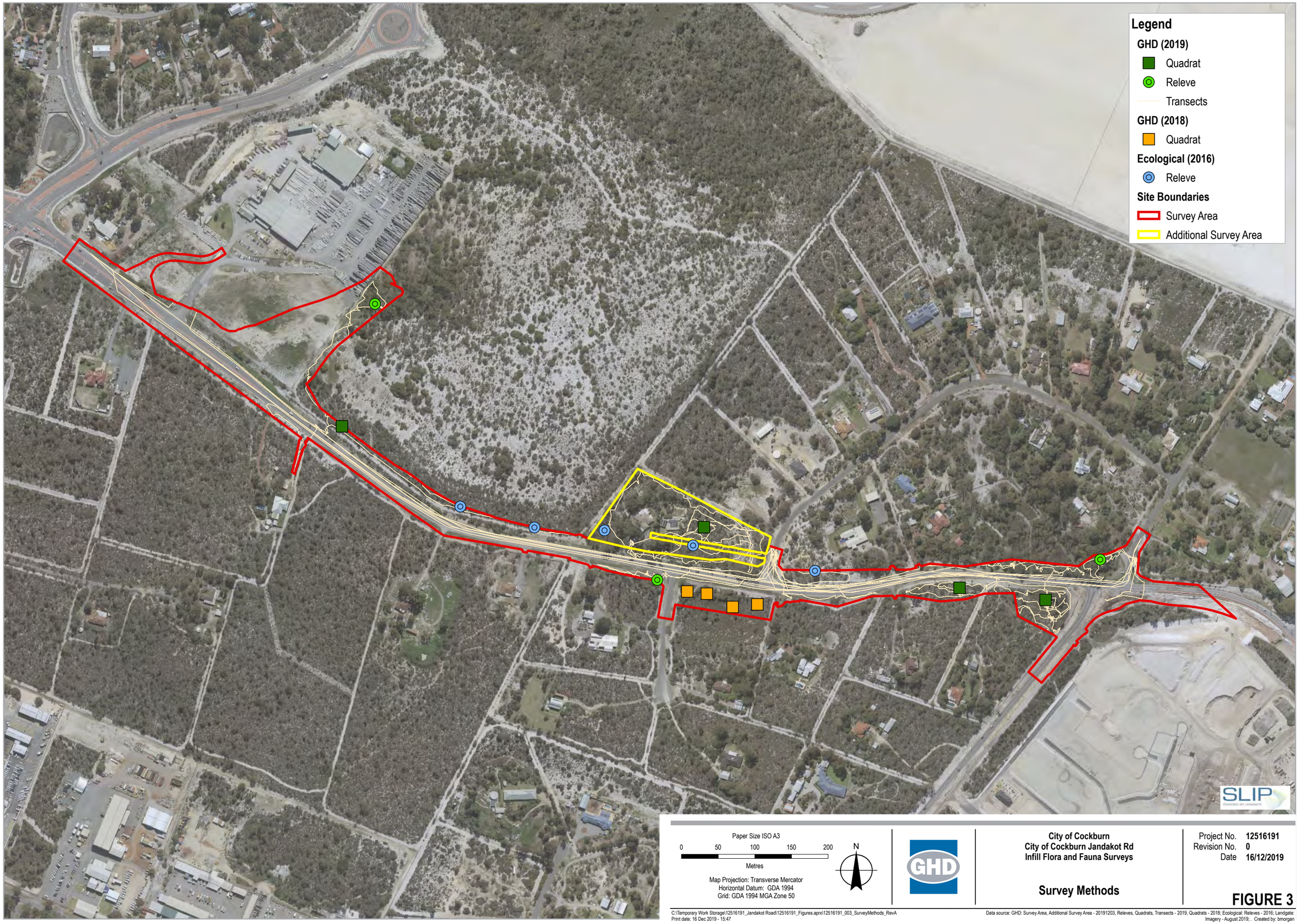
Data source: GHD: Survey Area, Additional Survey Area - 20191203; Landgate: Imagery - August 2019; DBCA: Priority Flora, Priority Fauna, TEC/PEC - 20191115.
Created by: bmorgan



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

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Survey Methods

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 3

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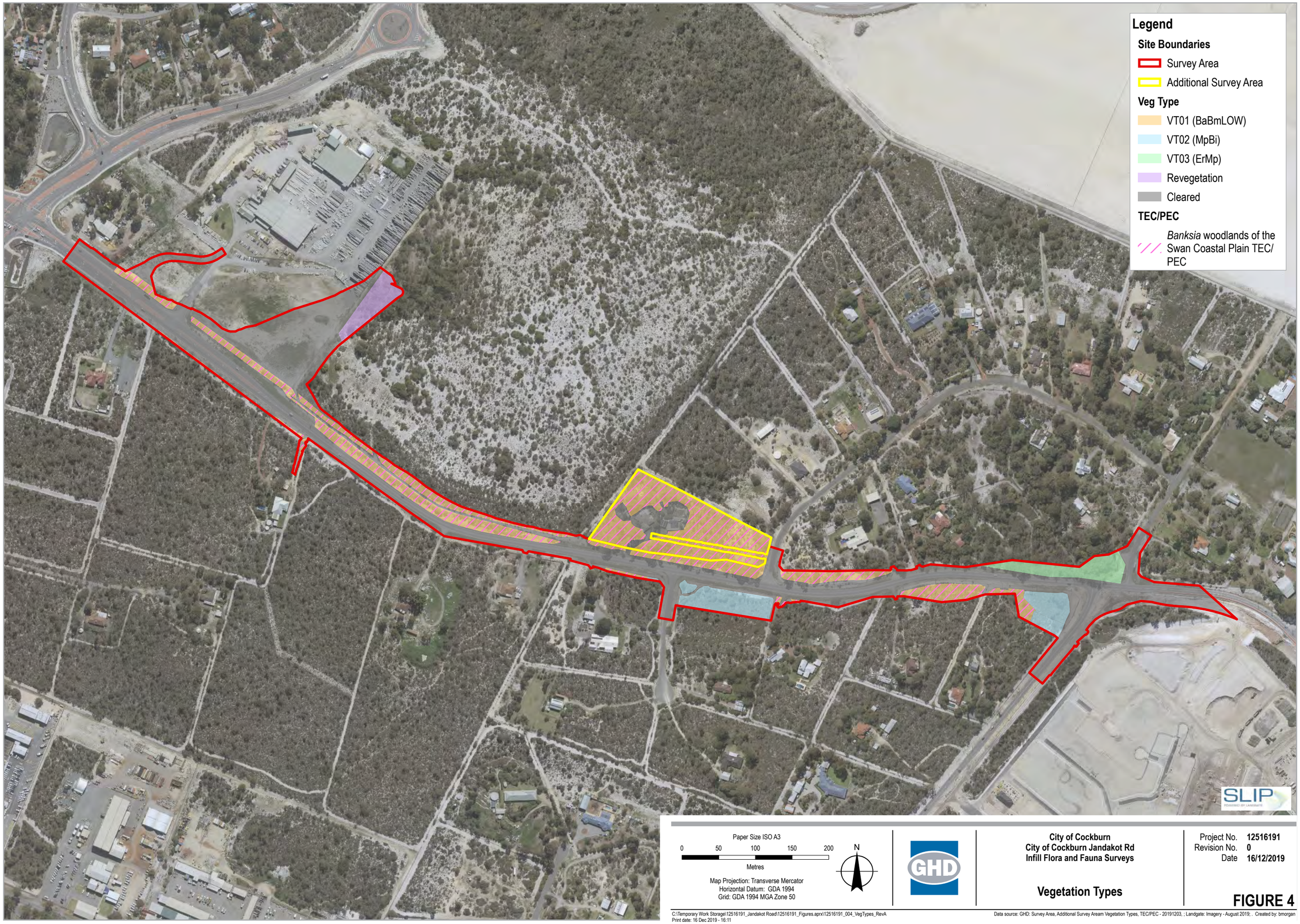
Data source: GHD: Survey Area, Additional Survey Area - 20191203, Releves, Quadrats, Transects - 2019, Quadrats - 2018; Ecological: Releves - 2016; Landgate: Imagery - August 2019; . Created by: bmorgan



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

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Vegetation Types

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 4

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Data source: GHD: Survey Area, Additional Survey Aream Vegetation Types, TEC/PEC - 20191203, ; Landgate: Imagery - August 2019; . Created by: bmorgan

Paper Size ISO A3

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Metres

N

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

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Vegetation Condition

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 5

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Data source: GHD: Survey Area, Additional Survey Area, Vegetation Condition ; Landgate: Imagery - August 2019; . Created by: bmorgan

Paper Size ISO A3

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Metres

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

N

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Fauna Habitats

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 6

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Data source: GHD: Survey Area, Additional Survey Area, Fauna Habitats - 20191203, ; Landgate: Imagery - August 2019; . Created by: bmorgan

Paper Size ISO A3

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Metres

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

N

GHD

City of Cockburn
City of Cockburn Jandakot Rd
Infill Flora and Fauna Surveys

Black Cockatoo Habitat

Project No. **12516191**
Revision No. **0**
Date **16/12/2019**

FIGURE 7

C:\Temporary Work Storage\12516191_Jandakot Road\12516191_Figures.aprx\12516191_007_BCHabitats_RevA
Print date: 16 Dec 2019 - 16:15

Data source: GHD: Survey Area, Additional Survey Area, Fauna Habitats - 20191203, ; Landgate: Imagery - August 2019; . Created by: bmorgan

Appendix B - Key legislation and guidelines, 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 (DEE).

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 Water and Environment Regulation (DWER) 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 DWER, 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.

State Wildlife Conservation Act 1950

The WC Act provides for the conservation and protection of wildlife. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA) 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 Primary Industries and Regional Development (DPIRD) 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.

DPIRD 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 *Australian Heritage Commission Act 1975* 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 *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002*.
The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) applies.
Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

Reserves and conservation areas

Bush Forever

Bush Forever, which was released in December 2000 and proclaimed in 2010, is a Government initiate 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 Biodiversity, Conservation and Attractions managed lands and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional parks, nature reserves, State forest and timber reserves. DBCA managed conservation estate, is vested with the Conservation Commission of Western Australia. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed land use

changes and development proposals that abut DBCA managed lands will generally be referred to DBCA 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” (DEE 2018b). 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” (DEE 2018b).

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 (DEE 2018a):

- 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

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 (2018), 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.

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 2016a). 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.
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 DBCA 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 DBCA 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 DBCA

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤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.
Priority 2	Poorly known ecological communities. 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.
Priority 3	Poorly known ecological communities. (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Category	Description
Priority 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016b) 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 DEE 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 DBCA 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 DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	Poorly-known taxa Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	Poorly-known taxa Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

Priority 3	Poorly-known taxa Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	Rare, Near Threatened and other taxa in need of monitoring 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. 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. C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.

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 (2016b) 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 2010).

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 socioeconomic 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.

Appendix C – Desktop searches

EPBC Act PMST (5 km)

DBCA Naturemap Flora Report (5 km)

DBCA Naturemap Fauna Report (5 km)

Australian Government
Department of the Environment and Energy

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.

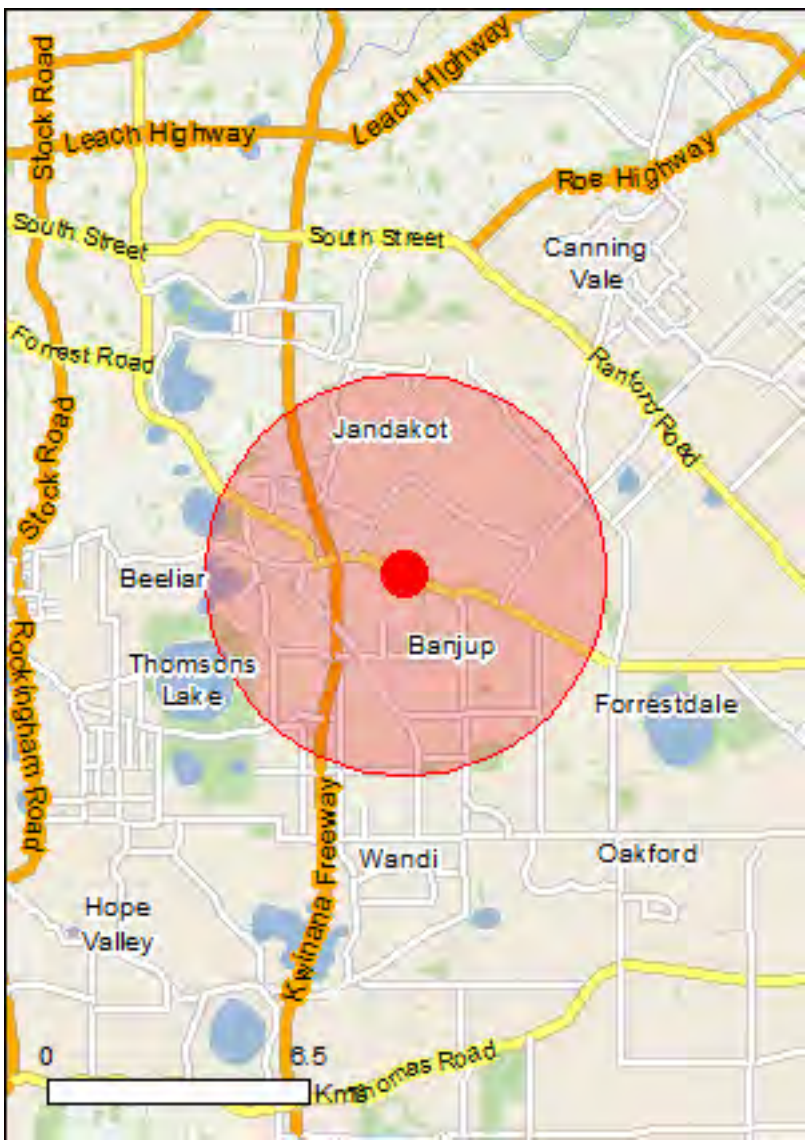
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 17/10/19 15:11:30

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

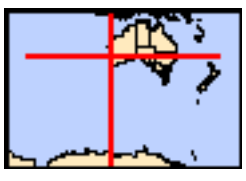
Caveat
Acknowledgements



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

Coordinates

Buffer: 5.0Km



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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	24
Listed Migratory Species:	17

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:	26
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	41
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within Ramsar site

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
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Insects		
Neopasiphae simplicior A native bee [66821]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	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
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to 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
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known 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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to 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
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Gibbs Road	WA
Harry Waring Marsupial Reserve	WA
Piara	WA
Thomsons Lake	WA
Unnamed WA49561	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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur 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
Turdus merula Common Blackbird, Eurasian Blackbird [596]		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
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
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
Asparagus plumosus Climbing Asparagus-fern [48993]		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 habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may 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
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
		habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
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
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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
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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
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		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

Nationally Important Wetlands [Resource Information]

Name	State
Gibbs Road Swamp System	WA
Thomsons Lake	WA

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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

-32.13046 115.87552

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
-Department of Land and Resource Management, Northern Territory
-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, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-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.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap CS Fauna Report

