Reconnaissance Flora and Vegetation Assessment

Rottnest Island Golf Precinct

Project No: EP23-032(09)

Prepared for Rottnest Island Authority
June 2026



Document Control

Doc name:	Reconnaissance Flora and Vegetation Assessment Rottnest Island Golf Precinct				
Doc no.:	EP23-032(09)--015A MS				
Version	Date	Author		Reviewer	
1	June 2026	[redacted]	MS	[redacted]	RAW
	Submitted for client review				
A	June 2026	[redacted]	RAW	[redacted]	RAW
	Minor updates based on client review				

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Executive Summary

The Rottnest Island Authority engaged Emerge Associates to conduct a flora and vegetation assessment within Rottnest Island Golf Precinct on Rottnest Island (the 'site').

A desktop study was completed to provide contextual information. A field survey was conducted on 29 April 2026 during which the composition and condition of vegetation was recorded. Data analysis and report preparation was then completed to the standard required of a reconnaissance survey with reference to EPA (2016a).

Outcomes of the assessment include the following:

- No threatened or priority flora were recorded in the site.
- No threatened flora have potential to occur in the site.
- Four priority flora species have the potential to occur within the site: *Lachnagrostis nesomytica* subsp. *nesomytica* (P1), *Lachnagrostis nesomytica* subsp. *pseudofiliformis* (P1), *Lepidium puberulum* (P4) and *Myosotis australis* subsp. *australis* (P4). A targeted survey during the species flowering period would be required to determine the presence or absence of these species (survey in November would fall within the flowering period of all four species).
- Eight vegetation units were recorded within the site, ranging from 'completely degraded' to 'very good' condition.
- The majority of the site has been highly disturbed, with 8.42 ha (86%) in 'degraded' to 'completely degraded' condition. Vegetation in 'good' and 'very good' condition occurs across 1.13 ha (12%), with the remainder of the site comprising open water (0.2 ha, 2%).
- The following TECs and PECs occur within the site:
  - 'Subtropical and temperate coastal saltmarsh' TEC/PEC (0.40 ha)
  - '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands' TEC (0.44 ha)
- No other TECs or PECs occur.

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Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority

Table A2: Abbreviations – General terms

General terms	
A	Annual
CR	Critically endangered
FCT	Floristic community type
IBRA	Interim Biogeographic Regionalisation for Australia
NVIS	National Vegetation Information System (ESCAVI 2003)
P1	Priority 1
P3	Priority 3
P4	Priority 4
PEC	Priority ecological community
P	Perennial
TEC	Threatened ecological communities

Table A3: Abbreviations – Legislation

Legislation	
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
CALM Act	*Conservation and Land Management Act 1984*
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*

Table A4: Abbreviations – units of measurement

Units of measurement	
ha	Hectare
km	Kilometre
mm	Millimetre

1 Introduction

1.1 Purpose

Emerge Associates (Emerge) were engaged by the Rottnest Island Authority (RIA) to conduct a flora and vegetation survey within Rottnest Island Golf Precinct on Rottnest Island as shown in **Figure 1** (hereafter referred to as the 'site').

Flora and vegetation surveys are required to characterise vegetation values, particularly those values relevant to statutory or regulatory approvals such as 'native vegetation', 'threatened flora', 'priority flora', 'threatened ecological communities' (TECs), 'priority ecological communities' (PECs) and weeds.

1.2 Statutory and regulatory context

Native vegetation is protected in Western Australia under the *Environmental Protection Act 1986* (EP Act) and can't be cleared without a permit, referral or valid exemption. The EP Act defines native vegetation as indigenous aquatic or terrestrial flora. In the *Environmental Factor Guideline – Flora and Vegetation*, the Environmental Protection Authority (EPA) clarifies that this definition applies to native vascular flora, and further identifies vegetation as groupings of flora (EPA 2016b). Biological diversity, habitat function, scarcity, association with wetlands and other ecosystem services influence the value placed on native vegetation (DWER 2018a). Planted vegetation is generally not regarded as native vegetation unless established as a requirement under the EP Act or other written law or regulation.

Flora and 'ecological communities[1]' may further be listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2021) and the State *Biodiversity Conservation Act 2016* (BC Act) (DBCA 2025a). Threatened flora and ecological communities (TECs) are classified as either 'critically endangered'(CR), 'endangered' (EN) or 'vulnerable' (VU) (DCCEEW 2021). Ministerial approval is required to impact threatened flora and TECs, governed by regulatory guidance and policy at Commonwealth and/or State levels.

Native flora and ecological communities that are not listed as threatened, but are otherwise considered rare or under threat, may be added to a Department of Biodiversity, Conservation and Attractions (DBCA) priority list (DBCA 2025a). Priority flora and ecological communities (PECs) are classified as either 'priority 1' (P1), 'priority 2' (P2), 'priority 3' (P3) or 'priority 4' (P4). Priority listing does not confer direct statutory protection. However, priority classifications are considered during EP Act approvals and associated regulatory processes.

The EPA's *Environmental Factor Guideline - Flora and Vegetation* recommends that flora and vegetation may be considered significant for a range of reasons other than threatened or priority listing (EPA 2016b). A key value of vegetation is often its function as habitat for threatened or priority fauna.

[1] Ecological communities are typically identified as specific groupings of flora. They may therefore be most simply understood as types of vegetation.

Flora that have negative environmental or economic impacts are often referred to as weeds (DBCA 2023a). Particularly detrimental weeds may be listed as a 'declared pest' pursuant to the State *Biosecurity and Agriculture Management Act 2007* (BAM Act) or a 'weed of national significance' (WoNS) under Commonwealth policy (DAFF 2021). The management of weeds may be obliged under the BAM Act or as an outcome of statutory or regulatory processes at Commonwealth, State or local government levels.

Further information on classification of legislation and policy relevant to flora and vegetation assessments is provided in **Appendix A**.

1.3 Scope of work

The scope of work was to undertake a reconnaissance flora and vegetation survey with reference to the EPA's *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a). This guidance provides advice for planning and undertaking flora and vegetation surveys for 'environmental impact assessment' of significant proposals under Part IV of the EP Act. In the absence of alternative official protocols for other scenarios, EPA (2016a) is considered an appropriate standard for flora and vegetation surveys across Western Australia generally.

As part of the scope of work the following tasks were undertaken:

- Desktop study to provide contextual information relevant to the assessment of flora and vegetation within the site.
- Field survey to record flora, vegetation units and vegetation condition.
- Analysis and mapping of contextual information, vegetation units, vegetation condition and threatened and priority flora or ecological communities (if present).
- Documentation of the desktop study, methods, results, discussion and conclusions.

2 Desktop Study

2.1 Site location and extent

The site is located on Rottnest Island which is part of the City of Cockburn in the Perth metropolitan region of Western Australia and extends over 9.75 hectares (ha) as shown in **Figure 1**. The site is bounded by the Rottnest Island Golf Course to the south and west, a mixture of native and planted vegetation to the east and native vegetation to the north.

2.2 Climate

The Perth metropolitan region of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters (BoM 2026). Recent rainfall at the closest weather station to the site has been somewhat inconsistent with long term averages (see **Plate 1**) (BoM 2026). Monthly rainfall was higher than long-term averages during winter and spring 2025 but lower than long-term averages during summer 2025/2026. Flora and vegetation surveys should be undertaken during the optimal seasonal periods for detection and identification of the range of flora likely to be present (EPA 2016a). For the 'south-west and interzone' botanical province in which the site occurs, the optimal survey period is spring (September to November)> (EPA 2016a).

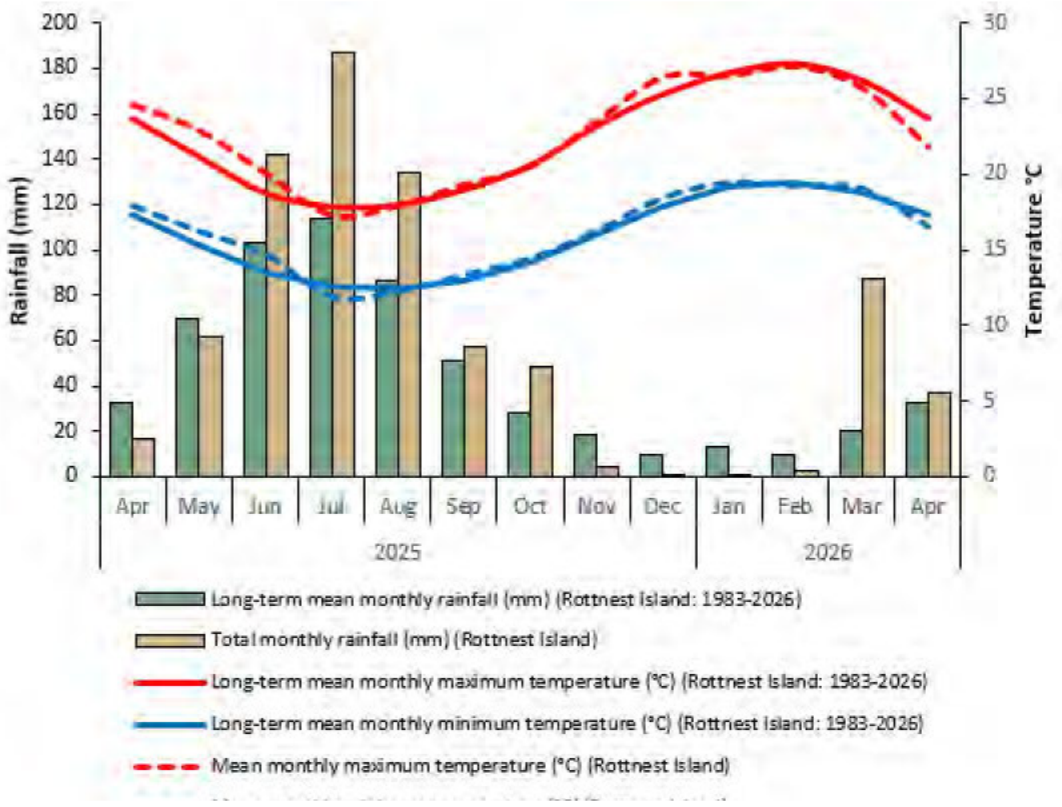


Plate 1: Rainfall and temperature 12 months prior to survey compared to long-term means

2.3 Geomorphology and soils

Rottnest Island forms part of a chain of limestone islands and reefs on the continental shelf off the coast of Perth (Playford 1988). The island was submerged underwater 130,000 years ago after which it spent a period above sea level connected to the mainland and was then separated approximately 7,000 years ago (Rottnest Island Authority 2014).

