Belmont Park Racecourse Redevelopment Native Vegetation Clearing Permit Application – Supporting Information

Attachment 4

Flora, Vegetation and Fauna Assessment (Emerge Associates 2021)

This page has been left blank intentionally.

TECHNICAL MEMORANDUM
Flora, Vegetation and Fauna Assessment
Burswood Peninsula

PROJECT NUMBER	EP21-054(02)	**DOC. NUMBER**	EP21-054(02)--001 SKP
PROJECT NAME	Burswood Belmont Park Precinct A Development Support	**CLIENT**	Golden Sedayu Pty Ltd
AUTHOR	SKP	**REVIEWER**	RAW
VERSION	1	**DATE**	15/07/2021

1. INTRODUCTION

Golden Sedayu Pty Ltd (Golden Sedayu) are developing the Burswood peninsula as part of the Belmont Park residential development. The development extends over Lot 102 Goodwood Parade, part of Lot 1002 on plan P403881 and part of Lot 9101 on plan P073845 (herein referred to collectively as the 'site').

The site is located approximately 3 kilometres (km) east of the Perth Central Business District within the Town of Victoria Park. The site extends over approximately 34.53 ha and is bound by the Swan River to the north, west and east and the Graham Farmer Freeway and the Belmont Park racecourse to the south, as shown in **Figure 1**.

1.1. Purpose and scope of work

Emerge Associates (Emerge) were engaged by Golden Sedayu to provide information regarding the flora and vegetation values within the site.

The scope of work was to undertake a flora, vegetation and fauna assessment with reference to the Environmental Protection Authority's (EPA's) relevant technical guidance documents (EPA 2016a, 2020).

As part of this scope of work, the following tasks were undertaken for the vegetation within the site:

- Desktop review of relevant background information pertaining to the site and surrounds, including database searches for threatened flora and fauna species and ecological communities.
- Identification of potential habitat for conservation significant flora and fauna species and an assessment of likelihood of occurrence.
- Compilation of a flora species list as part of the field survey.
- Mapping of plant communities, vegetation condition and fauna habitat types.
- Identification of black cockatoo habitat including identification and mapping of black cockatoo habitat trees.
- Identification of conservation significant flora, vegetation and/or fauna within the site.
- Documentation of the desktop assessment, survey methodology and results into a technical memorandum.

2. PREVIOUS SURVEYS

Emerge have previously undertaken multiple vegetation surveys of the site in May, June, July and December 2011. Seven plant communities in 'good' to 'completely degraded' condition were

recorded within the current site boundary. No threatened or priority flora species or communities were recorded.

The surveys in 2011 were never documented into a standalone flora and vegetation assessment. Rather, they informed an *Environmental Setting and Foreshore Ecology* report (Emerge Associates 2011a), a *Foreshore Management Strategy* (Emerge Associates 2011d), an *Environmental Assessment and Justification Report* (Emerge Associates 2011c) and a subsequent clearing permit application (Emerge Associates 2011b).

Following the previous surveys, in August 2013 the 'subtropical and temperate coastal saltmarsh' vegetation community was listed as a TEC under the EPBC Act and as a PEC in WA. Subsequently, in 2017 Emerge undertook a targeted vegetation assessment to determine the extent of the 'subtropical and temperate coastal saltmarsh' TEC in the site but the report was not documented.

3. BACKGROUND

3.1. Climate

Climate influences the types of vegetation that grow in a region and the life cycles of the flora present. It is therefore critical for a flora and vegetation survey to respond appropriately to climatic conditions to ensure that surveys are conducted during times when flora species are easiest to detect and identify.

The south-west of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters. In Mediterranean type climates some flora species will typically spend part of their lifecycle as either underground storage organs or as seed. This is an adaptation to unfavourable environmental conditions such as excessive heat and drought that occur over the summer period. These species, known as 'geophytes' or 'annuals', tend to re-emerge during winter when favourable conditions return and are most visible during spring, which is the flowering period for a majority of plant species. Therefore, spring is the optimal time to complete flora and vegetation surveys in the south-west of WA.

An average of 730.9 millimetres (mm) of rainfall is recorded annually from the Perth Metro weather station (no. 9225), which is the closest weather station, located approximately 3 km from the site. The majority of this rainfall is received between the months of May and September. Mean maximum temperatures at the Perth Metro weather station range from 18.5°C in July to 31.5°C in February, while mean minimum temperatures range from 7.9°C in July to 18.3°C in February (BoM 2021).

A total of 233.6 mm of rain was recorded between January and May 2021 prior to the survey, which is more than the combined long-term average of 174.3 mm for the same months (BoM 2021). Since the survey was undertaken outside of the main flowering period (spring), the amount of rainfall was not considered to affect the survey outcomes.

3.2. Geomorphology and soils

Landform and soils influence vegetation types at regional and local scales. The site occurs on the Swan Coastal Plain, which is the geomorphic unit that characterises much of the Perth metropolitan area. The Swan Coastal Plain is approximately 500 km long and 20 to 30 km wide and is roughly bound by the Indian Ocean to the west and the Darling Scarp to the east. Broadly the Swan Coastal

Plain consists of two sedimentary belts of different origin. Its eastern side comprises the Pinjarra Plain which formed from the deposition of alluvial material washed down from the Darling Scarp, while its western side comprises three dune systems that run roughly parallel to the Indian Ocean coastline (Seddon 2004). These dune systems, referred to as Quindalup, Spearwood and Bassendean associations, represent a succession of coastal deposition that has occurred since the late Quaternary period (approximately two million years ago) (Kendrick *et al.* 1991) and, as a result, they contain soils at different stages of leaching and formation.

Examination of broad scale mapping places the site within the Swan association which consists of alluvial terraces with red earths and duplex soils (Churchward and McArthur 1980). Finer scale mapping by Gozzard (2011) places the site in the Swan River floodplain. The Swan River is a permanently open estuary system that supports fresh/brackish conditions during winter to spring and salty conditions during summer to autumn.

Soil investigations indicate that the entire site has been covered in imported fill, beginning in the late 1800s (Golder Associates 2011). Additional information regarding the historic land use is provided in **Section 3.6**.

The site is not known to contain any restricted landforms or unique geological features.

3.3. Topography

The site is low lying with elevation ranging from 1 m in relation to the Australian height datum (mAHD) near the Swan River to 3 mAHD towards the centre of the site (DoW 2008).

3.4. Hydrology and wetlands

Wetlands include "areas of seasonally, intermittently or permanently waterlogged soils or inundated land, whether natural or otherwise, fresh and saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries" (Wetlands Advisory Committee 1977). Wetlands can further be recognised by the presence of vegetation associated with waterlogging or the presence of hydric soils such as peat, peaty sand or carbonate mud (Hill *et al*. 1996).

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. The following lists of important wetlands were checked as part of this assessment:

- *Ramsar List of Wetlands of International Importance* (DSEWPaC 2013)
- *A Directory of Important Wetlands in Australia* (Environment Australia 2001).

No Ramsar listed wetlands are located within or near the site. Adjacent to the site, the Swan River is listed as an 'important wetland' (the Swan-Canning Estuary).

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2018) shows two 'major' drains within the site: one in the north-eastern portion of the site and one on the western boundary of the site. These have been installed to drain water from the adjacent racecourse.

The Department of Biodiversity, Conservation and Attractions (DBCA) has developed the *Geomorphic Wetlands of the Swan Coastal Plain* dataset (DBCA 2020). This dataset maps geomorphic wetland

features and classifies them based on their landform shape and water permanence. Each feature is assigned to one of three management categories which guides land use and conservation.

A review of the *Geomorphic Wetlands, Swan Coastal Plain* dataset indicated that the adjacent Swan River estuary is mapped as a 'conservation' category wetland (UFI 13316), of which small areas are mapped as occurring within the site (DBCA 2020). One 'multiple use' category artificial lake is present adjacent to the site within the Belmont Racecourse track.

3.5. Regional vegetation

Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. At a continental scale the *Interim Biogeographic Regionalisation of Australia* (IBRA) divides the Swan Coastal Plain into two floristic subregions (Environment Australia 2000).

The site is contained within the 'SWA02' or Perth subregion, which is characterised as mainly containing *Banksia* low woodland on leached sands with *Melaleuca* swamps where ill-drained; and woodland of *Eucalyptus gomphocephala* (tuart), *E. marginata* (jarrah) and *Corymbia calophylla* (marri) on less leached soils (Beard 1990). This subregion is recognised as a biodiversity hotspot and contains a wide variety of endemic flora and vegetation types.

Variations in native vegetation within the site can be further classified based on regional vegetation associations. Heddle *et al.* (1980) mapping shows the site as comprising the 'Swan complex', which is described as comprising fringing woodland of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* with localized occurrences of low open forest of *Casuarina obesa* and *Melaleuca cuticularis*.

The 'Swan complex' was determined to have 13.57% of its pre-European extent remaining, of which 0.82% is protected for conservation purposes (Government of Western Australia 2019).

3.6. Historic land use

Review of historical images available from 1953 onwards shows that multiple large scale clearing events have previously occurred within the site (WALIA 2021). The site is known to have been subject to multiple historic contamination activities, including disposal of fly ash from the East Perth Power Station, filling with material dredged from the Swan River and filling with construction and demolition rubble (Emerge Associates 2011e). Significant flora, vegetation and fauna

3.7. Conservation significant values

3.7.1. Threatened and priority species

Certain flora and fauna taxa that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, flora and fauna taxa may be listed as 'threatened' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Threatened taxa listed under the EPBC Act are assigned a conservation status according to attributes such as population size and geographic distribution. Any action likely to have a significant impact on a taxon listed under the EPBC Act requires Ministerial approval.

In Western Australia flora and species may also be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act). It is an offence to 'take' or 'disturb' threatened flora and fauna listed under the BC Act without Ministerial approval.

Flora and fauna species that do not currently meet the criteria for listing as threatened but are potentially rare or threatened may be added to the DBCA's *Priority Flora List* or *Priority Fauna List.* These species are classified into 'priority' levels based on threat. Whilst priority species are not under direct statutory protection, they are considered during State approval processes. Further information on threatened and priority species and their categories is provided in **Appendix A**.

3.7.1.1. Black cockatoos

Three threatened species of black cockatoo occur in the south-west of WA (referred to herein collectively as 'black cockatoos'):

- *Calyptorhynchus latirostris* (Carnaby's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus baudinii* (Baudin's cockatoo) which is listed as 'endangered' under the EPBC Act and the BC Act.
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo) which is listed as 'vulnerable' under the EPBC Act and the BC Act.

Black cockatoo habitat is conventionally separated into breeding, roosting and foraging categories:

- Black cockatoos nest in hollows that form in trees which are usually more than ~200 years old. 'Breeding habitat' comprises 'habitat trees' which are trees of a species known to support black cockatoo breeding and which either have a suitably large enough nest hollow or have a large enough diameter at breast height (DBH) to indicate that a suitable nest hollow could develop in time (DSEWPaC 2012). A minimum DBH for a habitat tree is defined as ≥50 centimetres (cm) for most tree species used by black cockatoos and ≥30 cm for *Eucalyptus wandoo* (wandoo) and *Eucalyptus salmonophloia* (salmon gum) (DSEWPaC 2012). Breeding habitat is also generally expected to be located within 7 km of food and water resources (Saunders 1990).
- Roosting refers to black cockatoos congregating in a tree or group of trees to rest overnight. 'Roosting habitat' consists of groups or individual tall trees used for roosting. Roosts generally comprise the tallest trees in an area and can include native and non-native trees (DSEWPaC 2012). They are often located within 6 km of water and food resources, with additional foraging ranges within 12 km (Shah 2006; DSEWPaC 2012; Le Roux 2017). The use of a particular roost may vary depending on availability of food and water resources.
- Black cockatoos feed on the fruit and seeds of a range of native and non-native plant species. 'Foraging habitat' is vegetation that contains plant species known to be foraged on by black cockatoos.

Each black cockatoo species has a defined breeding season, with Baudin's cockatoo breeding from August/September to February/March and Carnaby's cockatoo breeding from July/August to January/February (DSEWPaC 2012). Forest red-tailed black cockatoo breeds in October/November but may breed in March/April if there is good autumn rainfall (DSEWPaC 2012). There is also evidence that forest red-tail black cockatoos breed throughout the year, with peaks in April – June and August – October (Johnstone *et al.* 2013).

3.7.2. Threatened and priority ecological communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. An ecological community's structure, composition and

distribution are determined by environmental factors such as soil type, position in the landscape, altitude, climate and water availability (DoEE 2017a). 'Threatened ecological communities' (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection.

Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment. TECs are also listed within Western Australia but are currently not afforded direct statutory protection at a State level. Nonetheless their significance is acknowledged through other State environmental approval processes such as 'environmental impact assessment' pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. A plant community that is under consideration for listing as a TEC in Western Australia, but does not yet meet survey criteria or has not been adequately defined, may be listed as a 'priority ecological community' (PEC). Listing as a PEC is similarly considered during State approval processes. Further information on categories of TECs and PECs is provided in **Appendix A**.

3.7.1. Migratory fauna

Some fauna species that migrate to Australia and its external territories or pass though or over Australian waters during their annual migrations are protected under Commonwealth and State legislation. At a Commonwealth level, migratory fauna taxa may be listed as 'migratory' under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires Ministerial approval. Further information on migratory species is provided in **Appendix A**.

3.7.2. Local and regional significance

Flora species and ecological communities may be significant irrespective of whether they have special protection under policy or legislation. Two key reasons that vegetation within the site may be significant are listed below:

- The site is in close proximity to the Swan River.
- The vegetation within the site has potential value as habitat for threatened or priority fauna species including, in particular, Carnaby's black cockatoo and the forest red-tailed black cockatoo, which are listed as threatened under the EPBC Act and in WA.

3.8. Declared pests

The terms 'pest' can refer to any plant or animal that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. A particularly invasive or detrimental pest species may be listed as a 'declared pest' pursuant to Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act), indicating that it warrants special management to limit its spread.

At a National level, pest fauna may be listed as 'Established Pests and Diseases of National Significance' (EPDNS) under the *Australian Pest Animal Strategy (2017-2027) (DoA 2017)*. Further information on categories of declared pests is provided in **Appendix A.**

3.9. Weeds

In addition to being listed as a declared pest, weeds may be listed as a *Weed of National Significance* (WoNS). The Australian government has compiled a list of 32 WoNS (DoEE 2021). Whilst the WoNS list is non-statuatory, many WoNS are also listed under the BAM Act. Further information on categories of declared pests is provided in **Appendix A**.

Due to historical disturbance weed species are expected to be present at the site. Previous surveys have recorded high weed cover including species such as **Tamarix aphylla*, **Cortaderia selloana* and **Cynodon dactylon* (refer **Section 3**).

4. METHODS

4.1. Flora and vegetation

4.1.1. Desktop assessment

A search was conducted for threatened and priority flora that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2020a), *NatureMap* (DBCA 2020) and DBCA's threatened and priority flora database (reference no. 12-0721FL).

A search was also conducted for TECs and PECs that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2020a), the *weed and native flora dataset* (Keighery *et al.* 2012) and DBCA's threatened and priority ecological communities' databases (reference no. 42-0621EC).

4.1.2. Field survey

A botanist and an environmental consultant from Emerge visited the site on 14 June 2021 to conduct the flora and vegetation survey. The site was traversed on foot and the vegetation composition and condition was recorded.

Detailed sampling of the vegetation was undertaken using a combination of non-permanent 10 x 10 m quadrats and relevés. The quadrats were established using fence droppers bound by measuring tape. The relevés were completed over an equivalent 10 x 10 m area without the use of physical markers and were included to provide a more rapid sample of patches of vegetation in poorer condition and/or of smaller size. The position of each sample was recorded with a hand-held GPS unit.

The data recorded within the sample included:

- site details (site name, site number, observers, date, location)
- environmental information (slope, aspect, bare-ground, rock outcropping soil type and colour class, litter layer, topographical position, time since last fire event)
- biological information (vegetation structure and condition, 'foliage projective cover' (FPC), degree of disturbance and species present).

Additional native plant taxa not observed within the sample locations were recorded opportunistically as the botanist traversed the site. A representative flora species list was compiled that focussed on native species and included a limited selection of the non-native species present. Photographs were taken throughout the field visit to show particular site conditions.

The suitability of habitat within the site for conservation significant species identified in the desktop assessment was assessed (refer **Section 4.1.1**). Where identified, areas of suitable habitat were traversed to search for conservation significant species.

All plant specimens collected during the field survey were dried, pressed and then named in accordance with requirements of the Western Australian Herbarium. Identification of specimens occurred through comparison with named material and through the use of taxonomic keys. Flora species not native to Western Australia are denoted by an asterisk (*) in text and raw data.

Vegetation condition was assigned at each sample location and changes in vegetation condition were noted and mapped across the site. The condition of the vegetation was assessed using the Keighery scale (1994) (**Table 1**).

Table 1: Vegetation condition scale applied during the field assessment

Condition	Definition (Keighery 1994)
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very good	Vegetation structure altered obvious signs of disturbance. For example, 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. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, 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. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely degraded	The structure of the 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.

4.1.3. Mapping and data analysis

4.1.3.1. Likelihood of occurrence

Based on the information recorded during the field survey, an assessment of the likelihood of occurrence of threatened and priority flora species and communities within the site was undertaken using the categories outlined in **Table 2**.

Table 2: Likelihood of occurrence assessment categories and definitions

Likelihood	Definition
Recorded	The species was recorded during the current field survey.
Likely	The site contains suitable habitat for the species and it is likely the species may occur based on presence of a recent historical record within or close to the site.
Possible	The site contains suitable habitat for the species but there is no other information to suggest that the species may occur within or close to the site.
Unlikely	The site does not contain suitable habitat for the species or the site contains suitable habitat for the species within which thorough targeted searches were completed and conclusion has been made that the species is unlikely to be present.

4.1.3.2. Plant communities

The plant communities within the site were identified from the sample data collected during the field survey. The vegetation was described according to the dominant species present using the structural formation descriptions of the *National Vegetation Inventory System* (NVIS) (NVIS Technical Working Group 2017). The identified plant communities were mapped on aerial photography from the samples and boundaries were interpreted from aerial photography and notes taken in the field. Vegetation condition was mapped on aerial photography based on the samples and notes recorded during the field survey to define areas with differing condition.

4.1.3.3. Floristic community types

The identified plant communities were compared to the regional 'floristic community type' (FCT) dataset *A floristic survey of the southern Swan Coastal Plain* by Gibson *et al.* (1994). The sample data (presence/absence) was reconciled with Gibson *et al.* (1994) by standardising the names of taxa with those used in the earlier study. This was necessary due to changes in nomenclature in the intervening period. Taxa that were only identified to genus level were excluded, while some infra-species that have been identified since 1994 were reduced to species level. The combined dataset was then imported into the statistical analysis package PRIMER v6 (Clarke and Gorley 2006).

As data from a localised survey is often spatially correlated, data for each sample was compared to Gibson *et al.* (1994) separately. This removed the influence of spatial correlation when assigning an FCT. The analysis included the compilation of a resemblance matrix using the Bray-Curtis distance measure which provided the percentage similarity between all pairs of samples. Subsequently, a cluster analysis was undertaken using the resemblance matrix and hierarchical agglomerative clustering, to produce a dendrogram.