Created By Guest user on 17/10/2019

Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'By Circle'
Centre 115° 51' 52" E,32° 06' 36" S
Buffer 5km
Group By Species Group

Species Group	Species	Records
Bird	30	1300
Invertebrate	4	11
Mammal	4	178
Reptile	2	47
TOTAL	**40**	**1536**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Bird					
1.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
2.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
3.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
4.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
5.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
6.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
7.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
8.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
9.	24790	*Calidris tenuirostris (Great Knot)*		T	
10.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
11.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
12.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
13.	25574	*Charadrius dubius (Little Ringed Plover)*		IA	
14.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
15.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
16.	24791	*Gallinago hardwickii (Latham's Snipe, Japanese snipe)*		IA	
17.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
18.	47975	*Ixobrychus dubius (Australian Little Bittern)*		P4	
19.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
20.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
21.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
22.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
23.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
24.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
25.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
26.	48237	*Rostratula australis (Australian Painted Snipe)*		T	
27.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
28.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
29.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
30.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
Invertebrate					
31.	48935	*Idiosoma sigillatum (Swan Coastal Plain shield-backed trapdoor spider)*		P3	
32.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
33.	33994	*Throscodectes xiphos (Stylet Bush Cricket, Stylet Throsco (Jandakot))*		P1	Y
34.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Mammal					
35.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
36.	24146	*Myrmecobius fasciatus (Numbat, Walpurti)*		T	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
37.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
38.	24145	*Setonix brachyurus (Quokka)*		T	

Reptile

39.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
40.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	

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 wholely 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 CS Flora Report

Created By Guest user on 17/10/2019

Conservation Status	Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only	Yes
Core Datasets Only	Yes
Species Group	All Plants
Method	'By Circle'
Centre	115° 51' 52" E,32° 06' 36" S
Buffer	5km
Group By	Family

Family	Species	Records
Celastraceae	1	3
Cyperaceae	1	1
Ericaceae	1	5
Fabaceae	2	2
Goodeniaceae	1	3
Haemodoraceae	1	1
Orchidaceae	5	43
Phyllanthaceae	1	1
Sapindaceae	1	10
Stylidiaceae	2	2
TOTAL	**16**	**71**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Celastraceae					
1.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
Cyperaceae					
2.	16245	*Cyathochaeta teretifolia*		P3	
Ericaceae					
3.	48297	*Styphelia filifolia*		P3	
Fabaceae					
4.	14932	*Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)*		P1	
5.	20462	*Jacksonia gracillima*		P3	
Goodeniaceae					
6.	7485	*Dampiera triloba*		P3	
Haemodoraceae					
7.	11557	*Phlebocarya pilosissima subsp. pilosissima*		P3	
Orchidaceae					
8.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
9.	10796	*Diuris drummondii (Tall Donkey Orchid)*		T	
10.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
11.	33742	*Microtis quadrata*		P4	
12.	1717	*Thelymitra variegata (Queen of Sheba)*		P2	
Phyllanthaceae					
13.	42022	*Poranthera moorokatta*		P2	
Sapindaceae					
14.	4763	*Dodonaea hackettiana (Hackett's Hopbush)*		P4	
Stylidiaceae					
15.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
16.	25800	*Stylidium paludicola*		P3	

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

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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.

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NatureMap Flora Report

Created By Guest user on 17/10/2019

Current Names Only Yes
Core Datasets Only Yes
Species Group All Plants
Method 'By Circle'
Centre 115° 51' 52" E,32° 06' 36" S
Buffer 5km
Group By Family

Family	Species	Records
Aizoaceae	3	28
Amaranthaceae	6	18
Anarthriaceae	3	60
Apiaceae	8	82
Araceae	2	4
Araliaceae	2	61
Asparagaceae	37	456
Asphodelaceae	1	1
Asteraceae	55	382
Boraginaceae	1	1
Brassicaceae	4	5
Bryaceae	1	2
Campanulaceae	10	89
Caryophyllaceae	7	47
Casuarinaceae	3	45
Celastraceae	2	4
Centrolepidaceae	3	23
Chenopodiaceae	2	3
Colchicaceae	1	64
Convolvulaceae	1	1
Crassulaceae	4	42
Cyperaceae	36	225
Dasypogonaceae	2	54
Dicranaceae	2	3
Dilleniaceae	9	118
Droseraceae	13	85
Elaeocarpaceae	2	11
Elatinaceae	1	1
Ericaceae	19	169
Euphorbiaceae	3	3
Fabaceae	63	467
Geraniaceae	4	15
Goodeniaceae	8	58
Haemodoraceae	30	231
Haloragaceae	4	24
Hemerocallidaceae	8	87
Hydrocharitaceae	1	1
Iridaceae	11	179
Juncaceae	3	18
Juncaginaceae	1	2
Lamiaceae	6	20
Loganiaceae	1	8
Lophocoleaceae	1	1
Loranthaceae	1	28
Lycopodiaceae	1	1
Macarthuriaceae	2	15
Marchantiaceae	1	1
Menyanthaceae	2	2
Montiaceae	5	28
Myrtaceae	52	493
Onagraceae	6	10
Orchidaceae	60	314
Orobanchaceae	3	4
Oxalidaceae	1	2
Papaveraceae	2	4
Phyllanthaceae	4	25
Pittosporaceae	1	1
Poaceae	43	395
Polygalaceae	1	1
Polygonaceae	4	6
Potamogetonaceae	1	1
Pottiaceae	1	1
Primulaceae	2	27
Proteaceae	17	355
Restionaceae	8	107
Rhamnaceae	2	4
Rubiaceae	3	28
Rutaceae	5	43
Salviniaceae	2	3
Santalaceae	3	4
Sapindaceae	1	10
Scrophulariaceae	2	2
Selaginellaceae	1	1
Solanaceae	4	11
Stylidiaceae	17	127

Thymelaeaceae	6	11
Typhaceae	1	2
Violaceae	1	1
Xanthorrhoeaceae	7	55
Zamiaceae	2	31
Zygophyllaceae	1	2
TOTAL	**660**	**5354**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Aizoaceae					
1.	48513	*Aizoon pubescens*	Y		
2.	2794	*Carpobrotus aequilaterus (Angular Pigface)*	Y		
3.	2795	*Carpobrotus edulis (Hottentot Fig)*	Y		
Amaranthaceae					
4.	2652	*Alternanthera nodiflora (Common Joyweed)*			
5.	2656	*Amaranthus caudatus (Love Lies Bleeding)*	Y		
6.	2718	*Ptilotus drummondii (Narrowleaf Mulla Mulla)*			
7.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
8.	2742	*Ptilotus manglesii (Pom Poms, Mulamula)*			
9.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
Anarthriaceae					
10.	1097	*Lyginia barbata*			
11.		*Lyginia barbata/imberbis*			
12.	18049	*Lyginia imberbis*			
Apiaceae					
13.	6214	*Centella asiatica*			
14.	6218	*Daucus glochidiatus (Australian Carrot)*			
15.	6219	*Eryngium pinnatifidum (Blue Devils)*			
16.	15446	*Eryngium pinnatifidum subsp. pinnatifidum*			
17.	6222	*Homalosciadium homalocarpum*			
18.	6249	*Platysace compressa (Tapeworm Plant)*			
19.	6253	*Platysace filiformis*			
20.	6289	*Xanthosia huegelii*			
Araceae					
21.	1051	*Lemna disperma (Duckweed)*			
22.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
Araliaceae					
23.	6240	*Hydrocotyle scutellifera*			
24.	6280	*Trachymene pilosa (Native Parsnip)*			
Asparagaceae					
25.		*?Asparagus asparagoides*			Y
26.		*?Lomandra sp.*			
27.		*?Sowerbaea laxiflora*			
28.	20752	*Asparagus aethiopicus*	Y		
29.	8779	*Asparagus asparagoides (Bridal Creeper)*	Y		
30.	1287	*Dichopogon capillipes*			
31.	13562	*Lachenalia aloides*	Y		
32.	1370	*Lachenalia reflexa*	Y		
33.	1307	*Laxmannia ramosa (Branching Lily)*			
34.	11911	*Laxmannia ramosa subsp. ramosa*			
35.		*Laxmannia sp.*			
36.	1309	*Laxmannia squarrosa*			
37.		*Lomandra ?caespitosa*			
38.		*Lomandra ?nigricans*			
39.		*Lomandra ?preissii*			
40.		*Lomandra ?suaveolens*			Y
41.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
42.		*Lomandra caespitosa/suaveolens*			Y
43.	1228	*Lomandra hermaphrodita*			
44.	14542	*Lomandra micrantha subsp. micrantha*			
45.	1234	*Lomandra nigricans*			
46.	1236	*Lomandra odora (Tiered Matrush)*			
47.	1239	*Lomandra preissii*			
48.		*Lomandra sp.*			
49.	1246	*Lomandra suaveolens*			
50.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
51.		*Thysanotus ?manglesianus/patersonii complex*			Y
52.		*Thysanotus ?thyrsoideus*			
53.	1318	*Thysanotus arbuscula*			
54.	1319	*Thysanotus arenarius*			
55.	1338	*Thysanotus manglesianus (Fringed Lily)*			
56.		*Thysanotus manglesianus/patersonii complex*			
57.	1343	*Thysanotus patersonii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
58.		*Thysanotus sp.*			
59.	1351	*Thysanotus sparteus*			
60.	1357	*Thysanotus thyrsoideus*			
61.	1358	*Thysanotus triandrus*			
Asphodelaceae					
62.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
Asteraceae					
63.		*?Conyza bonariensis*			
64.		*?Lactuca serriola*			
65.		*?Monoculus monstrosus*			Y
66.		*?Podotheca sp.*			Y
67.		*?Rhodanthe citrina*			
68.		*?Urospermum picroides*			
69.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
70.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
71.	7867	*Brachyscome bellidioides*			
72.	7878	*Brachyscome iberidifolia*			
73.	7909	*Carduus pycnocephalus (Slender Thistle)*	Y		
74.	7925	*Chondrilla juncea (Skeleton Weed)*	Y		
75.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
76.		*Conyza ?bonariensis*			
77.	7939	*Conyza bonariensis (Flaxleaf Fleabane)*	Y		
78.		*Conyza sp.*			
79.	20074	*Conyza sumatrensis*	Y		
80.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
81.	7961	*Dittrichia graveolens (Stinkwort)*	Y		
82.	15137	*Euchiton sphaericus*			
83.	20247	*Gamochaeta calviceps*	Y		
84.	19195	*Gamochaeta pensylvanica*	Y		
85.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
86.	8092	*Ixiolaena viscosa (Sticky Ixiolaena)*			
87.	8096	*Lactuca serriola (Prickly Lettuce)*	Y		
88.	18585	*Lagenophora huegelii*			
89.	44490	*Leontodon rhagadioloides*	Y		
90.	8099	*Leontodon saxatilis (Hairy Hawkbit)*	Y		
91.	8106	*Millotia tenuifolia (Soft Millotia)*			
92.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
93.	14187	*Myriocephalus occidentalis*			
94.	17756	*Osteospermum ecklonis*	Y		
95.	42281	*Pithocarpa cordata*			
96.	8165	*Pithocarpa pulchella (Beautiful Pithocarpa)*			
97.	18353	*Pithocarpa pulchella var. pulchella*			
98.	8175	*Podolepis gracilis (Slender Podolepis)*			
99.		*Podotheca ?chrysantha*			Y
100.		*Podotheca ?gnaphalioides*			
101.	8182	*Podotheca angustifolia (Sticky Longheads)*			
102.		*Podotheca angustifolia/gnaphalioides*			
103.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
104.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
105.		*Podotheca sp.*			
106.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
107.	8195	*Quinetia urvillei*			
108.	13300	*Rhodanthe citrina*			
109.	25878	*Senecio condylus*			
110.	20663	*Senecio multicaulis subsp. multicaulis*			
111.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
112.	45036	*Solidago chilensis*	Y		
113.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
114.	25902	*Symphyotrichum squamatum (Bushy Starwort)*	Y		
115.	8254	*Urospermum picroides (False Hawkbit)*	Y		
116.	8255	*Ursinia anthemoides (Ursinia)*	Y		
117.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
Boraginaceae					
118.	6710	*Heliotropium europaeum (Common Heliotrope)*	Y		
Brassicaceae					
119.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
120.	2995	*Brassica x napus*	Y		
121.	49010	*Cardamine occulta*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
122.	3050	*Menkea australis (Fairy Spectacles)*			
Bryaceae					
123.	44608	*Rosulabryum billarderii*			
Campanulaceae					
124.		*?Wahlenbergia capensis*			
125.		*?Wahlenbergia preissii*			Y
126.	37500	*Grammatotheca bergiana var. bergiana*	Y		
127.	7408	*Lobelia tenuior (Slender Lobelia)*			
128.	37440	*Monopsis debilis var. depressa*	Y		
129.		*Wahlenbergia ?capensis*			
130.		*Wahlenbergia ?preissii*			Y
131.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
132.	7389	*Wahlenbergia preissii*			
133.		*Wahlenbergia sp.*			
Caryophyllaceae					
134.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
135.	19825	*Petrorhagia dubia*	Y		
136.	2905	*Polycarpon tetraphyllum (Fourleaf Allseed)*	Y		
137.	2907	*Sagina procumbens (Spreading Pearlwort)*	Y		
138.	2909	*Silene gallica (French Catchfly)*	Y		
139.	15972	*Silene gallica var. gallica*	Y		
140.	2918	*Stellaria media (Chickweed)*	Y		
Casuarinaceae					
141.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
142.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
143.	1742	*Casuarina obesa (Swamp Sheoak, Kuli)*			
Celastraceae					
144.	9069	*Stackhousia huegelii*			
145.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
Centrolepidaceae					
146.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
147.	1125	*Centrolepis drummondiana*			
148.	1131	*Centrolepis inconspicua*			
Chenopodiaceae					
149.	2483	*Chenopodium album (Fat Hen)*	Y		
150.	33500	*Dysphania ambrosioides (Mexican Tea)*	Y		
Colchicaceae					
151.	12770	*Burchardia congesta*			
Convolvulaceae					
152.	6663	*Cuscuta epithymum (Lesser Dodder, Greater Dodder)*	Y		
Crassulaceae					
153.	3137	*Crassula colorata (Dense Stonecrop)*			
154.	11709	*Crassula colorata var. acuminata*			
155.	3139	*Crassula exserta*			
156.	3140	*Crassula glomerata*	Y		
Cyperaceae					
157.		*?Isolepis marginata*			Y
158.		*?Lepidosperma sp.*			
159.	741	*Baumea articulata (Jointed Rush)*			
160.	743	*Baumea juncea (Bare Twigrush)*			
161.	744	*Baumea laxa*			
162.	745	*Baumea preissii*			
163.	748	*Baumea vaginalis (Sheath Twigrush)*			
164.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
165.	16245	*Cyathochaeta teretifolia*		P3	
166.	783	*Cyperus congestus (Dense Flat-sedge)*	Y		
167.	816	*Cyperus tenuiflorus (Scaly Sedge)*	Y		
168.	20200	*Isolepis cernua var. setiformis*			
169.	917	*Isolepis marginata (Coarse Club-rush)*			
170.	921	*Isolepis producta*			
171.	10831	*Isolepis prolifera (Budding Club-rush)*	Y		
172.		*Lepidosperma ?sp. Brixton Street broad inflorescence*			Y
173.	925	*Lepidosperma angustatum*			
174.	45753	*Lepidosperma oldhamii (Oldham's Sword Sedge)*			
175.		*Lepidosperma pubisquameum "flat form"*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
176.	41649	*Lepidosperma rigidulum*			
177.	944	*Lepidosperma scabrum*			
178.		*Lepidosperma sp.*			
179.		*Lepidosperma sp. Brixton Street broad inflorescence*			
180.		*Lepidosperma sp. Brixton Street narrow inflorescence*			
181.		*Lepidosperma sp. Darling Scarp*			
182.		*Lepidosperma sp. inland scabrum*			Y
183.		*Lepidosperma sp. terete*			
184.	945	*Lepidosperma squamatum*			
185.		*Lepidosperma squamatum s.l.*			
186.	955	*Mesomelaena pseudostygia*			
187.	978	*Schoenus brevisetis*			
188.	979	*Schoenus caespititius*			
189.	982	*Schoenus clandestinus*			
190.	984	*Schoenus curvifolius*			
191.	992	*Schoenus grandiflorus (Large Flowered Bogrush)*			
192.	1036	*Tetraria octandra*			
Dasypogonaceae					
193.	19309	*Calectasia narragara*			
194.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
Dicranaceae					
195.	32338	*Campylopus introflexus*	Y		
196.	32344	*Dicranoloma diaphanoneuron*			
Dilleniaceae					
197.		*?Hibbertia subvaginata*			
198.	5134	*Hibbertia huegelii*			
199.		*Hibbertia huegelii complex*			
200.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
201.	45534	*Hibbertia hypericoides subsp. hypericoides*			
202.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
203.	43280	*Hibbertia sericosepala*			
204.	48381	*Hibbertia striata*			
205.	5173	*Hibbertia subvaginata*			
Droseraceae					
206.		*Drosera ?porrecta*			
207.		*Drosera ?sp. "climbing"*			Y
208.	48751	*Drosera drummondii*			
209.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
210.	3097	*Drosera gigantea (Giant Sundew)*			
211.	3106	*Drosera macrantha (Bridal Rainbow)*			
212.	3109	*Drosera menziesii (Pink Rainbow)*			
213.	3118	*Drosera pallida (Pale Rainbow)*			
214.	29178	*Drosera porrecta*			
215.		*Drosera sp.*			
216.		*Drosera sp. "climbing"*			
217.	3133	*Drosera subhirtella (Sunny Rainbow)*			
218.	3135	*Drosera zonaria (Painted Sundew)*			
Elaeocarpaceae					
219.	4524	*Platytheca galioides*			
220.	48341	*Tetratheca hirsuta subsp. viminea*			
Elatinaceae					
221.	5187	*Elatine gratioloides (Waterwort)*			
Ericaceae					
222.		*?Astroloma pallidum*			Y
223.	6323	*Astroloma ciliatum (Candle Cranberry)*			
224.	6334	*Astroloma pallidum (Kick Bush)*			
225.	6339	*Astroloma xerophyllum*			
226.	6341	*Brachyloma preissii (Globe Heath)*			
227.	6348	*Conostephium pendulum (Pearl Flower)*			
228.	6349	*Conostephium preissii*			
229.	13527	*Croninia kingiana*			
230.	6374	*Leucopogon conostephioides*			
231.	6425	*Leucopogon oxycedrus*			
232.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
233.	6434	*Leucopogon polymorphus*			
234.	6436	*Leucopogon propinquus*			
235.	6440	*Leucopogon racemulosus*			

