

Wetland Assessment

Karnup District Structure Plan

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Wetland Assessment

Karnup District Structure Plan



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Executive Summary

The City of Rockingham engaged Emerge Associates to conduct a wetland assessment within the Karnup District Structure Plan area (the 'site').

The assessment included a desktop study of the environmental context of the site in relation to the wetland features within the site based on the *Geomorphic Wetlands, Swan Coastal Plain* dataset (DBCA 2023a). Field surveys were conducted between July 2023 and February 2024, in line with flora, fauna and vegetation assessments undertaken for the site.

This report presents an evaluation of wetland features in the site mapped in the site and an assessment of each feature using the DBCA (2017) evaluation methodology.

A total of 17 geomorphic wetlands are mapped within the site by DBCA (2023a). The outcomes of the wetland assessment include the following:

- UFI 6446 and 6411 align with their current CCW management category. A new boundary is proposed for these features which comprises the boundary of the wetland vegetation.
- UFI 6414 within the site comprises a small portion of a larger wetland which lies outside of the site. The portion of UFI 6414 in the site aligns with its current CCW management category.
- UFIs 6429 and 6634 align with their currently assigned REW management category.
- UFI 6641 aligns with its current CCW management category. A new boundary is proposed for this feature which comprises the boundary of the wetland vegetation and excludes areas that do not represent a wetland landform or support wetland vegetation.
- UFI 16051 likely aligns with its current MUW management category but would require further survey as only part of the wetland was able to be accessed.
- UFIs 6413, 6624, 6636, 6548, 6625, 6626, 6638, 6426, 6428 and 15848 within the site were not able to be accessed but appear to align with their current management categories. Further on-ground survey would be required to confirm values.

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Appendix A

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Wetland Details and DBCA Evaluation Forms

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Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
EPA	Environmental Protection Authority
DBCA	Department of Biodiversity, Conservation and Attractions
DoW	Department of Water (now DWER)
DWER	Department of Water and Environmental Regulation

Table A2: Abbreviations – General terms

General terms	
CCW	Conservation category wetland
CR	Critically endangered
EN	Endangered
IBRA	Interim Biogeographic Regionalisation for Australia
MUW	Multiple use wetland
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
P5	Priority 5
PEC	Priority ecological community
PG	Perennial geophyte
REW	Resource enhancement wetland
TEC	Threatened ecological communities
UFI	Unique feature identifier
VU	Vulnerable

Table A3: Abbreviations – Legislation

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

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Table A4: Abbreviations – Units of measurement

Units of measurement	
cm	Centimetre
ha	Hectare
km	Kilometre
m	Metre
m ²	Square metre
m AHD	m in relation to the Australian height datum
mm	Millimetre

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1 Introduction

1.1 Purpose

Emerge Associates (Emerge) were engaged by the City of Rockingham to conduct a wetland assessment within the Karnup District Structure Plan area as shown in **Figure 1** (referred to herein as the 'site').

1.2 Legislation and policy

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

Flora and ecological communities may 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 2022c, 2023b). Threatened flora and TECs are classified as either 'critically endangered' (CR), 'endangered' (EN) and 'vulnerable' (VU) (DCCEEW 2021). Commonwealth and/or State ministerial approval is required to impact threatened flora or TECs.

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 2022b, c). 'Priority flora' and PECs are classified as either 'priority 1' (P1), 'priority 2' (P2), 'priority 3' (P3) or 'priority 4' (P4). They do not have direct statutory protection. However, their priority classification is taken into account during State and Local government approval processes.

Flora that are regarded as having negative environmental or economic impacts are often referred to as weeds (DBCA 2023c). Particularly detrimental weed species may be listed as a 'declared pest' pursuant to the State *Biosecurity and Agriculture Management Act 2007* (BAM Act) or as a 'weed of national significance' (WoNS) (DAWE 2021). Management of weeds, declared pests and WoNS may be required during government approval processes.

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

1.3 Scope of work

This report presents an evaluation of wetland features in the site mapped in the *Geomorphic Wetlands, Swan Coastal Plain* dataset (DBCA 2022a) using the DBCA (2017) evaluation methodology.

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

- A review of relevant background information including flora and vegetation and fauna surveys of the site.
- Identification and mapping of wetland vegetation and wetland landform, with a focus on verifying boundaries and values of existing wetland features.
- Application of the DBCA wetland evaluation methodology to determine the appropriate management category of each feature.
- Documentation of the methodology and results of the assessment into a report.

2 Desktop Study

2.1 Site context

2.1.1 Location and extent

The site is located in the City of Rockingham in the Southwest region of Western Australia and extends over 1,657 hectares (ha) as shown in **Figure 1**. The site is bounded by Kwinana Freeway to the east, Stakehill Road to the north, Mandurah Road and native vegetation to the west and Paganoni Rd to the south.

2.1.2 Geomorphology and soils

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 bounded 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 and its western side comprises three dune systems that run roughly parallel to the Indian Ocean coastline. These dune systems, referred to as Quindalup, Spearwood and Bassendean associations, represent a succession of coastal deposition and, as a result, they contain soils at different stages of leaching and formation (Kendrick *et al.* 1991). The site lies predominantly within the Spearwood dune system, with a portion in the east lying within the Bassendean dune system.

Examination of broad scale soil mapping shows four soil associations as occurring within the site, as described in **Table 1** (Churchward and McArthur 1980). The soil types mapped within the site are shown in **Figure 2**.

Table 1: Broad scale soil mapping within the site (Churchward and McArthur 1980)

Soil association	Location within site	Description
Karrakatta	Majority of the site	Undulating landscape with deep yellow sands over limestone.
Serpentine River	A strip along the north side of the eastern boundary	Poorly drained plain with fine textured alluvial soils.
Yoongarillup	A strip along the south side of the eastern boundary	Plains with low ridges and swales; shallow and brown sands over marine limestone.
Cottesloe	Very small patch in the south west corner	Low hilly landscape with shallow brown sands over limestone, much exposed limestone.

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

2.1.3 Topography

The elevation of the site ranges from 1 metre in relation to the Australian height datum (mAHD) on to 35 mAHD and varies across the site (DoW 2008) (**Figure 2**).

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2.1.4 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).

The *Geomorphic Wetlands of the Swan Coastal Plain* dataset maps geomorphic wetland features and classifies them based on their landform shape and water permanence (DBCA 2023a). Each wetland feature is assigned to one of three management categories: 'conservation', 'resource enhancement' and 'multiple use'.

A total of 17 geomorphic wetlands occur in the site, as outlined in **Table 2**. The locations and extent of these wetlands are shown in **Figure 3**.

Table 2: Geomorphic wetlands within the site (DBCA 2023a)

Unique feature identifier (UFI)	Name	Wetland type	Management category	Location
6411	Small Swamp	Sumpland	Conservation	Entire feature in the site
6413	Fletcher Road Swamp	Sumpland	Conservation	Entire feature in the site
6414	Anstey Swamp	Sumpland	Conservation	Partial feature in site
6446	Hidden Swamp	Dampland	Conservation	Entire feature in the site
6624	-	Sumpland	Conservation	Entire feature in the site
6636	-	Sumpland	Conservation	Entire feature in the site
6429	-	Dampland	Resource Enhancement	Entire feature in the site
6548	-	Dampland	Resource Enhancement	Entire feature in the site
6625	-	Sumpland	Resource Enhancement	Entire feature in the site
6626	-	Sumpland	Resource Enhancement	Entire feature in the site
6634	-	Dampland	Resource Enhancement	Entire feature in the site
6638	-	Sumpland	Resource Enhancement	Entire feature in the site
6641	-	Sumpland	Resource Enhancement	Partial feature in site
6426	Garden Swamp	Sumpland	Multiple Use	Entire feature in site
6428	Deerpark Swamp	Sumpland	Multiple Use	Entire feature in site
15848	-	Sumpland	Multiple Use	Partial feature in site
16051	-	Sumpland	Multiple Use	Entire feature in site

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 2017b) and *A Directory of Important Wetlands in Australia – Western Australia* (DBCA 2018) indicates that no Ramsar or listed 'important wetlands' are located within or near the site.

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The Department of Water and Environmental Regulation (DWER) hydrography linear dataset (DWER 2018b) records the following 30 wetland or water related features within the site:

- 14 perennial swamps
- 11 earth dams
- 3 areas subject to inundation
- 2 minor, non-perennial watercourses.

2.1.5 Bush Forever

The Government of Western Australia's *Bush Forever* policy is a strategic plan for conserving regionally significant bushland within the Swan Coastal Plain portion of the Perth Metropolitan Region. The objective of *Bush Forever* is to protect representations of all original ecological communities by targeting a minimum of 10% of each vegetation complex for protection (Government of WA 2000). *Bush Forever* sites are representative of regional ecosystems and habitat and have a key role in the conservation of Perth's biodiversity.

Two *Bush Forever* areas occur within the site and a further five occur adjacent to the site. Bush Forever Site 278 (Cassia Drive Bushland) occurs as two parcels within the north-western portion of the site. Bush Forever Site 379 (Anstey Swamp) occurs within the south-western portion of the site and extends to the north-west. Bush Forever Site 395 (Paganoni Swamp and Adjacent Bushland) is adjacent to the south of the site and extends slightly into the south-western boundary of the site. Bush Forever sites 376 and 75 occur adjacent to the north of the site and sites 277 and 394 lie adjacent to the site but are separated by the Kwinana Freeway.

The location of *Bush Forever* areas within and adjacent to the site are shown in **Figure 4**.

2.1.6 Flora and vegetation

Emerge Associates undertook a *Detailed Flora and Vegetation Assessment* for the site in conjunction with this wetland assessment, subject to the same property access limitations outlined in **Section 3.2.1** (Emerge Associates 2024b). The composition and condition of vegetation were recorded and flora and vegetation values described where possible, as summarised below:

- A total of 16 vegetation units were recorded over the site (**Figure 5**).
- The condition of the vegetation ranged from 'completely degraded' to 'very good' condition.
- No threatened or priority flora species were recorded within the site.
- The survey recorded 12.68 ha of the 'threatened ecological community' (TEC)/'priority ecological community' (PEC) 'banksia woodlands of the Swan Coastal Plain', 685.12 ha of the 'tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC/PEC, and 20.53 ha of the State listed 'southern *Eucalyptus gomphocephala*-*Agonis flexuosa* woodlands' PEC.
- An additional 54.82 ha of vegetation across the site has the potential to represent the 'tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC/PEC.