Where the sample tended to cluster with a grouping of different FCTs, samples were assessed separately to differentiate between FCTs. Ultimately the cluster analysis, as well as contextual information relating to the soils, landforms and known locations of FCTs within the region, was considered in the final determination of an FCT for vegetation within the site.

FCT analysis was not undertaken for samples located within disturbed vegetation with low native species diversity as the vegetation was considered unlikely to currently represent an FCT.

4.1.3.4. Threatened and priority ecological community

Areas of native vegetation potentially representing a TEC or PEC were assessed against key diagnostic characteristics and, if available, size and/or vegetation condition thresholds.

In particular, the site was assessed against the criteria outlined in the conservation advice for the 'subtropical and temperate coastal saltmarsh' (coastal saltmarsh) TEC (TSSC 2013). Plant communities containing saltmarsh vegetation were identified and each patch was classified into a dominant structural form and assessed against the diagnostic features and thresholds for the coastal saltmarsh TEC (TSSC 2013). This included identifying patch size and calculating the area of mosaic occurrences to determine whether they were larger than 0.1 ha.

The boundary of the coastal saltmarsh TEC was mapped on aerial photography based on the mosaic boundary (TSSC 2013). In accordance with TSSC (2013), the mosaic boundary was determined by combining patches of coastal saltmarsh vegetation within 30 m of each other into one patch, incorporating the bare ground, track or non-native vegetation between them.

The area of coastal saltmarsh TEC was also mapped as the PEC of the same name as the description and area/condition thresholds are identical.

4.1.4. Survey limitations

It is important to note the specific constraints imposed on surveys and the degree to which these may have limited survey outcomes. An evaluation of the survey methodology against standard constraints outlined in the EPA document *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) is provided in **Table 3.**

Table 3: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment

Constraint	Degree of limitation	Details
Availability of contextual information	No limitation	The broad scale contextual information described in **Section 2** is adequate to place the site and vegetation in context.
	Minor limitation	FCT assignment was undertaken through comparison to the authoritative floristic study of the Swan Coastal Plain by Gibson *et al*. (1994). Having a regional study to compare survey results is advantageous as it provides the ability to classify vegetation to a formal scheme. However, the Gibson *et al*. (1994) data is now more than 25 years out of date and was also derived from a limited sample of vegetation that was largely located on public land. Due to the high degree of local endemism / spatial variation inherent to vegetation on the Swan Coastal Plain it is likely that the groups identified for certain FCTs in Gibson *et al*. (1994) could be further separated into a greater number of groups to better reflect differences in vegetation composition evident at finer/local scales. Limitations of Gibson *et al.* (1994) and floristic analysis generally were acknowledged and other sources of information were drawn upon to inform the classification of vegetation. This assessment only sampled vegetation on one occasion. This was appropriate for a reconnaissance survey and the level of historical disturbance over the site.
Experience level of personnel	No limitation	This flora and vegetation assessment was undertaken by a qualified botanist with ten years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 11 years' experience in environmental science in Western Australia.

Table 3: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (continued)

Constraint	Degree of limitation	Details
Suitability of timing	No limitation	The survey was conducted in June and thus outside of the main flowering season. The survey timing was considered adequate for a reconnaissance survey, especially given the highly disturbed nature of the vegetation within the site.
Temporal coverage	No limitation	Comprehensive flora and vegetation assessments can require multiple visits, at different times of year, and over a period of a number of years, to enable observation of all species present. The site was only sampled once and outside of the main flowering period, however the vegetation present within the site is highly disturbed and primarily consists of non-native species.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	All parts of the site could be accessed as required.
Sampling intensity	No limitation	A total of 63 species were recorded within quadrats, releves and opportunistically, comprising 17 native species and 46 non-native species. The sampling intensity was considered adequate for a reconnaissance level survey and the degree of historical disturbance.
Influence of disturbance	No limitation	Time since fire is greater than 20 years for the western portion of the site and 1-2 years for the eastern portion as interpreted from aerial imagery. Therefore, short-lived species more common after fire may not have been visible within the western portion. However, given the site was largely cleared before 1948 and the vegetation primarily consists of non-native species, this is not considered to be a limitation.
	No limitation	Historical ground disturbance was evident throughout the site and native vegetation includes a high proportion of non-native species. The disturbance history of the site was considered when undertaking field sampling.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

4.2. Fauna

4.2.1. Desktop assessment

A search was conducted for threatened and priority fauna that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DoEE 2019), *NatureMap* (DBCA 2019) and DBCA's threatened and priority fauna database (reference no. FAUNA#6751).

4.2.2. Field survey

A botanist and an environmental consultant from Emerge conducted the fauna survey on the 14 June 2021, at the same time as the flora and vegetation survey.

Fauna habitat values were described, with particular reference to 'threatened' and 'priority' fauna species with potential to occur within the site[1]. Taxonomy and nomenclature for vertebrate fauna species was taken from the *Western Australian Museum Checklist of the Terrestrial Vertebrate Fauna of Western Australia* (Western Australian Museum 2019).

[1] Invertebrate taxa were not assessed and no evaluation of the potential for invertebrate taxa to occur within the site is provided.

4.2.3. Black cockatoos

The site was searched for potential black cockatoo breeding, roosting and foraging habitat.

Black cockatoo habitat trees were individually identified, tagged and assessed against attributes outlined in **Table 4** below. Habitat trees are typically defined as native eucalypts with diameter at breast height (DBH) ≥50 cm.

Table 4: Attributes recorded as part of the black cockatoo potential habitat tree (POT) assessment.

Attribute	Description
Tag	Unique identifier on a metal tag was attached to each potential habitat tree (POT).
GPS location	The location of each POT was recorded using a handheld GPS unit.
Tree species	Species and common name were identified.
Diameter at breast height (DBH) (cm)	Each POT was measured using a diameter tape.
Tree height (m)	The height of each POT was estimated.
Hollow information	If observed, hollows were noted and photographed.
Entrance information	The entrance diameter was estimated and the entry position noted (e.g. top-entry or side-entry).
Hollow orientation	The orientation of hollows was recorded (vertical, near-vertical, non-vertical).
Signs of use of hollows	Signs of use of hollows by black cockatoos or other species were noted.

The habitat trees were inspected from the ground for hollows that may be suitable for breeding by black cockatoos. The internal dimensions of all potentially suitable hollows were further inspected using a drone and/or a pole-mounted camera. Hollows were deemed suitable for black cockatoo breeding if the opening diameter was ≥ 10 cm (Groom 2010), the hollow was located at a sufficient height and if the hollow was located in a trunk branch that is large enough to allow for a mature BC to occupy it.

Each habitat tree was assigned to a category listed in **Table 5.**

Table 5: Habitat tree categories

Category	Specifications
Nest	The tree contains a hollow used by black cockatoos for breeding as confirmed by records of black cockatoos, their eggs or fledglings or other evidence of recent nesting activity by black cockatoos
Potential nest	The tree contains one or more hollows that are suitable for use by black cockatoos as breeding habitat as confirmed by internal hollow inspection^ and potential evidence of use by black cockatoos such as feathers, chew marks or nest material has been recorded within a hollow
Suitable hollow(s)	The tree contains one or more hollows that are suitable for use by black cockatoos as breeding habitat as confirmed by internal hollow inspection^
Potentially suitable hollow(s)	The tree contains or is suspected to contain one or more hollows that have the potential to be suitable for use by black cockatoos when either viewed from the ground or following an internal hollow inspection that was inconclusive^
No suitable hollow(s)	The tree does not contain hollow(s) that have the potential to be suitable for use by black cockatoos when viewed from the ground or contains hollows that were determined to be unsuitable for use by black cockatoos by internal inspection^

A dusk roost survey was not undertaken. The site was assessed for the potential of providing roosting habitat for BCs and for secondary evidence of roosting activity, such as branch clippings, droppings or moulted feathers. Patches of large native and non-native trees were assumed to provide potential black cockatoo roosting habitat.

4.2.4. Survey limitations

An evaluation of the survey methodology against standard constraints outlined in the EPA document *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016a) is provided in **Table 6**.

Table 6: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Terrestrial Fauna Surveys.

Constraint	Degree of limitation	Details
Level of survey	No limitation	A level 1 survey (desktop study and field survey) in combination with elements of a targeted black cockatoo survey was considered adequate given the relatively low habitat values within the site and the generally good availability of fauna information for the region.
Scope	No limitation	The survey focused on vertebrate fauna and habitat values, with particular focus on conservation significant taxa with potential to occur within the site.
Proportion of fauna identified, recorded and/or collected.	No limitation	All observed vertebrate fauna were identified.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	No limitation	Adequate information was available from database searches.
The proportion of the task achieved and further work which might be needed.	No limitation	The task was achieved in its entirety.
Experience level of personnel	No limitation	This fauna assessment was undertaken by a qualified ecologist who is experienced in conducting fauna surveys. Technical review was undertaken by a senior environmental consultant with over 10 years' experience in environmental science in Western Australia.
Suitability of timing	No limitation	Survey timing is not considered to be of great importance for Level 1 assessments.
Completeness	No limitation	The desktop assessment, field survey and black cockatoo components of the survey were completed. Detailed mapping of black cockatoo habitat was not undertaken.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	All parts of the site could be accessed as required.
Survey intensity	No limitation	The intensity of the survey was adequate given the size of the site and the relatively low habitat value present.
Influence of disturbance	No limitation	The site is highly modified due to historical disturbance. However, no recent disturbance was noted that may have affected outcomes of the survey.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

4.2.5. Mapping and data analysis

4.2.5.1. Fauna habitat

Fauna habitats were described and mapped based on plant communities identified as part of the flora and vegetation survey.

Fauna habitats were described according to the dominant flora species and vegetation type present, as determined from observations made during the field survey. The identified fauna habitats were mapped on aerial photography with the boundaries interpreted from aerial photography, previously identified plant communities and notes taken in the field.

Information on specific habitat requirements for conservation significant vertebrate fauna species with potential to occur within the site were compiled as part of the desktop assessment. This information was compared to the fauna habitats identified within the site to determine whether any conservation significant fauna species are considered to have potential to utilise the site.

4.2.5.2. Black cockatoo habitat

Habitat trees were classified according to the scheme outlined in **Table 5** and mapped on aerial imagery. A complete summary of the recorded attributes of habitat trees was compiled in a tabular format.

5. RESULTS AND DISCUSSION

5.1. General site conditions

The site is generally flat and low lying, with black-brown silty clay soils, particularly near the Swan River. During the survey low-lying areas of vegetation adjacent to the Swan River were inundated and soil in adjacent areas was moist. Bare areas and hardstand occur in the southern portion of the site.

The majority of the site supports non-native vegetation such as **Cynodon dactylon* (couch grass), **Cortaderia selloana* (pampas grass) and **Ricinus communis* (castor oil plant). Native vegetation dominated by species suited to inundation occurs around the perimeter of the site adjacent to the Swan River. Areas of samphire shrubs (*Salicornia* sp. and *Tecticornia* sp.) also occur inland from the Swan River in flat, clay pan like features. These clay pans appear to be an artificial landform, resulting from previous excavation or earthworks.

5.2. Flora and vegetation

5.2.1. Desktop assessment

The database search results identified a total of 10 threatened, 58 priority and one presumed extinct flora species occurring or potentially occurring within a 10 km radius of the site. Information on these species including their habitat preferences and flowering period is provided in **Appendix B**.

Based on background information available for the site, suitable habitat was considered to potentially occur within the site for five priority and one presumed extinct flora species as shown in **Table 7**.

Table 7: Conservation significant flora species considered to have potential to occur in the site based on known habitat preferences

Species	Level of significance		Life strategy	Habitat	Flowering period
	WA	EPBC Act			
Picris compacta	EX	-	A/P	Loam, limestone. River banks.	Unknown
Bolboschoenus fluviatilis	P1	-	P	Floodplain with grey/brown wet sand.	Nov
Eucalyptus x mundijongensis	P1	-	P	Loam or grey sand. Paddocks.	Unknown
Ptilotus sericostachyus subsp. *roseus*	P1	-	P	Unknown. Seem to be associated with wetlands/rivers.	Sep-Dec
Angianthus micropodioides	P3	-	A	Saline sandy soils on edge of rivers, depressions and clay pans.	Nov-Dec or Jan-Feb
Aponogeton hexatepalus	P4	-	P	Mud. Freshwater: ponds, rivers, claypans.	Jul-Oct

EX=presumed extinct, P1-P4=Priority 1-Priority 4, A=annual, P=perennial.

The database search results identified ten TECs and eight PECs occurring or potentially occurring within a 10 km radius of the site. Information on these communities is provided in **Appendix C.**

Based geomorphology, soils and regional vegetation patterns, one TEC and one PEC were considered to have potential to occur in the site:

- 'Subtropical and temperate coastal saltmarsh' TEC which is listed as 'vulnerable' under the EPBC Act. This TEC also represents a state listed PEC (priority 3).

5.2.2. Flora

5.2.2.1. Species inventory

A total of 17 native and 46 non-native (weed) species were recorded within the site during the field survey, representing 22 families and 60 genera. The dominant families containing native taxa were Chenopodiaceae (five native taxa and one weed taxa), Myrtaceae (three native taxa and one weed taxa) and Fabaceae (three native taxa and five weed taxa). The family containing the most taxa was Poaceae (no native and 12 non-native species).

A complete species list is provided in **Appendix D.**

5.2.2.2. Threatened and priority flora

No threatened or priority flora species were recorded within the site.

The majority of the threatened and priority flora species identified in the desktop assessment are not considered to occur in the site due to lack of suitable habitat or because they were not recorded during the field survey. The likelihood of occurrence results are provided in **Appendix B**.

Two flora species, *Picris compacta* (EX) and *Angianthus micropodioides* (P3), are annuals and would not have been visible at the time of the survey (if present). However, due to historical disturbance these species are not considered likely to occur in the site.

5.2.2.3. Locally and regionally significant flora

No locally or regionally significant flora species were recorded within the site.

5.2.2.4. Declared pests

One species listed as a declared pest (C3) pursuant to the BAM Act, **Tamarix aphylla* (athel pine), was recorded within the site. Multiple athel pine individuals were recorded throughout the site and occur as groups of plants and scattered individual trees .

Athel pine is also listed as a WoNS.

5.2.3. Vegetation

5.2.3.1. Plant communities

A total of twelve locations were sampled, comprised of three quadrats and nine relevés, as shown in **Figure 2**.

Nine plant communities were identified within the site. Plant communities **ErMCoJk** and **Jk** occur on the periphery of the site near the Swan River and are subject to seasonal inundation. Plant community **SqT** occurs as multiple patches slightly back from the river edge and are subject to a lower level of inundation than **ErMCoJk** and **Jk**. Plant community **Er** occurs as four patches in the north-eastern and western portions of the site. Plant communities **Co, EcJk**, **Pl** and **VjCo** exist as single patches in the northern and central portions of the site.

Some areas on the periphery of the site (Swan River) and a dam comprise water and were not mapped as a plant community (1.24 ha). A cleared area including some hardstand is present in the southern portion of the site (4.50 ha).

The remainder of the site contains **non-native** plant community which includes **Eucalyptus camaldulensis*, **Cortaderia selloana*, **Arundo donax* and dense non-native grasses.

A description and the area of each plant community is provided in **Table 8** and representative photographs of each are provided in **Plate 1** to **Plate 9**. The location of each plant community is shown in **Figure 2**. A matrix of species recorded within each plant community is provided in **Appendix E** and raw sample data in **Appendix F**.

Table 8: Description and extent of plant communities identified within the site

Plant community	Description	Area (ha)
Co	Low closed forest of *Casuarina obesa* over scattered **Washingtonia robusta* and **Cortaderia selloana* (**Plate 1**).	0.15
EcJk	Low open forest of **Eucalyptus camaldulensis* over open rushland to rushland of *Juncus kraussii* subsp. *australiensis* over open to closed tussock grassland of **Cynodon dactylon* and **Cenchrus clandestinus* (**Plate 2).**	0.33
Er	Low open forest to open woodland of *Eucalyptus rudis* over sparse rushland of *Juncus spp.* over grassland to closed grassland of **Cynodon dactylon* and **Cenchrus clandestinus* (**Plate 3**).	0.77
ErMCoJk	Low open forest of *Eucalyptus rudis, Casuarina obesa, Melaleuca cuticularis* and *M. rhaphiophylla* over rushland of *Juncus kraussii* subsp. *australiensis* over open herbland *Salicornia quinqueflora* and *Suaeda australis* (**Plate 4**).	0.28
Jk	Closed rushland *Juncus kraussii* subsp. *australiensis* over open forbland to forbland of *Salicornia quinqueflora* and *Suaeda australis* (**Plate 5**).	2.71
Pl	Closed tall shrubland of *Paraserianthes lophantha* (**Plate 6**).	0.01
SqT	Scattered *Casuarina obesa* (or absent) over open to closed shrubland *Salicornia quinqueflora* and *Tecticornia* spp. with open rushland of *Juncus kraussii* subsp. *australiensis* (or layer absent) (**Plate 7**).	1.92
VjCo	Low open woodland to woodland of *Casuarina obesa* over tall closed shrubland of *Viminaria juncea* over tussock grassland **Cenchrus clandestinus and *Polypogon monspeliensis* (**Plate 8**).	0.12
Non-native	Heavily disturbed areas comprising weeds with occasional native rushes and forbs and planted vegetation (**Plate 9**). Minor cleared areas and tracks were included in this community.	22.50

Plate 1: Plant community Co in 'degraded' condition

*Plate 2: Plant community **EcJk** in 'degraded' condition*

*Plate 3: Plant community **Er** in 'degraded' condition*

*Plate 4: Plant community **ErMCoJk** in 'very good' condition*

*Plate 5: Plant community **Jk** in 'very good' condition*

*Plate 6: Plant community **Pl** in 'degraded' condition*

*Plate 7: Plant community **SqT** in 'very good – good' condition*

*Plate 8: Plant community **VjCo** in 'degraded' condition*

Plate 9: Non-native vegetation in 'completely degraded' condition

5.2.3.2. Vegetation condition

The vegetation in the site ranged from 'very good' to 'completely degraded' condition. The most intact vegetation is located on the perimeter of the site, adjacent to the Swan River. Plant communities **Jk** and **ErMCoJk** in this area have regenerated following historic disturbance. Where this vegetation supports a relatively intact structure with moderate to low native species diversity, it was mapped as being in 'very good' condition. One patch of plant community **SqT** was mapped as

being in 'very good – good' condition as the vegetation was dominated by native species (with low diversity) but the structure showed some signs of disturbance.

Where the **SqT** and **Jk** vegetation supported higher density of weed species and lower native cover it was mapped as being in 'good' condition.

Some areas of the **SqT** and **Jk** vegetation, as well as all areas of the **EcJk**, **Er** and **VjCo** vegetation, comprised low native species diversity and high weed cover and were mapped as being in 'degraded' condition.

The **Pl** vegetation was present as monoculture of a single native species which is likely a product of disturbance. Similarly, the **Co** vegetation also supported a monoculture of a single native species and, although this species may sometimes occur in isolation or with few other native species, was considered to be a product of disturbance. Therefore, these plant communities were mapped as being in 'degraded' condition.

The water within the Swan River on the periphery of the site was not assigned a condition category (1.14 ha). The remainder of the site was mapped as being in 'completely degraded' condition as it comprised very high cover of non-native species, bare ground and a dam.

The extent of vegetation by condition category is detailed in **Table 9** and shown in **Figure 3**.