Landform and soils influence vegetation types at regional and local scales. Examination of broad scale soil mapping places the site within the Quindalup soil association (Churchward and McArthur 1980). The Quindalup association comprises calcareous sands on beach ridges and sand dunes. More detailed soil landscape mapping (DPIRD 2022) shows the site as comprising a variety of the soil types as detailed in **Table 1** and shown in **Figure 2**.

Table 1: Soil landscape mapping units within the site (DPIRD 2025)

Soil landscape unit	Location within site	Description
Quindalup flats and marsh	Central and western portion	Lower sand flats and salt marshes
Quindalup on Spearwood parabolic high	Northern portion	Nested, high relief parabolic dune limestone
Quindalup on Spearwood parabolic low	Southern portion	Irregular, undulating, low relief, dune limestone
Quindalup south wet, swamp phase	Central portion	Swamp
Quindalup terraces b	Majority of the site	Moderately deep sand over shell beds

The majority of the site is mapped as occurring within a 'potential karst' area and as such may support restricted landforms and unique geological features (Gozzard 2011).

2.4 Hydrology and wetlands

Wetlands are areas of seasonally, intermittently or permanently waterlogged land such as poorly drained soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries (Wetlands Advisory Committee 1977). Wetlands can 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. Review of the *Ramsar List of Wetlands of International Importance* (DBCA 2017) and *A Directory of Important Wetlands in Australia – Western Australia* (DBCA 2018) indicates that no Ramsar listed wetland occurs within or near the site. One 'important wetlands' (Rottnest Island lakes) occurs to the south of the site.

The Department of Water and Environmental Regulation (DWER) hydrography linear dataset (DWER 2018b) records the following two wetland or water related features within the site:

- lake - perennial
- drain - minor.

The locations of the hydrological features within and near the site are shown in **Figure 2**.

2.5 Regional vegetation

Native vegetation is described and mapped at different scales to illustrate patterns in its distribution. At a continental scale the *Interim Biogeographic Regionalisation for Australia* (IBRA) divides Australia into floristic subregions (DCCEEW 2025).

The site is contained within the Swan Coastal Plain IBRA region and within the 'SWA02' or Perth subregion. The Perth subregion is characterised by mainly 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. However, the vegetation on Rottnest Island differs from this description is more accurately described by Beard *et al.* (2013). Beard *et al.* (2013) mapping shows the site as comprising the 'Rockingham_15 Association', which is described as comprising '*Acacia*, rottnest pine, coastal moort or mixed tropical forest *Acacia rostellifera*, *Callitris preissii*, *Eucalyptus lehmannii*, *E. cornuta*'.

Statewide statistics indicate that 79.09% of the pre-European extent of the Rockingham_15 association remained in the Perth IBRA sub-region in 2017, with none currently protected for conservation purposes (Government of Western Australia 2018).

2.6 Historical land use

Review of historical images available from 1955 onwards shows that the majority of the site was cleared of native vegetation between 1955 and 2000 as part of development associated with Rottnest Island golf course. By 2000 most of the golf course, buildings and tracks present today were established (WALIA 2026).

2.7 Threatened and priority flora

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) has compiled various datasets relating to 'matters of national environmental significance' (MNES) (DCCEEW 2026). The *Protected Matters Search Tool* provides general guidance on threatened flora listed under the EPBC Act based on validated records and less reliable unvalidated habitat distribution modelling (DCCEEW 2026).

DBCA's *Threatened and Priority Flora Database* and *WA Herbarium Database* contain validated and historical unvalidated point records of threatened and priority flora populations in Western Australia (DBCA 2025a).

Searches of the *Protected Matters Search Tool* (DCCEEW 2026) and DBCA's threatened and priority flora databases (reference no. 32-0426FL) indicate there are records for one threatened and four priority flora within a 10 km radius of the site (refer **Appendix B**). The distribution and habitat preferences of the four priority flora outlined in **Table 2** align most closely with the sites' environmental context (**Figure 2** and **Section 2.1** to **Section 2.6** above). Note that unreliable records were excluded from consideration.

Table 2: Threatened or priority flora species with distribution and habitat preferences most closely aligned to environmental features in the site

Species	Status		Life strategy	Flowering period
	WA	EPBC Act		
Lachnagrostis nesomytica subsp. *nesomytica*	P1	-	A/P	Nov
Lachnagrostis nesomytica subsp. *pseudofiliformis*	P1	-	A/P	Nov-Dec
Lepidium puberulum	P4	-	A	Jul-Aug, Oct-Nov
Myosotis australis subsp. *australis*	P4	-	A	Sep-Dec

Status: CR=critically endangered, EN=endangered, VU=vulnerable, T = threatened, P1-P4=Priority 1-Priority 4,
Life strategy: A= annual, P=perennial, PG=perennial geophyte

2.8 Threatened and priority ecological communities

The *Protected Matters Search Tool* provides general guidance on TECs listed as CR and EN under the EPBC Act that may occur within a location based on reliable records and less reliable habitat distribution modelling (DCCEEW 2026).

DBCA's *Threatened and Priority Ecological Community buffers and boundaries in WA* dataset contains validated records of TECs and PECs as buffered polygons.

Searches of the *Protected Matters Search Tool* (DCCEEW 2026) and DBCA's TEC and PEC database (reference no. 21-0426EC) indicate there are records for two TECs and eight PECs within a 10 km radius of the site (refer **Appendix C**). The distribution and habitat preferences of the TECs and PECs outlined in **Table 3** align most closely with the sites' environmental context (**Figure 2** and **Section 2.1** to **Section 2.6** above).

Table 3: Threatened or priority ecological communities with distribution and habitat preferences most closely aligned to environmental features in the site

Code	Species	Status	
		WA	EPBC Act
SCP30a	*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain	CR	-
SCP29a	Coastal shrublands on shallow sands	P3	-

3 Methods

3.1 Field survey

An experienced botanist visited the site on 29 April 2026 to conduct a field survey. The timing of the field survey followed engagement given this was a reconnaissance survey and there wasn't an intention to align the visit with a particular seasonal or flowering period.

During the field survey the site was traversed by vehicle and on foot and the floral composition and condition of vegetation was recorded along with photographic images and notes. Specimens were collected where the identity of flora required further confirmation. Habitats were assessed for their suitability for the threatened or priority species and ecological communities identified in **Table 2** and **Table 3**. If suitable habitats or occurrences of threatened or priority flora, or potential TECs or PECs, were detected, field survey focus and effort was adapted accordingly. No targeted searches were undertaken

3.1.1 Sampling

Sampling of the vegetation was undertaken using a 10 x 10 m relevés. Habitats and vegetation units determined to be suitable or potentially suitable for the TECs and PECs identified in **Table 3** were prioritised. 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[2] of each sample was recorded with a hand-held GPS receiver (±5 m accuracy).

The data recorded within each sample included:

- sampling information (name/ number, recorder, date, spatial location)
- environmental information (elevation, slope, aspect, bare-ground, rock outcropping, soil type and colour, soil moisture, litter layer, topographical position, time since last fire event, disturbance)
- biological information (species, plant specimens, vegetation structure, vegetation condition, 'foliage projective cover', weeds).

3.1.2 Vegetation condition

The condition of the vegetation was assessed using the EPA (2016a) scale adapted from Keighery (1994) (**Table 4**).

[2] For quadrats the north-west corner was recorded.

Table 4: Vegetation condition scale applied during the field survey

Category	Definition (EPA 2016a)
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely degraded	The structure of 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 and shrubs.

^relative to the expected natural diversity for that vegetation.

3.2 Analysis and data preparation

3.2.1 Flora identification

Flora were identified through comparison with named material and using taxonomic keys. Plant specimens collected during the field survey were dried, pressed and named in accordance with requirements of the (Western Australian Herbarium 2026).

Flora was classified as native if indigenous to the IBRA region in which the site occurs. Non-native flora is denoted by '*' and planted vegetation by 'Pl' in text and raw data. The legal or policy status of flora was denoted using codes outlined in **Appendix A.**

3.2.2 Sampling adequacy

A species accumulation curve was plotted from sample data by generating a trendline (log) in Microsoft Excel. The trendline was forecast to locate the asymptote of the curve (the point at which the curve flattens), which provides an indication of amount of sampling that would be required before it can be assumed few species remain undetected.

Species richness was estimated in PRIMER v6 (Clarke and Gorley 2006). Jacknife1 and Chao2 non-parametric estimators are reported as these are known to perform well in comparison to simulated and real data sets and are also recommended for small sample sizes (Gotelli and Colwell 2011). Differences between recorded and estimated species richness was used to evaluate the adequacy of sampling effort.

3.2.3 Vegetation unit identification and description

Vegetation units were identified using notes and the sample data collected during the field survey. Each vegetation unit 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). Spatial data was then created for vegetation units and vegetation condition and mapped on aerial imagery using notes collected during the field survey.

3.2.4 Floristic community type assignment

The identified vegetation units were compared to the regional 'floristic community type' (FCT) dataset *Flora and weed data for the Swan Coastal Plain* (Keighery *et al.* 2012). Each sample was compared to Keighery *et al.* (2012) separately to limit the influence of spatial correlation when assigning an FCT. 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.

Sample data (presence/absence) was first reconciled with Keighery *et al.* (2012) 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).

A resemblance matrix was generated using the Bray-Curtis distance measure which provided the percentage similarity between all pairs of samples. A cluster analysis was then performed using the resemblance matrix and hierarchical agglomerative clustering, to produce a dendrogram.

Where a sample tended to cluster with a grouping of different FCTs, the resemblance matrix was examined. Ultimately a combination of cluster analysis, resemblance matrix and contextual information relating to the soils, landforms and known FCTs within the region was considered in the final determination of an FCT for vegetation.

3.2.5 Threatened and priority flora confirmation

Once identified, spatial data for threatened and/or priority flora occurrences recorded during the field survey was compiled and mapped on aerial imagery.

The remaining threatened and priority flora identified in the desktop study but not recorded during the field survey were assigned a 'likelihood of occurrence' as outlined in **Table 5**.