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2.1.7 Fauna

Emerge Associates undertook a *Basic Fauna and Targeted Black Cockatoo Assessment* for the site in conjunction with this wetland assessment, subject to the same property access limitations (Emerge Associates 2024a). The fauna, fauna habitat and black cockatoo values were described where possible, as summarised below:

- Two threatened, two specially protected and one priority species were recorded during the survey: Carnaby's black cockatoo (endangered (EN) under the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) and *Biodiversity Conservation Act* (BC Act)), forest red-tailed black cockatoo (vulnerable (VU) under the EPBC Act and BC Act), glossy ibis (migratory (MI) under the EPBC Act), brush-tailed phascogale (conservation dependant (CD) in Western Australia) and quenda (priority 4 (P4) in WA).
- Despite not being recording during the survey, the following species were considered to have a high or moderate likelihood of occurring within the site:
 - Pacific swift (MI under the EPBC Act)
 - Peregrine falcon (other specially protected (OS) in WA)
 - Blue-billed duck (P4 in WA)
 - Swan Coastal Plain shield-backed trapdoor spider (priority 3 (P3) in WA)
 - Graceful sunmoth (P4 in WA)
 - Jewelled sandplain ctenotus (Swan Coastal Plain population) (P3 in WA)
 - Perth slider (P3 in WA)
 - Black-striped snake (P3 in WA)
- The survey recorded 2,644 black cockatoo habitat trees. Of these, 58 are suitable nesting trees and 2,586 are potential nesting trees, using the categories listed in **Table 3**, based on current black cockatoo guidelines (DAWE 2022).
- Native and non-native foraging habitat for forest red-tailed black cockatoo and Carnaby's black cockatoo was mapped within the site and divided into 'primary' and 'secondary' foraging habitat based on black cockatoo foraging preferences. Primary food plants were defined as those with historical and contemporary records of regular consumption by a black cockatoo species. Secondary food plants were defined as plants that black cockatoo species have been recorded consuming occasionally or that, based on their limited extent or agricultural origin, should not be considered a sustaining resource (Emerge Associates 2024a).

Table 3: Black cockatoo habitat tree categories (DAWE 2022)

Category	Specifications
Known nesting tree	Trees (live or dead but still standing) which contains a hollow where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks or feathers).
Suitable nesting tree	Trees with suitable nesting hollows present [^] , although no evidence of use. Note that any species of tree may develop suitable hollows for breeding.
Potential nesting tree	Trees that have a suitable DBH to develop a nest hollow, but do not currently have suitable nesting hollows. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH. Note that many species of eucalypt may develop suitable hollows for breeding.

[^]Hollow determined to be suitable for use as breeding habitat by black cockatoos.

3 Methods

3.1 Field survey

Experienced botanists visited the site on nine occasions from 28 September to 30 November 2023 to conduct the field survey. Some wetlands were able to be accessed and otherse were viewed from afar or not able to be surveyed (refer **Section 3.2.1**). Accessible wetlands within the site were traversed on foot and the composition and condition of vegetation, fauna species and habitat, and wetland features were recorded. Plant specimens were collected where the identity of flora required further confirmation. Photographic images and notes were recorded as required.

3.1.1 Sampling

As part of the *Detailed Flora and Vegetation* survey (Emerge Associates 2024b), sampling of the vegetation was undertaken using a combination of non-permanent 10 x 10 m quadrats and relevés. Where vegetation was deemed to be of good or better condition, quadrats were established using fence droppers bounded by measuring tape. 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 position¹ of each sample was recorded with a hand-held GPS receiver (± 5 m accuracy).

The data recorded within each sample included:

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

Twelve locations were sampled by Emerge Associates (2024b), comprised of eight quadrats and four relevés, as shown in **Figure 5**. Two of these quadrats are located within wetland features (Q5 and Q12).

3.1.2 Vegetation condition

The condition of the vegetation was assessed by Emerge Associates (2024b) using the Keighery (1994) scale (**Table 4**), as shown in **Figure 6**.

¹ For quadrats the north-west corner was recorded.

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Table 4: Vegetation condition scale applied during the field survey

Category	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.

^relative to the expected natural diversity for that vegetation.

3.1.3 Fauna species and habitat

Fauna species and habitat identified in Emerge Associates (2024a) was reviewed for each wetland feature in the site, with particular attention paid to fauna species which inhabit wetland vegetation and/or landforms and species listed under Commonwealth and State legislation and policy.

3.1.4 Wetland features

Accessible wetlands within the site were traversed on foot to assess the current land use, wetland topography, hydrology (including any alterations to hydrology such as drains or dams), habitat values, and any other flora, vegetation and fauna values relevant to the DBCA (2017) evaluation methodology.

3.2 Analysis and data preparation

3.2.1 Lot access

Some lots were unable to be accessed during the survey due to lack of permission from landowners (**Figure 1**). Where access was limited, best efforts were made to take accurate data from nearby accessible lots or public roads. Aerial imagery was also reviewed to determine level of disturbance and whether the wetland feature was likely to support native vegetation.

3.2.2 Management category evaluation

Each accessible wetland feature was evaluated using the DBCA (2017) methodology which classifies wetlands into one of three management category as outlined in **Table 5**. Where features were not accessible, values were viewed from afar (where possible) and aerial imagery was reviewed. The

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management category evaluation for inaccessible wetlands features was only undertaken where sufficient information was able to be collected.

Table 5: Description of management categories from DBCA (2017a)

Management category	Definition
Conservation (CCW)	Wetlands which support a high level of attributes and functions.
Resource enhancement (REW)	Wetlands which may have been modified or degraded, but still support substantial attributes and functions.
Multiple use (MUW)	Wetlands with few remaining important attributes and functions.

3.2.3 Mapping

Environmental features, vegetation units, vegetation condition, threatened or priority flora or ecological communities were mapped on aerial photography using notes and data collected in the field. Geomorphic wetland boundaries were mapped based on aerial imagery and on-site observations of hydrology and canopy of wetland vegetation.

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 2016b) is provided in **Table 6**.

Table 6: Evaluation of assessment against standard constraints outlined in (EPA 2016b)

Constraint	Degree of limitation	Details
Availability of contextual information	No limitation	The broad scale contextual information described in Section 2.1 is adequate to place the site and vegetation in context.
		Previous surveys provided contextual information needed to undertake the assessment.
Experience level of personnel	No limitation	The wetland assessment was undertaken by botanists with between 1 and 13 years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 13 years' experience in environmental science in Western Australia.
Spatial coverage and access	Limitation	Not all parts of the site could be accessed as required (Figure 1). Where sites have not been visited or only partially visited, this has been explicitly communicated. Limitations of evaluation results from wetland features with partial access have been described and a full site survey would be required to determine the values and applicable management category, in accordance with DBCA requirements.
Influence of disturbance	No limitation	Historical ground disturbance was evident in parts of the site. The disturbance history of the site was considered when undertaking field sampling and wetland evaluation.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

4 Results

Of the 17 wetland features within the site, one was able to be fully accessed and six were partially accessible during the field survey. The remaining wetlands were located in lots where access was not permitted and a determination of wetland values was made from adjacent accessible lots and public land, where possible (**Table 7**).

Vegetation type and condition was able to be described for four of the inaccessible wetlands (UFIs 6426, 6428, 6548, 15848), which were in either 'degraded' or 'completely degraded' condition. These wetlands support limited habitat values for fauna and have highly altered wetland processes. The remaining six inaccessible wetland features (UFIs 6413, 6624, 6625, 6626, 6636, 6638) contained vegetation which was unable to be characterised due to access restrictions. A review of aerial imagery indicated these wetlands are likely to align with their current management categories due to the presence of relatively intact native vegetation. However, further assessment including on-ground surveys would be needed to confirm the management category and boundary of all inaccessible wetland features.

Information on the values of each wetland which was surveyed on-ground is provided below in **Section 4.1**.

4.1 Wetland values

4.1.1.1 UFI 6446

This wetland feature is composed of vegetation unit **EgMr** which is an open forest of *Eucalyptus gomphocephala* over low open forest of *Melaleuca raphiophylla* over closed sedgeland of *Gahnia trifida* and forbland of *Centella asiatica*, *Lobelia anceps* and *Opercularia vaginata*. The **EgMr** vegetation associated with the feature is in 'good' condition. A quadrat (Q5) was used to sample this vegetation and it was determined to represent floristic community type (FCT) 17 '*Melaleuca raphiophylla* – *Gahnia trifida* seasonal wetlands'. Further information on this wetland is provided in **Appendix B**. A representative photo of the vegetation is provided in **Plate 1**.

The wetland falls within *Bush Forever* Site 379 and the vegetation forms part of a wider connected ecological corridor. Potential nesting trees for black cockatoos occur within the wetland (i.e. habitat trees without suitable nesting hollows).

The current feature boundary is not consistent with the hydrology or wetland vegetation observed on-site. As such, a revised boundary which comprises the canopy of wetland vegetation (**EgMr**) is proposed, as shown in **Figure 8**.

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Plate 1: Representative photo of wetland feature UFI 6446

4.1.1.2 UFI 6411

The central portion of UFI 6411 was able to be accessed but the northern and eastern portions were not. However, the portions of the wetland which were not accessed were small and adjacent to accessible areas. Considering this, and as the majority of the wetland extent was traversed, a sufficient assessment of relevant values was completed.

This wetland feature is composed primarily of vegetation unit **EgMr** (as described above). The vegetation associated with the feature is in 'good' condition. A quadrat (Q12) was used to sample this vegetation and it was determined to represent FCT 17 '*Melaleuca raphiophylla* – *Gahnia trifida* seasonal wetlands'. Further information on this wetland is provided in **Appendix B**. A representative photo of the vegetation is provided in **Plate 2**.

Potential nesting trees for black cockatoos occur within the wetland (i.e. habitat trees without suitable nesting hollows). The wetland maintains its primary processes and functions and provides a nursery and habitat for native fauna populations.

The current feature boundary is not consistent with the hydrology or wetland vegetation observed on-site. As such, a revised boundary which comprises the canopy of wetland vegetation (**EgMr**) is proposed, as shown in **Figure 8**. The eastern boundary of the wetland was not able to be traversed and would require further survey to confirm.

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Plate 2: Representative photo of wetland feature UFI 6411

4.1.1.3 UFI 6414

UFI 6414 comprises Anstey Swamp, which is a large wetland that lies to the west of the site. Only a small portion of this wetland feature lies within the site.

The portion of this wetland feature within the site is composed of vegetation unit **Mr**, which is a low open forest of *Melaleuca raphiophylla* and *Melaleuca teretifolia*. The portion of **Mr** within this wetland feature is in 'degraded' condition. However, the wetland extends to the north and supports remnant vegetation likely in 'good' or better condition.

The wetland is located within the Bush Forever Site 379 which is likely to support a range of other values such as providing habitat for fauna. Assessment of the wetland boundary was not undertaken as only a small portion of the feature was able to be surveyed.

4.1.1.4 UFI 6429

The currently mapped boundary of UFI 6429 extends over multiple lots and only the eastern portion was accessible.

This wetland feature is composed primarily of vegetation unit **EgEm**, which is an open forest of *Eucalyptus gomphocephala* and *Eucalyptus marginata* over open shrubland of *Spyridium globulosum* and *Acacia pulchella* over pasture weeds. It was determined to be in 'degraded' condition. Small areas within the mapped feature were classified as 'non-native' vegetation in 'completely degraded' condition. A representative photo of the vegetation is provided in **Plate 3**.

One suitable nesting tree and multiple potential nesting trees for black cockatoos occur within the wetland. Additional values, such as black cockatoo habitat, may occur within the western

Wetland Assessment

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inaccessible portion of the wetland. Determination of the wetland boundary was not undertaken as only part of the feature was able to be surveyed. Further assessment of the inaccessible portion of the wetland would be required to determine its current boundary.



Plate 3: Partially representative photo of wetland feature UFI 6429

4.1.1.5 UFI 6634

The currently mapped boundary of UFI 6634 extends over two lots and only the northern lot was accessible.

This wetland feature is composed primarily of vegetation unit **EmAfBa**, which comprises scattered *Eucalyptus marginata*, *Allocasuarina fraseriana* and *Banksia attenuata* and *B. menziesii* trees over weeds. The **EmAfBa** vegetation associated with the wetland was mapped as being in 'degraded' and 'good-degraded' condition. Small areas within the mapped feature were classified as 'non-native' vegetation in 'completely degraded' condition. A representative photo of the vegetation is provided in **Plate 4**.