Table 9: Extent of vegetation condition categories within the site

Condition category (Gibson *et al.* 1994)	Size (ha)
Pristine	0
Excellent	0
Very good	2.30
Very good – good	0.62
Good	1.51
Degraded	1.86
Completely degraded	27.10

5.2.3.3. Floristic community types

Plant communities **Jk**, **SqT** and **ErMCoJk** were determined to represent FCT 16 'highly saline seasonal wetlands'. This FCT was described as 'poorly reserved' and 'vulnerable' (Gibson *et al.* 1994).

Samples within the **Jk**, **SqT** and **ErMCoJk** vegetation grouped with Gibson *et al.* (1994) sites representing FCT 16 in the cluster with 30-58% similarity. The samples within each community is shown in **Table 10** and the cluster dendrograms are provided in **Appendix G**.

All other plant communities were too degraded and comprised too few native species to infer an FCT.

Table 10: Plant community, sample and FCT

Plant community	Sample	Floristic community type (FCT)
Jk	R2, R4, Q8	FCT 16 'highly saline seasonal wetlands'
SqT	Q3	
ErMCoJk	R1, R9	

5.2.3.4. Threatened and priority ecological communities

The following TECs and PECs were identified within the site:

- 'Subtropical and temperate coastal saltmarsh' TEC
- 'Subtropical and temperate coastal saltmarsh' PEC.

A total of 6.48 ha coastal saltmarsh TEC/PEC was mapped within the site. The coastal saltmarsh TEC/PEC occurs on the perimeter of the site as shown in **Figure 4**.

Note that the 6.48 ha coastal saltmarsh TEC/PEC comprises the total area within the mosaic boundary (refer **Section 4.1.3.4**) and includes 4.85 ha of saltmarsh vegetation and 1.63 ha of bare areas.

The 6.48 ha of coastal saltmarsh TEC vegetation mapped in the site also represents the state listed coastal saltmarsh PEC (P3).

5.2.3.1. Locally and regionally significant vegetation

Due to the sites' location on the Swan River, the saltmarsh vegetation is likely to be locally significant. Many areas of saltmarsh vegetation along the Swan River have been historically cleared or have been impacted by changes to hydrology. This vegetation provides a buffer to the river as well as habitat for multiple fauna species, particularly birds.

5.3. Fauna

5.3.1. Fauna habitat

Historical disturbance and the removal of most of the native vegetation has significantly compromised fauna habitat values within the site.

Six fauna habitat types were identified within the site: **woodland**, **river**, **dam**, **fringing riverine vegetation, grassland** and **cleared area**.

A description and the area of each habitat type is provided in **Table 11** and representative photographs of each are provided in **Plate 10** to **Plate 12**. The location of each habitat is shown on **Figure 5**.

The highest fauna habitat values within the site are associated with the **woodland, river and fringing riverine vegetation.**

Table 11: Fauna habitat types recorded within the site.

Habitat type	Description	Area (ha)
Woodland	Woodlands to open forests *Eucalyptus rudis, *Eucalyptus camaldulensis*, **Eucalyptus* spp. and *Casuarina obesa* over non-native grasslands (**Plate 10)**.	1.38
River	Open water forming part of the Swan River (**Plate 11**)	0.63
Fringing riverine vegetation	Open to closed forbland, rushland and shrubland fringing the Swan River and subject to varying levels of inundation (**Plate 11**)	5.42
Dam	Water within a constructed dam.	0.10
Grassland	Dense non-native grassland with scattered trees and shrubs (**Plate 12**)	22.5
Bare ground	Areas of bare ground and hardstand.	4.50

*Plate 10: **Woodland** habitat*

*Plate 11: **River** (left) and **fringing riverine vegetation** (right) habitats*

*Plate 12: **Grassland** habitat*

5.3.2. Desktop assessment

A total of 351 fauna species were identified from database searches as occurring or potentially occurring within 3 km of the site[2]. This includes 24 threatened, 9 priority, 12 migratory fauna, two conservation dependent and one other specially protected species as listed in **Appendix G**.

5.3.3. Conservation significant fauna

One priority fauna species, *Isoodon fusciventer* (quenda) (P4), was recorded in the site from indirect foraging evidence. Characteristic foraging holes attributed to quenda were recorded within a patch of the woodland habitat in the western portion of the site (plant community **Co**).

An additional 21 fauna species of conservation significance are considered likely or possible to occur within the site, as listed in **Table 12** below.

The remainder of the fauna species of conservation significance identified during the desktop assessment are considered unlikely to occur in the site due to lack of suitable habitat or because the site lies outside of the species known distribution range. The likelihood of occurrence assessment for all conservation significant fauna species is provided in **Appendix G**.

[2] Includes native and non-native species

Table 12: Summary of conservation significant fauna species with potential to occur within the site

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Birds					
Actitis hypoleucos	Common sandpiper	MI	MI	Edge of sheltered waters salt or fresh, e.g. estuaries, mangrove creeks, rocky coasts, near-coastal saltlakes (including saltwork ponds), river pools, lagoons, claypans, drying swamps, flood waters, dams and sewage ponds. Preferring situations where low perches are available (Johnstone & Storr 1998).	Possible
Apus pacificus	Pacific swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Pizzey & Knight 2012).	Possible
Botaurus poiciloptilus	Australasian bittern	EN	EN	In or over water, in tall reedbeds, sedges, rushes, cumbungi, lignum. Also occurs in ricefields, drains in tussocky paddocks and occasionally in saltmarshes and brackish wetlands.	Possible
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	Occurs in tidal mudflats, saltmarshes and mangroves, as well as, shallow fresh,brackish or saline inland wetlands. It is also known from floodwaters, irrigated pastures and crops, sewage ponds, saltfields.	Possible
Calidris ferruginea	Curlew sandpiper	CR	CR (MI)	Mainly shallows of estuaries and near-coastal saltlakes (including saltwork ponds) and drying near-coastal freshwater lakes and swamps. Also beaches and near-coastal sewage ponds.	Possible
Calidris melanotos	Pectoral sandpiper	MI	MI	Mainly fresh waters (swamps, lagoons, river pools, irrigation channels and sewage ponds); also samphire flats around estuaries and saltlakes (Johnstone & Storr 1998).	Possible
Calidris ruficollis	Red-necked stint	MI	MI	Tidal mudflats, saltmarshes, sandy or shelly beaches, saline and freshwater wetlands (coastal and inland), saltfields, sewage ponds (Pizzey and Knight 2012).	Possible
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	Eucalypt and Corymbia forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding Corymbia calophylla, Eucalyptus marginata, introduced Melia azdarach and Eucalyptus spp. trees.	Possible

Table 12: Summary of conservation significant fauna species with potential to occur within the site (continued)

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of Pinus spp. Attracted to seeding Banksia spp., Dryandra spp., Hakea spp., Eucalyptus spp., Corymbia calophylla, Grevillea spp., and Allocasuarina spp. (Johnstone and Storr 1998).	Possible
Falco peregrinus	Peregrine falcon	OS	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	Possible
Hydroprogne caspia	Caspian tern	MI	MI	Mainly sheltered areas, estuaries (when not laden with silt) and tidal creeks; occasionally near-coastal saltlakes (including saltwork ponds) and brackish pools in lower courses of rivers; rarely fresh waters.	Possible
Ixobrychus dubius	Australian little bittern	P4	-	Dense vegetation surrounding/within freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of Typha spp., Baumea spp. and tall rushes in freshwater swamps around lakes and along rivers (Johnstone and Storr 1998).	Possible
Numenius madagascariensis	Eastern curlew	CR	CR (MI)	Mainly tidal mudflats; also reef flats, sandy beaches and rarely near-coastal lakes (including saltwork ponds) (Johnstone and Storr 1998).	Possible
Oxyura australis	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998).	Possible
Pandion haliaetus	Osprey	MI	MI	Coasts, estuaries, bays, inlets, islands, and surrounding waters; coral atolls, reefs, lagoons, rock cliffs, stacks (Pizzey & Knight 2012).	Possible
Pluvialis squatarola	Grey Plover	MI	MI	Mudflats, saltmarsh, tidal reefs and estuaries, rarely inland (Pizzey and Knight 2012).	Possible
Sternula nereis nereis	Australian fairy tern	VU	VU	Sheltered blue-water seas close to land, estuaries (when free of silt) and near-coastal lakes (Johnstone and Storr 1998).	Possible
Thalasseus bergii	Crested tern	MI	MI	Mainly blue-water seas (especially within 3 km of land), including southern estuaries in summer and autumn (when free of silt); also tidal creeks in north, but not penetrating far into larger estuaries.	Possible

Table 12: Summary of conservation significant fauna species with potential to occur within the site (continued)

Species	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Tringa nebularia	Common greenshank	MI	MI	Mudflats, estuaries, saltmarshes, margins of lakes, wetlands, claypans (fresh amd saline), commercial saltfields, sewage ponds (Pizzey & Knight 2012).	Possible
Tyto novaehollandiae novaehollandiae	Australian masked owl	P3	-	Forests, open woodlands, farmlands with large trees. E.g. river red gums, adjacent cleared country, timbered watercourses, paperbark woodlands and caves (Pizzey & Knight 2012).	Possible
Mammals					
Hydromys chrysogaster	Rakali	P4	-	Areas with permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen et al. 1985).	Possible
Isoodon fusciventer	Quenda	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012a)	Recorded

5.3.4. Black cockatoo habitat

As detailed in **Table 12,** two black cockatoo species have potential to occur in the site: Baudin's cockatoo and forest red-tailed black cockatoo.

A total of 33 black cockatoo habitat trees were recorded within the site, as shown in **Figure 6**.

Of these trees, 32 are *Eucalyptus rudis* (flooded gum) and one is a stag (dead tree). An internal hollow inspection was undertaken for two habitat trees, which were originally assessed to potentially contain suitable hollows based on the initial inspection from ground level. The internal inspection determined that these hollows were not suitable for use by black cockatoos as they were too shallow. Therefore, the site does not currently provide breeding habitat for black cockatoos. An inventory of all habitat trees recorded within the site is provided in **Appendix I**.

Native and non-native trees within the site have the potential to provide roosting and foraging habitat for black cockatoos. No evidence of black cockatoo roosting or foraging activity was observed within the site.

6. CONCLUSIONS

6.1. Flora and vegetation

Nine plant communities were identified within the site. The vegetation has been subject to historical disturbance and 78% is in 'completely degraded'. Smaller areas of vegetation on the western and northern periphery of the site adjoining the Swan River are in 'degraded' to 'very good' condition.

No threatened or priority flora species were recorded during the surveys and none are considered likely to occur due to lack of suitable habitat.

The site contains a 6.48 ha patch of the EPBC Act listed coastal saltmarsh TEC and PEC of the same name. The area of TEC includes saltmarsh vegetation, including adjacent bare substrate, tracks and non-native vegetation in accordance with the TEC conservation advice (TSSC 2013).

The saltmarsh vegetation is likely to be locally and regionally significant due to its close proximity and interactions with the Swan River.

6.2. Fauna

Six fauna habitats were identified within the site and the highest fauna habitat values are associated with the **woodland, river and fringing riverine vegetation.**

One priority fauna species, *Isoodon fusciventer* (quenda) (P4), was recorded in the site from indirect foraging evidence. An additional 21 fauna species of conservation significance are considered likely or possible to occur in the site, including two species of threatened black cockatoo Baudin's cockatoo and forest red-tailed black cockatoo.

The site contains 33 black cockatoo habitat trees but none contain hollows that are suitable for breeding by black cockatoos. Therefore, the site does not currently provide breeding habitat for black cockatoos. The site contains habitat suitable for black cockatoo roosting and foraging but no evidence of activity was observed.

7. REFERENCES

7.1. General references

Beard, J. S. 1990, *Plant Life of Western Australia*, Kangaroo Press Pty Ltd., Kenthurst, N.S.W.

Churchward, H. M. and McArthur, W. M. 1980, *'Landforms and Soils of the Darling System, Western Australia'*, in Department of Conservation and Environment (ed.), *Atlas of Natural Resources Darling System Western Australia*, Department of Conservation and Environment.

Clarke, K. R. and Gorley, R. N. 2006, *PRIMER v6: User Manual/Tutorial*, PRIMER-E, Plymouth.

Department of Biodiversity, Conservation and Attractions (DBCA) 2020, *Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)*.

Department of Agriculture (DoA) 2017, *Australian Pest Animal Strategy (2017-2027)*, Canberra.

Department of Water (DoW) 2008, *LiDAR Elevation Dataset, Swan Coastal Plain*, Perth.

Department of Sustainability Environment Water Populations and Communities (DSEWPaC) 2012, *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris, Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii and Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*, Commonwealth of Australia, Canberra.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2013, *Ramsar wetlands of Australia*, Australian Government, Canberra.

Department of Water and Environmental Regulation (DWER) 2018, *Hydrography Linear (Heirarchy) (DWER-031)*, Perth.

Emerge Associates 2011a, *Belmont Park - Environmental Setting and Foreshore Ecology*, EP11-023--001 GFT, Version 1.

Emerge Associates 2011b, *Clearing Application - Lots 9000 and 102 Belmont Park Racecourse Redevelopment*, EP11-066(02)—001 GFT, Version A.

Emerge Associates 2011c, *Environmental Assessment and Justification Report - Belmont Park Racecourse Redevelopment*, EP11-023--006, Revision B.

Emerge Associates 2011d, *Foreshore Management Strategy - Belmont Park Racecourse Redevelopment*.

Emerge Associates 2011e, *Preliminary Site Investigation - Belmont Park Racecourse Redevelopment*, EP11-025(01)--001.

Environment Australia 2000, *Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 - Summary Report*, Department of Environment and Heritage.

Environment Australia 2001, *A Directory of Important Wetlands In Australia, Third Edition*, Environment Australia, Canberra.

Environmental Protection Authority (EPA) 2016a, *Technical Guidance - Terrestrial Fauna Surveys*, Perth.

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

Environmental Protection Authority (EPA) 2020, *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment*, Joondalup, Western Australia.

Gibson, N., Keighery, B., Keighery, G., Burbidge, A. and Lyons, M. 1994, *A Floristic survey of the southern Swan Coastal Plain*, Department of Conservation and Land Management and the Conservation Council of Western Australia, Perth.

Golder Associates 2011, *Conceptual Hydrgeological Model - Belmont Park Redevelopment, Belmont, Perth, WA*.

Government of Western Australia 2019, *2018 South West Vegetation Complex Statistics. Current as of March 2019*, WA Department of Biodiversity, Conservation and Attractions, Perth.

Gozzard, J. R. 2011, *Sea to scarp [electronic resource]: geology, landscape and land use planning in the southern Swan Coastal Plain*, Geological Survey of Western Australia.

Groom, C. 2010, *Artificial Hollows for Carnaby's Black Cockatoo: An investigation of the placement, use, monitoring and maintenance requirements of artificial hollows for Carnaby's black cockatoo*, Department of Environment and Conservation, Perth.

Heddle, E. M., Loneragan, O. W. and Havel, J. J. 1980, *'Vegetation Complexes of the Darling System Western Australia'*, in Department of Conservation and Environment (ed.), *Atlas of Natural Resources Darling System Western Australia*, Perth.

Hill, A. L., Semeniuk, C. A., Semeniuk, V. and Del Marco, A. 1996, *Wetlands of the Swan Coastal Plain: Volume 2A - Wetland Mapping, Classification and Evaluation*, Water and Rivers Commission and the Department of Environmental Protection, Perth.

Johnstone, R., Kirby, T. and Sarti, K. 2013, *The breeding biology of the forest red-tailed black cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. I. Characteristics of nest trees and nest hollows*, Pacific Conservation Biology, 19(2): 121-142.

Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

Keighery, B. J., Keighery, G. J., Longman, V. M. and Clarke, K. A. 2012, *Weed and Native Flora Data for the Swan Coastal Plain*, Departments of Environmental Protection and Conservation and Land Management, Western Australia.

Kendrick, G. W., Wyrwoll, K. H. and Szabo, B. J. 1991, *Pliocene-Pleistocene coastal events and history along the western margin of Australia*, Quaternary Science Reviews, 10: 419-439.

Le Roux, C. 2017, *Nocturnal roost tree, roost site and landscape characteristics of Carnaby's Black-Cockatoo (Calyptorynchus latirostris) on the Swan Coastal Plain*, Edith Cowan University Research Online.

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

Saunders, D. A. 1990, *Problems of Survival in an Extentively Cultivated Landscape: the case of Carnaby's Cockatoo Calyptorhynchus funereus latirostris*, Biological Conservation, 54: 277-290.

Seddon, G. 2004, *A Sense of Place: a response to an environment, the Swan Coastal Plain Western Australia*, Blooming Books, Melbourne.

Shah, B. 2006, *Conservation of Carnaby's Black Cockatoo on the Swan Coastal Plain, Western Australia*, Birds Australia, Perth.

Threatened Species Scientific Committee (TSSC) 2013, *Environment Protection And Biodiversity Conservation Act 1999 (EPBC Act) (S266b) Conservation Advice For Subtropical And Temperate Coastal Saltmarsh*, Department of Sustainability, Environment, Water, Population and Communities.

Western Australian Museum 2019, *WA Museum Checklist of the Terrestrial Vertebrate Fauna of Western Australia*, Perth, Western Australia.

Wetlands Advisory Committee 1977, *The status of reserves in System Six*, Environmental Protection Authority, Perth.

7.2. Online references

Department of Agriculture, Water and the Environment (DAWE) 2021, *Weeds of National Significance*, viewed 12 July 2021, <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html>.