NatureMap
Mapping Western Australia's biodiversity

NatureMap Fauna Report

Created By Guest user on 17/10/2019

Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'By Circle'
Centre 115° 51' 52" E,32° 06' 36" S
Buffer 5km
Group By Species Group

Species Group	Species	Records
Amphibian	9	408
Bird	196	24673
Fish	1	1
Invertebrate	60	217
Mammal	18	333
Reptile	42	791
TOTAL	**326**	**26423**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25398	*Crinia georgiana (Quacking Frog)*			
2.	25399	*Crinia glauerti (Clicking Frog)*			
3.	25400	*Crinia insignifera (Squelching Froglet)*			
4.	25410	*Heleioporus eyrei (Moaning Frog)*			
5.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
6.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
7.	25388	*Litoria moorei (Motorbike Frog)*			
8.	25420	*Myobatrachus gouldii (Turtle Frog)*			
9.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
10.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
11.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
12.	24262	*Acanthiza inornata (Western Thornbill)*			
13.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
14.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
15.	25536	*Accipiter fasciatus (Brown Goshawk)*			
16.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
17.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
18.	24831	*Acrocephalus australis subsp. gouldi (Australian Reed Warbler)*			
19.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
20.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
21.	24310	*Anas castanea (Chestnut Teal)*			
22.	24312	*Anas gracilis (Grey Teal)*			
23.	24313	*Anas platyrhynchos (Mallard)*			
24.		*Anas platyrhynchos subsp. domesticus*			
25.	24315	*Anas rhynchotis (Australasian Shoveler)*			
26.	24316	*Anas superciliosa (Pacific Black Duck)*			
27.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
28.		*Anser anser*			
29.	24561	*Anthochaera carunculata (Red Wattlebird)*			
30.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
31.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
32.	24285	*Aquila audax (Wedge-tailed Eagle)*			
33.	25558	*Ardea ibis (Cattle Egret)*			
34.	25559	*Ardea intermedia (Intermediate Egret)*			
35.	41324	*Ardea modesta (great egret, white egret)*			
36.	24340	*Ardea novaehollandiae (White-faced Heron)*			
37.	24341	*Ardea pacifica (White-necked Heron)*			
38.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
39.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
40.	24318	*Aythya australis (Hardhead)*			
41.		*Barnardius zonarius*			
42.	24319	*Biziura lobata (Musk Duck)*			
43.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
44.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
45.	25715	*Cacatua roseicapilla (Galah)*			
46.	25716	*Cacatua sanguinea (Little Corella)*			
47.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
48.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
49.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
50.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
51.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
52.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
53.	24787	*Calidris minuta (Little Stint)*			
54.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
55.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
56.	24790	*Calidris tenuirostris (Great Knot)*		T	
57.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
58.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
59.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
60.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
61.	25574	*Charadrius dubius (Little Ringed Plover)*		IA	
62.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
63.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
64.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
65.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
66.		*Chroicocephalus novaehollandiae*			
67.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			
68.	24288	*Circus approximans (Swamp Harrier)*			
69.	24289	*Circus assimilis (Spotted Harrier)*			
70.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
71.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
72.	24399	*Columba livia (Domestic Pigeon)*	Y		
73.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
74.	24416	*Corvus bennetti (Little Crow)*			
75.	25592	*Corvus coronoides (Australian Raven)*			
76.	25701	*Coturnix ypsilophora (Brown Quail)*			
77.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
78.	25595	*Cracticus tibicen (Australian Magpie)*			
79.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
80.	25596	*Cracticus torquatus (Grey Butcherbird)*			
81.	24322	*Cygnus atratus (Black Swan)*			
82.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
83.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
84.	24324	*Dendrocygna arcuata (Wandering Whistling Duck, Chestnut Whistling Duck)*			
85.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
86.		*Egretta garzetta*			
87.		*Egretta novaehollandiae*			
88.		*Elanus axillaris*			
89.	25540	*Elanus caeruleus (Black-shouldered Kite)*			
90.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
91.		*Eolophus roseicapillus*			
92.	24567	*Epthianura albifrons (White-fronted Chat)*			
93.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
94.	25621	*Falco berigora (Brown Falcon)*			
95.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
96.	25623	*Falco longipennis (Australian Hobby)*			
97.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
98.	25727	*Fulica atra (Eurasian Coot)*			
99.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
100.	24791	*Gallinago hardwickii (Latham's Snipe, Japanese snipe)*		IA	
101.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
102.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
103.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
104.	42314	*Gavicalis virescens (Singing Honeyeater)*			
105.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
106.	25530	*Gerygone fusca (Western Gerygone)*			
107.	24271	*Gerygone fusca subsp. fusca (Western Gerygone)*			
108.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
109.	24443	*Grallina cyanoleuca (Magpie-lark)*			
110.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
111.	24295	*Haliastur sphenurus (Whistling Kite)*			
112.	47965	*Hieraaetus morphnoides (Little Eagle)*			
113.	25734	*Himantopus himantopus (Black-winged Stilt)*			
114.	24775	*Himantopus himantopus subsp. leucocephalus (Black-winged Stilt)*			
115.	24491	*Hirundo neoxena (Welcome Swallow)*			
116.	47975	*Ixobrychus dubius (Australian Little Bittern)*		P4	
117.	25637	*Larus novaehollandiae (Silver Gull)*			
118.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
119.	25661	*Lichmera indistincta (Brown Honeyeater)*			
120.	24582	*Lichmera indistincta subsp. indistincta (Brown Honeyeater)*			
121.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
122.	25683	*Lonchura castaneothorax (Chestnut-breasted Mannikin)*			
123.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
124.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
125.	25654	*Malurus splendens (Splendid Fairy-wren)*			
126.	25758	*Megalurus gramineus (Little Grassbird)*			
127.	47997	*Melanodryas cucullata (Hooded Robin)*			
128.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
129.	24587	*Melithreptus chloropsis (Western White-naped Honeyeater)*			
130.	24736	*Melopsittacus undulatus (Budgerigar)*			
131.	24598	*Merops ornatus (Rainbow Bee-eater)*			
132.		*Microcarbo melanoleucos*			
133.	25693	*Microeca fascinans (Jacky Winter)*			
134.	25542	*Milvus migrans (Black Kite)*			
135.	24738	*Neophema elegans (Elegant Parrot)*			
136.	25747	*Ninox connivens (Barking Owl)*			
137.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
138.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
139.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
140.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
141.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
142.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
143.	25682	*Pardalotus striatus (Striated Pardalote)*			
144.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
145.	48060	*Petrochelidon ariel (Fairy Martin)*			
146.	48061	*Petrochelidon nigricans (Tree Martin)*			
147.	48066	*Petroica boodang (Scarlet Robin)*			
148.	24659	*Petroica goodenovii (Red-capped Robin)*			
149.	25697	*Phalacrocorax carbo (Great Cormorant)*			
150.	24665	*Phalacrocorax fuscescens (Black-faced Cormorant)*			
151.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
152.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
153.	25699	*Phalacrocorax varius (Pied Cormorant)*			
154.	24409	*Phaps chalcoptera (Common Bronzewing)*			
155.	25587	*Phaps elegans (Brush Bronzewing)*			
156.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
157.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
158.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
159.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
160.	24747	*Platycercus spurius (Red-capped Parrot)*			
161.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
162.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
163.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
164.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
165.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
166.	25703	*Podargus strigoides (Tawny Frogmouth)*			
167.	25704	*Podiceps cristatus (Great Crested Grebe)*			
168.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
169.	25722	*Polytelis anthopeplus (Regent Parrot)*			
170.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
171.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
172.	24769	*Porzana fluminea (Australian Spotted Crake)*			
173.	25732	*Porzana pusilla (Baillon's Crake)*			
174.	24770	*Porzana pusilla subsp. palustris (Baillon's Crake)*			
175.	24771	*Porzana tabuensis (Spotless Crake)*			
176.		*Purpureicephalus spurius*			
177.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
178.	48096	*Rhipidura albiscapa (Grey Fantail)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
179.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
180.	48237	*Rostratula australis (Australian Painted Snipe)*		T	
181.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
182.	30948	*Smicrornis brevirostris (Weebill)*			
183.	24528	*Sterna hybrida subsp. javanica (Whiskered Tern)*			
184.	48594	*Sternula nereis (Fairy Tern)*			
185.	24329	*Stictonetta naevosa (Freckled Duck)*			
186.	25597	*Strepera versicolor (Grey Currawong)*			
187.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
188.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
189.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
190.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
191.	25552	*Tadorna radjah (Radjah Shelduck)*			
192.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
193.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
194.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
195.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
196.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
197.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
198.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
199.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
200.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
201.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
202.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
203.	25577	*Vanellus miles (Masked Lapwing)*			
204.	24386	*Vanellus tricolor (Banded Lapwing)*			
205.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Fish

206.		*Carassius auratus*			

Invertebrate

207.		*Akamptogonus novarae*			
208.		*Allothereua maculata*			
209.		*Aname mainae*			
210.		*Aname tepperi*			
211.		*Araneus cyphoxis*			
212.		*Araneus eburneiventris*			
213.		*Araneus senicaudatus*			
214.		*Artoria flavimana*			
215.		*Artoria linnaei*			
216.		*Artoria taeniifera*			
217.		*Backobourkia heroine*			
218.		*Ballarra longipalpus*			
219.		*Cherax destructor*			
220.		*Cherax quinquecarinatus*			
221.		*Cormocephalus aurantiipes*			
222.		*Cormocephalus novaehollandiae*			
223.		*Cormocephalus rubriceps*			
224.		*Cryptoerithus quobba*			
225.		*Cyrtophora parnasia*			
226.		*Daphnia carinata*			
227.		*Dingosa serrata*			
228.		*Eodelena convexa*			
229.		*Eriophora biapicata*			
230.		*Erythracarus decoris*			
231.		*Hogna crispipes*			
232.		*Idiommata blackwalli*			
233.	48935	*Idiosoma sigillatum (Swan Coastal Plain shield-backed trapdoor spider)*		P3	
234.		*Isopeda leishmanni*			
235.		*Kangarosa properipes*			
236.		*Lampona cylindrata*			
237.		*Latrodectus hasseltii*			
238.		*Longepi woodman*			
239.		*Lycosa gilberta*			
240.		*Maratus pavonis*			
241.		*Missulena granulosa*			
242.		*Missulena occatoria*			
243.		*Mituliodon tarantulinus*			
244.		*Mitzoruga insularis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
245.		*Paralamyctes cammooensis*			Y
246.		*Phenasteron longiconductor*			
247.		*Pinkfloydia harveii*			
248.		*Podykipus collinus*			
249.		*Prionosternum scutatum*			
250.		*Raveniella cirrata*			
251.		*Raveniella peckorum*			
252.		*Scolopendra laeta*			
253.		*Servaea melaina*			
254.		*Simaetha tenuior*			
255.		*Smeringopus natalensis*			
256.		*Steatoda capensis*			
257.		*Supunna funerea*			
258.		*Supunna picta*			
259.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
260.		*Synothele michaelseni*			
261.	33994	*Throscodectes xiphos (Stylet Bush Cricket, Stylet Throsco (Jandakot))*		P1	Y
262.		*Tinytrema yarra*			
263.		*Urodacus novaehollandiae*			
264.		*Venator immansueta*			
265.		*Venatrix pullastra*			
266.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Mammal					
267.	47713	*Austronomus australis (White-striped Free-tailed Bat)*			
268.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
269.	24041	*Felis catus (Cat)*	Y		
270.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
271.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
272.	24223	*Mus musculus (House Mouse)*	Y		
273.	24146	*Myrmecobius fasciatus (Numbat, Walpurti)*		T	
274.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
275.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
276.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
277.	24243	*Rattus fuscipes (Western Bush Rat)*			
278.	24244	*Rattus norvegicus (Brown Rat)*	Y		
279.	24245	*Rattus rattus (Black Rat)*	Y		
280.	24145	*Setonix brachyurus (Quokka)*		T	
281.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
282.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
283.	24206	*Vespadelus regulus (Southern Forest Bat)*			
284.	24040	*Vulpes vulpes (Red Fox)*	Y		
Reptile					
285.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
286.	44629	*Anilios australis*			
287.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
288.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
289.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
290.	24980	*Christinus marmoratus (Marbled Gecko)*			
291.	30893	*Cryptoblepharus buchananii*			
292.	25020	*Cryptoblepharus plagiocephalus*			
293.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
294.	25027	*Ctenotus australis*			
295.	25039	*Ctenotus fallens*			
296.	25040	*Ctenotus gemmula (Jewelled South-west Ctenotus (Swan Coastal Plain subpop P3), skink)*			
297.	25047	*Ctenotus impar*			
298.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
299.	25468	*Demansia psammophis (Yellow-faced Whipsnake)*			
300.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
301.	25100	*Egernia napoleonis*			
302.	25250	*Elapognathus coronatus (Crowned Snake)*			
303.	24959	*Gehyra variegata*			
304.	25119	*Hemiergis quadrilineata*			
305.	25133	*Lerista elegans*			
306.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
307.	25005	*Lialis burtonis*			
308.	25184	*Menetia greyii*			
309.	25191	*Morethia lineoocellata*			
310.	25192	*Morethia obscura*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
311.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
312.	25252	*Notechis scutatus (Tiger Snake)*			
313.	25253	*Parasuta gouldii*			
314.	25509	*Pletholax gracilis (Keeled Legless Lizard)*			
315.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
316.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
317.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
318.	25511	*Pseudonaja affinis (Dugite)*			
319.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
320.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
321.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
322.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
323.	25519	*Tiliqua rugosa*			
324.	25204	*Tiliqua rugosa subsp. aspera*			
325.	25207	*Tiliqua rugosa subsp. rugosa*			
326.	25218	*Varanus gouldii (Bungarra or Sand 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 wholely 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
Mapping Western Australia's biodiversity