One potential nesting tree for black cockatoos and primary native foraging habitat for Carnaby's black cockatoo and forest red-tailed black cockatoo occurs within the wetland.

The wetland's hydrology appears to be significantly altered and vegetation does not comprise species typically associated with wetlands. Therefore, the current mapped extent of the wetland feature is unlikely to represent the actual wetland boundary. Further assessment of the inaccessible portion of the wetland would be required to determine its current values and whether it still represents a wetland.

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Plate 4: Partially representative photo of wetland feature UFI 6634

4.1.1.6 UFI 6641

The currently mapped boundary of UFI 6641 extends beyond the site to the east to include part of the Kwinana Freeway road surface and reserve.

The portion of this mapped wetland feature within the site is composed of vegetation unit **MrKg**, which is a low woodland of *Melaleuca raphiophylla* over open to closed shrubland of *Kunzea glabrescens* over forbland of *Dasypogon bromeliifolius* and weeds. The **MrKg** vegetation within the wetland feature was mapped as being in 'good' condition. Vegetation unit **MrKg** was considered too altered to assign to an FCT (Emerge Associates 2024b). A representative photo of the vegetation is provided in **Plate 5**.

The wetland's hydrology has been significantly altered as a result of the Kwinana Fwy development. Due to these changes, the current extent of the wetland feature does not represent the actual wetland boundary. A revised boundary based on hydrological and vegetation observations on site is proposed in **Figure 8**.

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Plate 5: Partially representative photo of wetland feature UFI 6641

4.1.1.7 UFI 16051

The currently mapped boundary of UFI 16051 extends over multiple lots and only two small portions of the wetland were accessible, with the remainder observed from afar.

This wetland feature is composed of a combination of open forest of *Eucalyptus gomphocephala* (vegetation unit **Eg**) in 'degraded' condition and non-native vegetation in 'completely degraded' condition.

A small portion of primary native foraging habitat for black cockatoos was recorded in the western portion of the wetland feature. One suitable nesting tree and multiple potential nesting trees for black cockatoos occur within the wetland.

The wetland's hydrology appears to be significantly altered and a dam is located in the northern portion. The vegetation has been subject to historical disturbance and comprises species not typically associated with wetlands. Due to these changes, the current extent of the wetland feature is unlikely to represent the actual wetland boundary. Further assessment of the inaccessible portion of the wetland would be required to determine its current values and whether it still represents a wetland.

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4.2 Management category evaluation

The appropriate management category of each wetland in accordance with DBCA (2017) methodology is provided in **Table 7**.

Table 7: Wetland feature management category evaluation outcomes

UFI	Access	Current management category (DBCA 2023a)	Proposed management category
6411	Partial	CCW	CCW
6413	None	CCW	CCW*
6414	Partial	CCW	CCW
6446	Full	CCW	CCW
6624	None	CCW	CCW*
6636	None	CCW	CCW*
6429	Partial	REW	REW
6548	None	REW	REW*
6625	None	REW	REW*
6626	None	REW	REW*
6634	Partial	REW	REW
6638	None	REW	REW*
6641	Partial	REW	CCW
6426	None	MUW	MUW*
6428	None	MUW	MUW*
15848	None	MUW	MUW*
16051	Partial	MUW	MUW

*Further assessment including on-ground surveys would be required to provide a final determination on the appropriate management category and wetland boundary.

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5 Discussion

All the accessible wetlands, except UFI 6641, aligned with their current management category. UFIs 6411, 6414 and 6646 meet the definition of their currently assigned conservation management category as they support a high level of attributes and functions. These wetland features aligned with the conservation category using the preliminary and/or secondary evaluation.

UFIs 6429 and 6634 meet the definition of their currently assigned resource enhancement management category as they have been modified or degraded but still support substantial attributes and functions. UFI 6429 classified as a resource enhancement wetland in the secondary evaluation and the defining attribute was flora. UFI 6634 classified as a conservation wetland in the preliminary evaluation as it met criterion 3: 'supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government or the State' due to the presence of primary native foraging habitat for Carnaby's black cockatoo and forest red-tailed black cockatoo, which are listed under the Commonwealth EPBC Act and State BC Act. However, the DBCA (2017) methodology states that if a wetland feature satisfies the preliminary evaluation criteria but is not considered to be commensurate with the values of a conservation management category wetland then a secondary evaluation is required. Black cockatoo foraging habitat is not unique to wetlands, occurring across a variety of landforms (and more often not in association with wetlands). Therefore, a secondary evaluation was undertaken and the wetland was determined to align with its current resource enhancement category which was deemed appropriate.

UFI 16051 aligns with its current multiple use management category as it has few remaining 'important attributes and functions'. However, only part of this feature was accessible and further survey would be required to confirm values. When viewed from accessible areas, it appears part of this feature may support a higher level of values than that of a multiple use category but further survey would be required to confirm this.

UFI 6641 is currently mapped as a resource enhancement category wetland but classified as a conservation management category in the preliminary evaluation as at least 90% of the wetland supports vegetation in 'good' or better condition. The evaluation was based on the proposed new wetland boundary as the current boundary includes areas which have been subject to intensive disturbance and no longer support a wetland landform or vegetation.

For wetlands which were not accessible during the survey, a combination of survey from afar (where possible) and review of aerial imagery indicated that the current management category is likely appropriate. Some REWs may meet the criteria to classify as a CCW if at least 90% of the vegetation is in 'good' or better condition. However, further survey would be required to confirm values and management category.

Reclassification of wetland boundaries or management categories requires submission of a formal application to DBCA for consideration. Ultimate wetland boundaries require acceptance from DBCA and may differ slightly to the wetland canopy vegetation extent in order to ensure they align with the scale of the geomorphic wetlands dataset.

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6 Conclusions

A total of 17 geomorphic wetlands are mapped within the site by (DBCA 2023a). The outcomes of the wetland assessment include the following:

- UFI 6446 and 6411 align with their current CCW management category. A new boundary is proposed for these features which comprises the boundary of the wetland vegetation.
- UFI 6414 within the site comprises a small portion of a larger wetland which lies outside of the site. The portion of UFI 6414 in the site aligns with its current CCW management category.
- UFIs 6429 and 6634 align with their currently assigned REW management category.
- UFI 6641 aligns with its current CCW management category. A new boundary is proposed for this feature which comprises the boundary of the wetland vegetation and excludes areas that do not represent a wetland landform or support wetland vegetation.
- UFI 16051 likely aligns with its current MUW management category but would require further survey as only part of the wetland was able to be accessed.
- UFIs 6413, 6624, 6636, 6548, 6625, 6626, 6638, 6426, 6428 and 15848 within the site were not able to be accessed but appear to align with their current management categories. Further on-ground survey would be required to confirm values.

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7 References

7.1 General references

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Karnup District Structure Plan



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Figures



Figure 1: Site Location

Figure 2: Soils and Topography

Figure 3: Current Geomorphic Wetlands

Figure 4: Bush Forever Sites

Figure 5: Vegetation Units

Figure 6: Vegetation Condition

Figure 7: Black Cockatoo Values

Figure 8: Proposed Geomorphic Wetlands

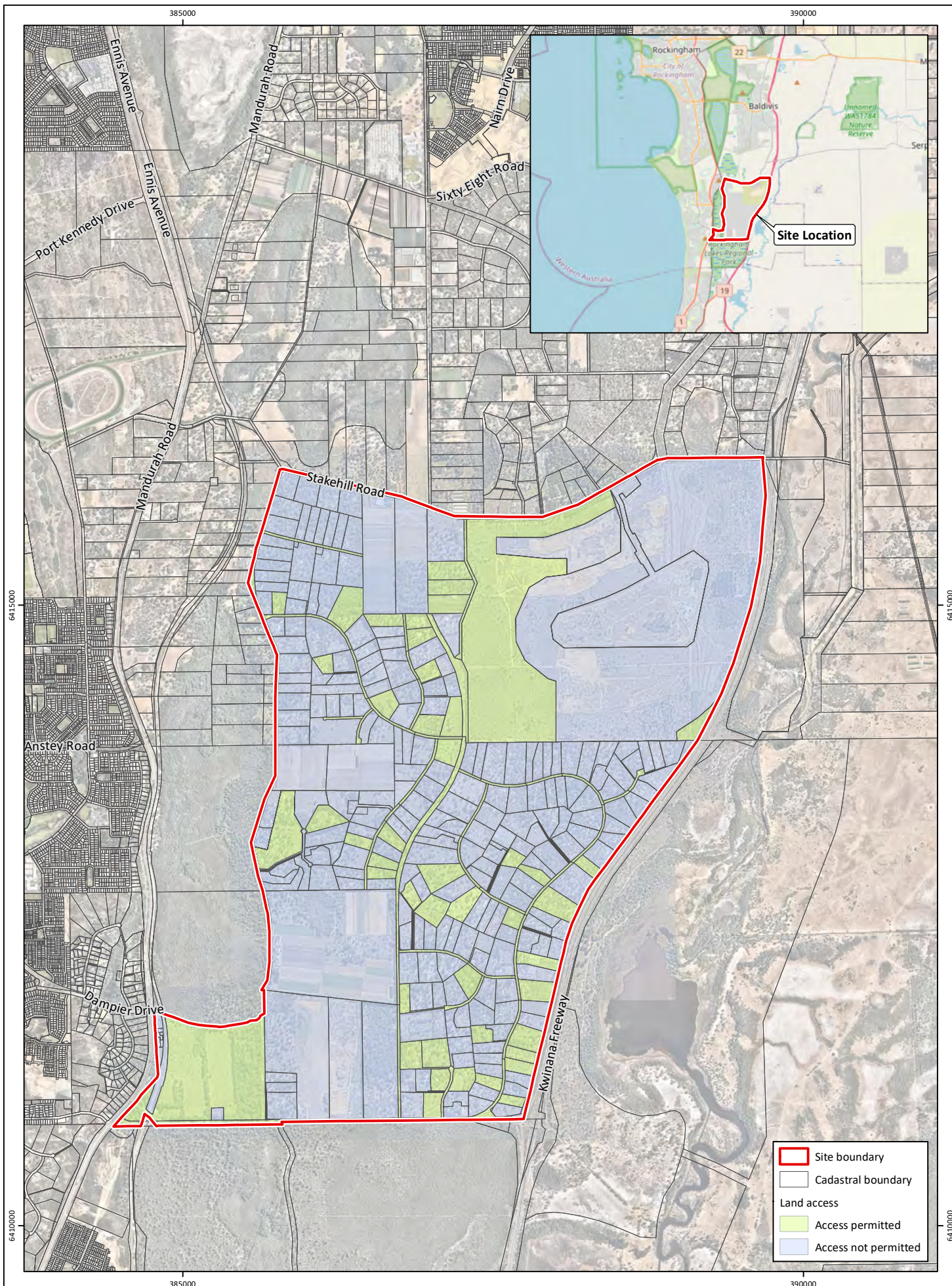


Figure 1: Site Location

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Karnup District Structure Plan