Table 5: Decision matrix for likelihood of occurrence of threatened and priority flora not recorded during the field survey

Habitat	Survey limitation		
	Limitation to detection	Minor limitation to detection	No limitation to detection
Suitable / marginal	Potential to occur	Unlikely to occur	Nil (does not occur)
Unsuitable	Very unlikely to occur		

3.2.6 TEC and PEC confirmation

Vegetation unit / FCT associations were assessed against TEC and PEC diagnostic characteristics and, if available, size and/or vegetation condition thresholds (DBCA 2023b). Where TEC or PEC was identified, spatial data was created to define patch boundaries mapped on aerial imagery using notes collected during the field survey.

The TECs or PECs identified in the desktop study but not recorded during the field survey were assigned a 'likelihood of occurrence' as outlined in **Table 6**.

Table 6: Decision matrix for likelihood of occurrence of TECs and PECs not recorded during the field survey

Habitat	Survey limitation	
	Limitation to detection	No limitation to detection
Suitable / marginal	Potential to occur	Nil (does not occur)
Unsuitable	Unlikely to occur	

3.3 Limitations

It is important to note constraints imposed on assessments and the degree to which these may have limited outcomes. An evaluation of the desktop study and methods applied in the current assessment against standard constraints outlined in the EPA document *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) is provided in **Table 7**.

Table 7: Evaluation of assessment against standard constraints outlined in EPA (2016a)

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 flora and vegetation in context.
	Minor limitation	Regarding assignment of FCTs, the Keighery *et al.* (2012) dataset was derived from a limited number of samples of vegetation from largely publicly owned land which is now more than 30 years out of date. Consequently, it is unknown to what degree official FCTs are an appropriate reference for the biodiverse vegetation across the Swan Coastal Plain. Furthermore, Keighery *et al.* (2012) collected data in the main flowering period (spring) and in many cases sampled plots multiple times to provide a complete species list. This reconnaissance survey only sampled the site once and outside of the main flowering period, thus FCTs assignment is based on incomplete data. However, it is considered unlikely that additional sampling in spring would change the results of the FCT analysis.

Table 7: Evaluation of assessment against standard constraints outlined in EPA (2016a)

Constraint	Degree of limitation	Details
Experience level of personnel	No limitation	This flora and vegetation assessment was undertaken by a qualified botanist with seven years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 15 years' experience in environmental science in Western Australia.
Suitability of timing	No limitation	In Mediterranean climates some flora species spend part of their lifecycle as underground storage organs or seed to avoid excessive heat and drought over the summer period. These species, known as 'geophytes' or 'annuals', tend to re-emerge during winter and are often most visible during spring, which is the flowering period for the majority of plant species. Therefore, spring is the optimal time to complete flora and vegetation surveys in the south-west of WA. The survey was conducted in April and thus outside of the main flowering season. However, this is not considered a limitation to the reconnaissance level survey.
Temporal coverage	No limitation	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. While it is likely that additional flora species remain undetected, this is not considered a limitation to a reconnaissance level survey.
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 26 species were recorded, of which 13 were recorded from four sample locations and 13 were recorded opportunistically. Minimum species richness within site is estimated at between 19 (Jacknife1) and 29 (Chao2) species (refer species accumulation curve and estimates shown in **Plate 2**). The number of species recorded in the site is higher than the Jackknife1 estimate and similar to the Chao2 estimate and combined with the degraded nature of the majority of the site, demonstrates that survey effort was adequate to prepare a near-comprehensive species inventory for the site.
Influence of disturbance	No limitation	Historical ground disturbance was evident throughout the majority of the site. 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 Results

4.1 Flora

4.1.1 Species inventory

A total of 26 flora species were recorded during the field survey. A summary of the legal and policy status of flora taxa is provided in **Table 8.** A complete species list is provided in **Appendix D.**

Table 8: Summary of legal and policy status of taxa recorded in the site

Status	Unlisted	Threatened	Priority	Declared Pest	Planted	Total
Native	13	0	0	-	3	16
Non-native	5	-	-	0	5	10
Total	18	0	0	0	8	26

Sampling recorded 13 species from four samples. A further 13 species were recorded opportunistically across the site. A species accumulation curve derived from sample data is presented in **Plate 2.** Species richness was estimated to be between 19 (Jacknife1) and 29 (Chao2) indicating a majority of the flora present were detected.

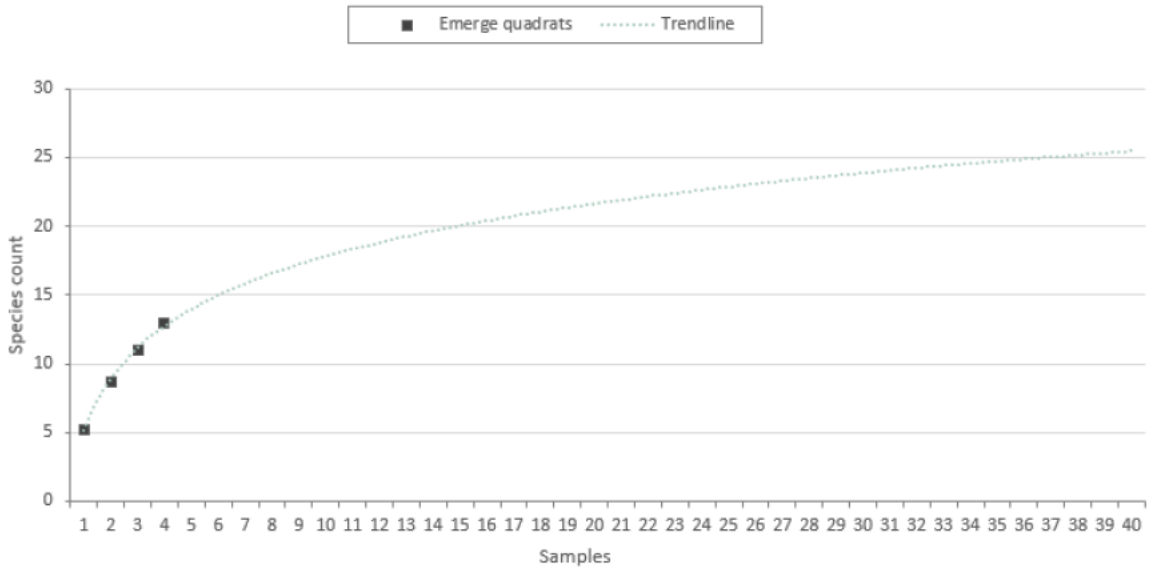


Plate 2: Species accumulation curve derived from sample data y = 5.5234ln(x) + 5.0907 R^2 = 0.9946

4.1.2 Threatened and priority flora

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

The following priority flora species are considered to have potential to occur in the site as the survey limitations preclude confirmation of their absence:

- *Lachnagrostis nesomytica* subsp. *nesomytica* (P1)
- *Lachnagrostis nesomytica* subsp. *pseudofiliformis* (P1)
- *Lepidium puberulum* (P4)
- *Myosotis australis* subsp. *australis* (P4).

The remainder of threatened and priority flora identified in the desktop study do not occur as outlined in **Appendix B**.

4.1.3 Declared pests

No declared pests pursuant to the BAM Act or weeds of national significance (WoNS) were recorded.

4.2 Vegetation

4.2.1 Vegetation units

Eight vegetation units were identified within the site, as mapped from four sample locations. A description and the area of each vegetation unit is provided in **Table 9**. The location of each vegetation unit and sample location is shown in **Figure 3**. Raw sample data is provided in **Appendix E**.

Table 9: Description and extent of vegetation units identified within the site

Code	Description	Sample/s	Total area (ha)	Proportion of site (%)	Representative photograph
Ac	Closed shrubland *Atriplex ?cinerea* over occasional *Suaeda australis* over non-native forb and/or grassland weeds.	-	0.02	0.21	
Ap	Shrubland *Acanthocarpus preissii* over occasional ?*Poa poiformis* or *Lepidosperma gladiatum* over forbland to open forbland **Trachyandra divaricata* (or absent) over non-native forb and/or grassland.	R4	0.30	3.08	

Table 9: Description and extent of vegetation units identified within the site (continued)

Code	Description	Sample/s	Total area (ha)	Proportion of site (%)	Representative photograph
EgMl	Closed forest *Eucalyptus gomphocephala* (planted) and occasional *Melaleuca lanceolata* over non-native forb and/or grassland and occasional native species.	-	0.94	9.64	
Gt	Sedgeland *Gahnia trifida* over non-native forb and/or grassland and occasional native species.	-	0.18	1.85	

Table 9: Description and extent of vegetation units identified within the site (continued)

Code	Description	Sample/s	Total area (ha)	Proportion of site (%)	Representative photograph
Ml	Open forest to woodland *Melaleuca lanceolata* and occasional *Callitris preissii* and/or *Pittosporum ligustrifolium* (or absent) over shrubland *Rhagodia baccata* (or absent) over non-native forb and/or grassland and occasional native species.	R1, R3	1.76	18.05	
T	Chenopod shrubland *Tecticornia ?indica* subsp. *bidens* and *Tecticornia ?halocnemoides* over bare ground and scattered pasture weeds.	R2	0.4	4.10	

Table 9: Description and extent of vegetation units identified within the site (continued)

Code	Description	Sample/s	Total area (ha)	Proportion of site (%)	Representative photograph
Predominantly non-native vegetation	Heavily disturbed areas comprising bare ground, weeds, turf, planted trees or built structures including buildings and infrastructure.	-	5.95	61.03	
Waterbody	Open water associated with a saline lake.	-	0.2	2.05	

4.2.2 Vegetation condition

The extent of vegetation by condition category is detailed in Table 10 and shown in Figure 4.

Table 10: Extent of vegetation condition categories within the site

Condition category (Keighery 1994)	Total area (ha)	Proportion of site (%)
Pristine	0	0
Excellent	0	0
Very good	0.31	3.18
Good	0.82	8.41
Degraded	2.20	22.56
Degraded - completely degraded	0.27	2.77
Completely degraded	5.95	61.03

4.2.3 Floristic community type

The floristic analysis tended to identify highest similarity of samples to multiple FCTs, particularly FCTs S11, S12 and 16. The most similar Keighery *et al.* (2012) samples and the resulting FCTs are shown in Table 11.

The relevant portions of the cluster dendrograms are provided in Appendix F.