Western Australian Herbarium 2018, *FloraBase—the Western Australian Flora.* Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au>

Western Australia's Land Information Authority (WALIA) 2021, *Landgate*, <https://www0.landgate.wa.gov.au/>

Figures

Figure 1: Site Location

Project:	Flora, Vegetation and Fauna Assessment Burswood Peninsula
Client:	Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F01

Drawn:	GAR
Date:	07/07/2021
Checked:	SKP
Approved:	RAW
Date:	15/07/2021

N

0 100 200 300
Metres

Scale: 1:7,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 2: Plant Communities

Project: Flora, Vegetation and Fauna Assessment
Burswood Peninsula
Client: Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F02
Drawn: GAR
Date: 07/07/2021
Checked: SKP
Approved: RAW
Date: 15/07/2021

N

0 100 200
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

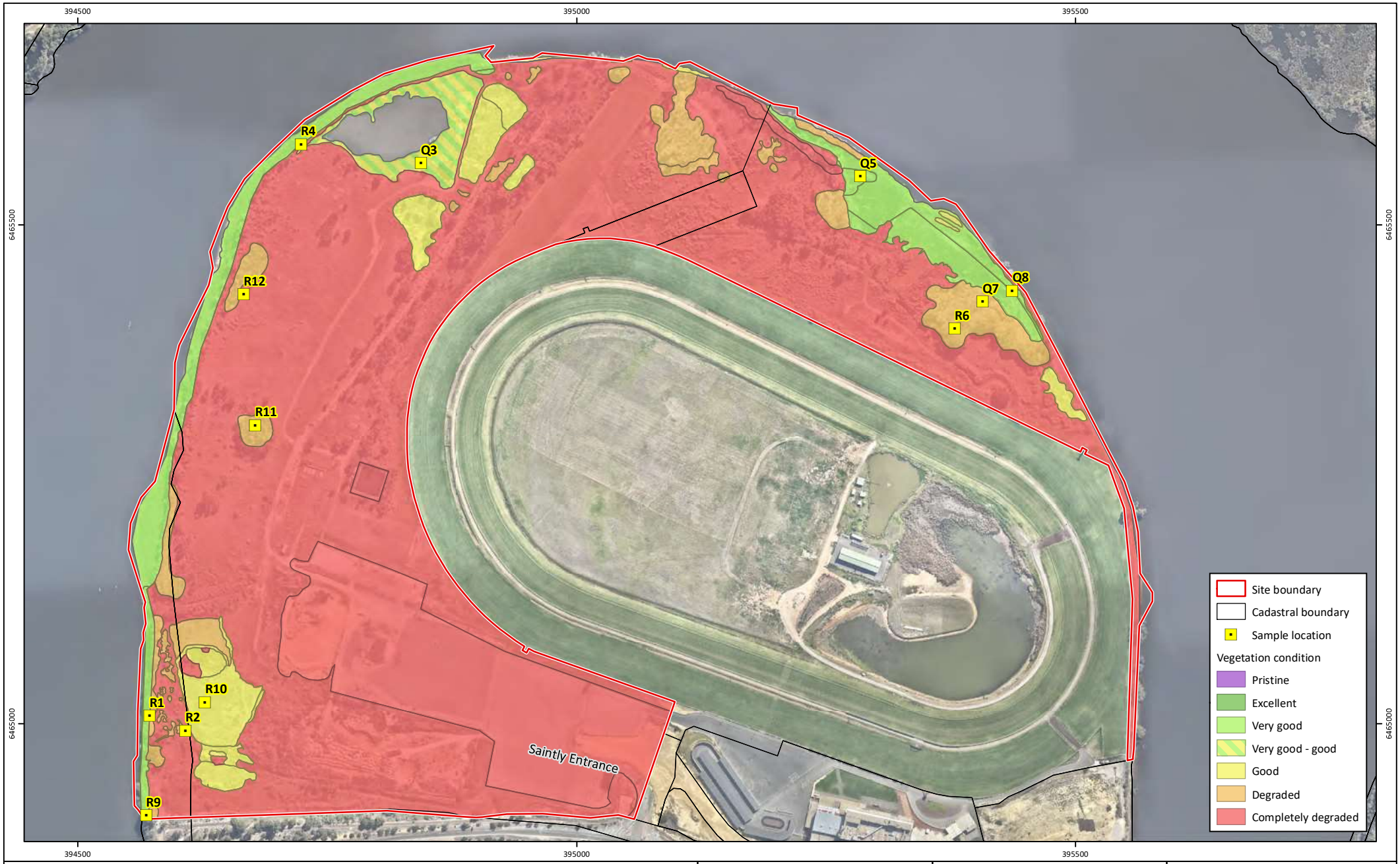


Figure 3: Vegetation Condition

Project: Flora, Vegetation and Fauna Assessment
Burswood Peninsula
Client: Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F03
Drawn: GAR
Date: 07/07/2021
Checked: SKP
Approved: RAW
Date: 15/07/2021

N

0 100 200
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 4: Threatened and Priority Ecological Community

Project: Flora, Vegetation and Fauna Assessment
Burswood Peninsula
Client: Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F04
Drawn: GAR
Date: 07/07/2021
Checked: SKP
Approved: RAW
Date: 15/07/2021

N

0 100 200
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 5: Fauna Habitats

Project: Flora, Vegetation and Fauna Assessment
Burswood Peninsula
Client: Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F05
Drawn: GAR
Date: 07/07/2021
Checked: SKP
Approved: RAW
Date: 15/07/2021

N

0 100 200
Metres

Scale: 1:5,000@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Figure 6: Black Cockatoo Habitat Trees

Project: Flora, Vegetation and Fauna Assessment
Burswood Peninsula
Client: Golden Sedayu Pty Ltd

Plan Number:
EP21-054(02)--F06
Drawn: GAR
Date: 07/07/2021
Checked: SKP
Approved: RAW
Date: 15/07/2021

N

0 100 200
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

Appendix A

Additional Information

Conservation Significant Flora and Vegetation

Threatened and priority flora

Flora species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, flora species can be listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Flora species considered 'threatened' pursuant to Schedule 1 of the EPBC Act are assigned categories according to their conservation status, as outlined in **Table 1**.

In Western Australia, plant taxa may be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act) which is enforced by Department of Biodiversity Conservation and Attractions (DBCA). Threatened flora species are listed under sections 19(1) and 26(2) of the BC Act. It is an offence to 'take' or disturb threatened flora without Ministerial approval. Section 5(1)1 of the Act defines to take as including "… to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means" or to cause or permit the same to be done. The definition of threatened flora under the BC Act is provided in **Table 1**.

Section 43 of the BC Act requires that an occurrence of a threatened species or threatened ecological community is reported to DBCA where the occurrence has been identified as part of field work completed:

- as part of an assessment under Part IV of the *Environmental Protection Act 1986*; or
- in relation to an application for a clearing permit under the *Environmental Protection Act 1986* section 51E(1)(d).

Penalties apply to individuals and organisations that fail to provide accurate reports of threatened species or communities.

The *Biodiversity Conservation Regulations 2018* (BC Regulations 2018) came into effect on January 1 2019. The BC Regulations include provisions for licencing, charges, penalties and other provisions associated with the BC Act.

Flora species that may be threatened or near threatened but lack sufficient information to be listed under the BC Act may be added to the DBCA's *Priority Flora List* (DBCA 2018d). Priority flora species are considered during State approval processes. Priority flora categories and definitions are listed in **Table 1**.

Table 1: Definitions of conservation significant flora species pursuant to the EPBC Act and BC Act and on DBCA's Priority Flora List (DBCA 2018d)

Conservation code	Description
EX†	Threatened Flora – Presumed Extinct Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
T^†	Threatened Flora – Extant Taxa which are declared to be likely to become extinct or is rare, or otherwise in need of special protection.
CR^	Threatened Flora – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN^	Threatened Flora – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU^	Threatened Flora – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
P1	Priority One – Poorly Known Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2	Priority Two – Poorly Known Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey.
P3	Priority Three – Poorly Known Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but needs further survey.
P4	Priority Four – Rare Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

^pursuant to the EPBC Act, †pursuant to the BC Act, on DBCA's *Priority Flora List*

Threatened and priority ecological communities

'Threatened ecological communities' (TECs) are recognised as ecological communities that are rare or under threat and therefore warrant special protection. Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. TECs nominated for listing under the EPBC Act are considered by the Threatened Species Scientific Committee and a final decision is made by the Commonwealth Minister for the Environment. Once listed under the EPBC Act, communities are categorised as either 'critically endangered', 'endangered' or 'vulnerable' as defined in **Table 2**. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Minister for the Environment.

Within Western Australia TECs are determined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (WATECSAC) and endorsed by the State Minister for the Environment. The WATECSAC is an independent group comprised of representatives from organisations including tertiary institutions, the Western Australian Museum and DBCA. The TECs endorsed by the State Minister are published by DBCA (DBCA 2018b).

TECs are assigned to one of the categories outlined in **Table 2** according to their status (in relation to the level of threat). TECs are afforded direct statutory protection at a State level under the BC Act and BC Regulations. Ecological communities are listed under Section 27(1) and 33 of the BC Act. Their significance is also acknowledged through other state environmental approval processes such as 'environmental impact assessment' pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Table 2: Categories of threatened ecological communities (English and Blyth 1997; DEC 2009).

Conservation code	Description
PD	Presumably Totally Destroyed An ecological community that has been adequately searched for but for which no representative occurrences have been located.
CE	Critically Endangered An ecological community that has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
E	Endangered An ecological community that has been adequately surveyed and is not critically endangered but is facing a very high risk of total destruction in the near future.
V	Vulnerable An ecological community that has been adequately surveyed and is not critically endangered or endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

An ecological community that is under consideration for listing as a TEC, but does not yet meet survey criteria or has not been adequately defined may be listed as a 'priority ecological community' (PEC). PECs are categorised as priority category 1, 2 or 3 as described in **Table 3**. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for 'near threatened', or 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' (DEC 2009). Listed PECs are published by DBCA (DBCA 2017b).

Table 3: Categories of priority ecological communities (DEC 2013)

Priority code	Description
P1	Priority One: Poorly known ecological communities Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2	Priority Two: Poorly known ecological communities Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3	Priority Three: Poorly known ecological communities (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4	Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5	Priority Five: 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.

Conservation Significant Fauna

Fauna species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, fauna species can be listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Migratory birds may be recognised under international treaties including:

- *Japan Australia Migratory Bird Agreement 1981* (JAMBA)
- *China Australia Migratory Bird Agreement 1998* (CAMBA)
- *Republic of Korea-Australia Migratory Bird Agreement 2007* (ROKAMBA)
- *Bonn Convention 1979* (The Convention on the Conservation of Migratory Species of Wild Animals).

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as 'matters of national environmental significance' (MNES) under the EPBC Act. Fauna species considered 'threatened' pursuant to Schedule 1 of the EPBC Act are assigned categories as outlined in **Table 4**.

Table 4: Definitions of conservation significant fauna species pursuant to the EPBC Act

Conservation Code	Category
X	Threatened Fauna –Extinct There is no reasonable doubt that the last member of the species has died.
EW[#]	Threatened Fauna –Extinct in the Wild Taxa which are known only to survive in cultivation, captivity or as a naturalised population outside its past range, or taxa which have not been recorded in its known and/or expected habitat despite appropriate exhaustive surveys.
CR[#]	Threatened Fauna – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN[#]	Threatened Fauna – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU[#]	Threatened Fauna – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
Migratory[#]	Migratory Fauna All migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and All native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Ma	Marine Fauna Species in the list established under s248 of the EPBC Act

[#]matters of national environmental significance (MNES) under the EPBC Act

In Western Australia, fauna taxa may be classed as 'threatened', 'extinct', or 'specially protected' under the *Biodiversity Conservation Act 2016* (BC Act), which is enforced by Department of Biodiversity Conservation and Attractions (DBCA) (DBCA 2019). The definitions of these categories are provided in **Table 5**.

Table 5: Definitions of specially protected fauna schedules under the BC Act (DBCA 2019)

Category	Conservation Code	Definition
Threatened	CR	Critically endangered Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
	EN	Endangered Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
	VU	Vulnerable Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
Extinct	EX	Extinct Species where there is no reasonable doubt that the last member of the species has died.
	EW	Extinct in the wild Species that is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form. Note that no species are currently listed as EW.
Specially protected	MI	Migratory species Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth Includes birds that subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds.
	CD	Species of special conservation interest (conservation dependent fauna) Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
	OS	Other specially protected species Fauna otherwise in need of special protection to ensure their conservation.

Fauna species that may be threatened or near threatened but lack sufficient information to be legislatively listed may be added to the DBCA's *Priority Fauna List* (DBCA 2018c). Species listed under priorities 1-3 comprise possible threatened species that do not meet survey criteria or are otherwise data deficient. Species listed under priority 4 are those 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 (DBCA 2019).

Priority fauna species are considered during State approval processes. Priority fauna categories and definitions are listed in **Table 6** (DBCA 2019).

Table 6: Definitions of priority fauna categories on DBCA's Priority Fauna List (DBCA 2019)

Conservation Code	Category
P1	Priority 1 – Poorly known 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.
P2	Priority 2 – Poorly known 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.
P3	Priority 2 – Poorly known 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.
P4	(a) Priority 4 – Rare species Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Priority 4 – Near Threatened Species 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) Priority 4 – Other Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Weeds

A number of legislative and policy documents exist in relation to weed management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding weed management in Western Australia and lists declared pest species. At a national level, the Australian government has compiled a list of 32 Weeds of National Significance (WoNS) (DoEE 2018), of which many are also listed under the BAM Act.

Declared Pests

Part 2.3.23 of the BAM Act requires a person must not; "*a) keep, breed or cultivate the declared pest; b) keep, breed or cultivate an animal, plant or other thing that is infected or infested with the declared pest; c) release into the environment the declared pest, or an animal, plant or other thing that is infected or infested with the declared pest; or d) intentionally infect or infest, or expose to infection or infestation, a plant, animal or other thing with a declared pest*".

Under the BAM Act, all declared pests are assigned a legal status, as described in **Table 7**. Species assigned to the 'declared pest, prohibited - s12' category are placed in one of three control categories, as described in **Table 8**.

The *Biosecurity and Agriculture Management Regulations 2013* specify keeping categories for species assigned to the 'declared pest - s22(2)' category, which relate to the purposes of which species can be kept, as well as the entities that can keep them. The categories are described in **Table 9**.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act (DPIRD 2020).

Table 7: Legal status of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
Declared Pest Prohibited - s12	May only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest s22(2)	Must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia

Table 8: Control categories of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
C1	Exclusion 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 Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3	Management Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their

Category	Description
	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.

Table 9: Keeping categories of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
Prohibited	Can only be kept under a permit for public display and education purposes, and/or genuine scientific research, by entities approved by the state authority.
Exempt	No permit or conditions are required for keeping.
Restricted	Organisms which, relative to other species, have a low risk of becoming a problem for the environment, primary industry or public safety and can be kept under a permit by private individuals.

Wetland Habitat

Geomorphic wetland types

On the Swan Coastal Plain DBCA (2017a) have used the geomorphic wetland classification system developed by Semeniuk (1987) and Semeniuk and Semeniuk (1995) to classify wetlands based on the landform shape and water permanence (hydro-period) as outlined in **Table 10**.

Table 10: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

Level of inundation	Geomorphology			
	Basin	Flat	Channel	Slope
Permanently inundated	Lake	-	River	-
Seasonally inundated	Sumpland	Floodplain	Creek	-
Seasonally waterlogged	Dampland	Palusplain	-	Paluslope

Wetland management categories

DBCA maintains the *Geomorphic Wetland of the Swan Coastal Plain* dataset (DBCA 2018a), which also categorises individual wetlands into specific management categories as described in **Table 11**.

Table 11: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

Management category	Description of wetland	Management objectives
Conservation (CCW)	Support high levels of attributes	Preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land. Protection provided under environmental protection policies.
Resource enhancement (REW)	Partly modified but still supporting substantial functions and attributes	Restore wetland through maintenance and enhancement of wetland functions and attributes. Protection via crown reserves, state or local government owned land, environmental protection policies and sustainable management on private properties.
Multiple use (MUW)	Few wetland attributes but still provide important hydrological functions	Use, development and management considered in the context of water, town and environmental planning through land care.

The management categories of wetland features are determined based on hydrological, biological and human use features. The DBCA document *A methodology for the evaluation of specific wetland types on the Swan Coastal Plain, Western Australia* (DBCA 2017a) details the methodology by which wetlands on the Swan Coastal Plain are assigned management categories based on a two tiered evaluation system, with preliminary and secondary evaluation stages. The preliminary evaluation aims to identify any features of conservation significance that would immediately place the wetland within the CCW management category. Examples of these significant features include presence on significant wetland lists, presence of TECs or PECs (Priority 1 and 2), presence of threatened flora and

over 90% of vegetation in good or better condition based on the Keighery (1994) scale. If such environmental values are identified the wetland would be categorised as CCW without further evaluation.

Should the preliminary evaluation indicate that no such features occur, the secondary evaluation and site assessment are then applied. In the secondary evaluation, an appropriate management category is determined through the assessment of a range of environmental attributes, functions and values.

Wetland reclassification

DBCA have a protocol for proposing changes to the wetland boundaries and management categories of the existing geomorphic wetland dataset (DEC 2007). The procedure involves a wetland desktop evaluation and site assessment which culminates in a recommended management category. Relevant information should be obtained in the optimal season for vegetation condition and water levels, which is usually spring (DEC 2007). In the case of larger wetlands that have undergone a degree of disturbance, a separate management category may be assigned to parts of the wetland in order to reflect the current values.

References

General references

Department of Biodiversity, Conservation and Attractions (DBCA) 2017a, *A methodology for the evaluation of wetlands on the Swan Coastal Plain*, draft prepared by the Wetlands Section of the Department of Biodiversity, Conservation and Attractions and the Urban Water Branch of the Department of Water and Environmental Regulation, Perth.

Department of Biodiversity Conservation and Attractions (DBCA) 2017b, *Priority Ecological Communities for Western Australia Version 27*, Species and Communities Branch, Department of Biodiversity, Conservation and Attractions.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018a, *Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018b, *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment*, Perth.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018c, *Threatened and Priority Fauna List 15 February 2018*, Perth.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018d, *Threatened and Priority Flora List 16 January 2018*, Perth.

Department of Biodiversity Conservation and Attractions (DBCA) 2019, *Conservation Codes for Western Australian Flora and Fauna - last updated 3 January 2019*.

Department of Environment and Conservation (DEC) 2007, *Protocol for proposing modifications to the Geomorphic Wetlands Swan Coastal Plain dataset*, Perth.

Department of Environment and Conservation (DEC) 2009, *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*, Perth.

Department of Conservation (DEC) 2013, *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*, Perth.

English, V. and Blyth, J. 1997, *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province*, ANCA National Reserves System Cooperative Program, Project Number N702, Perth.

Keighery, B. 1994, *Bushland Plant Survey: A guide to plant community survey for the community*, Wildflower Society of WA (Inc), Nedlands.

Semeniuk, C. A. 1987, *Wetlands of the Darling System - a geomorphic approach to habitat classification*, Journal of the Royal Society of Western Australia, 69: 95-112.

Semeniuk, C. A. and Semeniuk, V. 1995, *A Geomorphic Approach to Global Classification for Inland Wetlands*, Vegetatio, 118(1/2): 103-124.

Online references

Department of Agriculture and Food (DAFWA) 2018, *The Western Australian Organism List* (WAOL), <https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>.

Department of Environment and Energy (DoEE) 2018, Weeds of National Significance, <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html>.