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Checked: TDP
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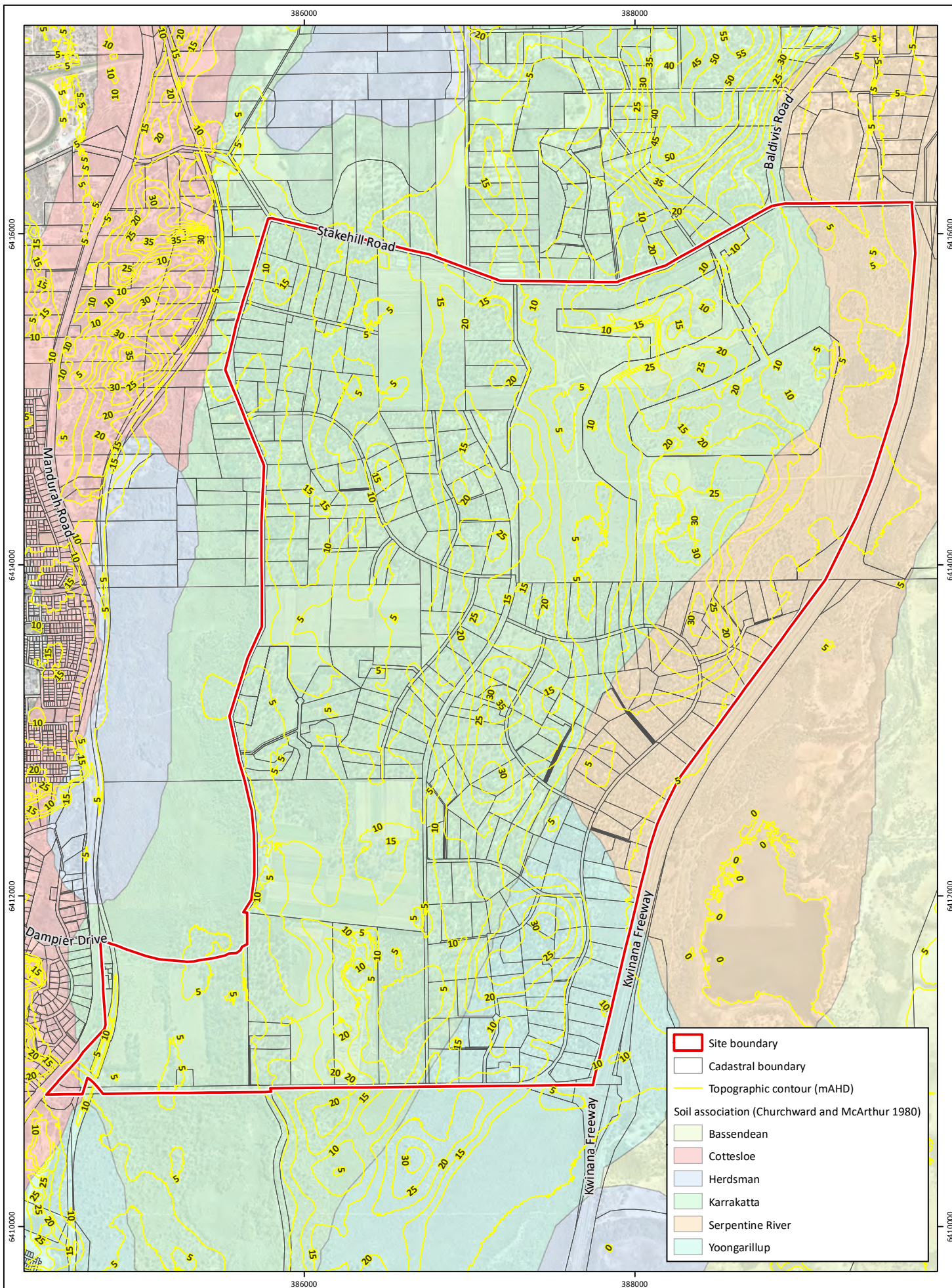


Figure 2: Soils and Topography

Project: Wetland Assessment
Karnup District Structure Plan

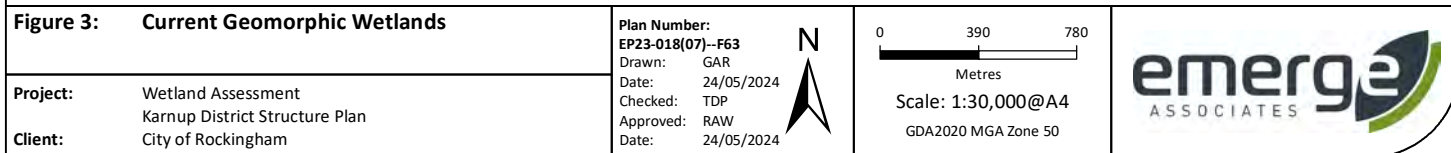
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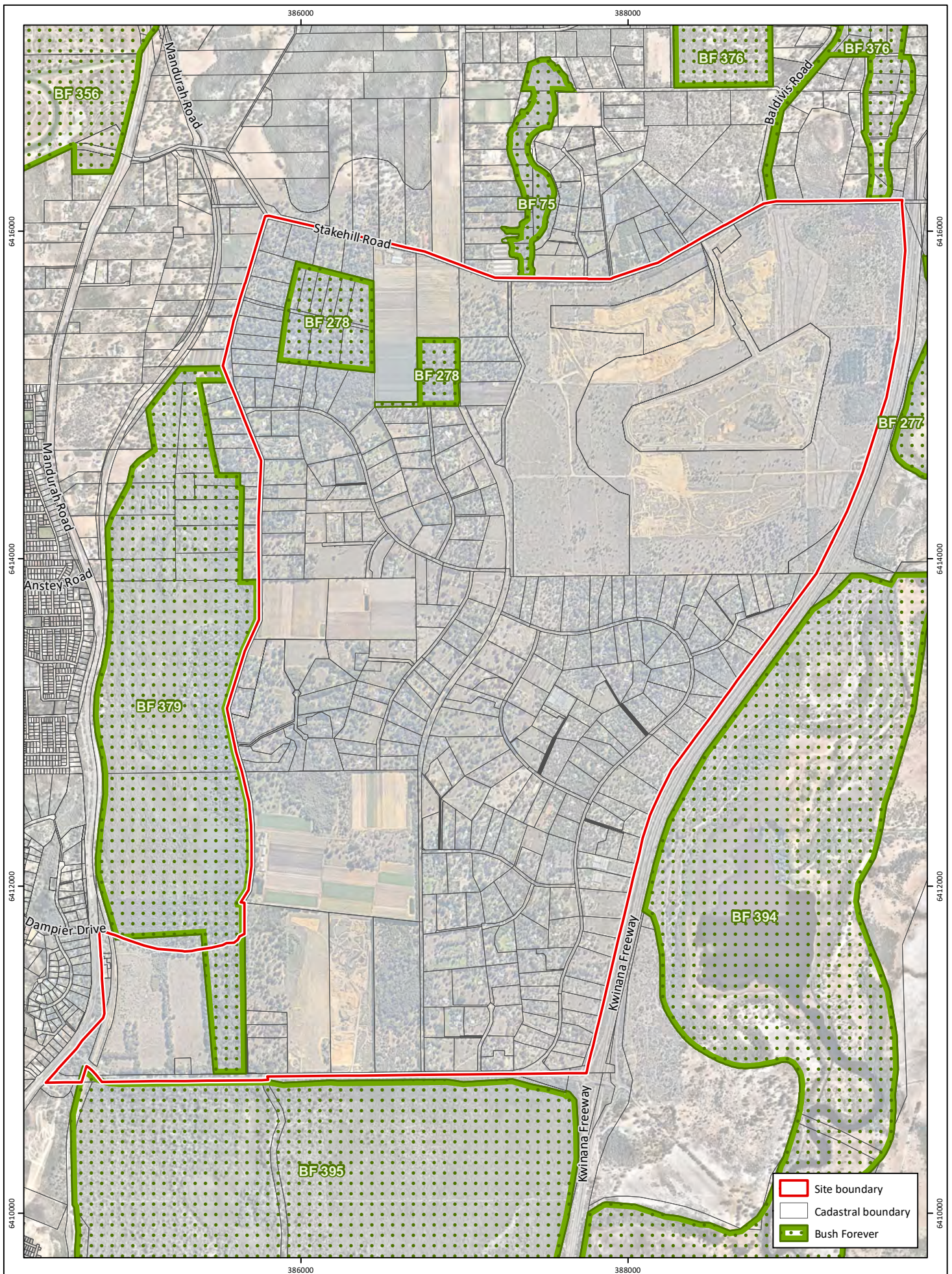


Figure 4: Bush Forever Sites

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

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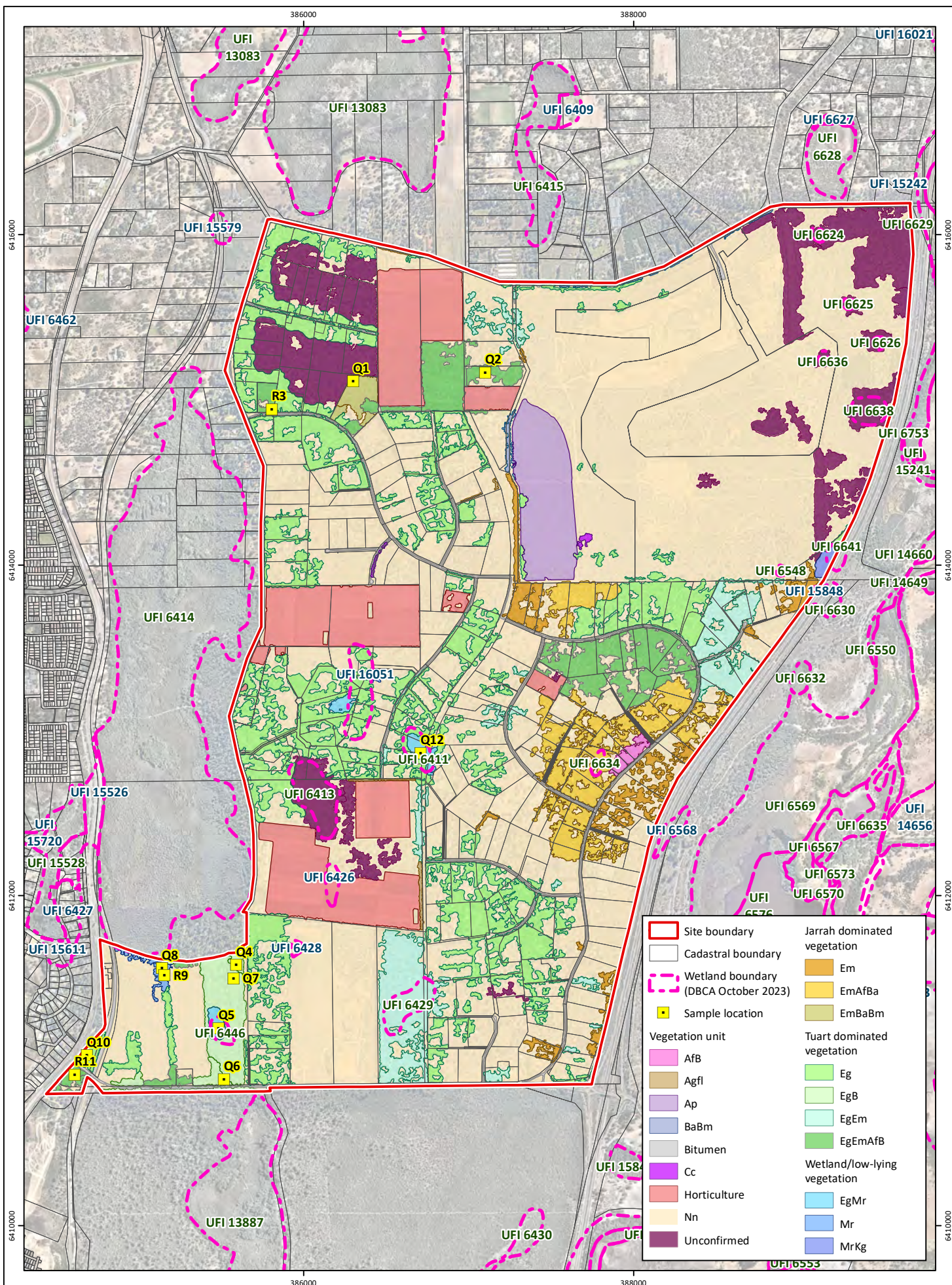