Table 11: Vegetation unit and likely FCT represented within the site for each sample

Vegetation unit	Sample	Most similar Keighery *et al.* (2012) sites	Similarity (%)	Determined floristic community type (FCT)
Ap	^R4	rott01 (FCT S11)	30.00	FCT S11: Northern *Acacia rostellifera – Melaleuca systena* shrublands'
		GARD04 (FCT 30a)	24.00	
		GARD01 (FCT 30a)	22.22	
Ml	R1	rott03 (FCT S12)	16	FCT S12: 'Rottnest Island *Melaleuca lanceolata* and/or *Callitris preissii* forests and woodlands'
		rott06 (FCT S12)	16	
	R3	rott03 (FCT S12)	13	
		rott06 (FCT S12)	13	
T	^R2	GARD04 (FCT 30a)	26.09	FCT 16: 'Highly saline seasonal wetlands'
		GARD01 (FCT 30a)	24.00	
		rott01 (FCT S11)	22.22	
		rott06 (FCT S12)	22.22	
		rott05 (FCT 16)	21.05	

^ denotes samples individual similarity to Keighery et al. (2012) dataset sites rather than a cluster within the dendrogram

4.2.4 Threatened and priority ecological communities

The following TECs and PEC were identified within the site:

- Subtropical and temperate coastal saltmarsh TEC/PEC
- *Callitris preissii* (or *Melaleuca lanceolata*) forests or woodlands TEC.

The locations of the TECs and PEC within the site are shown in **Figure 5**. A summary table of each TEC and PEC present and the area (ha) is provided in **Table 12.**

Table 12: TECs and PECs within the site

TEC/PEC	Area (ha)
'Subtropical and temperate coastal saltmarsh' TEC/PEC	0.40
'Callitris preissii (or *Melaleuca lanceolata*) forests or woodlands' TEC	0.44

The **T** vegetation met the criteria to represent the Commonwealth listed 'Subtropical and temperate coastal saltmarsh' TEC as detailed in **Table 13.**

Table 13: Assessment of site conditions against the Subtropical and temperate coastal saltmarsh TEC criteria (adapted from (DSEWPaC 2013))

Criteria	Site implications
Occurs south of 23° 37'	The site occurs south of 23° 37'.
Occurs on the coastal margin, along estuaries and on low energy coasts	The site does not occur on the coastal margin, along estuaries or on low energy coasts. However, vegetation unit **T** is associated with a saline lake of an offshore island that is likely to maintain some groundwater connectivity with the sea (DSEWPaC 2013).
Occurs on sandy or muddy substrates and may include coastal clay pans (and the like)	The **T** vegetation occur on sandy or muddy substrate.
Occurs on places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences, but not areas only receiving aerosol spray	It is possible that the lake associated with vegetation unit **T** has groundwater tidal influence and it also retains some connectivity to Garden Lake through a drainage channel. Garden Lake and adjacent lakes are closed lagoons.
Consists of dense to patchy areas of characteristic coastal saltmarsh plant species (i.e. salt tolerant herbs, succulent shrubs or grasses, that may also include bare sediment as part of the mosaic)	The **T** vegetation tends to comprise a dense layer of *Tecticornia ?indica* subsp. *bidens and Tecticornia ?halocnemoides*. Both species are commonly recorded within the TEC.
Proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas is not greater than 50%, nor is proportional ground cover by seagrass greater than 50%	The **T** vegetation does not include a tree canopy layer.
Result	All of the **T** vegetation represents the TEC. The site supports 0.4 ha of the subtropical and temperate coastal saltmarsh TEC.

DBCA's *Priority Ecological Community* list indicates that the description, area and condition thresholds that apply to the Commonwealth-listed TEC of the same name also apply to the

'subtropical and temperate coastal saltmarsh' PEC (DBCA 2023c). Therefore, a total of 0.4 ha of this PEC occurs within the site as shown in **Figure 5.**

Portions of the **MI** vegetation represent the '*Callitris preissii* (or *Melaleuca lanceolata*) forests or woodlands' TEC as they contain key indicator species and meet the TEC description. No official condition thresholds apply to this TEC and so the **MI** vegetation in good or better condition is considered to represent this TEC. As such 0.44 ha of this TEC occurs within the site.

The remainder of TECs or PECs identified in the desktop study do not occur or are considered unlikely to occur as outlined in refer **Appendix C**.

5 Discussion

5.1 Threatened and priority flora

Four priority species occur on Rottnest Island: *Lachnagrostis nesomytica* subsp. *nesomytica* (P1), *Lachnagrostis nesomytica* subsp. *pseudofiliformis* (P1), *Lepidium puberulum* (P4) and *Myosotis australis* subsp. *australis* (P4). Both *Lachnagrostis* species are restricted to the edges of salt lakes and thus vegetation unit **T** and the adjacent **waterbody** edge comprise habitat for these species. Both *Lachnagrostis* species are annual grasses and flower in November thus would not have been discernible at the time of the survey. A targeted survey in November would be required to determine the presence or absence of: *L. nesomytica* subsp. *nesomytica* and *L.* subsp. *pseudofiliformis*.

Lepidium puberulum (P4) occurs on the WA mainland and various islands, with one record on Rottnest Island in *Melaleuca lanceolata* woodland (WA Herbarium 2023). *Myosotis australis* subsp. *australis* (P4) occurs along the coast of WA between Perth and Esperance with scattered occurrences. Four occurrences of *M. australis* subsp. *australis* have been recorded on Rottnest Island, where it occurs on shallow sands over limestone in the southern portion of the island. Both *L. puberulum* and *M. australis* subsp. *australis* are annuals and so a targeted survey in the flowering period (July-August or October-November for *Lepidium puberulum* and September-December for *Myosotis australis* subsp. *australis*) would be required to determine the presence or absence of these species. The **Ap** and **Ml** vegetation in 'good' or better condition comprises potentially suitable habitat for both species.

The PMST database search indicated that *Diuris micrantha* or habitat for the species may potentially occur within 10 km of the site. However, as detailed in **Section 2.7**, PMST database results are largely based on unvalidated habitat distribution modelling rather than validated records. No confirmed records of *D. micrantha* occur on Rottnest Island and no suitable habitat for the species is present within the site. Therefore, the species is considered to be absent from the site.

5.2 Vegetation

5.2.1 Vegetation condition

Most of the vegetation within the site shows evidence of a high level of historical disturbance through land clearing and weed invasion.

The most intact vegetation is associated with vegetation unit **T** and **Ap** which were mapped as being in 'very good' condition where they support high native species cover and low weed cover. Parts of vegetation units **Ap**, **Ml** and **T** were mapped in 'good' condition where they comprised a very low number of native species with high cover, and lower weed cover than the 'degraded' vegetation. A compound condition category was used for vegetation that partially met criteria for multiple condition categories. Parts of vegetation units **Ml** and **EgMl** were mapped as being in 'degraded - completely degraded' condition as, while they comprise an overstorey layer of native trees or tall shrubs, they lack native understorey vegetation and instead occur as a non-native grassland of pasture weeds/golf course. Vegetation in 'completely degraded' vegetation consists of the golf

course, tracks and infrastructure which supported high weed cover and were almost devoid of native species.

5.2.2 Floristic community type assignment

The Gibson *et al.* (1994) dataset is the standard for FCT analysis in the Swan Coastal Plain region (EPA 2016a) but does not include any samples on Rottnest Island. Keighery *et al.* (2012) is more appropriate to use for FCT analysis for the site as it provides an updated version of the Gibson *et al.* (1994) dataset with six sites on Rottnest Island. When compared to the Keighery *et al.* (2012) dataset, the samples clustered to a range of FCTs; mostly FCTs defined solely by Keighery *et al*. (2012) and detailed in *Bush Forever* documentation, noting FCTs 16, S11 and S12 were assigned to the Keighery *et al.* (2012) samples on Rottnest Island.

It should be noted that whilst Keighery *et al.* (2012) defined FCTs S11, S12 and S16 and provided community names, no other details exist as to the defining species and characteristics. Therefore, assignment of some of the vegetation in the site to FCT S11, S12 and S16 is based solely on the FCT analysis and Keighery *et al.* (2012) community name.

The low similarity of the sample data to FCTs is likely due to the high level of historical disturbance, very low number of species in each sample (less than ten species) and the low number of Keighery *et al*. (2012) samples on Rottnest Island. Therefore, a combination of the FCT analysis results, flora species present and contextual information was used to assign the most likely FCT for each vegetation unit.

Additional flora survey undertaken in the main flowering period may increase the number of annual native and non-native species recorded within the site. Whilst this may also affect the results of the FCT analysis to some extent, it is not considered likely to change the final assignment of FCTs due to the high level of historical disturbance.

5.2.3 Threatened and priority ecological communities

The 'subtropical and temperate coastal saltmarsh' TEC/PEC was not identified within the results of the PMST or DBCA database searches. However, it is listed as occurring on the island within the *Terrestrial Conservation Action Plan* (Rottnest Island Authority 2015) and the **T** vegetation meets the criteria to represent the TEC/PEC.

The DBCA database shows that multiple occurrences of the '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands' TEC occur within the vicinity of the site. Due to the presence of *Melaleuca lanceolata* and *Callitris preissii*, portions of the **MI** vegetation are considered to represent the State listed '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands' TEC. The *Interim Recovery Plan* for the '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands' TEC refers to FCT S12 'Rottnest Island *Melaleuca lanceolata* and/or *Callitris preissii* forests and woodlands' as a sub-type of the TEC. Samples R1 and R3 in **MI** showed highest similarity to FCT S12. As there are no condition thresholds for the TEC, vegetation in 'good' or better condition has been classified as the TEC as it is considered to represent a relatively intact and recognisable form of the TEC.

6 Conclusions

Outcomes of the assessment include the following:

- No threatened or priority flora were recorded in the site.
- No threatened flora have potential to occur in the site.
- Four priority flora species have the potential to occur within the site: *Lachnagrostis nesomytica* subsp. *nesomytica* (P1), *Lachnagrostis nesomytica* subsp. *pseudofiliformis* (P1), *Lepidium puberulum* (P4) and *Myosotis australis* subsp. *australis* (P4). A targeted survey during the species flowering period would be required to determine the presence or absence of these species (survey in November would fall within the flowering period of all four species).
- Eight vegetation units were recorded within the site, ranging from 'completely degraded' to 'very good' condition.
- The majority of the site has been highly disturbed, with 8.42 ha (86%) in 'degraded' to 'completely degraded' condition. Vegetation in 'good' and 'very good' condition occurs across 1.13 ha (12%), with the remainder of the site comprising open water (0.2 ha, 2%).
- The following TECs and PECs occur within the site:
  - 'Subtropical and temperate coastal saltmarsh' TEC/PEC (0.40 ha)
  - '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands' TEC (0.44 ha)
- No other TECs or PECs occur.

7 References

7.1 General references

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7.2 Online references

The online resources that have been utilised in the preparation of this report are referenced in Section 7.1, with access date information provided in Table R1.