NatureMap Fauna Stats Report

Created By Guest user on 17/10/2019

Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'By Circle'
Centre 115° 51' 52" E,32° 06' 36" S
Buffer 5km
Group By Species Group

Area (ha)		7851.91
Taxa:	Naturalised	11
	Native	315
Endemics:		2
Families:		99
Genera:		225
Conservation Status:	-	286
	1	1
	3	3
	IA	19
	T	10
	4	6
	S	1
MS Status:	-	325
	PN	1
Rank:	-	302
	subsp.	24

Top Ten Families

		Species	Records
1.	Scincidae	18	646
2.	Anatidae	17	4035
3.	Psittacidae	17	1854
4.	Scolopacidae	14	399
5.	Accipitridae	13	886
6.	Meliphagidae	12	1765
7.	Rallidae	12	1616
8.	Ardeidae	10	725
9.	Elapidae	10	62
10.	Charadriidae	9	277

Top Ten Genera

		Species	Records
1.	*Calidris*	7	124
2.	*Anas*	6	1591
3.	*Phalacrocorax*	5	377
4.	*Ardea*	5	381
5.	*Tiliqua*	4	77
6.	*Cacatua*	4	197
7.	*Falco*	4	180
8.	*Ctenotus*	4	76
9.	*Cracticus*	4	1146
10.	*Porzana*	4	199

[1] Endemic To Query Area

Name ID	Species	Conservation Status
	Paralamyctes cammooensis	
33994	*Throscodectes xiphos (Stylet Bush Cricket, Stylet Throsco (Jandakot))*	P1

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Flora Report

Created By Guest user on 17/10/2019

Current Names Only	Yes
Core Datasets Only	Yes
Species Group	All Plants
Method	'By Circle'
Centre	115° 51' 52" E,32° 06' 36" S
Buffer	5km
Group By	Family

Area (ha)		7851.91
Taxa:	Naturalised	118
	Native	542
Endemics:		44
Families:		81
Genera:		326
Conservation Status:	-	644
	1	1
	3	6
	T	3
	4	4
	2	2
MS Status:	-	655
	PN	3
	MS	2
Rank:	-	602
	subsp.	36
	var.	22

Top Ten Families

		Species	Records
1.	Fabaceae	63	467
2.	Orchidaceae	60	314
3.	Asteraceae	55	382
4.	Myrtaceae	52	493
5.	Poaceae	43	395
6.	Asparagaceae	37	456
7.	Cyperaceae	36	225
8.	Haemodoraceae	30	231
9.	Ericaceae	19	169
10.	Proteaceae	17	355

Top Ten Genera

		Species	Records
1.	*Caladenia*	17	155
2.	*Acacia*	16	119
3.	*Lepidosperma*	14	73
4.	*Lomandra*	13	248
5.	*Drosera*	13	85
6.	*Stylidium*	12	96
7.	*Conostylis*	11	98
8.	*Thysanotus*	11	118
9.	*Trifolium*	10	28
10.	*Eucalyptus*	9	75

[1]Endemic To Query Area

Name ID	Species	Conservation Status
	?Asparagus asparagoides	
	?Astroloma pallidum	
	?Calandrinia sp.	
	?Calytrix angulata	
	?Conostylis sp.	
	?Diuris corymbosa/magnifica	
	?Eremaea pauciflora	
	?Hemiandra sp.	
	?Isolepis marginata	
	?Leptomeria empetriformis	
	?Melaleuca thymoides	
	?Monoculus monstrosus	
	?Opercularia vaginata	

?Phlebocarya sp.
?Podotheca sp.
?Romulea rosea
?Scholtzia involucrata
?Solanum nigrum
?Wahlenbergia preissii
?Xanthorrhoea brunonis
Acacia pulchella ?var glaberrima
Aira/Pentameris sp.
Caladenia ?arenicola
Caladenia ?discoidea
Caladenia ?longicauda subsp. calcigena
Calytrix ?angulata
Calytrix angulata/flavescens
Calytrix leschenaultii/fraseri
Diuris ?magnifica
Drosera ?sp. "climbing"
Eucalyptus ?camaldulensis x robusta
Haemodorum ?spicatum
Lepidosperma ?sp. Brixton Street broad inflorescence
Lepidosperma sp. inland scabrum
Levenhookia ?pusilla
Lomandra ?suaveolens
Lomandra caespitosa/suaveolens
Pelargonium ?littorale
Podotheca ?chrysantha
Pterostylis ?sanguinea
Pterostylis aff. nana ?short sepal
Thysanotus ?manglesianus/patersonii complex
Trifolium ?campestre/dubium
Wahlenbergia ?preissii

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Appendix D – Flora data

Flora species list

Species matrix

Flora site data

Flora likelihood of occurrence assessment guidelines

Flora likelihood of occurrence assessment

Flora species list

Family	Taxon	Status	Source		
			This survey	GHD (2019)	Eco Logical (2017)
Aizoaceae	*Carpobrotus edulis*	*	x		
Anarthriaceae	*Lyginia barbata*		x		x
Apiaceae	*Centella asiatica*		x		
Araliaceae	*Trachymene pilosa*		x	x	
Asparagaceae	*Laxmannia squarrosa*		x	x	x
Asparagaceae	*Lomandra caespitosa*		x		
Asparagaceae	*Lomandra micrantha*		x	x	
Asparagaceae	*Thysanotus ?patersonii/manglesianus*		x		
Asparagaceae	*Thysanotus multiflorus*		x		
Asphodelaceae	*Trachyandra divaricata*	*	x		
Asteraceae	*Arctotheca calendula*	*	x		
Asteraceae	*Ursinia anthemoides* subsp. *anthemoides*	*	x	x	
Asteraceae	*Conyza bonariensis*	*		x	
Asteraceae	*Hyalosperma cotula*	*		x	
Asteraceae	*Hypochaeris glabra*	*	x		
Asteraceae	*Lactuca serriola*	*		x	
Asteraceae	*Siloxerus humifusus*		x	x	
Asteraceae	*Sonchus oleraceus*	*	x	x	
Asteraceae	*Urospermum picroides*	*	x	x	
Asteraceae	*Waitzia suaveolens*		x		
Brassicaceae	*Brassica tournefortii*	*		x	
Campanulaceae	*Lobelia tenuior*			x	
Campanulaceae	*Wahlenbergia capensis*	*	x	x	
Casuarinaceae	*Allocasuarina ?glauca* (planted)	*	x	x	
Casuarinaceae	*Allocasuarina humilis*		x		x
Caryophyllaceae	*Petrorhagia dubia*	*		x	
Celastraceae	*Tripterococcus brunonis*		x		
Colchicaceae	*Burchardia congesta*		x		x
Cupressaceae	*Callitris priessii* (planted)		x		
Cyperaceae	*Mesomelaena pseudostygia*		x		x
Cyperaceae	*Cyperus tenellus*	*		x	
Cyperaceae	*Schoenus efoliatus*			x	
Cyperaceae	*Schoenus clandestinus*		x		

Family	Taxon	Status	Source		
			This survey	GHD (2019)	Eco Logical (2017)
Dasypogonaceae	*Dasypogon bromeliifolius*		x	x	x
Dilleniaceae	*Hibbertia hypericoides subsp. hypericoides*		x		x
Dilleniaceae	*Hibbertia subvaginata*		x		
Dilleniaceae	*Hibbertia striata*		x		
Ericaceae	*Conostephium pendulum*		x		x
Euphorbiaceae	*Euphorbia peplus*	*	x	x	
Euphorbiaceae	*Euphorbia terracina*	*	x	x	
Euphorbiaceae	*Ricinus communis*	*	x		
Fabaceae	*Acacia huegelii*		x		
Fabaceae	*Acacia iteaphylla*	*	x		x
Fabaceae	*Acacia longifolia subsp. longifolia*	*	x	x	x
Fabaceae	*Acacia pulchella* var. *glaberrima*		x		
Fabaceae	*Acacia rostellifera*		x		
Fabaceae	*Acacia saligna*		x		
Fabaceae	*Acacia sp* (non-local planted)	*	x		
Fabaceae	*Acacia stenoptera*		x	x	
Fabaceae	*Acacia pulchella* var. *glaberrima*				x
Fabaceae	*Bossiaea eriocarpa*		x		x
Fabaceae	*Daviesia triflora*		x		x
Fabaceae	*Euchilopsis linearis*			x	
Fabaceae	*Gastrolobium capitatum*		x		
Fabaceae	*Gompholobium tomentosum*		x	x	x
Fabaceae	*Hovea trisperma*			x	
Fabaceae	*Hovea pungens*		x		
Fabaceae	*Jacksonia furcellata*		x		
Fabaceae	*Jacksonia sternbergiana*		x		
Fabaceae	*Lupinus angustifolius*	*	x		
Fabaceae	*Trifolium arvense*	*	x		
Fabaceae	*Trifolium campestre*	*	x		
Fabaceae	*Vicia sativa*	*	x		
Geraniaceae	*Pelargonium capitatum*	*	x	x	x
Goodeniaceae	*Dampiera linearis*		x		
Goodeniaceae	*Lechenaultia floribunda*		x	x	x
Goodeniaceae	*Scaevola repens*		x		
Haemodoraceae	*Anigozanthos humilis*		x		x

Family	Taxon	Status	Source		
			This survey	GHD (2019)	Eco Logical (2017)
Haemodoraceae	*Anigozanthos manglesii*		x		
Haemodoraceae	*Conostylis aculeata*		x		x
Haemodoraceae	*Haemodorum* sp		x		
Haemodoraceae	*Phlebocarya ciliata*		x	x	
Iridaceae	*Freesia alba x leichtlinii*	*	x	x	
Iridaceae	*Patersonia occidentalis*		x		x
Iridaceae	*Gladiolus caryophyllaceus*	*	x	x	x
Juncaceae	*Juncus pallidus*		x		
Lamiaceae	*Hemiandra pungens*		x		
Lauraceae	*Cassytha sp*		x		
Loganiaceae	*Phyllangium paradoxum*		x		
Loranthaceae	*Nuytsia floribunda*		x	x	x
Myrtaceae	*Astartea scoparia*		x	x	
Myrtaceae	*Calytrix flavescens*		x		
Myrtaceae	*Chamelaucium uncinatum*	*	x		
Myrtaceae	*Corymbia calophylla*		x		
Myrtaceae	*Corymbia maculata* (non-local planted)	*	x		
Myrtaceae	*Eremaea pauciflora*		x		
Myrtaceae	*Eucalptus utilis* (non-local planted)	*	x		
Myrtaceae	*Eucalyptus camaldulensis*	*	x		
Myrtaceae	*Eucalyptus gomphocephala* (planted)		x		
Myrtaceae	*Eucalyptus marginata*		x		
Myrtaceae	*Eucalyptus rudis*		x		
Myrtaceae	*Eucalyptus todtiana*		x		
Myrtaceae	*Euchilopsis linearis*		x		
Myrtaceae	*Hypocalymma angustifolium*		x		
Myrtaceae	*Hypocalymma robustum*		x	x	
Myrtaceae	*Leptospermum laevigatum*	*	x		

Family	Taxon	Status	Source		
			This survey	GHD (2019)	Eco Logical (2017)
Myrtaceae	*Melaleuca preissiana*		x	x	
Myrtaceae	*Melaleuca seriata*		x		
Myrtaceae	*Melaleuca thymoides*		x		
Myrtaceae	*Regelia inops*		x	x	
Myrtaceae	*Scholtzia capitata*		x		
Myrtaceae	*Eremaea pauciflora* var. *pauciflora*				x
Myrtaceae	*Eucalyptus marginata subsp. marginata*				x
Myrtaceae	*Kunzea glabrescens*			x	x
Myrtaceae	*Pericalymma ellipticum*			x	
Myrtaceae	*Regelia ciliata*				x
Myrtaceae	*Scholtzia involucrata*			x	x
Oleaceae	*Olea euroaea*	*	x		
Orchidaceae	*Microtis media*		x	x	x
Orchidaceae	*Pterostylis vittata*		x		
Papaveraceae	*Fumaria capreolata*	*	x	x	
Poaceae	*Aira cupaniana*	*	x		
Poaceae	*Amphipogon turbinatus*		x	x	
Poaceae	*Avena barbata*	*	x	x	x
Poaceae	*Austrostipa flavescens*			x	
Poaceae	*Briza minor*	*		x	
Poaceae	*Briza maxima*	*	x		x
Poaceae	*Bromus diandrus*	*	x		
Poaceae	*Cynodon dactylon*	*	x		
Poaceae	*Ehrharta calycina*	*	x	x	x
Poaceae	*Ehrharta longiflora*	*	x	x	
Poaceae	*Eragrostis curvula*	*	x		
Poaceae	*Lagurus ovatus*	*	x	x	
Poaceae	*Vulpia myuros*	*		x	
Primulaceae	*Lysimachia arvensis*	*	x	x	
Proteaceae	*Banksia attenuata*		x	x	x
Proteaceae	*Banksia ilicifolia*		x	x	
Proteaceae	*Banksia menziesii*		x		x
Proteaceae	*Banksia prionotes* (planted)		x		
Proteaceae	*Persoonia saccata*		x		
Proteaceae	*Petrophile linearis*		x	x	x
Proteaceae	*Stirlingia latifolia*		x		x