Figure 5: Vegetation Units

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

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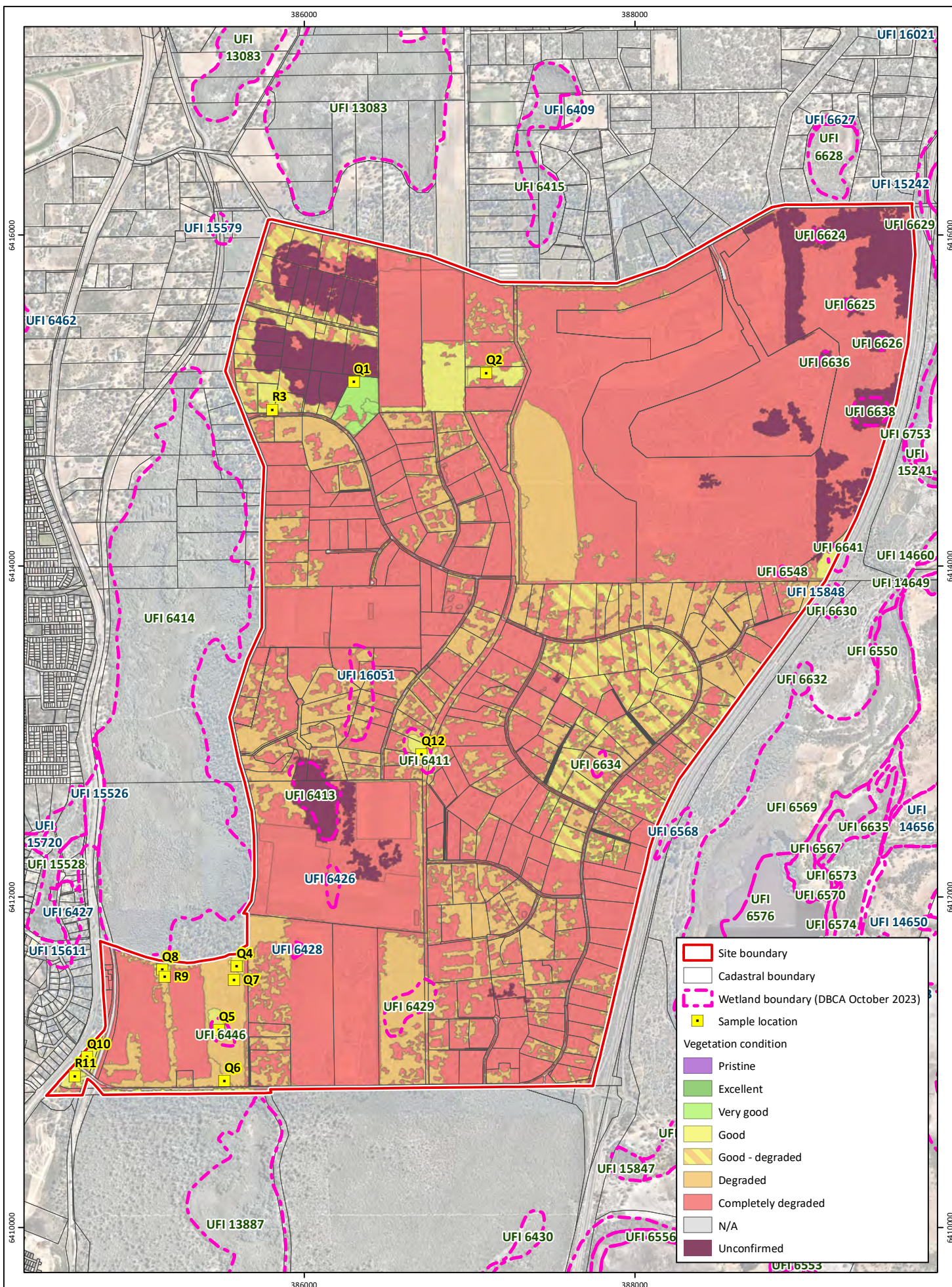


Figure 6: Vegetation Condition

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

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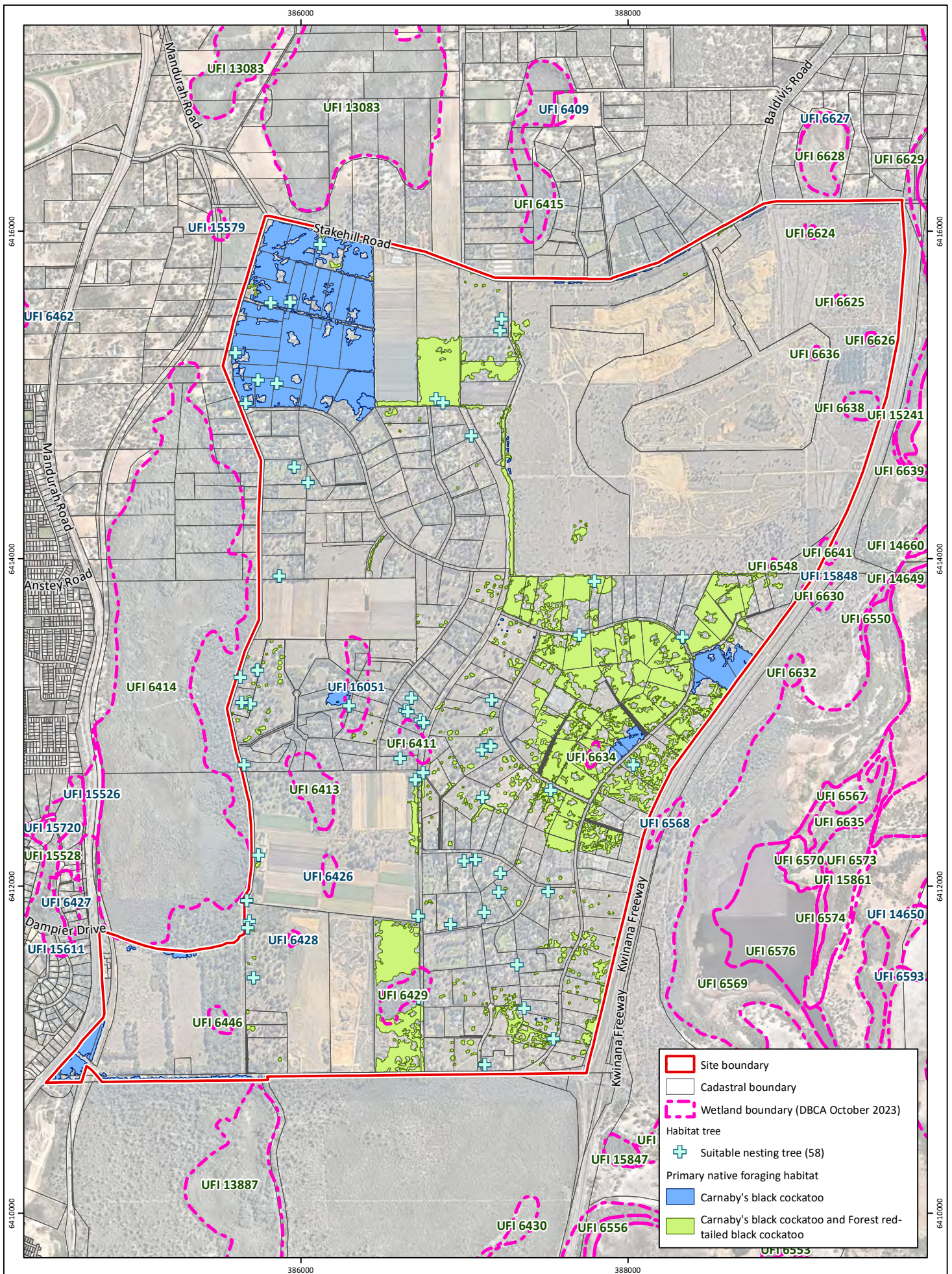


Figure 7: Black Cockatoo Values

Project: Wetland Assessment
Karnup District Structure Plan
Client: City of Rockingham

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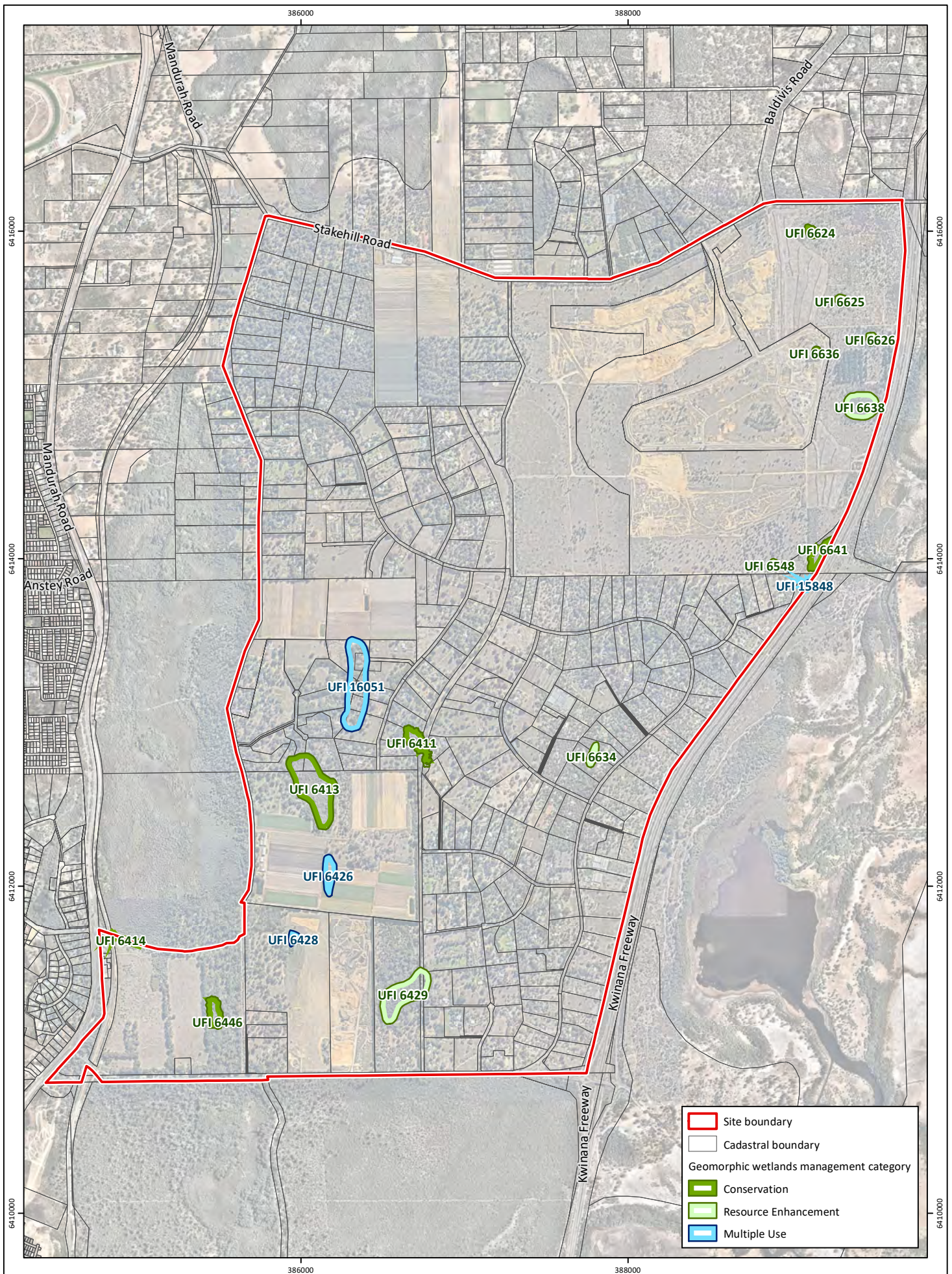