Appendix B

Likelihood of Occurrence - Flora

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Caladenia huegelii	CR	EN	PG	Well-drained, deep sandy soils in lush undergrowth in a variety of moisture levels.	Sep-early Nov	Unlikely
Grevillea thelemanniana	CR	CR	P	Sand, sandy clay. Winter-wet low-lying flats.	May-Nov	Unlikely
Diuris purdiei	EN	EN	PG	Sand to sandy clay soils in areas subject to winter inundation.	late September to mid-October, but only after a summer or early autumn fire (Brown et al., 1998)	Unlikely
Eremophila glabra subsp. chlorella	EN	-	P	Sandy clay. Winter-wet depressions.	Jul-Nov	Unlikely
Macarthuria keigheryi	EN	EN	P	Low-lying winter-wet damp grey/white sands in open patches.	Sep-Dec or Feb-Mar	Unlikely
Andersonia gracilis	VU	EN	P	Seasonally damp, black sandy clay flats near or on the margins of swamps.	Sep-Nov	Unlikely
Conospermum undulatum	VU	VU	P	Sand and sandy clay soils, on flat or gently sloping sites between the Swan and Canning Rivers	May-Oct	Unlikely
Diuris drummondii	VU	VU	PG	In low-lying depressions in peaty and sandy clay swamps.	Nov-Jan	Unlikely
Acacia denticulosa	VU	VU	P	Sand, loam, clay. Granite outcrops, rarely on sandplains.	Sep-Oct	Unlikely
Eucalyptus rhodantha var. rhodantha	VU	VU	P	Grey/yellow/red sand over laterite. Undulating country, hillslopes.	Jul-Sep or Dec-Jan	Unlikely
Picris compacta	EX	-	A/P	Loam, limestone. River banks.	Unknown	Unlikely
Bolboschoenus fluviatilis	P1	-	P	Floodplain with grey/brown wet sand.	Nov	Unlikely
Eucalyptus x mundijongensis	P1	-	P	Loam or grey sand. Paddocks.	Unknown	Unlikely
Ptilotus sericostachyus subsp. roseus	P1	-	P	Unknown. Seem to be associated with wetlands/rivers.	Sep-Dec	Unlikely
Haloragis scoparia	P1	-	P	Clay in winter-wet areas.	May	Unlikely

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Hydrocotyle striata	P1	-	A	Sand and clay in springs and creeklines.	Nov	Unlikely
Lepidium pseudohyssopifolium	P1	-	A/P	Swampy ground.	Jun-Sep	Unlikely
Levenhookia preissii	P1	-	A	Grey or black, peaty sand. Swamps	Sep-Dec/Jan	Unlikely
Typhonium peltandroides	P1	-	P	Shallow sand amongst rough sandstone, red clay. Sides of gorges, vine thickets, rocky sites or along watercourses.	Dec or Jan-Feb	Unlikely
Acacia benthamii	P2	-	P	Sand, typically on limestone breakaways	Aug - Sept	Unlikely
Calectasia grandiflora	P2	-	P	White, grey or yellow sand.	Jun-Nov	Unlikely
Calothamnus macrocarpus	P2	-	P	Rocky quartzite soils, sand. Slopes.	Feb or Aug-Dec	Unlikely
Chamelaucium floriferum subsp. diffusum	P2	-	P	Sand, clay. Frequently with outcropping granite.	Jan-Dec	Unlikely
Eucalyptus educta	P2	-	P	Shallow soils. Granite rocks.	Apr	Unlikely
Fabronia hampeana	P2	-	P	Dry pale grey sand.	Unknown	Unlikely
Grevillea manglesii subsp. ornithopoda	P2	-	P	Red-brown loam over clay	Sep-Nov	Unlikely
Johnsonia pubescens subsp. cygnorum	P2	-	P	Grey white yellow sands on flats and seasonally wet areas.	Sep	Unlikely
Melaleuca viminalis	P2	-	P	Sand, clay in creeklines and wetlands.	Oct-Dec	Unlikely
Poranthera moorokatta	P2	-	A	Sandy or clay soils. Dampland or low sandy dunes.	Oct or Feb	Unlikely
Thelymitra variegata	P2	-	P	Sandy clay, sand, laterite.	Jun-Sep	Unlikely
Angianthus micropodioides	P3	-	A	Saline sandy soils on edge of rivers, depressions and clay pans.	Nov-Dec or Jan-Feb	Unlikely
Acacia horridula	P3	-	P	Gravelly soils over granite, sand, rocky hillsides.	May-Aug	Unlikely
Adenanthos cygnorum subsp. chamaephyton	P3	-	P	Grey sand, lateritic gravel.	Jul or Sep to Dec or Jan	Unlikely
Babingtonia urbana	P3	-	P	Grey sand, lateritic gravel.	Jan-Mar	Unlikely
Byblis gigantea	P3	-	P	Sandy-peat swamps. Seasonally wet areas.	Sep-Jan	Unlikely
Byblis gigantea	P3	-	P	Sandy-peat swamps. Seasonally wet areas.	Sep-Jan	Unlikely
Carex tereticaulis	P3	-	P	Black peaty sand.	Sep-Oct	Unlikely
Conostylis bracteata	P3	-	P	Sand, limestone. Consolidated sand dunes	Aug-Sep	Unlikely

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Cyathochaeta teretifolia	P3	-	P	Grey sand, sandy clay in swamps and creek edges.	Oct-Jan	Unlikely
Dampiera triloba	P3	-	P	Damp peat/loam soil.	Aug-Dec	Unlikely
Dicrastylis micrantha	P3	-	P	Red sand. Sandplains.	Sep-Dec	Unlikely
Dillwynia dillwynioides	P3	-	P	Winter wet depressions on sandy soils	Aug - Dec	Unlikely
Hibbertia leptotheca	P3	-	P	Brown to white sand with limestone.	Aug-Sep	Unlikely
Isopogon autumnalis	P3	-	P	Yellow-grey sand.	Feb,Mar,Apr,May or June	Unlikely
Lasiopetalum glutinosum subsp. glutinosum	P3	-	P	Brown clay loam on slopes	Sep-Dec	Unlikely
Lasiopetalum membranaceum	P3	-	P	Sand over limestone	Sep-Dec	Unlikely
Meionectes tenuifolia	P3	-	P	Clay loam in seasonally wet areas.	Oct-Dec	Unlikely
Platysace ramosissima	P3	-	P	Sandy soils.	Oct-Nov	Unlikely
Schoenus benthamii	P3	-	P	White, grey ands, sandy clay in winter wet flats and swamps	Oct-Nov	Unlikely
Schoenus capillifolius	P3	-	A	Brown mud in claypans	Oct-Nov	Unlikely
Schoenus pennisetis	P3	-	A	Grey or peaty sand in swamps and winter-wet depressions.	Aug-Sep	Unlikely
Stylidium aceratum	P3	-	A	Sandy soils in swamp heathland.	Oct-Nov	Unlikely
Stylidium paludicola	P3	-	P	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland	Oct-Dec	Unlikely
Aponogeton hexatepalus	P4	-	P	Mud. Freshwater: ponds, rivers, claypans.	Jul-Oct	Unlikely
Boronia tenuis	P4	-	P	Laterite, stony soils, granite.	Aug-Nov	Unlikely
Calothamnus graniticus subsp. leptophyllus	P4	-	P	Clay over granite, lateritic soils. Hillsides.	Jun-Aug	Unlikely
Dodonaea hackettiana	P4	-	P	Sand, outcropping limestone.	Jul-Oct	Unlikely
Drosera occidentalis	P4	-	P	Flat, brown/white/yellow moist sand/clay/peat, often near swamps.	Oct-Dec/Jan	Unlikely
Eucalyptus caesia subsp. caesia	P4	-	P	Loam. Granite outcrops.	May-Sep	Unlikely
Eucalyptus caesia subsp. magna	P4	-	P	Loam. Granite outcrops.	May-Sep	Unlikely
Eucalyptus kruseana	P4	-	P	Sandy loam. Granite outcrops & hills.	Jun-Sep	Unlikely

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Grevillea pimeleoides	P4	-	P	Gravelly soils over granite. Rocky hillsides.	May-Nov	Unlikely
Hydrocotyle lemnoides	P4	-	A	Floating in swamps.	Aug-Oct	Unlikely
Hypolaena robusta	P4	-	P	White sand. Sandplains.	Sep-Oct	Unlikely
Jacksonia sericea	P4	-	P	Calcareous and sandy soils on	Dec-Feb	Unlikely
Ornduffia submersa	P4	-	A	Sandy clay in inundated	Aug-Nov	Unlikely
Schoenus natans	P4	-	A	Aquatic, in winter-wet	Oct	Unlikely
Stylidium longitubum	P4	-	A	Sandy clay, clay. Seasonal wetlands.	Oct-Dec	Unlikely
Verticordia lindleyi subsp. lindleyi	P4	-	P	Sand and sandy clay in winter wet areas.	May or Nov-Jan	Unlikely

Note: T=threatened, CE=critically endangered, E=endangered, V=vulnerable, P1=Priority 1, P2=Priority 2, P3=Priority 3, P4=Priority 4, P=perennial, PG=perennial geophyte, A=annual. Species considered to potentially occur within the site are shaded green

Appendix C

Likelihood of Occurrence – Threatened and Priority Communities

Code	Community name	TEC/PEC	Level of significance		Likelihood of occurrence
			State	EPBC Act	
Tuart woodlands	Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain	TEC/PEC	P3	CR	Does not occur
Banksia WL SCP	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	TEC/PEC	P3	EN	Does not occur
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	TEC/PEC	P3	VU	Present
SCP30a	*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain	TEC	VU	-	Does not occur
Subtropical and Temperate Coastal Saltmarsh	Northern Spearwood shrublands and woodlands	PEC	P3	VU	Does not occur
SCP3a	*Corymbia calophylla - Kingia australis* woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	TEC	CR	EN	Does not occur
Wooded waterbird wetlands	Wooded wetlands which support colonial waterbird nesting areas	PEC	P2		Does not occur
Muchea limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	TEC	EN	EN	Does not occur
SCP02	Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson et al. (1994))	TEC	EN		Does not occur
SCP07	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	TEC	VU	CR	Does not occur
SCP20a	*Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	TEC	EN	EN	Does not occur
SCP20b	*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	TEC	EN	EN	Does not occur

Code	Community name	TEC/PEC	Level of significance		Likelihood of occurrence
			State	EPBC Act	
SCP21c	Low lying *Banksia attenuata* woodlands or shrublands	PEC	P3		Does not occur
SCP22	*Banksia ilicifolia* woodlands	PEC	P3		Does not occur
SCP24	Northern Spearwood shrublands and woodlands	PEC	P3		Does not occur

Note: TEC=threatened ecological community, PEC=priority ecological community, CR=critically endangered, EN=endangered, VU=vulnerable, P3=priority 3

Appendix D

Flora Species List

Flora Species List - Belmont Peninsula

Note: * denotes introduced weed species, DP denotes 'declared pests'

Family	Status	Species
Aizoaceae		
	*	*Carpobrotus edulis*
Anacardiaceae		
	*	*Schinus terebinthifolia*
Apiaceae		
	*	*Foeniculum vulgare*
Araceae		
	*	*Zantedeschia aethiopica*
Arecaceae		
	*	*Washingtonia filifera*
	*	*Washingtonia robusta*
Asteraceae		
	*	*Erigeron bonariensis*
	*	*Hypochaeris glabra*
	*	*Lactuca serriola*
	*	*Sonchus oleraceus*
	*	*Symphyotrichum squamatum*
	*	*Symphyotrichum subulatum*
Boraginaceae		
	*	*Heliotropium curassavicum*
Casuarinaceae		
		Casuarina obesa
	*	*Casuarina ?glauca*
Chenopodiaceae		
		Atriplex hypoleuca
	*	*Atriplex prostrata*
		Salicornia quinqueflora
		Suaeda australis
		Tecticornia halocnemoides
		Tecticornia indica subsp. bidens
Cyperaceae		
		Bolboschoenus caldwellii
	*	*Carex divisa*
	*	*Cyperus tenuiflorus*
	*	*Isolepis cernua* var. *setiformis*
Euphorbiaceae		
	*	*Ricinus communis*
Fabaceae		
		Acacia saligna
	*	*Chamaecytisus palmensis*
	*	*Lotus subbiflorus*
	*	*Lupinus cosentinii*
	*	*Melilotus indicus*
		Paraserianthes lophantha
	*	*Trifolium angustifolium*
		Viminaria juncea
Iridaceae		

Flora Species List - Belmont Peninsula

Note: * denotes introduced weed species, DP denotes 'declared pests'

Family	Status	Species
	*	*Romulea rosea*
	*	*Watsonia meriana var. bulbillifera*
Juncaceae		
		Juncus kraussii subsp. australiensis
		Juncus pallidus
Myrtaceae		
	*	*Eucalyptus camaldulensis*
		Eucalyptus rudis
		Melaleuca cuticularis
		Melaleuca rhaphiophylla
Oxalidaceae		
	*	*Oxalis glabra*
	*	*Oxalis pes-caprae*
	*	*Oxalis purpurea*
Papaveraceae		
	*	*Fumaria capreolata*
Poaceae		
	*	*Arundo donax*
	*	*Avena barbata*
	*	*Avena fatua*
	*	*Briza maxima*
	*	*Bromus diandrus*
	*	*Cenchrus clandestinus*
	*	*Cortaderia selloana*
	*	*Cynodon dactylon*
	*	*Ehrharta calycina*
	*	*Eragrostis curvula*
	*	*Paspalum dilatatum*
	*	*Polypogon monspeliensis*
		Sporobolus virginicus
Polygonaceae		
	*	*Rumex crispus*
Primulaceae		
		Samolus repens
Solanaceae		
	*	*Solanum nigrum*
Tamaricaceae		
	*, DP	*Tamarix aphylla*
Typhaceae		
		Typha domingensis

Appendix E

Flora Species x Plant Community Matrix

Flora Species x Plant Community Matrix - Burswood Peninsula

Species	Plant community								
	Co	EcJk	Er	ErMCoJk	Jk	Pl	SqT	VjCo	Non-native
Acacia saligna							X		X
Arundo donax					X		X		X
Atriplex hypoleuca			X	X	X				
Atriplex prostrata				X	X		X		
Avena barbata			X	X	X				X
Avena fatua									X
Bolboschoenus caldwellii							X		
Briza maxima			X	X	X				X
Bromus diandrus				X					X
Carex divisa			X						
Carpobrotus edulis				X	X				X
Casuarina obesa	X		X	X	X		X	X	X
Casuarina ?glauca					X		X		
Cenchrus clandestinus			X	X	X		X	X	X
Chamaecytisus palmensis					X			X	X
Cortaderia selloana	X		X		X			X	X
Cynodon dactylon			X	X	X		X		X
Cyperus tenuiflorus									X
Ehrharta calycina				X	X				X
Eragrostis curvula								X	X
Erigeron bonariensis									X
Eucalyptus camaldulensis		X							X
Eucalyptus rudis			X	X	X				X
Foeniculum vulgare			X						X
Fumaria capreolata			X						X
Heliotropium curassavicum									X
Hypochaeris glabra									X
Isolepis setiformis				X					
Juncus kraussii subsp. australiensis		X	X	X	X		X		X
Juncus pallidus			X		X				X

Flora Species x Plant Community Matrix - Burswood Peninsula

Species	Plant community								
	Co	EcJk	Er	ErMCoJk	Jk	Pl	SqT	VjCo	Non-native
Lactuca serriola									X
Lotus subbiflorus							X		X
Lupinus cosentinii									X
Melaleuca cuticularis				X					
Melaleuca rhaphiophylla			X	X					
Melilotus indicus					X		X	X	X
Oxalis glabra									X
Oxalis pes-caprae				X				X	X
Oxalis purpurea									X
Paraserianthes lophantha			X						X
Paspalum dilatatum			X						X
Polypogon monspeliensis					X		X	X	X
Ricinus communis					X				X
Romulea rosea				X					X
Rumex crispus									X
Salicornia quinqueflora			X	X	X		X		
Samolus repens					X				
Schinus terebinthifolia			X						X
Solanum nigrum								X	X
Sonchus oleraceus			X		X		X		X
Sporobolus virginicus				X			X		
Suaeda australis			X	X	X		X		
Symphyotrichum squamatum			X						X
Symphyotrichum subulatum				X	X		X		X
Tamarix aphylla					X				X
Tecticornia halocnemoides							X		
Tecticornia indica subsp. bidens					X		X		
Trifolium angustifolium									X
Typha domingensis					X		X		X
Viminaria juncea								X	

Flora Species x Plant Community Matrix - Burswood Peninsula

Species	Plant community								
	Co	EcJk	Er	ErMCoJk	Jk	Pl	SqT	VjCo	Non-native
Washingtonia filifera									X
Washingtonia robusta	X		X		X				X
Watsonia meriana var. bulbillifera			X	X	X			X	
Zantedeschia aethiopica			X						

Appendix F

Flora Survey Raw Data

Vegetation Sample Data

Sample Name: R1

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R1: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394571.8083	NW corner northing:	6465007.923
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	waterway
Time since fire:	> 5 yrs	Disturbance:	high - Weeds, clearingg, rubbish
Soil type/texture	silt/	Bare ground (%):	10
Rocks (%) and type:	No rocks	Soil colour:	brown/black
Litter:	% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R1

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R1: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Juncus kraussii subsp. australiensis	40
	Eucalyptus rudis	5
	Melaleuca cuticularis	5
	Casuarina obesa	5
	Salicornia quinqueflora	2
	Suaeda australis	40
*	*Atriplex prostrata*	0.5
	Atriplex hypoleuca	0
*	*Carpobrotus edulis*	3
*	*Cynodon dactylon*	10
*	*Watsonia meriana var. bulbillifera*	2
	Isolepis setiformis	1
*	*Bromus diandrus*	1
*	*Ehrharta calycina*	1
*	*Cenchrus clandestinus*	1
*	*Briza maxima*	1
*	*Romulea rosea*	0.5
*	*Symphyotrichum subulatum*	0.5
*	*Cynodon dactylon*	2
*	*Avena barbata*	0.5

Vegetation Sample Data

Sample Name: R2

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R2: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394608	NW corner northing:	6464993
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	near saturated	Landform:	flat
Time since fire:	> 5 yrs	Disturbance:	high - weeds, previous filling, cleairng
Soil type/texture	other/	Bare ground (%):	10
Rocks (%) and type:	No rocks	Soil colour:	grey/black
Litter:	2% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R2

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R2: Page 2 of 2

Species Data

* denotes non-native species

Status		Confirmed name	Cover (%)
	*	*Arundo donax*	30
		Juncus pallidus	5
		Juncus kraussii subsp. australiensis	1
		Tecticornia indica subsp. bidens	0.5
		Salicornia quinqueflora	0.5
	*	*Symphyotrichum subulatum*	5
	*	*Polypogon monspeliensis*	10
	*	*Cynodon dactylon*	50
	*	*Sonchus oleraceus*	1
	*	*Carpobrotus edulis*	1
	*	*Atriplex prostrata*	4
	*	*Melilotus indicus*	1
	*	*Ricinus communis*	1
	*	*Cortaderia selloana*	10
	*	*Cenchrus clandestinus*	Opp
	*	*Chamaecytisus palmensis*	Opp
	*	*Typha domingensis*	Opp

Vegetation Sample Data

Sample Name: Q3

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q3: Page 1 of 2

Quadrat and landform details

Sample type:	quadrat	Size:	other
NW corner easting:	394844	NW corner northing:	6465562
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	flat
Time since fire:	> 5 yrs	Disturbance:	high - clearing, filling, weeds
Soil type/texture	silt/	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	#REF!
Litter:	0% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: Q3

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q3: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Salicornia quinqueflora	90
	Suaeda australis	2
*	*Polypogon monspeliensis*	opp
*	*Atriplex prostrata*	2
*	*Symphyotrichum subulatum*	0.5
*	*Sonchus oleraceus*	6
*	*Melilotus indicus*	opp
	Juncus kraussii subsp. australiensis	opp
*	*Cenchrus clandestinus*	opp
*	*Cynodon dactylon*	opp
*	*Arundo donax*	opp
	Casuarina obesa	2
	Acacia saligna	opp
*	*Lotus subbiflorus*	opp
	Bolboschoenus caldwellii	opp

Vegetation Sample Data

Sample Name: R4

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R4: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394723.8731	NW corner northing:	6465580.763
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	waterway
Time since fire:	> 5 yrs	Disturbance:	moderate - rubbish, some weeds
Soil type/texture	silt/	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	brown/black
Litter:	2% (branches,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R4

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R4: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Juncus kraussii subsp. australiensis	70
	Salicornia quinqueflora	15
	Suaeda australis	15
*	*Atriplex prostrata*	1
*	*Ehrharta calycina*	opp
*	*Briza maxima*	opp
*	*Sonchus oleraceus*	opp
*	*Cortaderia selloana*	5
*	*Polypogon monspeliensis*	opp
*	*Avena barbata*	opp
*	*Carpobrotus edulis*	opp