Family	Taxon	Status	Source		
			This survey	GHD (2019)	Eco Logical (2017)
Proteaceae	*Synaphea spinulosa* subsp. *spinulosa*		x		x
Restionaceae	*Desmocladus flexuosus*		x		x
Restionaceae	*Hypolaena exsulca*		x	x	
Rubiaceae	*Opercularia vaginata*	*	x		
Rutaceae	*Boronia crenulata*		x	x	
Rutaceae	*Philotheca spicata*		x		
Solanaceae	*Solanum nigrum*	*	x		
Stylidiaceae	*Levenhookia stipitata*		x		
Stylidiaceae	*Stylidium brunonianum*		x		x
Stylidiaceae	*Stylidium repens*		x	x	
Thymelaeaceae	*Pimelea rosea subsp. rosea*				x
Xanthorrhoeaceae	*Xanthorrhoea preissii*		x	x	x

* Introduced (weed) species

DP Declared Pest

WoNS Weeds of National Significance

EN BC Act listed Threatened species

P1 DBCA Priority 3 species

P2 DBCA Priority 3 species

P3 DBCA Priority 3 species

Flora species by site matrix

Taxa	Jan01	Jan02	Jan03	Jan04	Jan05	Jan06	Jan07
Acacia longifolia subsp. *longifolia*	1			1			1
Acacia pulchella var. *glaberrima*			1				1
Acacia sp *(non-local planted)*	1						
Acacia stenoptera		1					
Agonis flexuosa	1						
Allocasuarina humilis	1					1	
Amphipogon turbinatus			1			1	
Astartea scoparia					1		1
Avena barbata	1		1	1			
Banksia attenuata			1			1	
Banksia ilicifolia	1			1			
Banksia menziesii	1		1			1	
Bossiaea eriocarpa	1		1				
Briza maxima		1	1		1	1	1
Bromus diandrus	1						
Burchardia congesta	1		1			1	
Calytrix ?flavescens			1				
Calytrix flavescens						1	
Carpobrotus edulis	1				1		
Cassytha sp	1		1			1	
Conostephium pendulum	1		1			1	
Conostylis aculeata		1	1				
Corymbia calophylla	1						
Dasypogon bromeliifolius			1	1	1	1	
Desmocladus flexuosus	1	1	1				
Ehrharta calycina			1	1	1	1	
Ehrharta longiflora	1						1
Eremaea pauciflora		1	1	1		1	
Eucalyptus gomphocephala		1					
Eucalyptus rudis							1
Eucalyptus todtiana			1				
Euchilopsis linearis					1		
Fumaria capreolata	1		1	1			
Gastrolobium ?capitatum	1					1	
Gladiolus caryophyllaceus	1		1		1	2	
Gompholobium tomentosum	1		1			1	
Haemodorum sp							
Hemiandra pungens	1					1	
Hibbertia hypericoides	1		1			1	

Taxa	Jan01	Jan02	Jan03	Jan04	Jan05	Jan06	Jan07
Hibbertia striata						1	
Hibbertia subvaginata					1		
Hovea pungens				1			
Hypocalymma angustifolium					1		
Hypocalymma robustum	1		1				
Hypochaeris glabra	1		1			1	
Hypolaena exsulca	1				1	1	
Laxmannia squarrosa						1	
Lechenaultia floribunda						1	
Leptospermum laevigatum	1						1
Leucopogon propinquus	1		1			1	
Levenhookia stipitata	1		1				
Lomandra caespitosa	1					1	
Lomandra micrantha	1		1				
Lyginia barbata	1		1			1	
Lysimachia arvensis			1				
Melaleuca preissiana				1	1		1
Melaleuca seriata			1				
Melaluca thymoides	1		1				
Mesomelaena pseudostygia	1		1			1	
Nuytsia floribunda	1		1				
Patersonia occidentalis			1			1	
Pelargonium capitatum	1						1
Petrophile linearis	1		1				
Phlebocarya ciliata			1				
Phyllangium paradoxum						1	
Pterostylis vittata			1				
Regelia inops	1			1			
Scaevola repens	1					1	
Schoenus clandestinus	1					1	
Scholtzia capitata	1		1			1	
Sonchus oleraceus	1		1			1	
Stirlingia latifolia	1		1				
Stylidium brunonianum	1					1	
Stylidium repens	1		1			1	
Synaphea spinulosa subsp. *spinulosa*							
Thysanotus ?patersonii/manglesianus	1		1			1	
Thysanotus multiflorus	1						
Trachymene pilosa	1		1		1	1	

Taxa	Jan01	Jan02	Jan03	Jan04	Jan05	Jan06	Jan07
Tripterococcus brunonis	1						
Urospermum picroides	1		1				
Ursinia anthemoides	1		1		1	1	
Waitzia suaveolens							
Xanthorrhoea preissii				1			

Flora site raw data (GHD 2019)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan01	*Banksia menziesii*	30-10%	6	Tree, palm (U)
Jan01	*Banksia attenuata*	30-10%	6	Tree, palm (U)
Jan01	*Nuytsia floribunda*	<10%	4	Tree, palm (U)
Jan01	*Allocasuarina humilis*	30-10%	1.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Acacia pulchella* var. *glaberrima*	<2% Few than 10	1.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Eremaea pauciflora*	<10%	1	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Stirlingia latifolia*	<2% Numerous	1.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Petrophile linearis*	<2% Numerous	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Synaphea spinulosa* subsp. *spinulosa*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Mesomelaena pseudostygia*	<10%	0.25	Sedge (G)
Jan01	*Patersonia occidentalis*	<10%	0.25	Forb (G)
Jan01	*Ehrharta calycina*	<2% Numerous	1.25	Tussock grass (G)
Jan01	*Ursinia anthemoides*	<2% Numerous	0.1	Forb (G)
Jan01	*Calytrix ?flavescens*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Briza maxima*	<2% Numerous	0.1	Other grass (G)
Jan01	*Gladiolus caryophyllaceus*	<2% Numerous	0.25	Forb (G)
Jan01	*Scholtzia capitata*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Stylidium repens*	<2% Numerous	0.1	Forb (G)
Jan01	*Laxmannia squarrosa*	<2% Numerous	0.1	Forb (G)
Jan01	*Gompholobium tomentosum*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Hypochaeris glabra*	<2% Numerous	0.1	Forb (G)
Jan01	*Conostylis aculeata*	<2% Numerous	0.1	Forb (G)
Jan01	*Lyginia barbata*	<2% Numerous	0.25	Sedge (G)
Jan01	*Dasypogon bromeliifolius*	<2% Few than 10	0.25	Forb (G)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan01	*Stylidium brunonianum*	<2% Numerous	0.25	Forb (G)
Jan01	*Conostephium pendulum*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Schoenus clandestinus*	<2% Few than 10	0.1	Sedge (G)
Jan01	*Lysimachia arvensis*	<2% Few than 10	0.1	Forb (G)
Jan01	*Thysanotus multiflorus*	<2% Few than 10	0.25	Forb (G)
Jan01	*Sonchus oleraceus*	<2% Few than 10	0.1	Forb (G)
Jan01	*Burchardia congesta*	<2% Few than 10	0.25	Forb (G)
Jan01	*Hibbertia hypericoides*	<10%	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Gastrolobium ?capitatum*	<2% Numerous	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Trachymene pilosa*	<2% Few than 10	0.1	Forb (G)
Jan01	*Urospermum picroides*	<2% Few than 10	0.1	Forb (G)
Jan01	*Lomandra caespitosa*	<2% Few than 10	0.1	Forb (G)
Jan01	*Bossiaea eriocarpa*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Levenhookia stipitata*	<2% Few than 10	0.1	Forb (G)
Jan01	*Scaevola repens*	<2% Few than 10	0.1	Forb (G)
Jan01	*Haemodorum sp*	<2% Few than 10	0.1	Forb (G)
Jan01	*Acacia stenoptera*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Waitzia suaveolens*	<2% Few than 10	0.1	Forb (G)
Jan01	*Cassytha sp*	<2% Few than 10	0.1	Forb (G)
Jan01	*Phlebocarya ciliata*	<2% Few than 10	0.25	Forb (G)
Jan01	*Lomandra micrantha*	<2% Few than 10	0.25	Forb (G)
Jan01	*Tripterococcus brunonis*	<2% Few than 10	0.25	Forb (G)
Jan01	*Leucopogon propinquus*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Hibbertia striata*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan01	*Hypolaena exsulca*	<2% Few than 10	0.5	Sedge (G)
Jan01	*Amphipogon turbinatus*	<2% Few than 10	0.25	Sedge (G)
Jan02	*Corymbia calophylla*	70-30%	10	Tree, palm (U)
Jan02	*Agonis flexuosa*	30-10%	8	Tree, palm (U)
Jan02	*Eucalyptus gomphocephala*	70-30%	10	Tree, palm (U)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan02	*Ehrharta calycina*	70-30%	0.25	Other grass (G)
Jan02	*Bromus diandrus*	30-10%	0.25	Other grass (G)
Jan02	*Eucalyptus rudis*	30-10%	10	Tree, palm (U)
Jan03	*Banksia menziesii*	<2% Few than 10	6	Tree, palm (U)
Jan03	*Banksia attenuata*	30-10%	6	Tree, palm (U)
Jan03	*Nuytsia floribunda*	<10%	4	Tree, palm (U)
Jan03	*Acacia pulchella* var. *glaberrima*	<2% Numerous	1.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Eremaea pauciflora*	<10%	1	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Petrophile linearis*	<2% Numerous	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Melaluca thymoides*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Mesomelaena pseudostygia*	<10%	0.25	Sedge (G)
Jan03	*Patersonia occidentalis*	<10%	0.25	Forb (G)
Jan03	*Ehrharta calycina*	<2% Numerous	1.25	Tussock grass (G)
Jan03	*Ursinia anthemoides*	<2% Numerous	0.1	Forb (G)
Jan03	*Calytrix ?flavescens*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Briza maxima*	<2% Numerous	0.1	Other grass (G)
Jan03	*Gladiolus caryophyllaceus*	<2% Numerous	0.25	Forb (G)
Jan03	*Scholtzia capitata*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Stylidium repens*	<2% Numerous	0.1	Forb (G)
Jan03	*Gompholobium tomentosum*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Hypochaeris glabra*	<2% Numerous	0.1	Forb (G)
Jan03	*Lyginia barbata*	<2% Numerous	0.25	Sedge (G)
Jan03	*Dasypogon bromeliifolius*	<2% Few than 10	0.25	Forb (G)
Jan03	*Conostephium pendulum*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Lysimachia arvensis*	<2% Few than 10	0.1	Forb (G)
Jan03	*Sonchus oleraceus*	<2% Few than 10	0.1	Forb (G)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan03	*Burchardia congesta*	<2% Few than 10	0.25	Forb (G)
Jan03	*Hibbertia hypericoides*	<10%	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Trachymene pilosa*	<2% Few than 10	0.1	Forb (G)
Jan03	*Urospermum picroides*	<2% Few than 10	0.1	Forb (G)
Jan03	*Bossiaea eriocarpa*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Levenhookia stipitata*	<2% Few than 10	0.1	Forb (G)
Jan03	*Cassytha* sp	<2% Few than 10	0.1	Forb (G)
Jan03	*Phlebocarya ciliata*	<2% Few than 10	0.25	Forb (G)
Jan03	*Lomandra micrantha*	<2% Few than 10	0.25	Forb (G)
Jan03	*Amphipogon turbinatus*	<2% Few than 10	0.25	Sedge (G)
Jan03	*Eucalyptus todtiana*	<10%	9	Tree, palm (U)
Jan03	*Melaleuca seriata*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Avena barbata*	<2% Numerous	0.5	Tussock grass (G)
Jan03	*Stirlingia latifolia*	<2% Numerous	1.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Fumaria capreolata*	<2% Few than 10	0.25	Forb (G)
Jan03	*Thysanotus ?patersonii/manglesianus*	<2% Few than 10	0.25	Forb (G)
Jan03	*Hypocalymma robustum*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Leucopogon propinquus*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan03	*Pterostylis vittata*	<2% Few than 10	0.25	Forb (G)
Jan03	*Desmocladus flexuosus*	<2% Few than 10	0.25	Sedge (G)
Jan03	*Conostylis aculeata*	<2% Numerous	0.1	Forb (G)
Jan04	*Melaleuca preissiana*	<10%	7	Tree, palm (U)
Jan04	*Banksia ilicifolia*	<2% Numerous	3.5	Tree, palm (U)
Jan04	*Xanthorrhoea preissii*	<10%	1.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan04	*Regelia inops*	<2% Numerous	1.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan04	*Acacia longifolia* subsp. *longifolia*	<2% Numerous	2	Shrub, cycad, grass-tree, tree-fern (M)
Jan04	*Dasypogon bromeliifolius*	70-30%	0.25	Forb (G)
Jan04	*Avena barbata*	<10%	1	Other grass (G)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan04	*Hovea pungens*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan04	*Fumaria capreolata*	<2% Numerous	0.5	Forb (G)
Jan04	*Eremaea pauciflora*	<10%	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan04	*Ehrharta calycina*	<2% Numerous	0.75	Other grass (G)
Jan05	*Melaleuca preissiana*	<2% Numerous	7	Tree, palm (U)
Jan05	*Astartea scoparia*	70-30%	2	Shrub, cycad, grass-tree, tree-fern (M)
Jan05	*Hypocalymma angustifolium*	<10%	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan05	*Euchilopsis linearis*	<10%	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan05	*Carpobrotus edulis*	<2% Numerous	0.25	Forb (G)
Jan05	*Ursinia anthemoides*	<2% Numerous	0.25	Forb (G)
Jan05	*Ehrharta calycina*	<2% Numerous	0.75	Other grass (G)
Jan05	*Briza maxima*	<2% Numerous	0.25	Other grass (G)
Jan05	*Gladiolus caryophyllaceus*	<2% Few than 10	0.25	Forb (G)
Jan05	*Dasypogon bromeliifolius*	<10%	0.5	Forb (G)
Jan05	*Trachymene pilosa*	<2% Few than 10	0.1	Forb (G)
Jan05	*Hibbertia subvaginata*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan05	*Hypolaena exsulca*	30-10%	0.5	Sedge (G)
Jan_05	*Acacia* sp *(non-local planted)*	<10%	2.75	Shrub, cycad, grass-tree, tree-fern (M)
Jan_05	*Acacia pulchella var. glaberrima*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Banksia menziesii*	<10%	3.5	Tree, palm (U)
Jan_06	*Banksia attenuata*	<10%	4	Tree, palm (U)
Jan_06	*Allocasuarina humilis*	30-10%	1.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Eremaea pauciflora*	30-10%	1.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Hibbertia hypericoides*	30-10%	0.75	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Gompholobium tomentosum*	<2% Numerous	0.75	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Burchardia congesta*	<2% Numerous	0.25	Forb (G)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan_06	*Ehrharta calycina*	<2% Numerous	1.25	Tussock grass (G)
Jan_06	*Ursinia anthemoides*	<2% Numerous	0.1	Forb (G)
Jan_06	*Gladiolus caryophyllaceus*	<2% Numerous	0.25	Forb (G)
Jan_06	*Scholtzia capitata*	<2% Few than 10	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Stylidium repens*	<2% Numerous	0.1	Forb (G)
Jan_06	*Hibbertia striata*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Dasypogon bromeliifolius*	<2% Few than 10	0.25	Forb (G)
Jan_06	*Calytrix flavescens*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Scaevola repens*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Cassytha sp*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Amphipogon turbinatus*	<2% Few than 10	0.25	Sedge (G)
Jan_06	*Gladiolus caryophyllaceus*	<2% Numerous	0.25	Forb (G)
Jan_06	*Lyginia barbata*	<2% Numerous	0.25	Sedge (G)
Jan_06	*Leucopogon propinquus*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Hypolaena exsulca*	<2% Few than 10	0.5	Sedge (G)
Jan_06	*Stylidium brunonianum*	<2% Numerous	0.25	Forb (G)
Jan_06	*Thysanotus ?patersonii/manglesianus*	<2% Few than 10	0.5	Forb (G)
Jan_06	*Mesomelaena pseudostygia*	<10%	0.25	Sedge (G)
Jan_06	*Laxmannia squarrosa*	<2% Numerous	0.1	Forb (G)
Jan_06	*Lechenaultia floribunda*	<2% Numerous	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Conostephium pendulum*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Gastrolobium ?capitatum*	<2% Numerous	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Phyllangium paradoxum*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Trachymene pilosa*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Sonchus oleraceus*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Hypochaeris glabra*	<2% Numerous	0.1	Forb (G)