Figure 8: Proposed Geomorphic Wetlands

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

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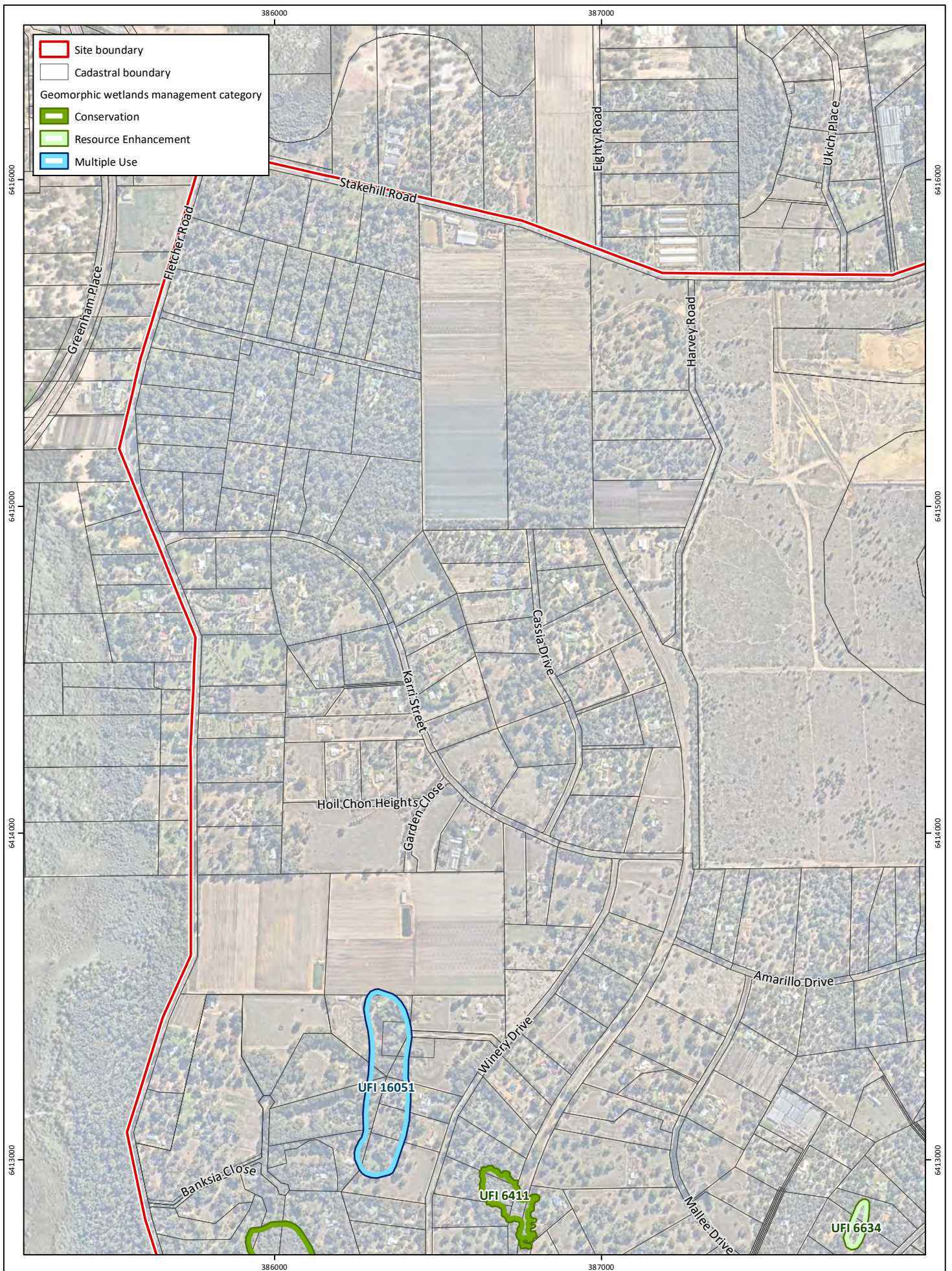


Figure 8: Proposed Geomorphic Wetlands

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

Plan Number: EP23-018(07)--F68a
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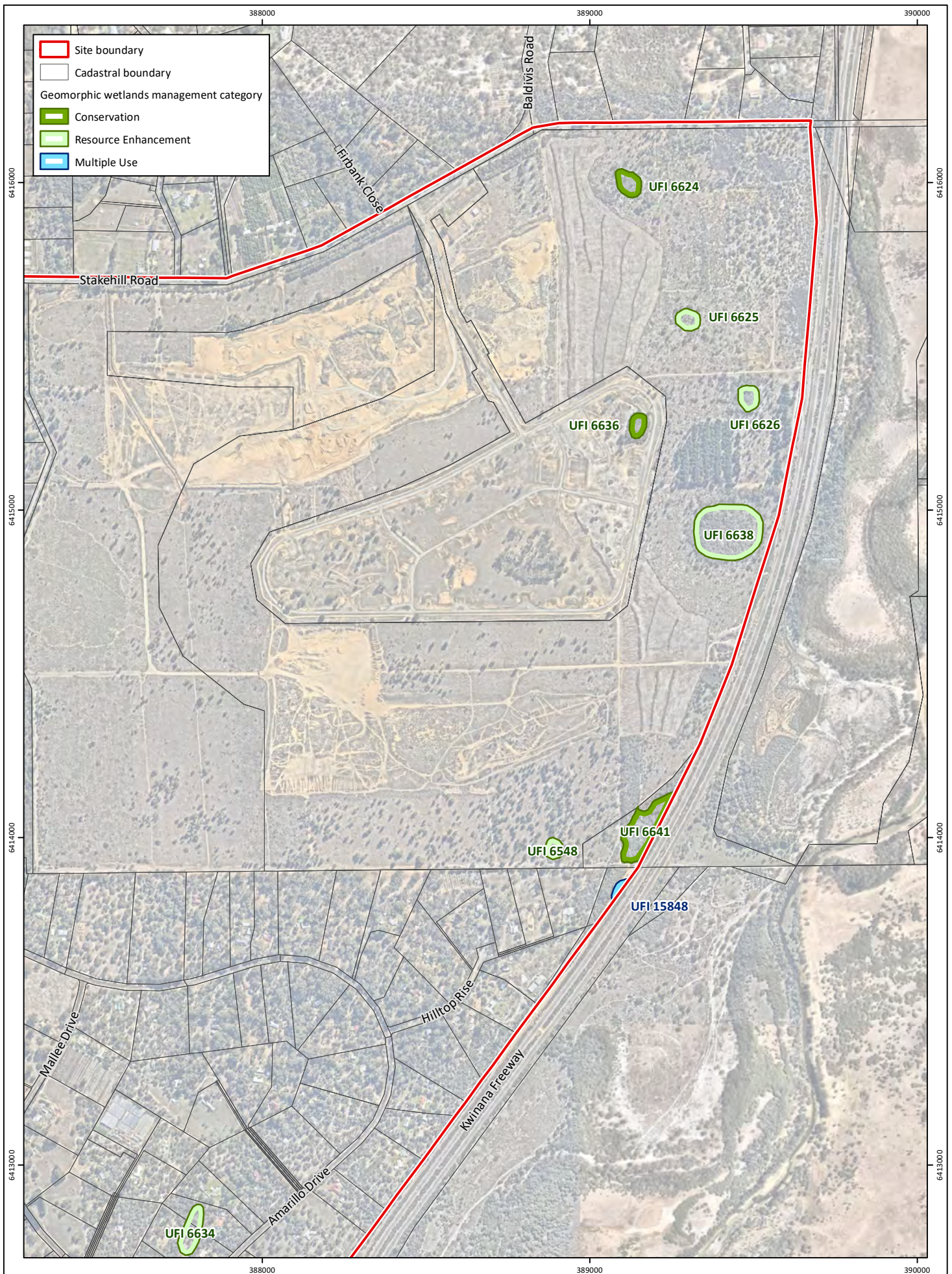


Figure 8: Proposed Geomorphic Wetlands

Project: Wetland Assessment
Karnup District Structure Plan

Client: City of Rockingham

Plan Number: EP23-018(07)--F68a
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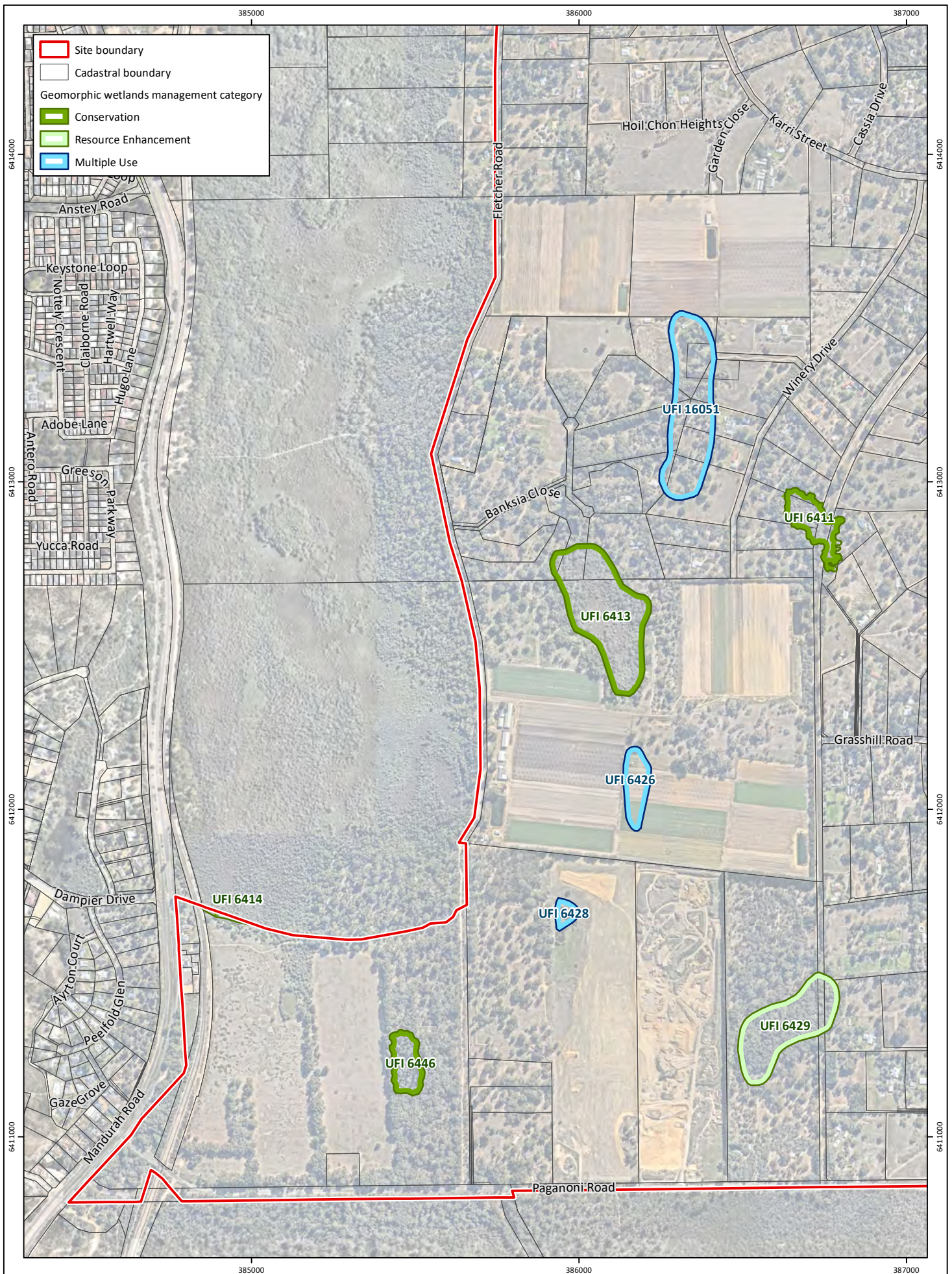