Vegetation Sample Data

Sample Name: Q5

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
Q5: Page 1 of 2

Quadrat and landform details

Sample type:	quadrat	Size:	10 m x 10 m
NW corner easting:	395284.1245	NW corner northing:	6465548.707
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	depression
Time since fire:	1-2 yrs	Disturbance:	moderate - fringing weeds
Soil type/texture	silt/	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	brown/black
Litter:	0% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: Q5

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q5: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Juncus kraussii subsp. australiensis	40
	Salicornia quinqueflora	25
	Tecticornia indica subsp. bidens	opp
	Suaeda australis	70
	Casuarina obesa	opp
	Tecticornia indica subsp. bidens	opp
	Samolus repens	opp
*, DP	*Tamarix aphylla*	opp
	Eucalyptus rudis	opp
*	*Cenchrus clandestinus*	opp
*	*Cynodon dactylon*	opp
*	*Watsonia meriana var. bulbillifera*	opp
*	*Juncus pallidus*	opp
*	*Briza maxima*	opp
*	*Avena barbata*	opp

Vegetation Sample Data

Sample Name: R6

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R6: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	395379	NW corner northing:	6465396
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	near saturated	Landform:	flat
Time since fire:	1-2 yrs	Disturbance:	high - weeds
Soil type/texture	silt/sand with organic layer	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	brown/
Litter:	5% (branches,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R6

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R6: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Eucalyptus rudis	50
	Cenchrus clandestinus	70
	Cynodon dactylon	30
	Watsonia meriana var. bulbillifera	5
	Juncus pallidus	2
	Briza maxima	2
	Avena barbata	2
	Schinus terebinthifolia	Opp
	Melaleuca rhaphiophylla	Opp
	Zantedeschia aethiopica	Opp
	Carex divisa	Opp
	Foeniculum vulgare	Opp
	Cortaderia selloana	Opp
	Sonchus oleraceus	Opp
	Paspalum dilatatum	Opp
	Fumaria capreolata	Opp

Vegetation Sample Data

Sample Name: Q7

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q7: Page 1 of 2

Quadrat and landform details

Sample type:	quadrat	Size:	10 m x 10 m
NW corner easting:	395406.7896	NW corner northing:	6465423.024
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	near saturated	Landform:	flat
Time since fire:	1-2 yrs	Disturbance:	high - weeds
Soil type/texture	silt/	Bare ground (%):	20
Rocks (%) and type:	No rocks	Soil colour:	brown/black
Litter:	20% (leaves,branches,logs)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: Q7

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q7: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Eucalyptus rudis	20
*	*Washingtonia robusta*	15
	Juncus kraussii subsp. australiensis	2
*	*Cenchrus clandestinus*	40
*	*Cynodon dactylon*	5
	Atriplex hypoleuca	1
	Salicornia quinqueflora	5
	Suaeda australis	0.5
	Paraserianthes lophantha	0.5
	Symphyotrichum squamatum	10
	Casuarina obesa	0.5

Vegetation Sample Data

Sample Name: Q8

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
Q8: Page 1 of 2

Quadrat and landform details

Sample type:	quadrat	Size:	10 m x 10 m
NW corner easting:	395436.6411	NW corner northing:	6465434.304
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	waterway
Time since fire:	1-2 yrs	Disturbance:	moderate -
Soil type/texture	silt/ with organic layer	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	black/
Litter:	5% (logs,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: Q8

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other Q8: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Juncus kraussii subsp. australiensis	40
	Salicornia quinqueflora	10
	Suaeda australis	5
	Atriplex hypoleuca	1
*	*Cenchrus clandestinus*	5
	Casuarina obesa	opp
*	*Washingtonia robusta*	opp

Vegetation Sample Data

Sample Name: R9

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R9: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394570.9886	NW corner northing:	6464885.634
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	waterway
Time since fire:	> 5 yrs	Disturbance:	high - weeds, rubbish
Soil type/texture	sand/silt	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	white/black
Litter:	15% (branches,twigs,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R9

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R9: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Casuarina obesa	30
	Melaleuca cuticularis	10
	Melaleuca rhaphiophylla	5
*	*Juncus kraussii subsp. australiensis*	10
*	*Suaeda australis*	60
	Salicornia quinqueflora	2
*	*Atriplex prostrata*	2
*	*Oxalis pes-caprae*	1
*	*Cenchrus clandestinus*	2
*	*Symphyotrichum subulatum*	2

Vegetation Sample Data

Sample Name: R10

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R10: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394627.5341	NW corner northing:	6465021.579
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	saturated	Landform:	flat
Time since fire:	> 5 yrs	Disturbance:	high - flyash, weeds
Soil type/texture	silt/clay	Bare ground (%):	20
Rocks (%) and type:	No rocks	Soil colour:	black/
Litter:	0% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R10

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R10: Page 2 of 2

Species Data

* denotes non-native species

Status		Confirmed name	Cover (%)
		Salicornia quinqueflora	70
	*	*Cenchrus clandestinus*	20
		Juncus kraussii subsp. australiensis	2
	*	*Cenchrus clandestinus*	50
	*	*Symphyotrichum subulatum*	5
		Tecticornia indica subsp. bidens	opp
		Typha domingensis	opp

Vegetation Sample Data

Sample Name: R11

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R11: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394677.7093	NW corner northing:	6465299.03
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	slightly damp	Landform:	flat
Time since fire:	> 5 yrs	Disturbance:	high -
Soil type/texture	sand/ with organic layer	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	brown/
Litter:	95% (leaves,twigs,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R11

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R11: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name	Cover (%)
	Casuarina obesa	95
	Cortaderia selloana	5
*	*Washingtonia robusta*	2

Vegetation Sample Data

Sample Name: R12

Project no.: EP21-054
Date: 14/06/2021
Author: SKP,other

Status Non-permanent
R12: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	other
NW corner easting:	394666.4292	NW corner northing:	6465430.619
Altitude (m):	0	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	slightly damp	Landform:	flat
Time since fire:	> 5 yrs	Disturbance:	high - weeds
Soil type/texture	sand/ with organic layer	Bare ground (%):	0
Rocks (%) and type:	No rocks	Soil colour:	brown/
Litter:	10% (,,)	Vegetation condition:	very good

Vegetation Sample Data

Sample Name: R12

Project no.: EP21-054
Date: 14/06/2021 **Status** Non-permanent
Author: SKP,other R12: Page 2 of 2

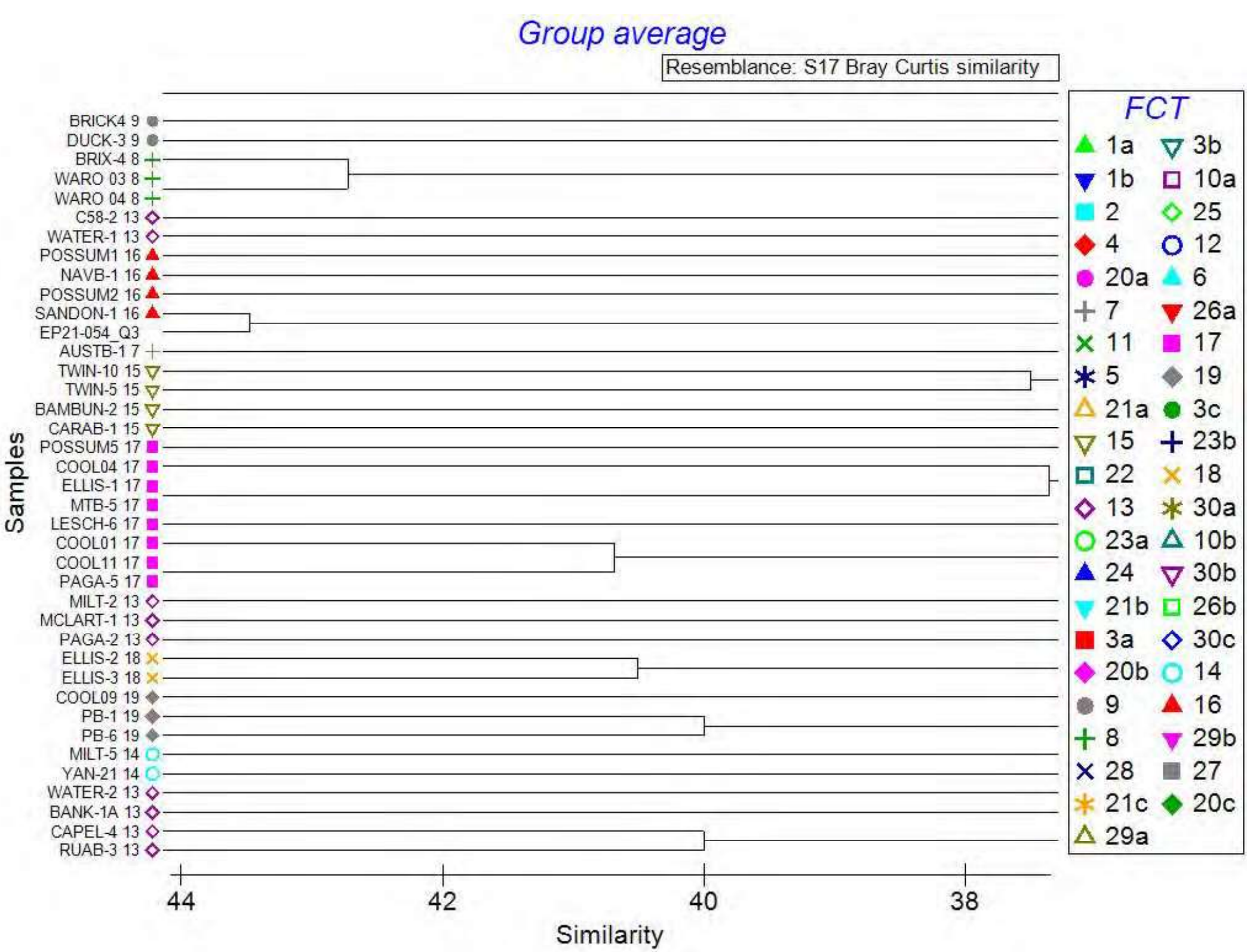
Species Data

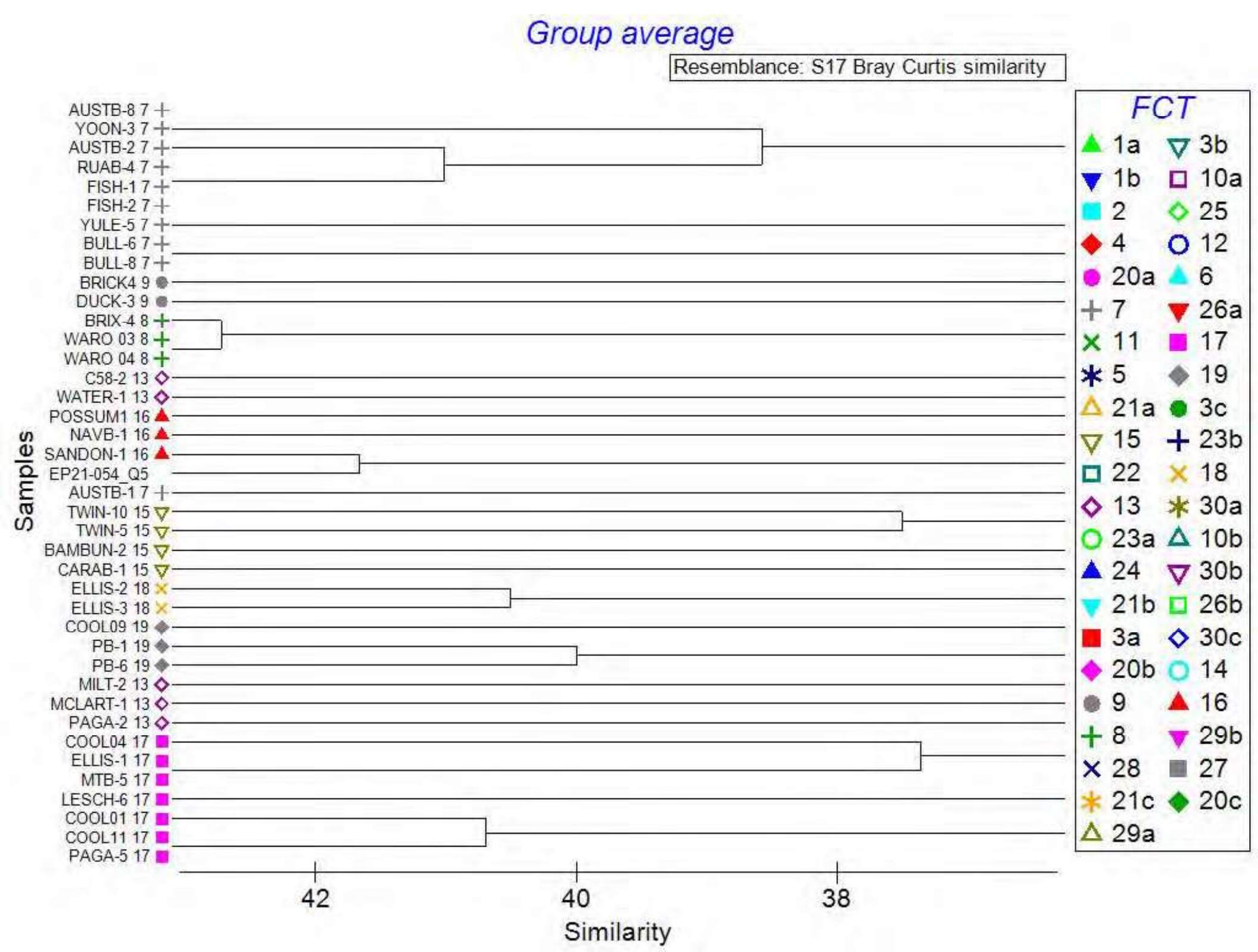
* denotes non-native species

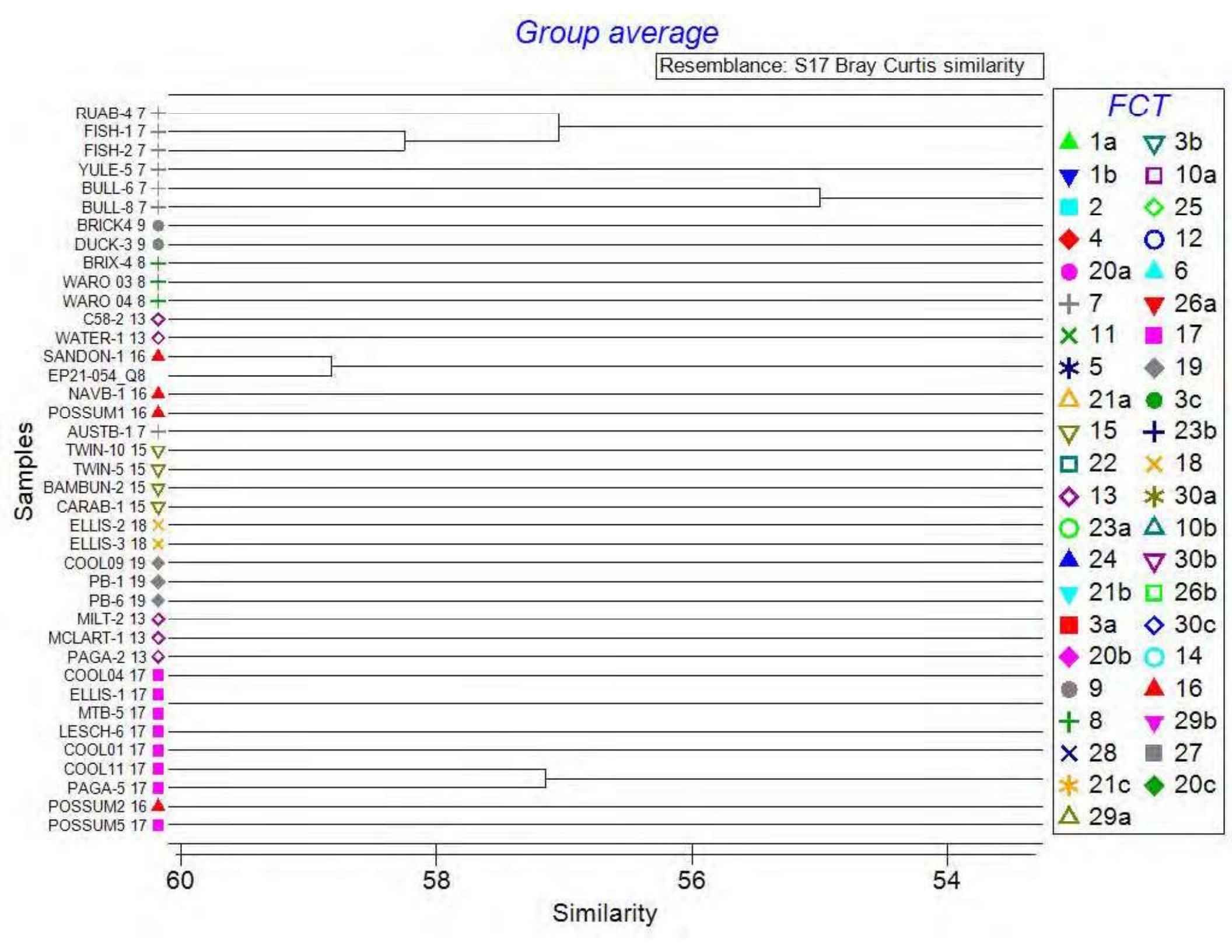
Status	Confirmed name	Cover (%)
	Casuarina obesa	10
	Viminaria juncea	20
*	*Cortaderia selloana*	10
*	*Cenchrus clandestinus*	2
*	*Cenchrus clandestinus*	50
*	*Eragrostis curvula*	20
*	*Polypogon monspeliensis*	5
*	*Melilotus indicus*	2
*	*Chamaecytisus palmensis*	5
*	*Oxalis pes-caprae*	10
*	*Solanum nigrum*	1
*	*Watsonia meriana var. bulbillifera*	1