Table R1 Access dates for online references

Reference	Date accessed	Website or dataset name
BoM (2026)	May 2026	Climate Data Online
DAFF (2021)	May 2026	Weeds of National Significance (WoNS)
DBCA (2025b)	May 2026	Threatened Ecological Communities
DCCEEW (2026)	May 2026	Protected Matters Search Tool
DPIRD (2026)	May 2026	Western Australian Organism List
WALIA (2026)	May 2026	Landgate Map Viewer
Western Australian Herbarium (2026)	May 2026	Florabase

Figures

Figure 1: Site Location

Figure 2: Soils and Hydrology

Figure 3: Vegetation Units

Figure 4: Vegetation Condition

Figure 5: Threatened and Priority Ecological Communities



Figure 1: Site Location

Project: Reconnaissance Flora and Vegetation Assessment
Rottnest Island Golf Precinct
Client: Rottnest Island Authority

Plan Number:
EP23-032(09)--F36
Drawn: GAR
Date: 27/05/2026
Checked: MS
Approved: RAW
Date: 03/06/2026

N

0 50 100
Metres

Scale: 1:3,000@A4

GDA2020 MGA Zone 50

emerge ASSOCIATES

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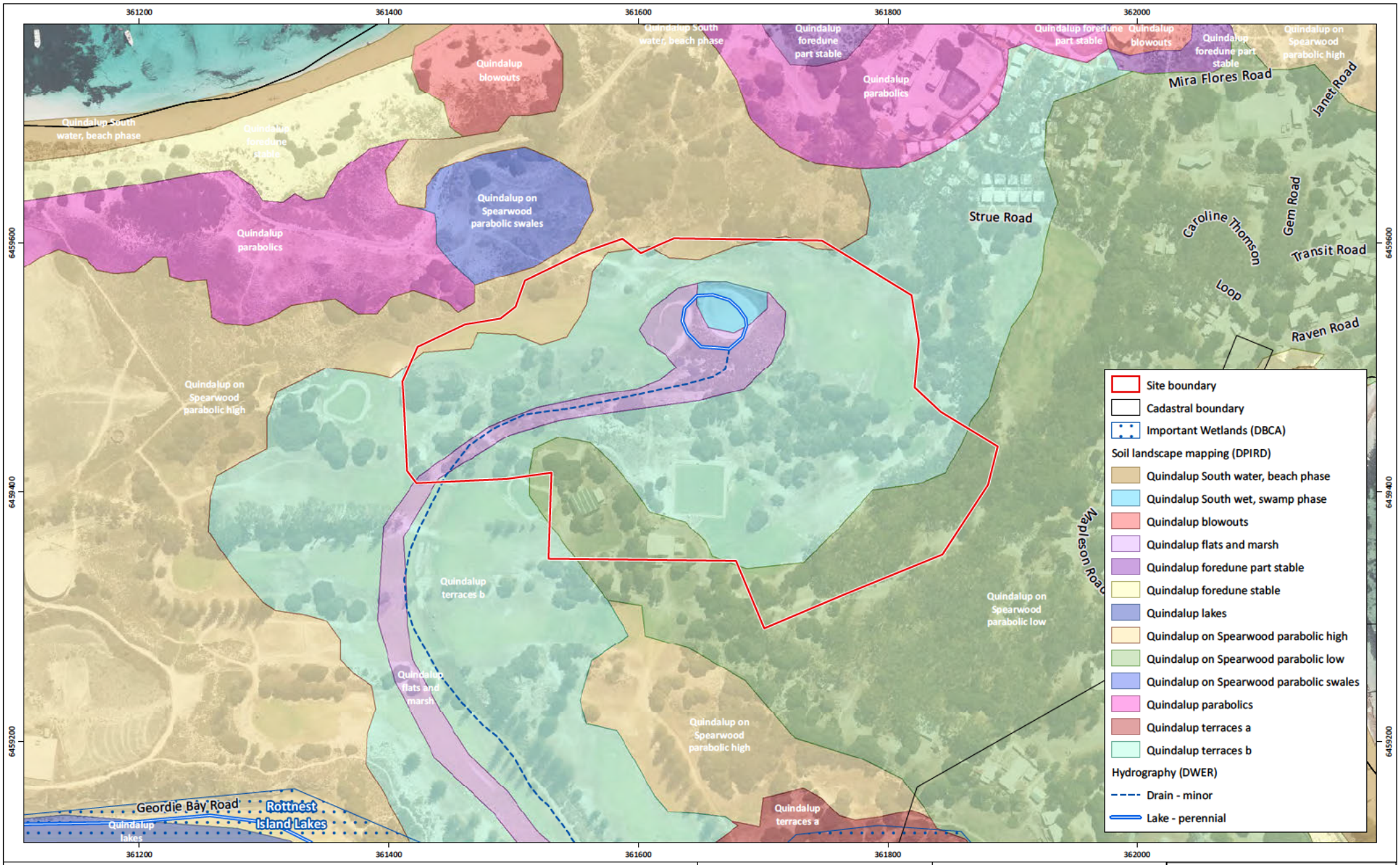


Figure 2: Soils and Hydrology

Project: Reconnaissance Flora and Vegetation Assessment
Rottnest Island Golf Precinct
Client: Rottnest Island Authority

Plan Number:
EP23-032(09)--F37
Drawn: GAR
Date: 27/05/2026
Checked: MS
Approved: RAW
Date: 03/06/2026

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Scale: 1:4,000@A4
GDA2020 MGA Zone 50

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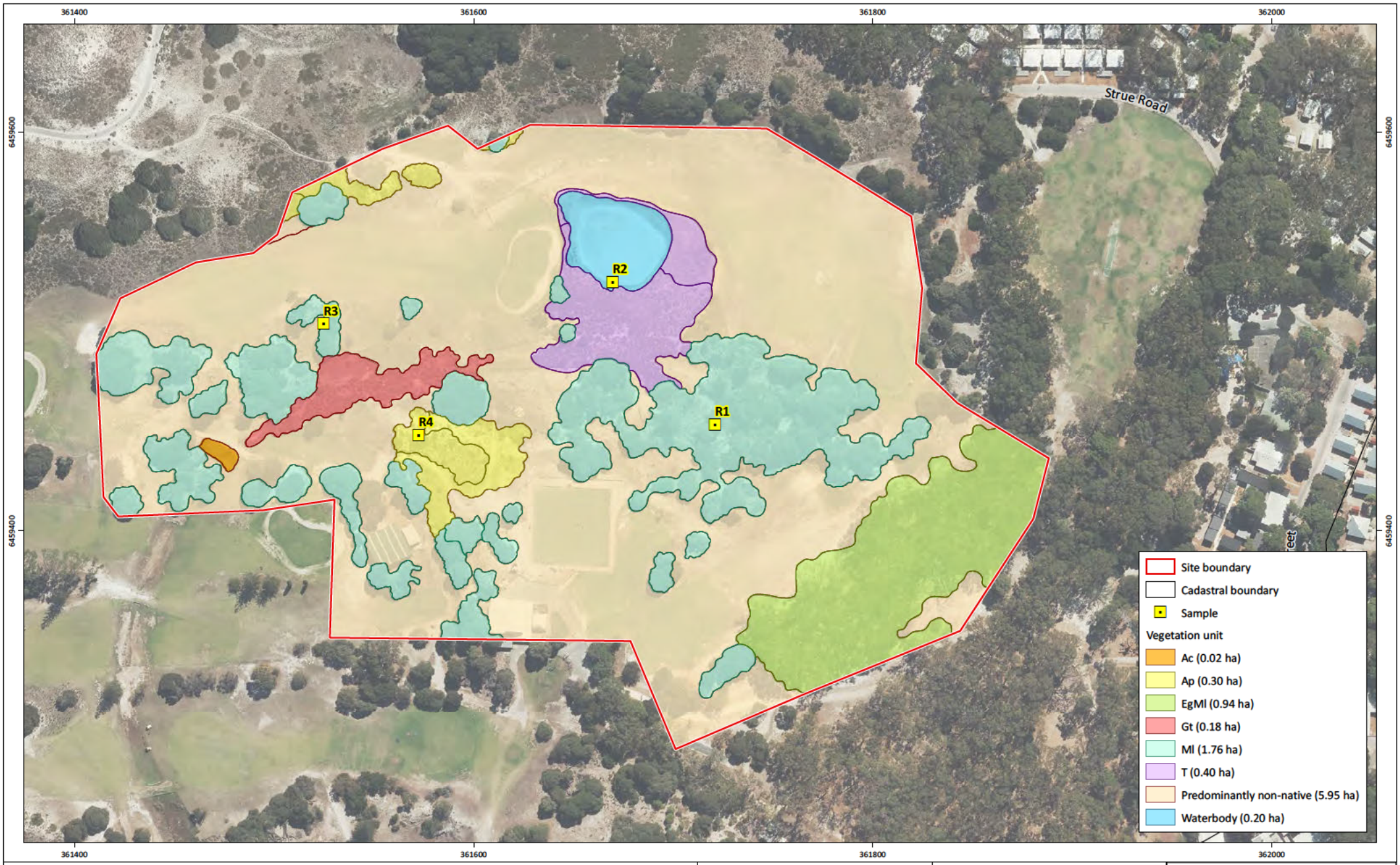


Figure 3: Vegetation Units

Project: Reconnaissance Flora and Vegetation Assessment
Rottnest Island Golf Precinct
Client: Rottnest Island Authority

Plan Number:
EP23-032(09)--F38
Drawn: GAR
Date: 27/05/2026
Checked: MS
Approved: RAW
Date: 03/06/2026

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Metres
Scale: 1:2,500@A4
GDA2020 MGA Zone 50