Figure 8: Proposed Geomorphic Wetlands

Project: Wetland Assessment
Karnup District Structure Plan

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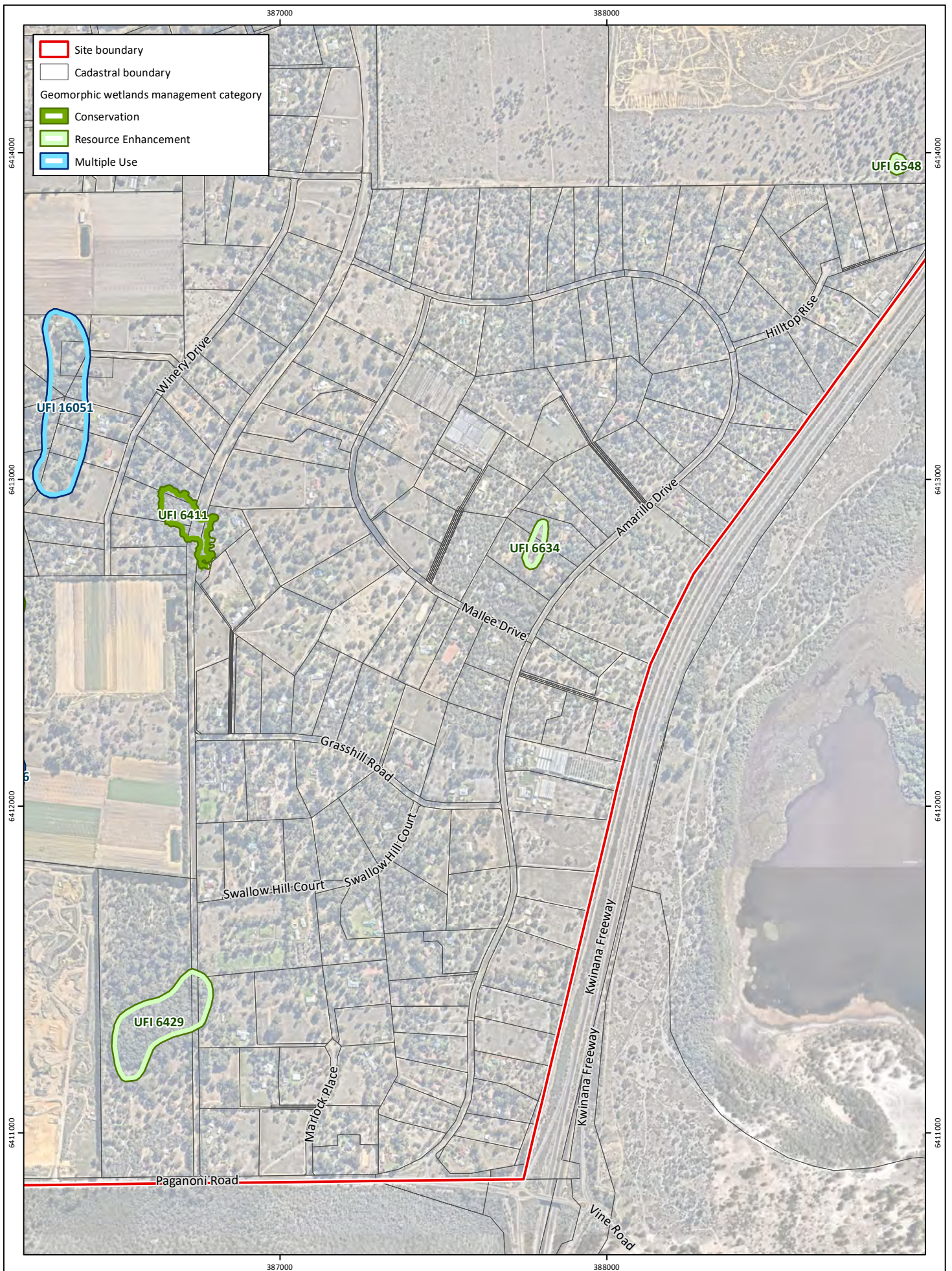


Figure 8: Proposed Geomorphic Wetlands

Project: Wetland Assessment
Karnup District Structure Plan

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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**.

Additional Background Information

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.

Additional Background Information



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).

Additional Background Information

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

Priority code	Description
P1	<p>Priority One: Poorly known ecological communities</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 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.</p>
P2	<p>Priority Two: Poorly known ecological communities</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 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.</p>
P3	<p>Priority Three: Poorly known ecological communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or;</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>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.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Priority Five: Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Additional Background Information



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.

Additional Background Information

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

Additional Background Information

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.

Additional Background Information

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

Additional Background Information



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.

Additional Background Information



References

General references

Department of Biodiversity, Conservation and Attractions (DBCA) 2017, *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.

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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 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

Wetland Details and DBCA Evaluation Forms



PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6411

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	N	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	N	
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	Y	Using proposed boundary (EgMr vegetation)
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Stake Hill CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6411 Small Swamp (Basin, Sumpland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	40.1%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	86.1%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	88.4%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Conservation category wetland
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DBCA *A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA* (December 2017)

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6446

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	Y	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	N	
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	Y	
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Stake Hill CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6446 (Basin, Dampland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	29.3%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	86.1%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	88.4%
	best representative of its type within its consanguineous suite domain.	N	no

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Conservation category wetland
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DBCA A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA (December 2017)

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6414

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	Y	Bush Forever site 379
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	Y	Glossy ibis found across the road
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	Y	No site access but likely to be
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Stake Hill CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6411 Small Swamp (Basin, Sumpland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	40.1%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	86.1%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	88.4%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Conservation category wetland
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DBCA A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA (December 2017)

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6429

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	N	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	N	
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	N	
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Stake Hill CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6429 (Basin, Dampland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	29.3%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	86.1%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	35.2%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Secondary evaluation required
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DBCA *A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA* (December 2017)

SECONDARY EVALUATION CRITERIA

CCW UFI No. 6429

Attributes / General functions/ criteria values		Number	Criteria	Y/N	Score if true	Score
Geomorphology	Representativeness	1	≤20% of wetlands of the same type are assigned Conservation on the Swan Coastal Plain by area.	N	H	
		2	≤20% of wetlands in the same consanguineous suite are assigned Conservation by area.	N	H	
		3	≤20% of wetlands of the same type in the same consanguineous suite are assigned Conservation by area.	N	H	
		4	The wetland is outstanding in some geomorphic aspect, for example size, origin, height relative to sea level, depth, age.	N	H	
	Naturalness	5	Alteration to the wetland's geomorphology by % area: < 25% altered (=H) 25-75% altered (=I) > 75% altered. (=L)	Y	H I L	I
	Scarcity	6	The wetland exhibits unusual geomorphology or unusual internal geomorphic features compared to other wetlands of the same type in the consanguineous suite.	N	H	
		7	The wetland is the best example of its type in its consanguineous suite.	N	H	
Wetland processes	Representativeness	8	The wetland is an important component of the natural hydrological cycle providing natural functions (e.g. flood protection and recharge/discharge). The wetland's vegetation, geomorphology, hydrology or sediments are modified; however, the wetland is still a component of the hydrological cycle providing natural and artificial functions (e.g. flood remediation, recharge/discharge and hydrological storage). The wetland's vegetation, geomorphology, hydrology or sediments are modified to the extent that the wetlands hydrological functions are artificial such as storage, or the wetland has been disconnected from the natural hydrological cycle and no longer provides natural attributes and functions.	Y	H I L	I
		9	The wetland supports a representative process (e.g. wetland process typical of the wetland's hydrological setting, sediment accretionary process typical of the wetland's geomorphic setting or hydrochemical process typical of the wetland's geological setting).	N	H	
	Naturalness	10	The wetland is not subject to altered wetland processes or, is subject to altered wetland processes and the wetland's natural attributes and functions are maintained. The wetland is subject to altered wetland processes and the wetland's natural attributes and functions have been changed; however, they have the potential to be rehabilitated.	Y	H I	I

High weed cover and loss of biological diversity

			The wetland is subject to altered wetland processes to the extent that the wetland no longer supports natural attributes and functions.		L		
	Scarcity	11	The wetland exhibits unusual processes (e.g. hydrological, sedimentological, chemical, biological) compared to other wetlands of the same type in the consanguineous suite.	N	H		
Linkages	Representativeness	12	The wetland is a hydrological link in a larger or more complex and intact system.	N	H		
	Naturalness	13	The wetland is part of a continuous ecological linkage or wildlife corridor, or a regionally significant ecological linkage or wildlife corridor connecting bushland or wetland areas.		H		Vegetation attached to Paganoni swamp which is part of a continuous linkage/corridor
			The wetland is part of a fragmented ecological linkage or wildlife corridor.	Y	I	I	
			The wetland is disturbed and isolated, surrounded by either a built or highly disturbed environment with no nearby native vegetation or waterways to support an intact or fragmented ecological linkage or wildlife corridor.		L		
	Scarcity	14	The wetland has unusual hydrological, hydrochemical or ecological linkages with adjacent wetland or bushland.	N	H		
Habitats	Representativeness	15	The wetland is isolated from other undisturbed wetlands or bushland and as a result, maintains important ecological or genetic fauna or flora diversity within its consanguineous suite domain.	N	H		
		16	The wetland contains evidence of surface water or groundwater expression that is vital for maintaining regionally significant populations of native aquatic or terrestrial flora or fauna.	N	H		
			The wetland contains evidence of surface water or groundwater expression that is important for maintaining populations of native aquatic or terrestrial flora or fauna.	Y	I	I	
		17	The wetland provides a nursery for native fauna populations, or maintains fauna populations at a vulnerable stage of their life cycle.	Y	H	H	Conservative estimate as whole wetland has not been visited
	Naturalness	18	The wetland supports habitats that are unaltered or the wetland has been altered and its natural habitats are maintained.		H		Degraded understorey
			The wetland supports habitats that are altered; however, the habitats are still identifiable and have the potential to be rehabilitated. The wetland is altered and as a result is no longer supporting natural habitats which can be rehabilitated.	Y	I	I	
	Scarcity	19	The wetland supports habitats that are unusual compared to other wetlands of the same type on the Swan Coastal Plain.	N	H		
		20	The wetland's current diversity of native flora is similar to what would be expected in an unaltered state.		H		Conservative estimate as whole wetland has not been visited
			The wetland supports a reduced diversity of native flora due to human induced disturbances.	Y	I	I	