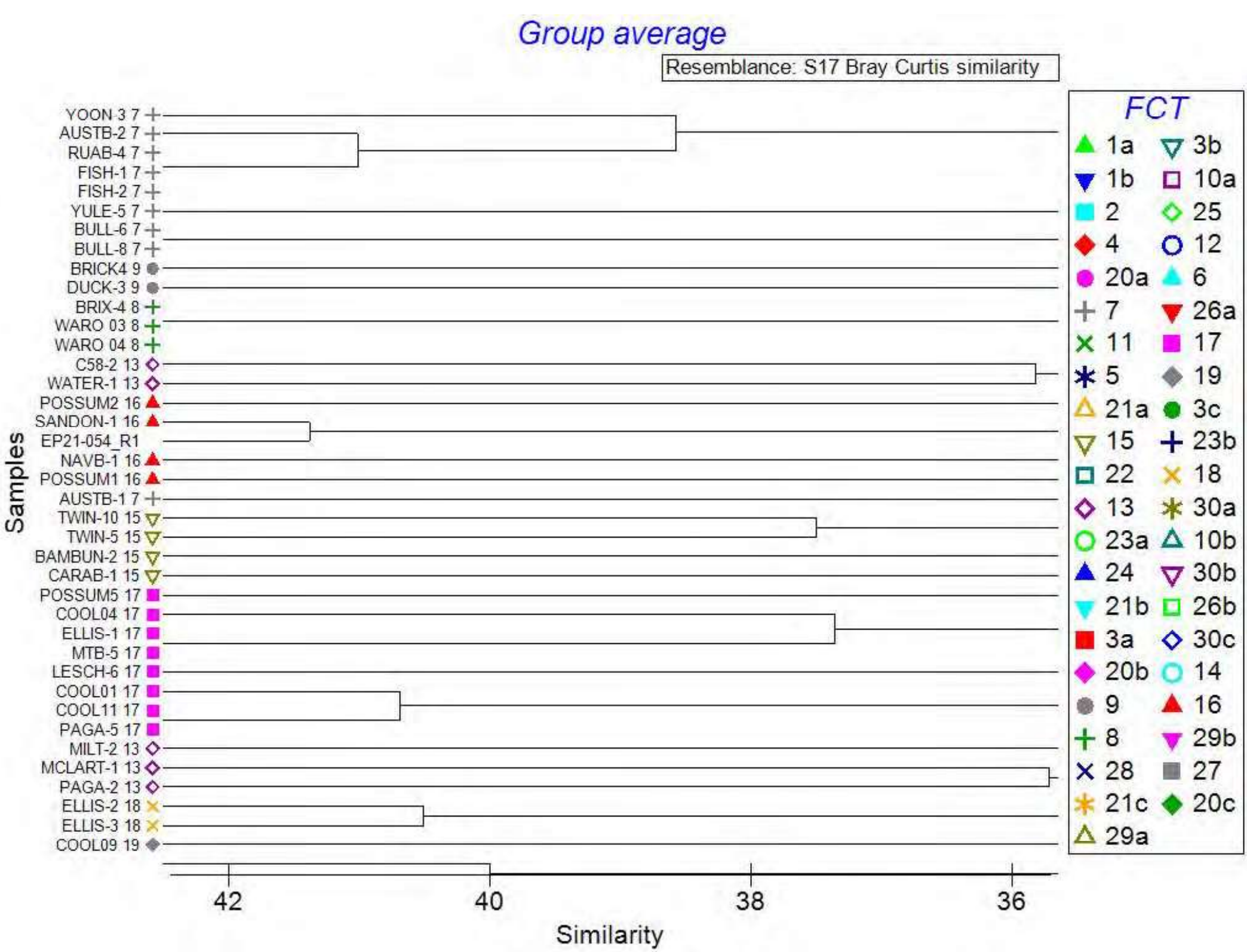
Appendix G

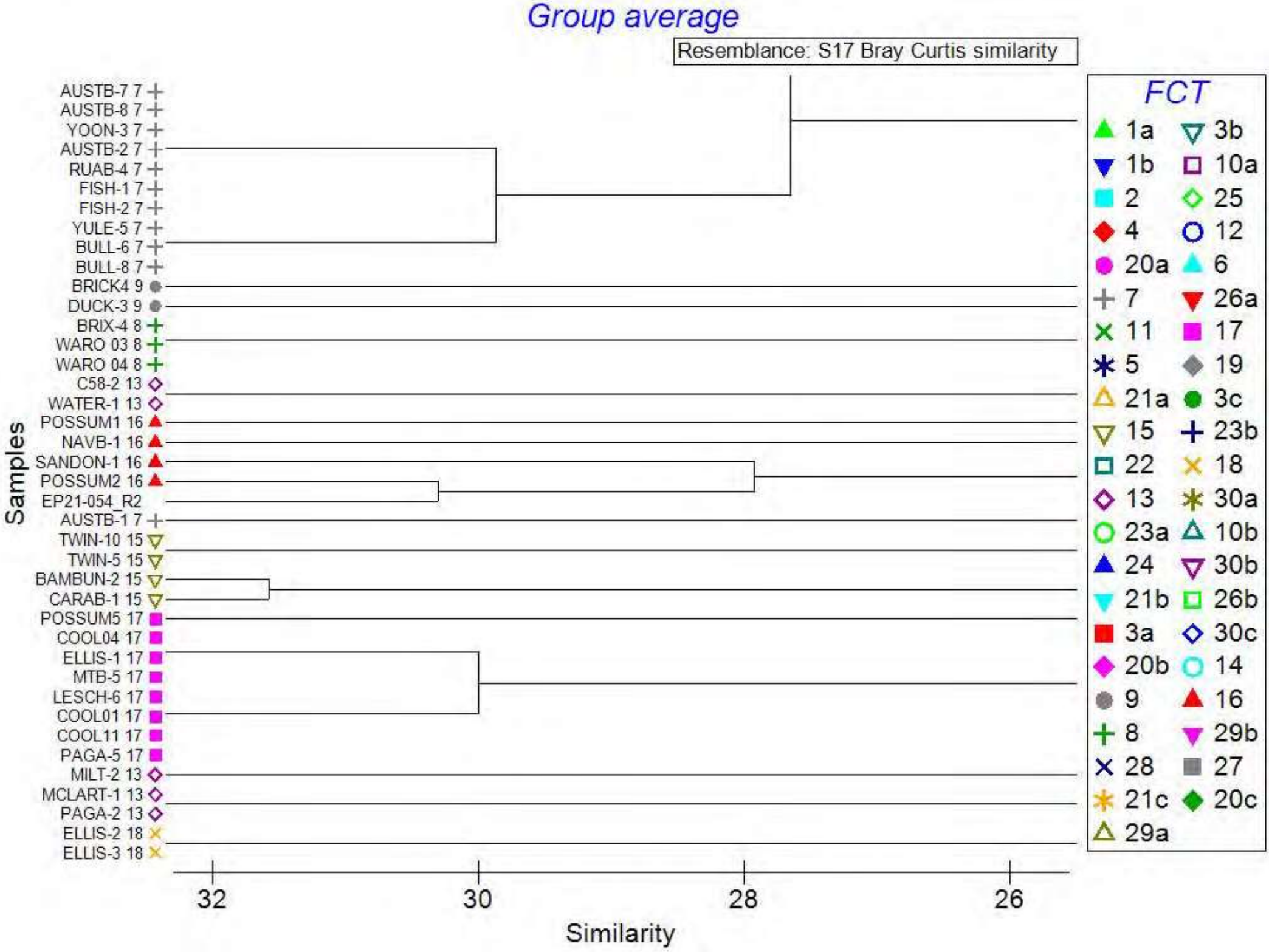
Cluster Dendrograms

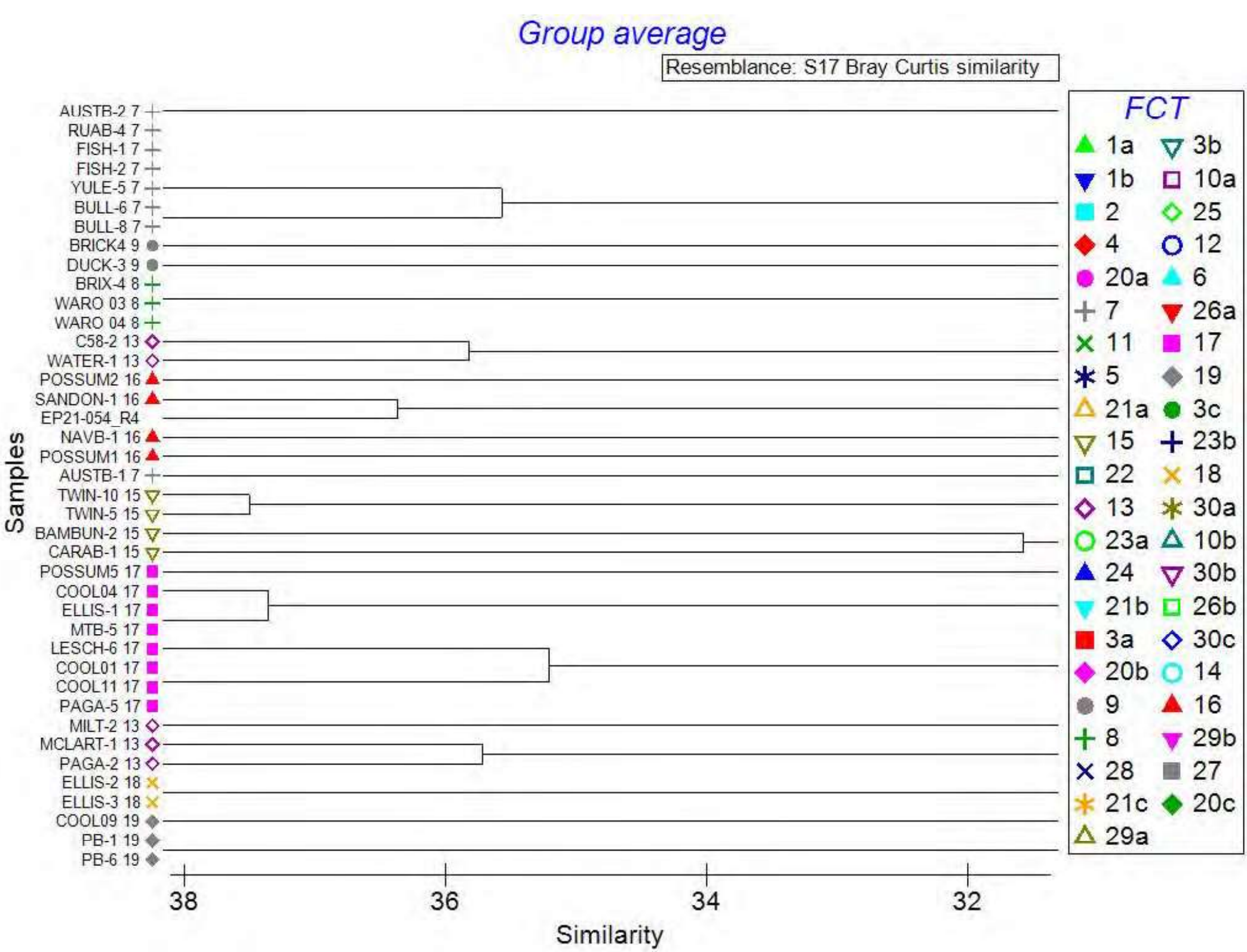

Group average
Resemblance: S17 Bray Curtis similarity
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
POSSUM1 16
NAVB-1 16
POSSUM2 16
SANDON-1 16
EP21-054_Q3
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
POSSUM5 17
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
MILT-2 13
MCLART-1 13
PAGA-2 13
ELLIS-2 18
ELLIS-3 18
COOL09 19
PB-1 19
PB-6 19
MILT-5 14
YAN-21 14
WATER-2 13
BANK-1A 13
CAPEL-4 13
RUAB-3 13
Samples
44
42
40
38
Similarity
FCT
1a
3b
1b
10a
2
25
4
12
20a
6
7
26a
11
17
5
19
21a
3c
15
23b
22
18
13
30a
23a
10b
24
30b
21b
26b
3a
30c
20b
14
9
16
8
29b
28
27
21c
20c
29a

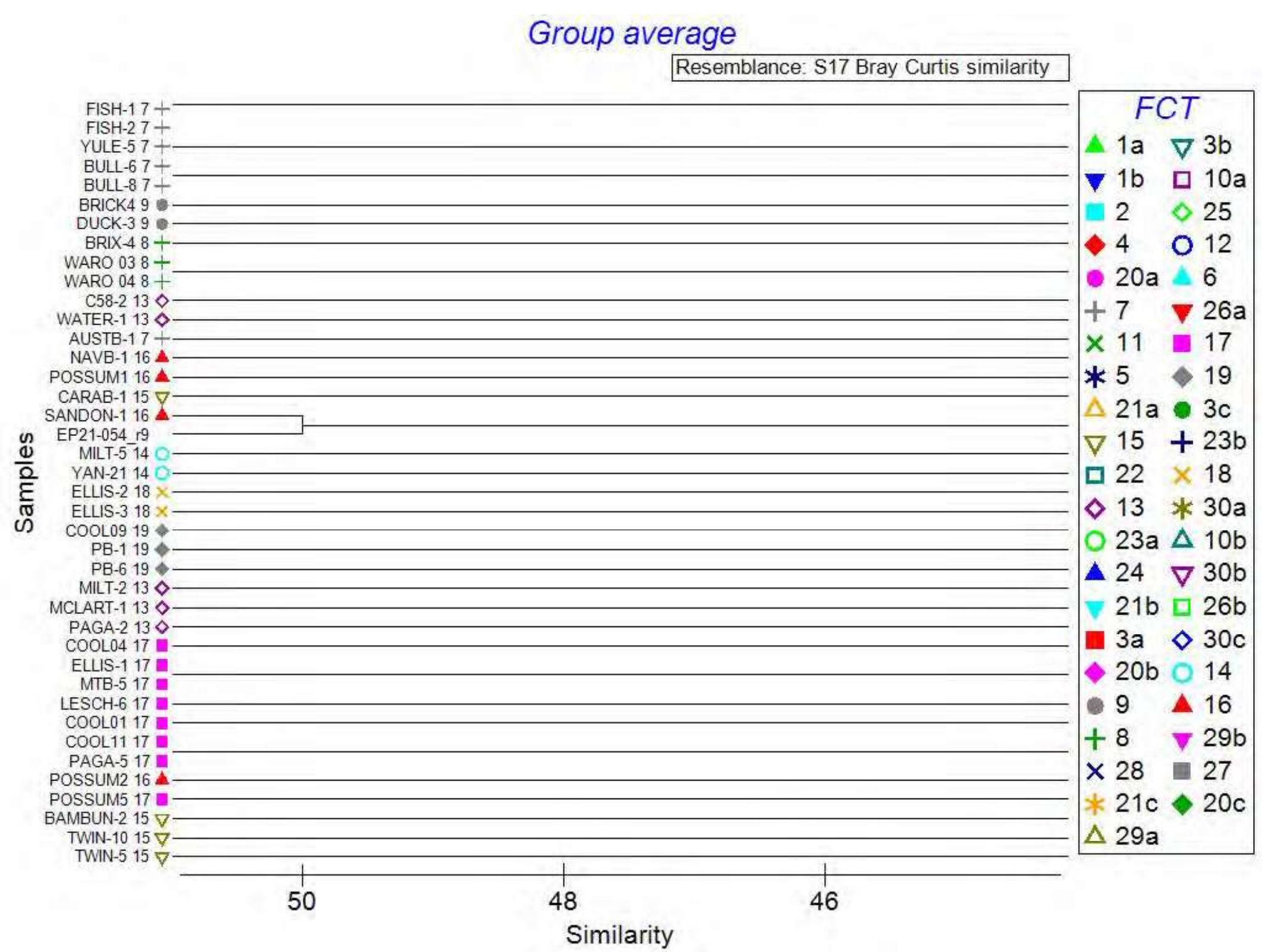

Group average
Resemblance: S17 Bray Curtis similarity
AUSTB-8 7
YOON-3 7
AUSTB-2 7
RUAB-4 7
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
POSSUM1 16
NAVB-1 16
SANDON-1 16
EP21-054_Q5
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
ELLIS-2 18
ELLIS-3 18
COOL09 19
PB-1 19
PB-6 19
MILT-2 13
MCLART-1 13
PAGA-2 13
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
Samples
42
40
38
Similarity
FCT
1a
1b
2
4
20a
7
11
5
21a
15
22
13
23a
24
21b
3a
20b
9
8
28
21c
29a
3b
10a
25
12
6
26a
17
19
3c
23b
18
30a
10b
30b
26b
30c
14
16
29b
27
20c


Group average
Resemblance: S17 Bray Curtis similarity
RUAB-4 7
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
SANDON-1 16
EP21-054_Q8
NAVB-1 16
POSSUM1 16
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
ELLIS-2 18
ELLIS-3 18
COOL09 19
PB-1 19
PB-6 19
MILT-2 13
MCLART-1 13
PAGA-2 13
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
POSSUM2 16
POSSUM5 17
Samples
60
58
56
54
Similarity
FCT
1a
3b
1b
10a
2
25
4
12
20a
6
7
26a
11
17
5
19
21a
3c
15
23b
22
18
13
30a
23a
10b
24
30b
21b
26b
3a
30c
20b
14
9
16
8
29b
28
27
21c
20c
29a


Group average
Resemblance: S17 Bray Curtis similarity
YOON-3 7
AUSTB-2 7
RUAB-4 7
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
POSSUM2 16
SANDON-1 16
EP21-054_R1
NAVB-1 16
POSSUM1 16
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
POSSUM5 17
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
MILT-2 13
MCLART-1 13
PAGA-2 13
ELLIS-2 18
ELLIS-3 18
COOL09 19
Samples
42
40
38
36
Similarity
FCT
1a
1b
2
4
20a
7
11
5
21a
15
22
13
23a
24
21b
3a
20b
9
8
28
21c
29a
3b
10a
25
12
6
26a
17
19
3c
23b
18
30a
10b
30b
26b
30c
14
16
29b
27
20c


Group average
Resemblance: S17 Bray Curtis similarity
AUSTB-7 7
AUSTB-8 7
YOON-3 7
AUSTB-2 7
RUAB-4 7
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
POSSUM1 16
NAVB-1 16
SANDON-1 16
POSSUM2 16
EP21-054_R2
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
POSSUM5 17
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
MILT-2 13
MCLART-1 13
PAGA-2 13
ELLIS-2 18
ELLIS-3 18
Samples
32
30
28
26
Similarity
FCT
1a
3b
1b
10a
2
25
4
12
20a
6
7
26a
11
17
5
19
21a
3c
15
23b
22
18
13
30a
23a
10b
24
30b
21b
26b
3a
30c
20b
14
9
16
8
29b
28
27
21c
20c
29a


Group average
Resemblance: S17 Bray Curtis similarity
AUSTB-2 7
RUAB-4 7
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
POSSUM2 16
SANDON-1 16
EP21-054_R4
NAVB-1 16
POSSUM1 16
AUSTB-1 7
TWIN-10 15
TWIN-5 15
BAMBUN-2 15
CARAB-1 15
POSSUM5 17
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
MILT-2 13
MCLART-1 13
PAGA-2 13
ELLIS-2 18
ELLIS-3 18
COOL09 19
PB-1 19
PB-6 19
Samples
38
36
34
32
Similarity
FCT
1a
3b
1b
10a
2
25
4
12
20a
6
7
26a
11
17
5
19
21a
3c
15
23b
22
18
13
30a
23a
10b
24
30b
21b
26b
3a
30c
20b
14
9
16
8
29b
28
27
21c
20c
29a


Group average
Resemblance: S17 Bray Curtis similarity
FISH-1 7
FISH-2 7
YULE-5 7
BULL-6 7
BULL-8 7
BRICK4 9
DUCK-3 9
BRIX-4 8
WARO 03 8
WARO 04 8
C58-2 13
WATER-1 13
AUSTB-1 7
NAVB-1 16
POSSUM1 16
CARAB-1 15
SANDON-1 16
EP21-054_r9
MILT-5 14
YAN-21 14
ELLIS-2 18
ELLIS-3 18
COOL09 19
PB-1 19
PB-6 19
MILT-2 13
MCLART-1 13
PAGA-2 13
COOL04 17
ELLIS-1 17
MTB-5 17
LESCH-6 17
COOL01 17
COOL11 17
PAGA-5 17
POSSUM2 16
POSSUM5 17
BAMBUN-2 15
TWIN-10 15
TWIN-5 15
Samples
50
48
46
Similarity
FCT
1a
1b
2
4
20a
7
11
5
21a
15
22
13
23a
24
21b
3a
20b
9
8
28
21c
29a
3b
10a
25
12
6
26a
17
19
3c
23b
18
30a
10b
30b
26b
30c
14
16
29b
27
20c