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
Jan_06	*Schoenus clandestinus*	<2% Few than 10	0.1	Sedge (G)
Jan_06	*Briza maxima*	<2% Numerous	0.1	Other grass (G)
Jan_06	*Hemiandra pungens*	<2% Few than 10	0.25	Shrub, cycad, grass-tree, tree-fern (M)
Jan_06	*Lomandra caespitosa*	<2% Few than 10	0.1	Forb (G)
Jan_06	*Patersonia occidentalis*	<10%	0.25	Forb (G)
Jan_07	*Melaleuca preissiana*	100-70%	8	Tree, palm (U)
Jan_07	*Astartea scoparia*	<2% Few than 10	2	Shrub, cycad, grass-tree, tree-fern (M)
Jan_07	*Leptospermum laevigatum*	30-10%	2	Shrub, cycad, grass-tree, tree-fern (M)
Jan_07	*Acacia longifolia* subsp. *longifolia*	30-10%	3	Shrub, cycad, grass-tree, tree-fern (M)
Jan_07	*Eucalyptus rudis*	30-10%	12	Tree, palm (U)
Jan_07	*Acacia pulchella var. glaberrima*	<2% Numerous	0.5	Shrub, cycad, grass-tree, tree-fern (M)
Jan_07	*Pelargonium capitatum*	<2% Numerous	0.25	Forb (G)
Jan_07	*Briza maxima*	70-30%	0.25	Other grass (G)
Jan_07	*Ehrharta longiflora*	70-30%	0.5	Other grass (G)
OPCOL	*Pelargonium capitatum*			
OPCOL	*Avena barbata*			
OPCOL	*Trifolium campestre*			
OPCOL	*Lagurus ovatus*			
OPCOL	*Cynodon dactylon*			
OPCOL	*Euphorbia peplus*			
OPCOL	*Desmocladus flexuosus*			
OPCOL	*Acacia longifolia subsp. longifolia*			
OPCOL	*Acacia iteaphylla*			
OPCOL	*Xanthorrhoea preissii*			
OPCOL	*Taraxacum khatoonae*			
OPCOL	*Eucalyptus camaldulensis*			

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
OPCOL	*Eucalptus utilis (non-local planted)*			
OPCOL	*Bromus diandrus*			
OPCOL	*Freesia alba* x *leichtlinii*			
OPCOL	*Melaleuca thymoides*			
OPCOL	*Fumaria capreolata*			
OPCOL	*Wahlenbergia capensis*			
OPCOL	*Anigozanthos humilis*			
OPCOL	*Opercularia vaginata*			
OPCOL	*Philotheca spicata*			
OPCOL	*Siloxerus humifusus*			
OPCOL	*Aira cupaniana*			
OPCOL	*Carpobrotus edulis*			
OPCOL	*Banksia ilicifolia*			
OPCOL	*Olea euroaea*			
OPCOL	*Jacksonia furcellata*			
OPCOL	*Eucalyptus todtiana*			
OPCOL	*Chamelaucium uncinatum*			
OPCOL	*Euphorbia terracina*			
OPCOL	*Acacia rostellifera*			
OPCOL	*Eragrostis curvula*			
OPCOL	*Lupinus angustifolius*			
OPCOL	*Trifolium arvense*			
OPCOL	*Ricinus communis*			
OPCOL	*Arctotheca calendula*			
OPCOL	*Corymbia maculata* (non-local planted)			
OPCOL	*Allocasuarina ?glauca* (planted)			

Site number	Taxon	Cover (%)	Height (m)	Form/stratum
OPCOL	*Callitris priessii* (planted)			
OPCOL	*Leptospermum laevigatum*			
OPCOL	*Acacia saligna*			
OPCOL	*Eucalyptus marginata*			
OPCOL	*Dampiera linearis*			
OPCOL	*Daviesia triflora*			
OPCOL	*Acacia huegelii*			
OPCOL	*Hemiandra pungens*			
OPCOL	*Microtis media*			
OPCOL	*Banksia prionotes* (planted)			
OPCOL	*Persoonia saccata*			
OPCOL	*Boronia crenulata*			
OPCOL	*Anigozanthos manglesii*			
OPCOL	*Solanum nigrum*			
OPCOL	*Centella asiatica*			
OPCOL	*Vicia sativa*			
OPCOL	*Juncus pallidus*			
OPCOL	*Jacksonia sternbergiana*			
OPCOL	*Trachyandra divaricata*			
OPCOL	*Banksia littoralis*			

Flora site photographs

JAN01

JAN02

JAN03

JAN04

JAN05

JAN06

JAN07

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within survey area from field survey results.
Likely	Species previously recorded within 5 km and large areas of suitable habitat occur in the project area.
Possible	Species previously recorded within 5 km and areas of suitable habitat occur/may occur in the project area.
Unlikely	Species previously recorded within 5 km, but suitable habitat does not occur in the project area.
Highly unlikely	Species not previously recorded within 5 km, suitable habitat does not occur in the project area and/or the project 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 – DEE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within the study area

TPFL and WAHERB – records of threatened flora from TPFL and WAHERB database searches within the study area

NM – DBCA *NatureMap* (accessed September 2019)

Flora likelihood of occurrence assessment of conservation significant flora identified in the desktop assessment as potentially occurring within the study area

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Acacia benthamii			P2	Shrub to 1.7 m tall. On clay sand with *Viminaria juncea* over low heath recorded at the closest population to the survey area.	Highly unlikely. Closest record 7.36 km north east of the survey area. Lack of suitable habitat in the survey area.	WAHERB, NM
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)			P1	Shrub, 0.4-1.5 m high. Fl. yellow, May or Aug. Grey or black sand over clay. Swampy areas, winter wet lowlands.	Unlikely. Closest record 3.87 km south west of the survey area. While suitable habitat exists in the survey area adequate searches did not record this species.	WAHERB, NM
Andersonia gracilis		EN	T	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay,	Highly Unlikely. No known records within 10 km. Lack of	NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
				gravelly loam. Winter-wet areas, near swamps	suitable habitat in the survey area.	
Aponogeton hexatepalus	Stalked Water Ribbons		P4	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green-white, Jul to Oct. Mud. Freshwater: ponds, rivers, claypans.	Highly Unlikely. Closest record 7.14 km east of the survey area. Lack of suitable habitat in the survey area.	WAHERB, TPFL, NM
Austrostipa jacobsiana		CE	CE	Tufted rhizomatous herb, to 1.2 m, leaf sheaths hairy. Marri woodland, Melaleuca tall shrubland.	Highly Unlikely – known to occur within 10.1 km of the survey area and suitable habitat present. Suitable search effort did not record the species.	WAHERB, TPFL, NM
Byblis gigantea			P3	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Fl. pink-purple/white, Sep to Dec or Jan. Sandy-peat swamps. Seasonally wet areas.	Highly Unlikely - Species previously recorded within 5.5 km and suitable habitat present. Suitable search effort did not record the species.	WAHERB, TPFL, NM
Caladenia huegelii	Grand Spider Orchid	EN	T	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	Highly Unlikely - Species previously recorded within 2.6 km and suitable habitat present. Suitable search effort during the flowering period did not record the species.	WAHERB, TPFL, NM
Cyathochaeta teretifolia			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 - Species previously recorded within 2.73 km and suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM
Dampiera triloba			P3	Erect perennial, herb or shrub, to 0.5 m high. Fl. blue, Aug to Dec.	Highly Unlikely - Species previously recorded within 2.73 km and suitable habitat present.	WAHERB, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
					Suitable search effort did not record the species.	
Diuris drummondii	Tall Donkey Orchid	VU	T	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow, Nov to Dec or Jan. Low-lying depressions, winter wet swamps.	Highly Unlikely - Species previously recorded within 2 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species.	WAHERB, NM
Diuris purdiei	Purdie's Donkey Orchid	EN	T	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. Grey-black sand, moist. Winter-wet swamps.	Highly Unlikely - Species previously recorded within 6.86 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species.	WAHERB, TPFL, NM
Dodonaea hackettiana	Hackett's Hopbush		P4	Erect shrub or tree, 1-5 m high. Fl. yellow-green/red, mainly Jul to Oct. Sand. Outcropping limestone.	Highly Unlikely - Species previously recorded within 2.7 km. No suitable habitat present.	WAHERB, TPFL, NM
Drakaea elastica	Glossy-leaved Hammer Orchid	EN	T	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow, Oct to Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Highly Unlikely - Species previously recorded within 10.2 km, however, lack of suitable *Kunzea* thicket habitat present with white sand and bare areas. Suitable search effort did not record the species.	WAHERB, TPFL, NM
Drakaea micrantha		VU	T	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow, Sep to Oct. White-grey sand.	Highly Unlikely - Species previously recorded within 5 km, however, lack of suitable *Kunzea* thicket habitat present with white sand and bare areas. Suitable search effort did not record the species.	WAHERB, TPFL, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Drosera occidentalis	Western Sundew		P4	Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Fl. pink/white, Oct to Dec or Jan. Banksia woodland, sedgeland.	Unlikely. Closest record 3.7 km south west of the survey area. While suitable habitat exists in the survey area adequate searches did not record this species.	TPFL, NM
Eremophila glabra subsp. *chlorella*		EN	EN	Prostrate & spreading or sprawling shrub, 0.2-1 m high. Fl. green-yellow, Jul to Nov. Sandy clay. Winter-wet depressions, clay flats.	Highly Unlikely - Species previously recorded within 6.89 km. No suitable habitat present. .	WAHERB, NM
Hydrocotyle lemnoides	Aquatic Pennywort		P4	Aquatic, floating annual, herb. Fl. purple, Aug to Oct. Swamps.	Highly Unlikely - Species previously recorded within 8.7 km. No suitable habitat present.	WAHERB, NM
Hydrocotyle striata			P1	Herb. Clay. Springs.	Highly Unlikely - Species previously recorded within 6.49 km. No suitable habitat present.	WAHERB, NM
Eleocharis keigheryi		VU	T	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green, Aug to Nov. Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Highly Unlikely - Species not known within 10 km. No suitable habitat present.	WAHERB, NM
Jacksonia gracillima			P3	Low spreading shrub, 40 cm high x 1 m wide. Winter damp flats. Grey-black sand.	Unlikely - Species previously recorded within 3.62 km and suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM
Jacksonia sericea			P4	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.	Highly Unlikely - Species previously recorded within 6.69 km. No suitable habitat present.	WAHERB, TPFL, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Kennedia beckxiana			P4	Prostrate or twining shrub or climber. Fl. red, Sep to Dec. Sand, loam. Granite hills & outcrops.	Highly Unlikely - Species previously recorded within 5.2 km. No suitable habitat present.	WAHERB, NM
Lepidosperma rostratum		EN	T	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay flats.	Highly Unlikely - Species previously recorded within 9.63 km. No suitable habitat present.	WAHERB, TPFL, NM PMST
Levenhookia preissii	Preiss's Stylewort		P1	Annual (ephemeral), herb, 0.03-0.17 m high. Fl. pink-red, Sep to Dec or Jan. Grey or black, peaty sand. Swamps.	Highly Unlikely - Species previously recorded within 4.17 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species.	WAHERB, NM
Meionectes tenuifolia			P3	Annual semi aquatic herb. Melaleuca claypans	Highly Unlikely - Species previously recorded within 10.4 km. No suitable habitat present.	WAHERB, NM
Microtis quadrata			P4	Erect herb with tuber, 40 cm high. Greenish flowers. Oct-Dec. Wetlands	Highly Unlikely - Species previously recorded within 2.67 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, NM
Ornduffia submersa			P4	Small waterlily-like plant with hairy white flowers and oval, glossy leaves that float flat on the surface of the shallow water.	Highly Unlikely - Species previously recorded within 8.62 km. No suitable habitat present.	WAHERB, TPFL, NM
Phlebocarya pilosissima subsp. *pilosissima*			P3	Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white, Aug to Oct. White or grey sand, lateritic gravel.	Unlikely - Species previously recorded within 1.06 km. Suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Pimelea calcicola			P3	Erect to spreading shrub, 0.2-1 m high. Fl. pink, Sep to Nov. Sand. Coastal limestone ridges.	Highly Unlikely - Species previously recorded within 6.92 km. No suitable habitat present.	WAHERB, NM
Schoenus benthamii			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.	Highly Unlikely - Species previously recorded within 8.37 km. No suitable habitat present.	WAHERB, TPFL, NM
Schoenus capillifolius			P3	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green, Oct to Nov. Brown mud. Claypans.	Highly Unlikely - Species previously recorded within 7.82 km. No suitable habitat present.	WAHERB, TPFL, NM
Schoenus pennisetis			P3	Tufted annual, grass-like or herb (sedge), 0.05-0.15 m high. Fl. purple-black, Aug to Sep. Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	Highly Unlikely - Species previously recorded within 8.33 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, NM
Stenanthemum sublineare			P2	Erect shrub, to 0.1 m high. Fl. green, Oct to Dec. Littered white sand. Coastal plain.	Unlikely - Species previously recorded within 9.43 km. Suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM
Poranthera moorokatta			P2			WAHERB, NM
Stylidium aceratum			P3	Reed-like perennial, herb, 0.35-1 m high. Fl. pink, Oct to Dec. Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Highly Unlikely - Species previously recorded within 8.33 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, NM
Stylidium longitubum	Jumping Jacks		P4	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to	Highly Unlikely - Species previously recorded within 2.65	WAHERB, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
				Dec. Sandy clay, clay. Seasonal wetlands.	km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	
Stylidium paludicola			P3	Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink, Oct to Dec. Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland	Highly Unlikely - Species previously recorded within 1.08 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, NM
Styphelia filifolia			P3	Shrub ca 30 cm. July- Sep. Banksia woodlands	Unlikely - Species previously recorded within 4.83 km. Suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM
Synaphea sp. Fairbridge Farm (D. Papenfus 696)		CR	T	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 - Species previously recorded within 5.83 km. No suitable habitat present.	WAHERB, NM
Thelymitra dedmaniarum	Cinnamon Sun Orchid	EN	T	Tuberous, perennial, herb, to 0.8 m high. Fl. yellow, Nov to Dec or Jan. Granite.	Highly Unlikely - Species previously recorded within 2.7 km. No suitable habitat present.	WAHERB, NM
Thelymitra variegata	Queen of Sheba		P2	Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink, Jun to Sep. Sandy clay, sand, laterite. Banksia woodland.	Highly Unlikely - Species previously recorded within 2.8 km and suitable habitat present. Suitable search effort did not record the species	WAHERB, NM