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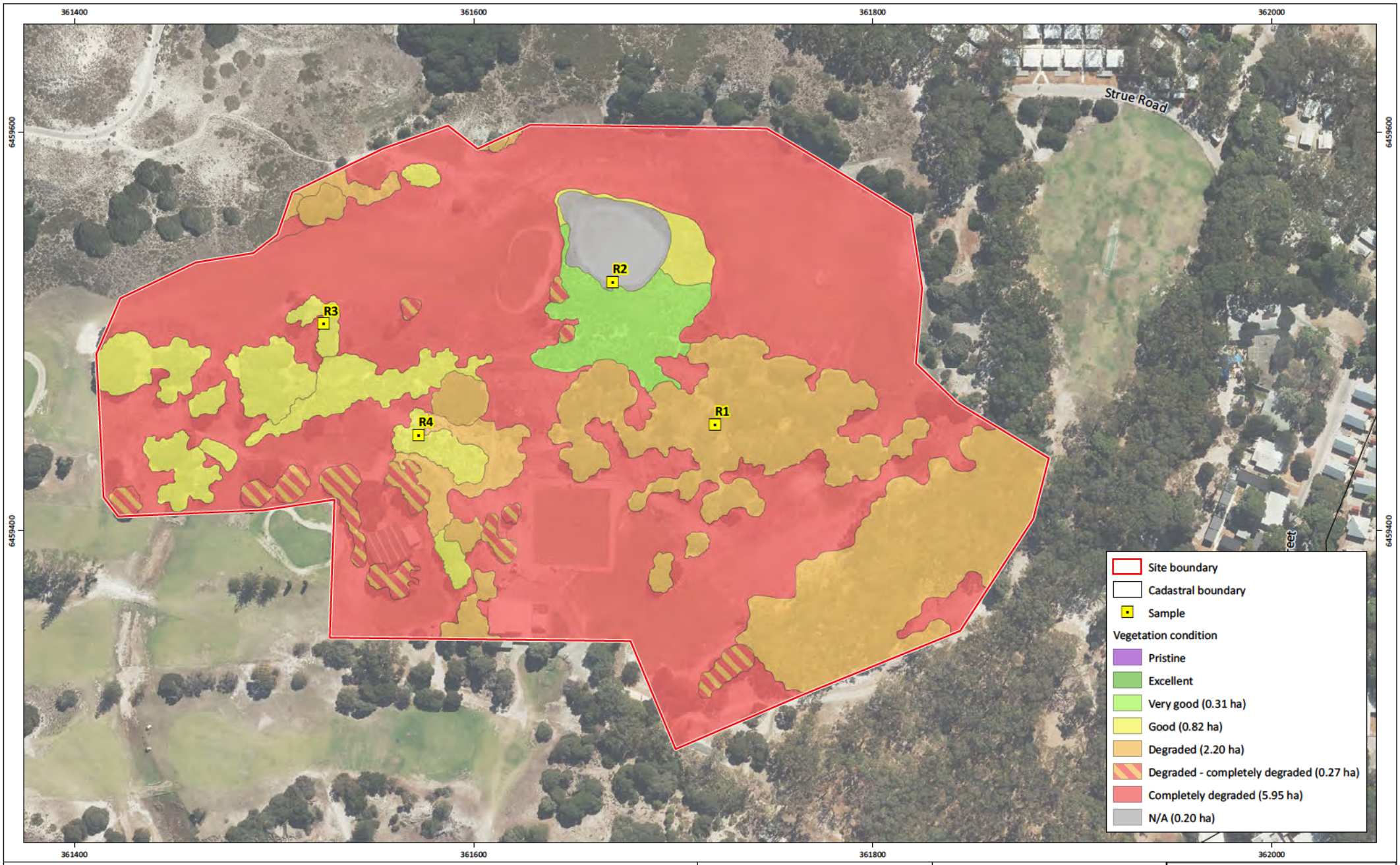


Figure 4: Vegetation Condition

Project: Reconnaissance Flora and Vegetation Assessment
Rottnest Island Golf Precinct
Client: Rottnest Island Authority

Plan Number:
EP23-032(09)--F39a
Drawn: GAR
Date: 29/06/2026
Checked: RAW
Approved: RAW
Date: 29/06/2026

N

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Metres
Scale: 1:2,500@A4
GDA2020 MGA Zone 50

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Figure 5: Threatened and Priority Ecological Communities

Project: Reconnaissance Flora and Vegetation Assessment
Rottnest Island Golf Precinct
Client: Rottnest Island Authority

Plan Number:
EP23-032(09)--F40a
Drawn: GAR
Date: 29/06/2026
Checked: RAW
Approved: RAW
Date: 29/06/2026

N

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Metres
Scale: 1:2,500@A4
GDA2020 MGA Zone 50

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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 as 'threatened' pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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 and published in the Biodiversity Conservation (Species) Order 2022. 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.

Threatened flora are assigned categories under the EPBC Act and BC Act according to their conservation status, as outlined in **Table 1**.

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 2018b). Priority flora species are considered during State approval processes. Priority flora are assigned categories as listed in **Table 1**.

Table 1: Definitions of threatened and priority flora species pursuant to the EPBC Act and BC Act and on DBCA's Priority Flora List (DBCA 2023b)

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 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.

In Western Australia TECs are listed under sections 27(1), 31 and 33 of the BC Act. 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 listed under the BC Act are defined in Schedule 1 of the Biodiversity Conservation (Threatened Ecological Communities) Order 2023. State TECs are also acknowledged through other 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*.

TECs are assigned to one of the categories outlined in **Table 2** according to their level of threat.

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 with insufficient information available to be considered a TEC or which are rare but not currently threatened may be listed as a 'priority ecological community' (PEC). PECs are categorised based on a variety of criteria, as described in **Table 3**. Listed PECs are published by DBCA (DBCA 2023a).

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.

Reporting

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.

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 4: 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 5: 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 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 6: 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 (2017) 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 7: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017)

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 8: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017)

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 2017) 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

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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.

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

Department of Primary Industries and Regional Development (DPIRD) 2020, The Western Australian Organism List (WAOL), < https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>.

Appendix B

Conservation Significant Flora Species and Likelihood of Occurrence Assessment

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Diuris micrantha	VU	VU	PG	Dark grey-black sandy clay-loam in winter wet depressions or swamps. Often in shallow standing water.	Aug/Sep-early Oct	Nil (does not occur) (unreliable record)
Lachnagrostis nesomytica subsp. *nesomytica*	P1	-	A/P	Brown peaty soil over limestone. Edges of saline lakes.	Nov	Potential to occur
Lachnagrostis nesomytica subsp. *pseudofiliformis*	P1	-	A/P	Peaty soil over limestone. Coastal areas, edges of saline lakes.	Nov-Dec	Potential to occur
Lepidium puberulum	P4	-	A	Sandy soils.	Jul - Aug or Oct - Nov	Potential to occur
Myosotis australis subsp. *australis*	P4	-	A	Rocks, bluffs, outcrops, ledges, scree, or banks.	Sep-Dec	Potential to occur

Note: VU=vulnerable, P1=Priority 1, P4=Priority 4, P=perennial, PG=perennial geophyte, A=annual. Species considered to potentially occur within the site are shaded green.

Appendix C

Conservation Significant Communities and Likelihood of Occurrence Assessment

Code	Community name	TEC/ PEC	Level of significance		Likelihood of occurrence
			State	EPBC Act	
Banksia woodlands of the SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	TEC/PEC	P3	EN	Nil (does not occur) (unreliable record)
SCP30a	*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands of the Swan Coastal Plain (floristic community type 30a as originally described in Gibson et al. 1994)	TEC	CR	-	Recorded
SCP29a	Coastal shrublands on shallow sands	PEC	P3	-	Nil (does not occur)
Government House Lake Microbial	Hypersaline microbial community 1 (Government House Lake, Rottnest)	PEC	P2	-	Nil (does not occur)
Rottnest Island Microbial - Garden	Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island). Community 5 - Garden Lake	PEC	P1	-	Nil (does not occur)
Rottnest Island Microbial - Herschel	Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island). Community 6 - Herschel Lake	PEC	P1	-	Nil (does not occur)
Rottnest Island Microbial - Vincent	Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island). Lake community 3 - Lake Vincent	PEC	P1	-	Nil (does not occur)
Rottnest Island Microbial - Timperley	Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island): Community 2 - Lake Timperley	PEC	P1	-	Nil (does not occur)
Rottnest Island Microbial - Baghdad	Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island); Lake Baghdad	PEC	P1	-	Nil (does not occur)
Rottnest Island Microbial - Serpentine	Rottnest Island Microbial Lake community 1 - Serpentine Lake	PEC	P1	-	Nil (does not occur)

Note: TEC=threatened ecological community, PEC=priority ecological community, EN=endangered, P1-P3=priority 1 to priority 3

Appendix D

Species List

Family	Status	Species
Araucariaceae	*Pl	*Araucaria heterophylla*
Arecaceae	*Pl	*Phoenix canariensis*
Asparagaceae		*Acanthocarpus preissii*
Asphodelaceae	*	*Trachyandra divaricata*
Asteraceae	*	*Dittrichia graveolens*
Casuarinaceae	Pl	*Casuarina obesa*
Chenopodiaceae		*Acacia rostellifera*
		Atriplex cinerea
		Rhagodia baccata
		Suaeda australis
		Tecticornia ?halocnemoides
		Tecticornia ?indica subsp. bidens
Cupressaceae		*Callitris preissii*
Cyperaceae		*Gahnia trifida*
		Lepidosperma gladiatum
Myrtaceae	Pl	*Agonis flexuosa*
	Pl	*Eucalyptus gomphocephala*
	*Pl	*Eucalyptus utilis*
		Melaleuca lanceolata
Oleaceae	*Pl	*Olea europaea*
Pinaceae	*Pl	*Pinus sp.*
Pittosporaceae		*Pittosporum ligustrifolium*
Poaceae	*	*Cynodon dactylon*
		Poa poiformis
Primulaceae	*	*Lysimachia arvensis*
Urticaceae	*	*Urtica urens*

*=non-native, Pl=planted

Appendix E

Sample Data

Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R1

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R1: Page 1 of 3

Quadrat and landform details

Sample type:	releve	Size:	10 m x 10 m
NW corner easting:	0	NW corner northing:	0
Altitude (m):	2	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	slightly damp	Landform:	flat
Time since fire:	no evidence	Disturbance:	high - ?clearing, weeds, herbivory quokka
Soil type/texture	loam/	Bare ground (%):	25
Rocks (%) and type:	1%, limestone	Soil colour:	brown/
Litter:	50% (twigs,logs,leaves)	Vegetation condition:	degraded



Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R1

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R1: Page 2 of 3

Species Data

* denotes non-native species

Status	Confirmed name
*	*Dittrichia graveolens*
	Gahnia trifida
*	*Lysimachia arvensis*
	Melaleuca lanceolata
*	*Trachyandra divaricata*
*	*Urtica urens*

Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R2

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R2: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	10 m x 10 m
NW corner easting:	0	NW corner northing:	0
Altitude (m):	1	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	damp	Landform:	depression
Time since fire:	no evidence	Disturbance:	moderate - herbivory
Soil type/texture	clay/	Bare ground (%):	1
Rocks (%) and type:	No rocks	Soil colour:	brown/
Litter:	5% (twigs,leaves,)	Vegetation condition:	very good



Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R2

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R2: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name
	Gahnia trifida
	Tecticornia ?halocnemoides
	Tecticornia ?indica subsp. bidens

Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R3

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R3: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	10 m x 10 m
NW corner easting:	0	NW corner northing:	0
Altitude (m):	1	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	slightly damp	Landform:	0
Time since fire:	no evidence	Disturbance:	high - weeds, vlearing
Soil type/texture	loam/	Bare ground (%):	0
Rocks (%) and type:	1%, limestone	Soil colour:	brown/
Litter:	1% (leaves,twigs,branches)	Vegetation condition:	degraded



Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R3

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R3: Page 2 of 2

Species Data

* denotes non-native species

Status	Confirmed name
*	*Cynodon dactylon*
*	*Dittrichia graveolens*
*	*Lysimachia arvensis*
	Melaleuca lanceolata
	Pittosporum ligustrifolium
	Rhagodia baccata
*	*Trachyandra divaricata*

Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R4

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R4: Page 1 of 2

Quadrat and landform details

Sample type:	releve	Size:	10 m x 10 m
NW corner easting:	0	NW corner northing:	0
Altitude (m):	10	Geographic datum/zone:	GDA94/Zone 50
Soil water content:	dry	Landform:	upper slope
Time since fire:	no evidence	Disturbance:	moderate - weeds, herbivory
Soil type/texture	sand/loam	Bare ground (%):	25
Rocks (%) and type:	5%, limestone	Soil colour:	brown/
Litter:	5% (twigs,leaves,)	Vegetation condition:	good



Vegetation Sample Data

Rottnest Island Golf Precinct

Sample Name: R4

Project no.: EP23-032(09)
Date: 29/04/2025 **Status** Non-permanent
Author: MS, R4: Page 2 of 2