Appendix H

Likelihood of Occurrence - Fauna

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Actitis hypoleucos	Common sandpiper	MI	MI	Edge of sheltered waters salt or fresh, e.g. estuaries, mangrove creeks, rocky coasts, near-coastal saltlakes (including saltwork ponds), river pools, lagoons, claypans, drying swamps, flood waters, dams and sewage ponds. Preferring situations wherelow perches are available (Johnstone & Storr 1998).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Apus pacificus	Pacific swift	MI	MI	Aerial, migratory species that is most often seen over inland plains and sometimes above open areas, foothills or in coastal areas. Sometimes occurs over settled areas, including towns, urban areas and cities (Pizzey & Knight 2012).	**Possible** May opportunistically occur in the site for short periods or fly over the site on commute or while foraging.
Botaurus poiciloptilus	Australasian bittern	EN	EN	In or over water, in tall reedbeds, sedges, rushes, cumbungi, lignum. Also occurs in ricefields, drains in tussocky paddocks and occasionally in saltmarshes and brackish wetlands.	**Possible** May occasionally utilise the fringing inundated riverine vegetation habitat.
Cacatua pastinator pastinator	Muir's corella	CD	-	Wheat and sheep farming country with remnant native forest. Species is restricted to the south-west corner of WA, near Lake Muir (DPaW 2015).	**Unlikely** The site is located outside of species known distribution range.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	Occurs in tidal mudflats, saltmarshes and mangroves, as well as, shallow fresh,brackish or saline inland wetlands. It is also known from floodwaters, irrigated pastures and crops, sewage ponds, saltfields.	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Calidris ferruginea	Curlew sandpiper	CR	CR (MI)	Mainly shallows of estuaries and near-coastal saltlakes (including saltwork ponds) and drying near-coastal freshwater lakes and swamps. Also beaches and near-coastal sewage ponds.	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Calidris melanotos	Pectoral sandpiper	MI	MI	Mainly fresh waters (swamps, lagoons, river pools, irrigation channels and sewage ponds); also samphire flats around estuaries and saltlakes (Johnstone & Storr 1998).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Calidris ruficollis	Red-necked stint	MI	MI	Tidal mudflats, saltmarshes, sandy or shelly beaches, saline and freshwater wetlands (coastal and inland), saltfields, sewage ponds (Pizzey and Knight 2012).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU	Eucalypt and Corymbia forests, often in hilly interior. More recently also observed in more open agricultural and suburban areas including Perth metropolitan area. Attracted to seeding Corymbia calophylla, Eucalyptus marginata, introduced Melia azdarach and Eucalyptus spp. trees.	**Possible** Roosting habitat present. Very limited foraging habitat present.
Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN	Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of Pinus spp. Attracted to seeding Banksia spp., Dryandra spp., Hakea spp., Eucalyptus spp., Corymbia calophylla, Grevillea spp., and Allocasuarina spp. (Johnstone and Storr 1998).	**Possible** Roosting habitat present. Very limited foraging habitat present.
Dasyornis longirostris	Western bristlebird	EN	EN	Dense, low, closed coastal heaths. Open heaths with dense clumps of shrubs, eucalypt thickets and tall swampy heaths. Much reduced by fire, draining for agriculture, but may need fire for optimal status over 50-10+ years. Current range in WA confined to south coast from Albany to Hopetoun (Pizzey and Knight 2012).	**Unlikely** The site is located outside of species known distribution range.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Diomedea amsterdamensis	Amsterdam albatross	CR	EN (MI)	The Amsterdam albatross is a marine, pelagic seabird. It nests in open patchy vegetation (among tussocks, ferns or shrubs) near exposed ridges or hillocks (Weimerskirch et al. 1985). It sleeps and rests on ocean waters when not breeding (Marchant and Higgins 1990)	**Unlikely** No suitable habitat occurs in the site.
Diomedea epomophora	Southern royal albatross	VU	VU (MI)	Rare visitor to Western Australian seas; it breeds on subantarctic islands south of New Zealand (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Diomedea exulans	Wandering albatross	VU	VU (MI)	Marine, pelagic and aerial species. It breeds on Macquarie Island and feeds in Australian portions of the Southern Ocean (DoE 2018).	**Unlikely** No suitable habitat occurs in the site.
Diomedea sanfordi	Northern royal albatross	EN	EN	Species is marine, pelagic and aerial. Habitat includes subantarctic, subtropical, and occasionally Antarctic waters (Marchant & Higgins 1990). Rare visitors to south Western Australian waters.	**Unlikely** No suitable habitat occurs in the site.
Falco hypoleucos	Grey falcon	VU	-	Species occurs in arid and semi-arid Australia, where it inhabits timbered lowland plains. In particular Acacia shrublands and that are crossed by tree-lined water courses. Species has alos been observed hunting in treeless areas and frequenting tussock grassland and open woodlands (TSSC 2020).	**Unlikely** The site is located outside of species known distribution range.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Falco peregrinus	Peregrine falcon	OS	-	Mainly found around cliffs along coasts, rivers, ranges and around wooded watercourses and lakes (Johnstone and Storr 1998).	**Possible** May opportunistically occur in the site for short periods or fly over the site on commute or while searching for prey.
Hydroprogne caspia	Caspian tern	MI	MI	Mainly sheltered areas, estuaries (when not laden with silt) and tidal creeks; occasionally near-coastal saltlakes (including saltwork ponds) and brackish pools in lower courses of rivers; rarely fresh waters.	**Possible** Marginal habitat occurs within the site (fringing inundated riverine vegetation and river).
Ixobrychus dubius	Australian little bittern	P4	-	Dense vegetation surrounding/within freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of Typha spp., Baumea spp. and tall rushes in freshwater swamps around lakes and along rivers (Johnstone and Storr 1998).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Leipoa ocellata	Mallefowl	VU	VU	Scrubs and thickets of Eucalyptus spp., Melaleuca lanceolata and Acacia linophylla; also other dense litter-forming shrublands. Attracted to fallen wheat in stubbles and along roads (Johnstone and Storr 1998).	**Unlikely** The site is located outside of species known distribution range.
Macronectes giganteus	Southern giant-petrel	MI	EN (MI)	Breeds on southern subantarctic and antarctic islands. May visit Western Australian waters from February to December (mostly June to September) (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Macronectes halli	Northern giant petrel	MI	VU (MI)	Breeds on subantarctic islands. May visit Western Australian water from February to September (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Motacilla cinerea	Grey wagtail	MI	MI	In Australia mostly near running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields and airfields (Pizzey & Knight 2012).	**Unlikely** No suitable/marginal habitat occurs in the site and occurences of this species in the south-west of Australia are generally rare.
Numenius madagascariensis	Eastern curlew	CR	CR (MI)	Mainly tidal mudflats; also reef flats, sandy beaches and rarely near-coastal lakes (including saltwork ponds) (Johnstone and Storr 1998).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Oxyura australis	Blue-billed duck	P4	-	Mainly deeper freshwater swamps and lakes; occasionally saltlakes and estuaries freshened by flood waters (Johnstone and Storr 1998).	**Possible** Recent records occur near the site and marginal habitat occurs in the site (fringing inundated riverine vegetation and river).
Pachyptila turtur subantarctica	Fairy prion	-	VU	Breeds on subantarctic islands and is presumed to frequent subtropical waters during non-breeding period (TSSC 2015).	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Pandion haliaetus	Osprey	MI	MI	Coasts, estuaries, bays, inlets, islands, and surrounding waters; coral atolls, reefs, lagoons, rock cliffs, stacks (Pizzey & Knight 2012).	**Possible** May opportunistically occur in the site for short periods or fly over the site on commute or while searching for prey.
Pluvialis squatarola	*Grey Plover*	MI	MI	Mudflats, saltmarsh, tidal reefs and estuaries, rarely inland (Pizzey and Knight 2012).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).
Puffinus pacificus	*Wedge-tailed shearwater*	MI	MI	Pelagic, marine bird known from tropical and subtropical waters. Tolerates a range of surface-temperatures and salinities, but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 % (sprat).	**Unlikely** No suitable habitat occurs in the site.
Rostratula australis	*Australian painted snipe*	EN	EN	Mainly shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (Marchant and Higgins 1993).	**Unlikely** No suitable/marginal habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Sternula nereis nereis	*Australian fairy tern*	VU	VU	Sheltered blue-water seas close to land, estuaries (when free of silt) and near-coastal lakes (Johnstone and Storr 1998).	Possible Marginal habitat occurs within the site (fringing inundated riverine vegetation and river).
Thalassarche cauta	*Shy albatross*	VU	VU (MI)	Scarce visitor (late May to mid-October) to southwestern and western seas. Breeds on islands off Tasmania and south New Zealand (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Thalassarche melanophris	*Black-browed albatross*	EN	VU (MI)	Seas of south and west coasts. Visitor to Western Australian mainland from January to early November (mostly May to September). Breeds on southern subantarctic and antarctic islands (Johnstone and Storr 1998).	**Unlikely** No suitable habitat occurs in the site.
Thalassarche melanophris impavida	*Campbell albatross*	VU	VU (MI)	Scarce visitor to south western and western seas. Breeds on Campbell island.	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Thalassarche steadi	*White-capped albatross*	VU	VU (MI)	Marine species that occurs in subantarctic and subtropical waters. It reaches tropical areas associated with the cool Humboldt Current off South America (Marchant & Higgins 1990). The species has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over continental shelves around continents. The species occurs both inshore and offshore (Marchant 1977) and enters harbours and bays (Jehl 1973). Birds gather to scavenge at commercial fishing grounds.	**Unlikely** No suitable habitat occurs in the site.
Thalasseus bergii	*Crested tern*	MI	MI	Mainly blue-water seas (especially within 3 km of land), including southern estuaries in summer and autumn (when free of silt); also tidal creeks in north, but not penetrating far into larger estuaries.	**Possible** Suitable habitat occurs within and adjacent to the site. Multiple recent records occur near the site.
Tringa nebularia	*Common greenshank*	MI	MI	Mudflats, estuaries, saltmarshes, margins of lakes, wetlands, claypans (fresh amd saline), commercial saltfields, sewage ponds (Pizzey & Knight 2012).	**Possible** Potentially suitable habitat occurs within the site (fringing inundated riverine vegetation).

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Tyto novaehollandiae novaehollandiae	*Australian masked owl*	P3	-	Forests, open woodlands, farmlands with large trees. E.g. river red gums, adjacent cleared country, timbered watercourses, paperbark woodlands and caves (Pizzey & Knight 2012).	**Possible** Potentially suitable habitat occurs in the site (woodland) but is very small in extent and the species is rarely recorded in the Perth metropolitan area. Givne the species is highly mobile it might occasioanlly occur but only for short periods of time.
Idiosoma sigillatum	*Swan Coastal Plain shield-backed trapdoor spider*	P3	-	Widely distributed in sandy areas on the Swan Coastal Plain and on Rottnest Island (Prince 2003).	**Unlikely** No suitable habitat present and no recent records occur near the site.
Bettongia penicillata ogilbyi	*Woylie*	CR	EN	Woodlands and adjacent heaths with a dense understorey of shrubs, particularly Gastrolobium spp. (TSSC 2018).	**Unlikely** Species is locally extinct.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Dasyurus geoffroii	*Chuditch*	VU	VU	Wide range of habitats from woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. Appears to utilise native vegetation along road sides in the wheatbelt (DEC 2012b).	**Unlikely** No recent records of this species occur within the wider area of the site. The habitat in the site is marginal and would only be used as a corridor for migrating between habitats, if at all. It is unlikely that the species would occur in such a build up area but if an individual did pass through then only rarely, for short periods of time.
Hydromys chrysogaster	*Rakali*	P4	-	Areas with permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen et al. 1985).	**Possible** Suitable habitat occurs in the site and recent records of this species occur near the site (5 km upstream at Baigup wetlands).

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Isoodon fusciventer	*Quenda*	P4	-	Dense scrubby, often swampy, vegetation with dense cover up to one metre high (DEC 2012)	**Recorded** Suitable habitat occurs in the site and characteritics foraging holes attributed to this species were recorded within the site. The fringing inundated riverine vegettaion, woodlands and part of the predominanatly grassland habitats provide suitable habitat for this species.
Phascogale tapoatafa wambenger	*South-western brush-tailed phascogale*	CD	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover (Triggs 2003).	**Unlikely** No recent records of this species occur near the site and the habitat in the site is marginal at best.
Pseudocheirus occidentalis	*Western ringtail possum*	CR	CR	On the Swan Coastal Plain in Agonis flexuosa woodlands and Agonis flexuosa/ Eucalyptus gomphocephala forests. Also Eucalyptus marginata forests (DBCA 2017).	**Unlikely** Species is locally extinct.
Ctenotus ora	*Coastal plains skink*	P3	-	Sandy substrates with low vegetation (including heath) in open Eucalyptus spp. and Corymbia calophylla woodland over Banksia spp. (Kay and Keogh 2012).	**Unlikely** No suitable habitat occurs in the site.

Species name	Common name	Level of significance		Habitat	Likelihood of occurrence
		WA	EPBC Act		
Lerista lineata	*Perth slider*	P3	-	Sandy coastal heath and low scrubland. Banksia spp. woodland, Eucalyptus gomphocephala open woodland over deep sands, and coastal dunes immediately adjacent to the beach (Wilson and Swan 2017).	**Unlikely** No suitable habitat occurs in the site.
Neelaps calonotos	*Black-striped snake*	P3	-	Coastal and near-coastal dunes, sandplains supporting heathlands and Banksia spp. woodlands (Bush et al. 2002).	**Unlikely** No suitable habitat occurs in the site.

Note: CE=critically endangered, EN=endangered, VU=vulnerable, CD=conservation dependent, MI=migratory, OS=other specially protected, P1=Priority 1, P2=Priority 2, P3=Priority 3, P4=Priority 4. Species recorded or considered to potentially occur within the site are shaded green.

References

Bush, B., Maryan, B., Browne-Cooper, R. and Robinson, D. 2007, Reptiles and Frogs in the Bush: Southwestern Australia, UWA Press, Nedlands.
Bray, D. J. and Gomon, M. F. 2018, Pouch Lamprey, Geotria australis.
Christensen, P. and Strahan, R. 1984, The Australian Museum Complete Book of Australian Mammals, Angus and Robertson Publishers, Sydney.
Cronin, L. 2007, Cronin's Key Guide to Australian Wildlife, Oxford University Press, Oxford, United Kingdom.
Department of Biodiversity, Conservation and Attractions (DBCA) 2017, Fauna Profile: Western Ringtail Possum Pseudocheirus occidentalis, Perth, Western Australia.
Johnstone, R. E. and Storr, G. M. 1998, Handbook of Western Australian Birds. Volume 1 - Non-Passerines (Emu to Dollarbird), Western Australian Museum, Perth.
Marchant, S. and Higgins, P. J. 1993, Handbook of Australian, New Zealand and Antarctic Birds. Volume two - Raptors to Lapwings, Oxford University Press, Melbourne, Victoria.
Morgan, D. L., Beatty, S. J., Klunzinger, M. W., Allen, M. G. and Burnham, Q. E. 2011, Field Guide to the Freshwater Fishes, Crayfishes and Mussels of South Western Australia, SERCUL, Perth, Western Australia.
Morcombe, M. 2004, Field Guide to Australian Birds, Steve Parish Publishing, Archerfield, Queensland.

Appendix I

Black Cockatoo Habitat Trees

Tag No.	*Species*	Easting	Northing	DBH (cm)	Category	Notes
802	*Eucalyptus rudis*	395559	6464993	50	Black cockatoo habitat tree (no suitable hollows)	
803	*Eucalyptus rudis*	395561	6465027	57	Black cockatoo habitat tree (no suitable hollows)	
804	*Eucalyptus rudis*	395560	6465031	50	Black cockatoo habitat tree (no suitable hollows)	
805	*Eucalyptus rudis*	395560	6465032	50	Black cockatoo habitat tree (no suitable hollows)	Internal hollow inspection undertaken
814	*Eucalyptus rudis*	395429	6465330	58	Black cockatoo habitat tree (no suitable hollows)	
816	*Eucalyptus rudis*	395385	6465390	85	Black cockatoo habitat tree (no suitable hollows)	
817	*Eucalyptus rudis*	395381	6465385	68	Black cockatoo habitat tree (no suitable hollows)	
822	*Eucalyptus rudis*	395374	6465396	74	Black cockatoo habitat tree (no suitable hollows)	
824	*Eucalyptus rudis*	395371	6465407	91	Black cockatoo habitat tree (no suitable hollows)	
826	*Eucalyptus rudis*	395365	6465411	53	Black cockatoo habitat tree (no suitable hollows)	
829	*Eucalyptus rudis*	395365	6465425	74	Black cockatoo habitat tree (no suitable hollows)	
830	*Eucalyptus rudis*	395370	6465424	52	Black cockatoo habitat tree (no suitable hollows)	
831	*Eucalyptus rudis*	395371	6465427	62	Black cockatoo habitat tree (no suitable hollows)	
832	*Eucalyptus rudis*	395375	6465416	50	Black cockatoo habitat tree (no suitable hollows)	
833	*Eucalyptus rudis*	395375	6465413	83	Black cockatoo habitat tree (no suitable hollows)	Internal hollow inspection undertaken
834	*Eucalyptus rudis*	395388	6465402	85	Black cockatoo habitat tree (no suitable hollows)	
835	*Eucalyptus rudis*	395404	6465406	61	Black cockatoo habitat tree (no suitable hollows)	
836	*Eucalyptus rudis*	395401	6465408	66	Black cockatoo habitat tree (no suitable hollows)	
837	*Eucalyptus rudis*	395412	6465407	78	Black cockatoo habitat tree (no suitable hollows)	
839	*Eucalyptus rudis*	395422	6465396	51	Black cockatoo habitat tree (no suitable hollows)	
841	*Eucalyptus rudis*	395424	6465395	50	Black cockatoo habitat tree (no suitable hollows)	
842	*Eucalyptus rudis*	395424	6465393	53	Black cockatoo habitat tree (no suitable hollows)	
844	*Eucalyptus rudis*	395434	6465396	70	Black cockatoo habitat tree (no suitable hollows)	
846	*Eucalyptus rudis*	395437	6465383	68	Black cockatoo habitat tree (no suitable hollows)	
847	*Eucalyptus rudis*	395435	6465382	63	Black cockatoo habitat tree (no suitable hollows)	
849	*Eucalyptus rudis*	395449	6465377	68	Black cockatoo habitat tree (no suitable hollows)	
851	*Eucalyptus rudis*	395443	6465385	71	Black cockatoo habitat tree (no suitable hollows)	
1000	*Eucalyptus rudis*	394575	6464909	55	Black cockatoo habitat tree (no suitable hollows)	

Tag No.	*Species*	Easting	Northing	DBH (cm)	Category	Notes
901	*Eucalyptus rudis*	394632	6465222	80	Black cockatoo habitat tree (no suitable hollows)	
941	*Eucalyptus rudis*	395000	6465642	51	Black cockatoo habitat tree (no suitable hollows)	
867	Stag	395380	6465434	61	Black cockatoo habitat tree (no suitable hollows)	
870	*Eucalyptus rudis*	395266	6465512	61	Black cockatoo habitat tree (no suitable hollows)	
872	*Eucalyptus rudis*	395262	6465528	53	Black cockatoo habitat tree (no suitable hollows)	