Taxon	Common name	Status		Description (if available) (WA Herbarium 2019, DEE 2018)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Thysanotus glaucus			P4	Caespitose perennial herb. Flowers purple. Flowers Nov. Banksia woodlands	Unlikely - Species previously recorded within 10.3 km. Suitable habitat present. Suitable search effort did not record the species.	WAHERB, NM
Thysanotus sp. Badgingarra (E.A. Griffin 2511)			P2	Perennial, herb (with tuberous roots), ca 0.35 m high. Fl. blue, Dec. Grey sand with lateritic gravel.	Highly Unlikely - Species previously recorded within 5.51 km. No suitable habitat present.	WAHERB, NM
Tripterococcus sp. Brachylobus (A.S. George 14234)			P4	Erect perennial herb 80 cm high and 15 cm wide. Fl. Oct-Nov. Melaleuca wetlands.	Highly Unlikely - Species previously recorded within 5.4 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, TPFL, NM
Verticordia lindleyi subsp. *lindleyi*			P4	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions.	Highly Unlikely - Species previously recorded within 9.91 km and suitable habitat present, however, degraded with high weed cover. Suitable search effort did not record the species	WAHERB, TPFL, NM

Appendix E – Fauna data

Fauna species list

Black Cockatoo habitat assessment data

Fauna likelihood of occurrence assessment guidelines

Fauna likelihood of occurrence assessment

Fauna list for current and previous surveys

Family	Taxon	Common name	Source		
			This survey	GHD 2019	Ecological 2017
Birds					
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	x		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		x	
Psittacidae	*Barnardius zonarius*	Australian ringneck	x		x
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo shrike	x	x	
Meliphagidae	*Lichmera indistincta*	Brown honey eater	x	x	x
Columbidae	*Phaps chalcoptera*	Common Bronzewing	x		x
Artamidae	*Cracticus torquatus*	Grey Butcherbird	x		x
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail			x
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			x
Meropidae	*Merops ornatus*	Rainbow bee-eater	x	x	
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	x	x	
Corvidae	*Corvus coronoides*	Raven	x	x	
Psittaculidae	*Purpureicephalus spurius*	Red capped parrot	x	x	x
Meliphagidae	*Anthochaera carunculata*	Red wattle bird	x	x	
Meliphagidae	*Lichenostomus virescens*	Singing honeyeater	x	x	x
Maluridae	*Malurus splendens*	Splendid fairy wren	x	x	x
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	x		x
Acanthizidae	*Smicrornis brevirostris*	Weebill	x		x
Acanthizidae	*Gerygone fusca*	Western Gerygone	x		x
Meliphagidae	*Phylidonyris niger*	White cheeked honeyeater	x		x
Rhipiduridae	*Rhipidura leucophrys*	Willie wagtail	x	x	x
Reptiles					
Scincidae	*Tiliqua rugosa*	Bobtail	x		x
Scincidae	*Hemiergis quadrilineata*	Two-toed Earless Skink			x
Mammals					

Family	Taxon	Common name	Source		
			This survey	GHD 2019	Ecological 2017
Canidae	*Vulpes vulpes*	Fox	x	x	
	Isoodon obesulus	Quenda	x		x
Leporidae	*Oryctolagus cuniculus*	Rabbit	x	x	
Felidae	*Felis catus*	Cat	x		

Black cockatoo potential breeding trees within the survey area

Tree Species	Easting	Northing	DBH	Hollows Present	Comment
Eucalyptus gomphocephala (planted)	392912.3	6447007	500	0	
Eucalyptus gomphocephala (planted)	392913.3	6447013	500	0	
Eucalyptus gomphocephala (planted)	392910.4	6447024	800	0	
Eucalyptus gomphocephala (planted)	392876.7	6446962	700	0	
Eucalyptus rudis	392922.5	6446992	600	0	
Eucalyptus rudis	393835.2	6446595	500	0	
Eucalyptus rudis	393910.7	6446649	600	0	
Eucalyptus rudis	393890.2	6446625	500	0	
Eucalyptus rudis	393777.9	6446639	600	3	3 small hollows less than 15 cm wide, not suitable for breeding
Eucalyptus rudis	393780.7	6446643	500	0	
Eucalyptus rudis	393791.2	6446636	500	0	
Eucalyptus rudis	393812.3	6446636	650	0	
Eucalyptus rudis	393817.5	6446634	500	0	
Eucalyptus rudis	393853.2	6446634	500	0	

Fauna likelihood of occurrence assessment guidelines

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the project area.
Likely	Species are **likely** to occur in the project 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 project area. OR Species known distribution overlaps with the project area and there is suitable habitat within the project area.
Unlikely	Species assessed as **unlikely** include those species previously recorded within 10 km of the project area however: • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the project area. • The suitable habitat within the project 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 project area however: • There is limited habitat in the project area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the project 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 project area include: • Those species that have no suitable habitat within the project area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the project area.