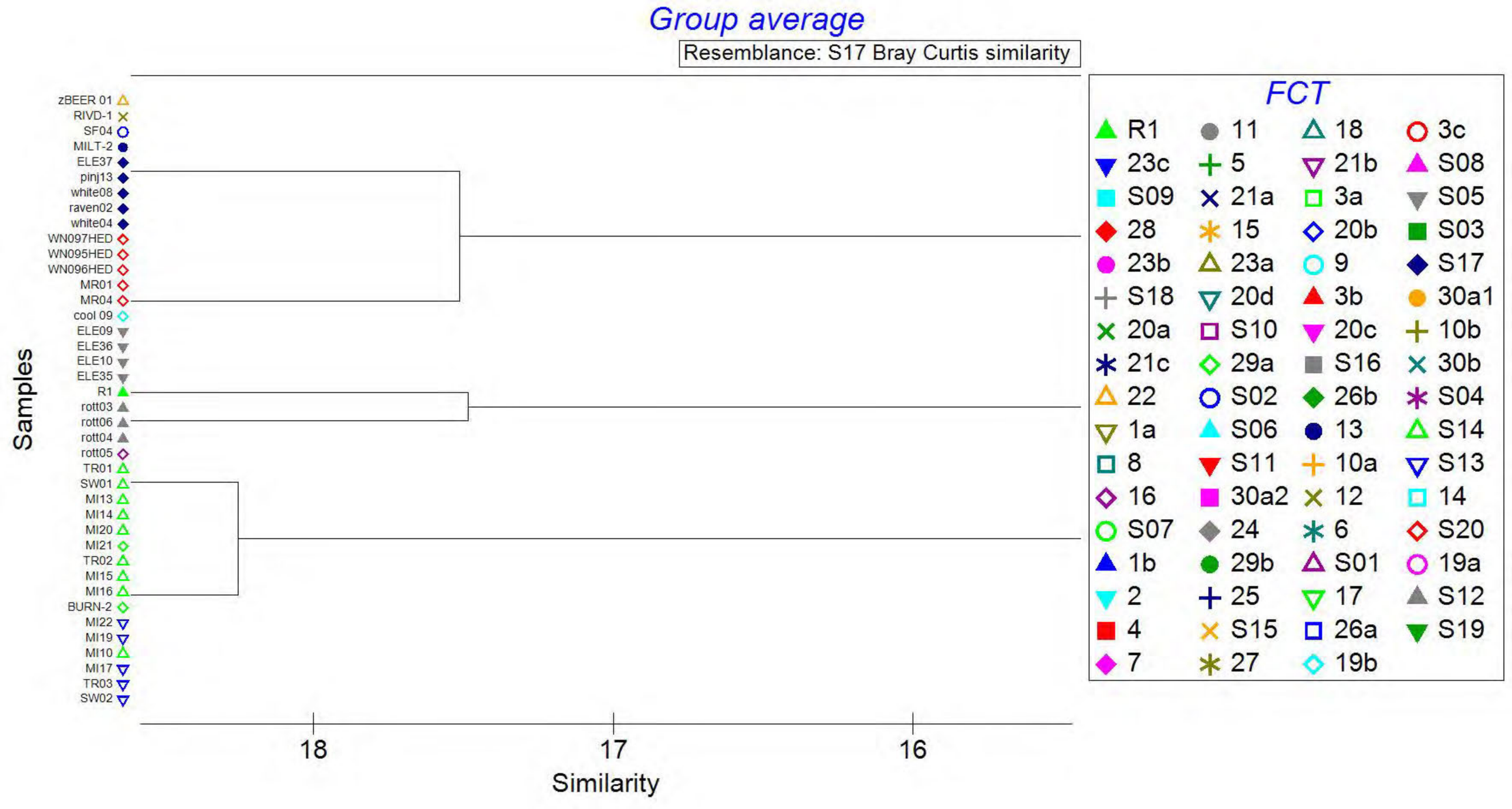
Species Data

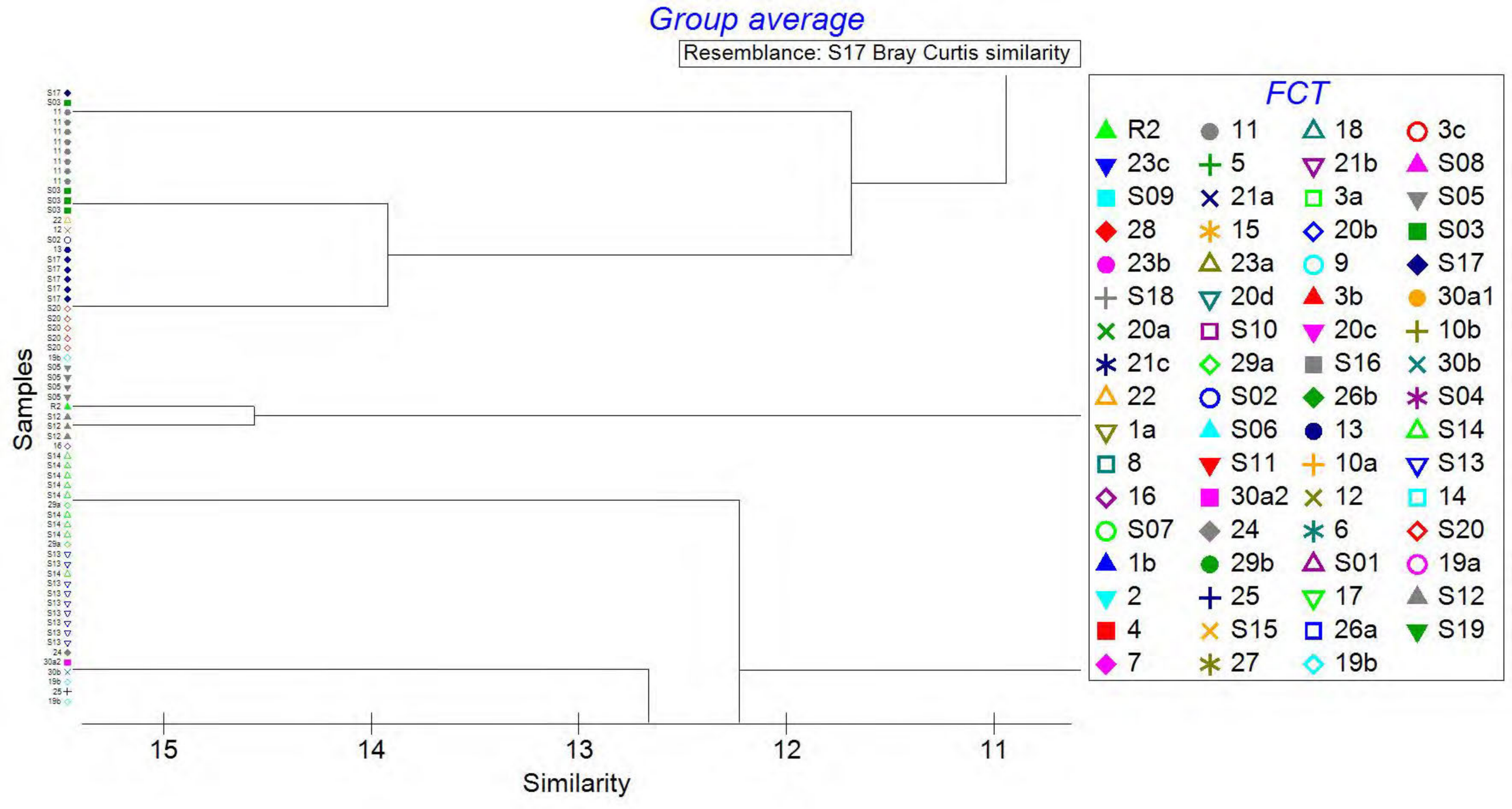
* denotes non-native species

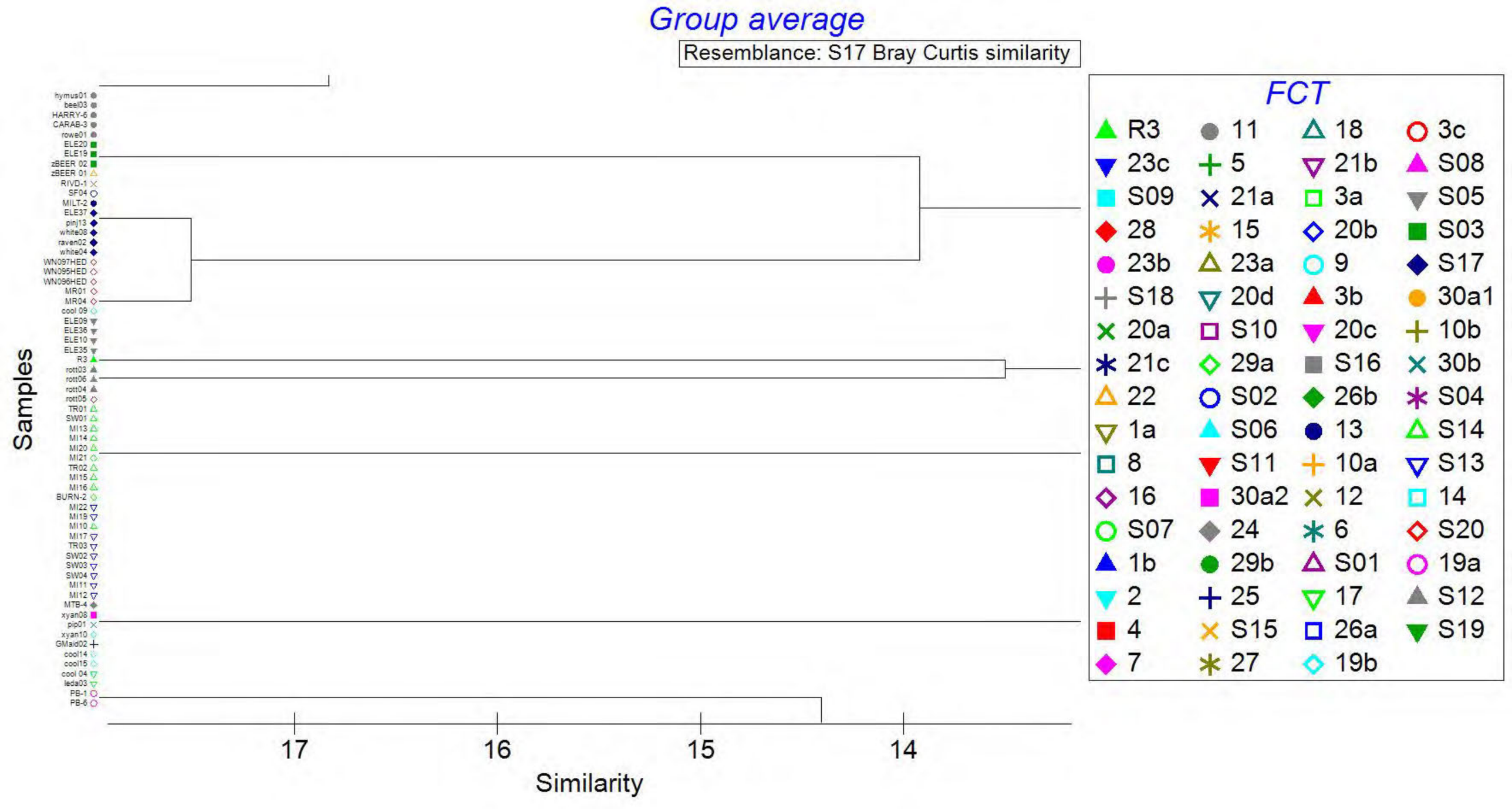
Status	Confirmed name
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*	*Dittrichia graveolens*
*	*Lysimachia arvensis*
	Poa poiformis
*	*Trachyandra divaricata*

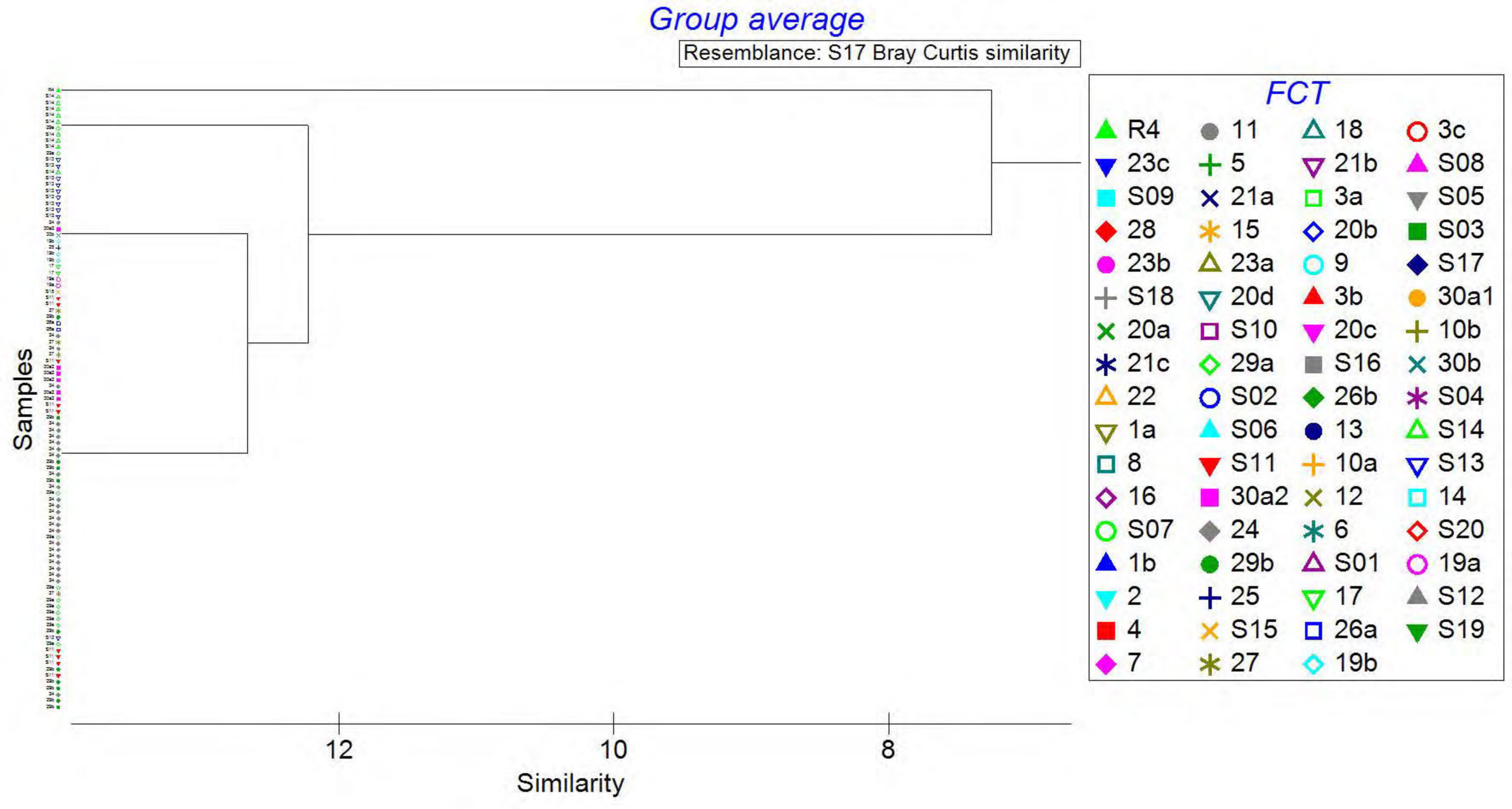
Appendix F

Cluster Dendrogram


Group average
Resemblance: S17 Bray Curtis similarity
zBEER 01
RIVD-1
SF04
MILT-2
ELE37
pinj13
white08
raven02
white04
WN097HED
WN095HED
WN096HED
MR01
MR04
cool 09
ELE09
ELE36
ELE10
ELE35
R1
rott03
rott06
rott04
rott05
TR01
SW01
MI13
MI14
MI20
MI21
TR02
MI15
MI16
BURN-2
MI22
MI19
MI10
MI17
TR03
SW02
Samples
18
17
16
Similarity
FCT
R1
11
18
3c
23c
5
21b
S08
S09
21a
3a
S05
28
15
20b
S03
23b
23a
9
S17
S18
20d
3b
30a1
20a
S10
20c
10b
21c
29a
S16
30b
22
S02
26b
S04
1a
S06
13
S14
8
S11
10a
S13
16
30a2
12
14
S07
24
6
S20
1b
29b
S01
19a
2
25
17
S12
4
S15
26a
S19
7
27
19b


Group average
Resemblance: S17 Bray Curtis similarity
Samples
Similarity
15
14
13
12
11
FCT
R2
11
18
3c
23c
5
21b
S08
S09
21a
3a
S05
28
15
20b
S03
23b
23a
9
S17
S18
20d
3b
30a1
20a
S10
20c
10b
21c
29a
S16
30b
22
S02
26b
S04
1a
S06
13
S14
8
S11
10a
S13
16
30a2
12
14
S07
24
6
S20
1b
29b
S01
19a
2
25
17
S12
4
S15
26a
S19
7
27
19b


Group average
Resemblance: S17 Bray Curtis similarity
Samples
hymus01
beel03
HARRY-6
CARAB-3
rowe01
ELE20
ELE19
zBEER 02
zBEER 01
RIVD-1
SF04
MILT-2
ELE37
pinj13
white08
raven02
white04
WN097HED
WN095HED
WN096HED
MR01
MR04
cool 09
ELE09
ELE36
ELE10
ELE35
R3
rott03
rott06
rott04
rott05
TR01
SW01
MI13
MI14
MI20
MI21
TR02
MI15
MI16
BURN-2
MI22
MI19
MI10
MI17
TR03
SW02
SW03
SW04
MI11
MI12
MTB-4
xyan08
pip01
xyan10
GMaid02
cool14
cool15
cool 04
leda03
PB-1
PB-6
17
16
15
14
Similarity
FCT
R3
11
18
3c
23c
5
21b
S08
S09
21a
3a
S05
28
15
20b
S03
23b
23a
9
S17
S18
20d
3b
30a1
20a
S10
20c
10b
21c
29a
S16
30b
22
S02
26b
S04
1a
S06
13
S14
8
S11
10a
S13
16
30a2
12
14
S07
24
6
S20
1b
29b
S01
19a
2
25
17
S12
4
S15
26a
S19
7
27
19b


Group average
Resemblance: S17 Bray Curtis similarity
FCT
R4
11
18
3c
23c
5
21b
S08
S09
21a
3a
S05
28
15
20b
S03
23b
23a
9
S17
S18
20d
3b
30a1
20a
S10
20c
10b
21c
29a
S16
30b
22
S02
26b
S04
1a
S06
13
S14
8
S11
10a
S13
16
30a2
12
14
S07
24
6
S20
1b
29b
S01
19a
2
25
17
S12
4
S15
26a
S19
7
27
19b
Samples
12
10
8
Similarity