Fauna likelihood of occurrence assessment of conservation significant fauna identified in the desktop assessment as potentially occurring within the study area.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
Actitis hypoleucos Common Sandpiper						Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia (Blakers et al. 1984; Higgins & Davies 1996). Areas of national importance and maximum	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						counts (Watkins 1993) Nuytsland Nature Reserve, Western Australia and Roebuck Bay, Western Australia.	
Apus pacificus Fork-tailed Swift						In Western Australia, 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. They are scattered along the coast from south-west Pilbara to the north and east Kimberley region, near Wyndham. There are sparsely scattered inland records, especially in the Wheatbelt, from Lake Annean and Wittenoom. They are found in the north and north-west Gascoyne Region, north through much of the Pilbara Region, and the south and east Kimberley. They are also recorded in the Timor Sea, both at sea and around islands such as the Ashmore Reef. Isolated records occur at Neale Junction in the Great Victoria Desert and on the Nullarbor Plain (Higgins 1999).	Highly unlikely – this species may occasionally forage aerially above the project area however it is habitat is not considered suitable to support this species.
Botaurus poiciloptilus Australasian Bittern	EN	EN		x		Densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands. In the southwest of Western Australia, 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	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						and channels fringed with lignum Muehlenbeckia, canegrass Eragrostis or other dense vegetation. It occasionally ventures into areas of open water or onto banks (DotE 2018b).	
Calidris acuminata Sharp-tailed Sandpiper	MI	MI			x	In Western Australia (WA), scattered records occur along the Nullarbor Plain and the southern areas of the Great Victoria Desert. They are widespread from Cape Arid to Carnarvon, around coastal and subcoastal plains of Pilbara Region to south-west and east Kimberley Division. Inland records indicate the species is widespread and scattered from Newman, east to Lake Cohen, south to Boulder and west to Meekatharra (Higgins & Davies 1996).	Unlikely – the habitat is considered low value for this species.
Calidris canutus Red Knot	EN & MI	EN		x		In Western Australia there are scattered records in the south, and it is occasionally seen around Peron Peninsula and Carnarvon. It is widespread on the coast from Ningaloo and Barrow Island to the south-west Kimberley Division. In the Northern Territory it is mainly recorded from Darwin, but also seen at various other sites. It is also recorded at Norfolk Island, Lord Howe Island, Macquarie Island, Kermadec Island, Chatham Island, Auckland Island and Campbell Island (Higgins & Davies 1996).	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
Calidris ferruginea Curlew Sandpiper	CR & MI	CR		x	x	In Western Australia, they are widespread around coastal and subcoastal plains from Cape Arid to south-west Kimberley Division, but are more sparsely distributed between Carnarvon and Dampier Archipelago. They occur in large numbers, in thousands to tens of thousands, at Port Hedland Saltworks, 80 Mile Beach, Roebuck Bay and Lake Macleod	Highly unlikely – the habitat is not considered suitable to support this species.
Calidris melanotos Pectoral Sandpiper	MI	MI			x	In Western Australia (WA), the species is rarely recorded. It has been observed at the Nullarbor Plain, Reid, Stoke's Inlet, Grassmere Lake, Warden Lake, Dalyup and Yellilup Swamp, Swan River, Benger Swamp, Guraga Lake, Wittecarra, Harding River, coastal Gascoyne, the Pilbara and the Kimberley (Higgins & Davies 1996).	Highly unlikely – the habitat is not considered suitable to support this species.
Calidris ruficollis Red-necked Stint	MI	MI			x	It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint has been recorded in all coastal regions, and found inland in all states when conditions are suitable. The Red-necked Stint probably travels in flocks and has been observed to feed in dense flocks. The Australian population was estimated at 353 000 (Watkins 1993). Sites of international importance and maximum or average counts (Watkins 1993) in Australia include: Eighty Mile Beach, Western Australia,	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						60 000, Port Hedland Saltworks, Western Australia, 23 000, Roebuck Bay, Western Australia, 19 800, Alfred Cove Nature Reserve, Western Australia, 10 000, Lake Macleod, Western Australia, 8312, Peel Inlet, Western Australia, 8063.	
Calidris tenuirostris Great Knot	CR & MI	CR			x	The Great Knot has been recorded around the entirety of the Australian coast, with a few scattered records inland. It is now absent from some sites along the south coast where it used to be a regular visitor (Garnett et al. 2011). The greatest numbers are found in northern Australia; where the species is common on the coasts of the Pilbara and Kimberley, from the Dampier Archipelago to the Northern Territory border, and in the Northern Territory from Darwin and Melville Island, through Arnhem Land to the south-east Gulf of Carpentaria	Highly unlikely – the habitat is not considered suitable to support this species.
Calyptorhynchus banksii naso Forest Red-tailed Black Cockatoo	VU	VU		x	x	The Forest Red-tailed Black Cockatoo inhabits the dense jarrah, karri, and marri forests receiving more than 600 mm annual average rainfall but also occurs in a range of other forest and woodland types, including Blackbutt (E. patens), Wandoo (E. wandoo), Tuart (E. gomphocephala), Albany Blackbutt (E. staeri), Yate (E. cornuta), and Flooded Gum (E. rudis) (DotE 2012). Habitats tend to have an understorey of balga (Xanthorrhoea spp.), kingia (Kingia	Present – presence of some foraging habitat (Jarrah) was recorded but not suitable for breeding.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						australis), snottygobble (Persoonia spp.), parrot bush (Banksia sessillis), holly-leaved mirbelia (Mirbelia dilatata), bull banksia (B. grandis), bullich (Taxandria spp.) and sheoak (Allocasuraina fraseriana). They are most common in the jarrah forest region of the northern Darling Range from Collie north to Mundaring and are very local throughout the lower south-west. They can be found on the Swan Coastal Plain, mainly in search of food the exotic white cedar (Melia azedarach). There are also several small isolated populations in the eastern parts of its range (DotE 2012).	
Calyptorhynchus baudinii Baudin's Cockatoo,	EN	EN		x		Baudin's Cockatoo occurs in south-west Western Australia (WA). The range of the species, which is generally bounded by the 750 mm isohyet, extends from Albany northward to Gidgegannup and Mundaring (east of Perth), and inland to the Stirling Ranges and near Kojonup (Davies 1966; DSEWPaC 2012p; Saunders 1974b, 1979; Saunders et al. 1985; Storr 1991). Breeding has been recorded to the south-west of the area bounded by Leschenault, Collie and Albany (DSEWPaC 2012p), with the most northerly record at Lowden, near Donnybrook (Johnstone & Storr 1998). Breeding has also been recorded at Serpentine (hills area), and	Unlikely – species habitat not suitable for foraging or breeding.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						east to Kojonup and near Albany (Johnstone & Kirkby 2008).	
Calyptorhynchus latirostris Carnaby's Black Cockatoo	EN	EN		x	x	Carnaby's Black Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum, wandoo, marri, jarrah and karri, and in shrubland or kwongan heathland dominated by Hakea, Dryandra, Banksia and Grevillea species. Breeding activity is restricted to eucalypt woodlands mainly in the semiarid and subhumid interior, from Kalbarri in the north, Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning. The species has expanded its breeding range westward and south into the jarrah-marri forests of the Darling Scarp and into the tuart forests of the Swan Coastal Plain, including the Yanchep area, Lake Clifton and near Bunbury. It nests in trees older than 120-150 years (DotEE 2018b).	Present – high value foraging habitat was recorded but not suitable for breeding. No foraging evidence of use was found during the survey.
Charadrius dubius Little Ringed Plover	MI	MI			x	Breeds on stony substrates around lakes, gravel pits, and along rivers; migrants occur in wide variety of fresh and brackish wetland habitats, but rarely out on open tidal areas (eBird 2018).	Highly unlikely – the habitat is not considered suitable to support this species.
Charadrius leschenaultii Greater Sand Plover	VU & MI	VU			x	In Australia, the Greater Sand Plover occurs in coastal areas in all states, though the greatest numbers occur in northern Australia, especially the north-	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						west (Marchant & Higgins 1993; Minton et al. 2006). In northern Australia, the species is especially widespread between North West Cape and Roebuck Bay in Western Australia (Barrett et al. 2003; Blakers et al. 1984; Lane 1987; Storr 1980, 1987); there are sparsely scattered records from the largely inaccessible area between Roebuck Bay and Darwin, but it often occurs in the Top End of the Northern Territory, including on Groote Eylandt (Barrett et al. 2003; Blakers et al. 1984; Chatto 2003; Goodfellow 2001; Noske & Brennan 2002; Storr 1977).	
Falco peregrinus Peregrine Falcon		OS			x	The Peregrine Falcon is found on and near cliffs, gorges, timbered watercourses, riverine environments, wetlands, plains, open woodlands, and pylons and spires of buildings, though less frequently in desert regions (Morcombe 2004). They are not common but can be found almost anywhere throughout WA and in the southwest, including particularly at Fitzgerald River, Stirling Range, Porongurup National Parks, Kondinin, and Peak Charles, with many more locations north of Perth (Nevill 2013).	Unlikely – whilst it is acknowledged that this species occurs locally and may fly over the survey area, the habitat is not considered suitable to support this species.
Gallinago hardwickii Latham's Snipe,	MI	MI			x	Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						located further south) (Higgins & Davies 1996). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South Wales (Barrett et al. 2003; Blakers et al. 1984; Frith et al. 1977). The species is widespread in Tasmania (Barrett et al. 2003; Naarding 1983; Thomas 1979) and is found in all regions of Victoria except for the north-west (Barrett et al. 2003; Blakers et al. 1984; Emison et al. 1987). Most birds spend the non-breeding period at sites located south of the Richmond River in New South Wales (Frith et al. 1977).	
Gelochelidon nilotica Gull-billed Tern	MI	MI			x	The Gull-billed Tern occurs on all continents except Antarctica. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean (Birdlife Australia 2018)	Highly unlikely – the habitat is not considered suitable to support this species.
Ixobrychus dubius Australian Little Bittern		P4			x	In Australia the bittern is found in the south-east of the continent, with most records deriving from the Murray-	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						Darling Basin, as well as patchily along the east coast, and in south-west Western Australia where it is locally common on the Swan Coastal Plain. Some scattered records are given from elsewhere, including coastal locations in the Kimberley region, the Top End, and the Torres Strait islands, with vagrants occasionally reaching Lord Howe Island and New Zealand. Apart from records of vagrants, circumstantial evidence that at least part of the population makes long-distance seasonal migrations is that most sightings, and the highest reporting rates, of the bitterns in southern Australia occur in spring and summer, with the birds largely absent in autumn and winter. There are few breeding records from the Australian tropics (Beardsell, C.M.; Norman, F.I.; Loyn, R.H. & Bennett, S.C. 1987).	
Limosa lapponica baueri Bar-tailed Godwit	VU	VU		x		The Bar-tailed godwit (Western Alaskan) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is widespread around the coast, from Eyre to Derby (TSSC 2016). They are	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						uncommon in the south west (Nevill 2013).	
Leipoa ocellata Malleefowl	VU	VU		X		The Malleefowl generally occurs in semi-arid areas of Western Australia, in shrublands and low woodlands that are dominated by mallee vegetation, as well as native pine Callitris woodlands, Acacia shrublands, paperbark, skheoak, Broombush Melaleuca uncinata vegetation, eucalypt woodlands, or coastal heathlands. Mostly they are found where there are sandy or gravel soils. The nest is a large mound of sand or soil and organic matter (Jones and Goth 2008; Morcombe 2004; Nevill 2013). In WA they are found from the southwest Nullarbor to Albany, north, and then west from Moore River up to Shark Bay, past Cue, across to Wiluna and east to the northern Victoria Desert south of the Blackstone Ranges (Nevill 2013	Highly unlikely – the habitat is not considered suitable to support this species.
Numenius madagascariensis Eastern Curlew	CE, Mi	VU		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. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, sometimes within the mangroves, and	Unlikely – the habitat is considered low value to this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						in coastal saltworks and sewage farms. In the south west, Eastern Curlews are recorded from Eyre, and there are scattered records from Stokes Inlet to Peel Inlet (Marchant & Higgins 1993). They are uncommon further south of Geraldton, but can be spotted in Alfred Cove, Peel Inlet and the Albany region (Nevill 2013).	
Oxyura australis Blue-billed Duck			P4		x	The blue-billed duck is a small Australian almost entirely aquatic duck (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 where deep fresh water is present (Morcombe 2004).	Highly unlikely – the habitat is not considered suitable to support this species.
Pandion cristatus Osprey, Eastern Osprey	MI	MI			x	The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island (Abbott 1982; Barrett et al. 2003; Bischoff 2001; Blakers et al. 1984; Clancy 1991; Condon 1969; Dennis 2007a; Johnstone & Storr 1998; Marchant & Higgins 1993). The total	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						range (breeding plus non-breeding) around the northern coast is more widespread, extending from Esperance in Western Australia to NSW, where records become scarcer towards the south, and into Victoria and Tasmania, where the species is a rare vagrant (Barrett et al. 2003; Blakers et al. 1984; Johnstone & Storr 1998; Marchant & Higgins 1993; Morris et al. 1981). The distribution of the species around the northern coast (south-western Western Australia to south-eastern NSW) appears continuous except for a possible gap at Eighty Mile Beach (Barrett et al. 2003; Blakers et al. 1984).	
Philomachus pugnax Ruff, reeve	MI	MI			x	In Western Australia the species has been recorded at the lower King River and it is mostly found in the south-west region of the state. It has been sighted at the Vasse River estuary, north to Namming Lake and Lake McLarty. It has been periodically recorded at Port Hedland, Kununurra and the Argyle Diamond Mine. There are unconfirmed reports at Curlewis Camp, Millstream Chichester, Broome and Roebuck Bay. In the Northern Territory the species has been recorded around Darwin, Colac Bay, Lake Ellesmere, Lake Poukawa and Lake Wainono (Higgins & Davies 1996).	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
Plegadis falcinellus Glossy Ibis	MI	MI			x	Within Australia, the Glossy Ibis is generally located east of the Kimberley in Western Australia and Eyre Peninsula in South Australia. The species is also known to be patchily distributed in the rest of Western Australia. The species is rare or a vagrant in Tasmania (Beehler et al. 1986; Coates & Bishop 1997; Marchant & Higgins 1990).	Highly unlikely – the habitat is not considered suitable to support this species.
Pluvialis fulva Pacific Golden Plover	MI	MI			x	In Western Australia, the species is seldom recorded along the southern or south-western coasts, but is more widespread along the Pilbara and Kimberley coasts between North-West Cape and the Northern Territory border. They are regularly recorded in coastal areas of the Top End of the Northern Territory (Alcorn et al. 1994; Barrett et al. 2003; Blakers et al. 1984; Marchant & Higgins 1993). The species is often recorded on Australia's outlying islands, including Lord Howe and Norfolk Islands, as well as on Christmas and Cocos-Keeling Islands in the Indian Ocean (McAllan et al. 2004; Schodde et al. 1983; Stokes 1988; Stokes et al. 1984).	Highly unlikely – the habitat is not considered suitable to support this species.
Pluvialis squatarola Grey Plover	MI	MI			X	In Australia, the Grey Plover has been recorded in all states, where it is found along the coasts, and it especially abundant on the western and southern coastlines, mainly between The Coorong and western beaches of the	Highly unlikely – the habitat is not considered suitable t support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						Eyre Peninsula in South Australia, and the coast of Western Australia between Albany and the northern Kimberley coast (Barrett et al. 2003; Blakers et al. 1984; Lane 1987	
Rostratula australis Australian Painted Snipe	EN, Mi	EN		x		The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia, canegrass, or sometimes tea-tree (Melaleuca). It sometimes uses areas that are lined with trees, or that have some scattered fallen or washed-up timber (DotEE 2018a). In the south west it can be found around Carnarvon and wetlands north of Perth, particularly those west of Moora and Gin Gin (Nevill 2013).	Highly unlikely – the habitat is not considered suitable to support this species.
Sternula nereis nereis Australian Fairy Tern	VU, Mi	VU		x		The Fairy Tern occurs along the coast of WA as far north as the Dampier Archipelago near Karratha, but mostly in the southern part of Australia including most of the coastline in the south west. It nests on sheltered sandy beaches, coastal inlets, spits and banks above the high tide line and below	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						vegetation. It has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands, and mainland coastline (DotEE 2018a, Nevill 2013). They can also be seen in saltfields, saline or brackish lakes, and sewage ponds near the coast.	
Thinornis rubricollis Hooded Plover, Hooded Dotterel		P4			x	The Hooded Plover occurs on sandy beaches between Jervis Bay, New South Wales and the Eyre Peninsula, South Australia, as well as in Tasmania and between Esperance and Perth in south-west Western Australia.They are not abundant (Birdlife Australia 2019)	Highly unlikely – the habitat is not considered suitable to support this species.
Tringa glareola (Wood Sandpiper)	MI	MI			x	In Western Australia the species is widespread but scattered in most regions. In the Northern Territory they are found at the Top End, scattered from Keep River, south and east to the Victoria River Downs and Crocodile Billabong and Ngukurr, and to Kakadu National Park and Darwin. In southern Northern Territory they are found mostly around Alice Springs. They have also been recorded on Christmas Island and Prince Edward Island (Higgins & Davies 1996).	Unlikely – the habitat is considered low value for this species.
Tringa nebularia Common Greenshank	Mi	IA		x	x	The Common Greenshank is found in a wide variety of inland wetlands and coastal habitats of varying salinity. It occurs in sheltered coastal areas typically with large mudflats and saltmarsh, mangroves or seagrass,	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						including embayments, harbours, river estuaries, deltas and lagoons, but less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats, and artificial wetlands. They occur around most of the coast from Cape Arid in the south to Carnarvon in the north-west (DotEE 2018a), and are moderately common here given suitable habitat. They can be found in areas including Wannamal Lake, many Perth lakes, Alfred Cove, Peel Inlet, Vasse and Harvey Estuaries, and the Albany and Esperance regions (Nevill 2013).	
Tringa stagnatilis Marsh Sandpiper, little greenshank	MI	MI			x	In Western Australia they are mainly found around the coast. A few visit New Zealand. The Marsh Sandpiper is also recorded on Lord Howe Island, Norfolk Island, Chatham Island and Christmas Island (Higgins & Davies 1996).	Highly unlikely the habitat is not considered suitable to support this species.
Invertebrate							
Neopasiphae simplicior A native bee	EN	CR	x			Neopasiphae simplicior is restricted in range, and is thought to only occur in a single location within the bushland of the Forrestdale Lake Nature Reserve adjacent to Forrestdale Lake and the Armadale Golf Course, with a previous population known from Cannington (Perth's southern suburbs). Forrestdale	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						Lake is located on the southern fringes of Perth's metropolitan area, and is one of the few remaining examples of the lakes and vegetation originally found on the Swan Coastal Plain. Only 20% of all the wetlands that once existed now remain, therefore it is likely that suitable habitat for this species has been cleared (Houston 1994).	
Synemon gratiosa Graceful Sunmoth		P4		x		The Graceful Sun Moth occurs within the Swan, South West and Midwest WA DEC regions, and the South-west, Swan and Northern Agricultural Natural Resource Management regions (WA DEC 2011).	Unlikely - habitat is not suitable to support this species.
Westralunio carteri Carter's Freshwater Mussel	VU	VU		x		Carter's Freshwater Mussel is usually found in freshwater river pools. They are most common in areas with muddy, silty and sandy bottoms and flowing permanent water. Environmental tolerances of W. carteri are not precisely known but they can be found where water temperatures range from 4° C to over 30° C.	Highly unlikely – habitat is not suitable to support this species.
Mammal							
Dasyurus geoffroii Chuditch, Western Quoll	VU	VU		x		Chuditch were previously known from most of Australia, occurring in every Mainland State and Territory. It was relatively abundant until European settlement, when the species underwent a drastic decline and contraction. It went extinct in New South Wales in the 1940s, Victoria in	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						the 1950s and in Queensland between 1880 and 1910. It is now largely restricted to the south-west of Western Australia, with small numbers in the Midwest, Wheatbelt and South Coast Regions. Historically, chuditch inhabited a wide range of habitats, but today it survives mostly in Jarrah Eucalyptus marginata forests and woodlands, mallee shrublands and heathlands.(DPAW 2018).	
Isoodon fusciventer Quenda		P4		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).	ikely – the species has been recorded within the survey area through suspected diggings. The available habitat is suitable for foraging and shelter, and provides habitat connectivity.
Myrmecobius fasciatus Numbat, Walpurti	EN	EN		x		Currently, numbats are only known to be surviving in a small area of WA's Jarrah forest and Wheatbelt, notably at Dryandra Woodland and the Upper Warren area. They have been successfully reintroduced to other locations within the Jarrah forest and Wheatbelt, and to sites in South Australia and New South Wales.	Unlikely – the habitat is considered low value for this species. Locally extinct.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
						The species was previously found to inhabit a wide range of habitats, including Mulga woodland, spinifex sandplains and Eucalypt forests and woodlands. In WA, their habitat is generally woodland dominated by Eucalyptus species, with abundant hollow logs and branches for shelter and termites for food (DPAW 2018).	
Notamacropus irma Western Brush Wallaby		P4		x		The Western Brush Wallaby is 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 (DEC 2012; Van Dyck and Strahan 2008).	Likely – the habitat may be suitable for this species but no observations were made during the survey.
Pseudocheirus occidentalis Western Ringtail Possum	CR	VU		x		There have been translocations of mostly displaced or rehabilitated western ringtail possums to numerous locations since 1991. Translocation sites approved by Department of Parks and Wildlife include Leschenault Peninsula Conservation Park, Yalgorup NP, Lane Poole Reserve and Keats State Forest Block at Dwellingup, Locke NR at Busselton, Karakamia Sanctuary (predator-free wildlife sanctuary privately owned and managed by Australian Wildlife Conservancy), Gelorup bushland south of Bunbury and Perup Sanctuary (predator-free enclosure within Tone Perup NR) east of Manjimup (DPAW 2017)	Highly unlikely – the habitat is not considered suitable to support this species.

Species name	Status			Source		Habitat Requirements	Likelihood of occurrence Survey area
	EPBC Act	BC Act	DBCA	EPBC Act PMST	NM		
Setonix brachyurus Quokka	VU	VU		x		The Quokka occurs on two offshore islands (Rottnest Island and Bald Island) and a number of mainland sites in south-west Western Australia (WA), ranging from just south of Perth to the Hunter River (Maxwell et al. 1996; Sinclair 1998). The distribution of this species is severely fragmented and there is little to no migration between populations (DoEE 2018).	Highly unlikely – the habitat is not considered suitable to support this species.
Reptile							
Lerista lineata Perth Slider, Lined Skink		P3		x		Lerista lineata is largely restricted to the Swan Coastal Plain where its distribution is centred on the highly disturbed southern Perth metropolitan area. As a consequence, much of this species' former habitat has disappeared. As most of its current distribution is in suburban gardens and remnant bushlands that subject to weed infestation, frequent fires, and further fragmentation and introduced predators (B Maryan et al 2015).	Likely – habitat is considered suitable but none were detected during survey.
Neelaps calonotos Black-striped Snake		P3		x		The Black-striped Snake is a burrowing snake that is restricted to the southwest coastal regions of WA, on sand plains along the Swan Coastal Plain, from Dongara south to Mandurah (Pearson 2013).	Likely – habitat is considered suitable but none were detected during survey.

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12516191-47858/https://projectsportal.ghd.com/sites/pp18_03/cityofcockburnjandak/ProjectDocs/12516191-REP-B-Flora and Fauna Survey Jandakot Road 2019.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	J Collins, N Barratt	D Farrar, G Gaikhorst		D Farrar		17/12/2019

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