Flora	Representativeness		The wetland supports a significantly reduced diversity of native flora species due to human induced disturbances.		L		Karrakatta - 12.4%
		21	The wetland is identified in a vegetation complex (Hedde et al. 1980) which is represented by: ≤30% of the pre-European extent 30-50% of the pre-European extent.		H I		
	Naturalness	22	Using the vegetation condition scale outlined in Appendix B, the wetland's vegetation condition by area is: ≥ 75% Good, Very Good, Excellent or Pristine 25-75% Good, Very Good, Excellent or Pristine < 25% Good, Very Good, Excellent or Pristine.	Y	H I L	L	Preliminary observation
		23	The wetland or ≥ 50% of the wetland boundary is surrounded by land dominated by remnant native vegetation. The wetland or 10-50% of the wetland boundary is surrounded by land dominated by remnant native vegetation. The wetland or < 10% of the wetland boundary is surrounded by land dominated by remnant native vegetation.	Y	H I L	I	
	Scarcity	24	The wetland supports an occurrence of Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora, or an occurrence of 3 or more significant flora taxa.	N	H		Conservative estimate as whole wetland has not been visited
		25	The wetland is likely to support Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora; however, the occurrence cannot be located or its habitat has been altered and is no longer in a natural state.	Y	I	I	
		26	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	N	H		
		27	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community.	N	I		
Fauna	Representativeness	28	The wetland is an ecological refuge for regionally significant fauna species or fauna assemblages. The wetland has the potential to be an ecological refuge but is disturbed and its attributes and functions require rehabilitation.	N Y	H I	I	CBC secondary and primary native
		29	The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regionally significant native fauna. The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regional or local fauna but only in association with other surrounding natural areas.	Y	H I	H	
	Naturalness	30	The wetland's current diversity of native fauna is similar to what would be expected in an unaltered state, or the wetland supports diverse fauna compared to other wetlands of the same type. The wetland supports a reduced diversity of fauna compared to other wetlands of the same type.	Y	H I	I	

	Scarcity		The wetland supports limited attributes and functions for fauna populations due to human induced disturbances.		L		CBC secondary and primary native Potentially quenda or blue billed duck - conservative estimate
		31	The wetland is likely to support a breeding, roosting, refuge or feeding site for populations of fauna listed by the Commonwealth (e.g. EPBC Act 1999, JAMBA, CAMBA, RoKAMBA Agreements) or the State (e.g. Threatened or Specially Protected Fauna listed under the Wildlife Conservation Act 1950).	Y	H	H	
		32	The wetland supports a breeding, roosting, refuge or feeding site for Priority 1, Priority 2, Priority 3 or Priority 4 fauna.	Y	H	H	
		33	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	N	H		
		34	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community or a breeding, roosting, refuge or feeding site for significant fauna.	N	I		
Cultural	Representativeness	35	The wetland or its immediate surrounds is identified for its natural values on a national or State heritage list or the wetland supports other known regional heritage values.	N	H		
		36	The wetland or its immediate surrounds is identified for its natural values on a municipal heritage list or the wetland supports other known local heritage values.	N	I		
		37	The wetland or its immediate surrounds is identified on a national, State or local list or register for its Aboriginal cultural value (e.g. Department of Aboriginal Affairs register).	N	H		
		38	The wetland is important to the local community either nationally or state wide for its natural values.	N	H		
		39	The wetland is or has the potential to be a site for public or private based recreation.	N	I		
		40	<p>The wetland is the subject of a recognised ecological restoration / rehabilitation project by a community group, landowner or land manager that aims to improve the wetland's natural, heritage, cultural or social values</p> <p>The wetland is likely to support heritage, cultural or social values; however, the value cannot be confirmed or the value has been disturbed and are no longer as important or significant.</p> <p>The wetland did support heritage, cultural or social values; however, these have been significantly disturbed and are no longer important or the values have been removed.</p>	Y	I	I	
Scientific and educational	Representativeness	41	<p>The wetland supports known important teaching or research characteristics and for this reason is an existing or potential education or research site. Note, the wetland must still support the relevant teaching or research characteristics.</p> <p>The wetland has the potential to be used as a study or research site.</p>	N	H		
			The wetland supports known scientific, geoheritage or geoconservation values.	N	I		
				N	H		

DBCA 2017

A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western .

SECONDARY EVALUATION TALLY

CCW UFI No. 6429

Attributes / functions / values	Scores		
	High	Intermediate	Low
Geomorphology	0	1	0
Wetland processes	0	2	0
Linkages	0	1	0
Habitats	1	2	0
Flora	0	3	1
Fauna	3	2	0
Cultural	0	1	0
Scientific and educational	0	0	0

Max of High + Intermediate 3

Total score	4	12	1
	12		
Defining attributes/functions/values	Flora		
Applicable management category	Rehabilitation potential		

Applicable management category	Rehabilitation potential
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Updated from DBCA 2017

A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western Australia

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6634

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	N	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	Y	CBC and FRTBC primary native foraging habitat
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	N	
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Gnangara CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6634 (Basin, Dampland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	29.3%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	59.2%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	28.9%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Conservation category wetland
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DBCA *A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA* (December 2017)

SECONDARY EVALUATION CRITERIA

CCW UFI No. 6634

Attributes / General functions/ criteria values		Number	Criteria	Y/N	Score if true	Score
Geomorphology	Representativeness	1	≤20% of wetlands of the same type are assigned Conservation on the Swan Coastal Plain by area.	N	H	29.3%
		2	≤20% of wetlands in the same consanguineous suite are assigned Conservation by area.	N	H	59.2%
		3	≤20% of wetlands of the same type in the same consanguineous suite are assigned Conservation by area.	N	H	28.9%
		4	The wetland is outstanding in some geomorphic aspect, for example size, origin, height relative to sea level, depth, age.	N	H	
	Naturalness	5	Alteration to the wetland's geomorphology by % area: < 25% altered (=H) 25-75% altered (=I) > 75% altered. (=L)	Y	H I L	L
	Scarcity	6	The wetland exhibits unusual geomorphology or unusual internal geomorphic features compared to other wetlands of the same type in the consanguineous suite.	N	H	
		7	The wetland is the best example of its type in its consanguineous suite.	N	H	
Wetland processes	Representativeness	8	The wetland is an important component of the natural hydrological cycle providing natural functions (e.g. flood protection and recharge/discharge). The wetland's vegetation, geomorphology, hydrology or sediments are modified; however, the wetland is still a component of the hydrological cycle providing natural and artificial functions (e.g. flood remediation, recharge/discharge and hydrological storage). The wetland's vegetation, geomorphology, hydrology or sediments are modified to the extent that the wetlands hydrological functions are artificial such as storage, or the wetland has been disconnected from the natural hydrological cycle and no longer provides natural attributes and functions.	N N Y	H I L	L
		9	The wetland supports a representative process (e.g. wetland process typical of the wetland's hydrological setting, sediment accretionary process typical of the wetland's geomorphic setting or hydrochemical process typical of the wetland's geological setting).	N	H	

	Naturalness	10	<p>The wetland is not subject to altered wetland processes or, is subject to altered wetland processes and the wetland's natural attributes and functions are maintained.</p> <p>The wetland is subject to altered wetland processes and the wetland's natural attributes and functions have been changed; however, they have the potential to be rehabilitated.</p> <p>The wetland is subject to altered wetland processes to the extent that the wetland no longer supports natural attributes and functions.</p>	N	H			Conservative as full wetland not accessed
	Scarcity	11	The wetland exhibits unusual processes (e.g. hydrological, sedimentological, chemical, biological) compared to other wetlands of the same type in the consanguineous suite.	N	H			
	Representative-ness	12	The wetland is a hydrological link in a larger or more complex and intact system.	N	H			
Linkages	Naturalness	13	<p>The wetland is part of a continuous ecological linkage or wildlife corridor, or a regionally significant ecological linkage or wildlife corridor connecting bushland or wetland areas.</p> <p>The wetland is part of a fragmented ecological linkage or wildlife corridor.</p> <p>The wetland is disturbed and isolated, surrounded by either a built or highly disturbed environment with no nearby native vegetation or waterways to support an intact or fragmented ecological linkage or wildlife corridor.</p>	N	H			
	Scarcity	14	The wetland has unusual hydrological, hydrochemical or ecological linkages with adjacent wetland or bushland.	N	H			
	Representative-ness	15	The wetland is isolated from other undisturbed wetlands or bushland and as a result, maintains important ecological or genetic fauna or flora diversity within its consanguineous suite domain.	N	H			
Habitats	Representative-ness	16	<p>The wetland contains evidence of surface water or groundwater expression that is vital for maintaining regionally significant populations of native aquatic or terrestrial flora or fauna.</p> <p>The wetland contains evidence of surface water or groundwater expression that is important for maintaining populations of native aquatic or terrestrial flora or fauna.</p>	N	H			
		17	The wetland provides a nursery for native fauna populations, or maintains fauna populations at a vulnerable stage of their life cycle.	N	H			

Flora	Naturalness	18	<p>The wetland supports habitats that are unaltered or the wetland has been altered and its natural habitats are maintained.</p> <p>The wetland supports habitats that are altered; however, the habitats are still identifiable and have the potential to be rehabilitated.</p> <p>The wetland is altered and as a result is no longer supporting natural habitats which can be rehabilitated.</p>	N	H		Conservative as full wetland not accessed
	Scarcity	19	The wetland supports habitats that are unusual compared to other wetlands of the same type on the Swan Coastal Plain.	N	H		
	Representative-ness	20	The wetland's current diversity of native flora is similar to what would be expected in an unaltered state.	N	H		Serpentine River (9.8%)
			The wetland supports a reduced diversity of native flora due to human induced disturbances.	N	I		
			The wetland supports a significantly reduced diversity of native flora species due to human induced disturbances.	Y	L	L	
		21	The wetland is identified in a vegetation complex (Heddle et al. 1980) which is represented by:				
			≤30% of the pre-European extent	Y	H	H	
			30-50% of the pre-European extent.	N	I		
	Naturalness	22	Using the vegetation condition scale outlined in Appendix B, the wetland's vegetation condition by area is: ≥ 75% Good, Very Good, Excellent or Pristine		H		Conservative as full wetland not accessed
			25-75% Good, Very Good, Excellent or Pristine	Y	I	I	
			< 25% Good, Very Good, Excellent or Pristine.		L		
		23	<p>The wetland or ≥ 50% of the wetland boundary is surrounded by land dominated by remnant native vegetation.</p> <p>The wetland or 10-50% of the wetland boundary is surrounded by land dominated by remnant native vegetation.</p>	Y	I	I	

			The wetland or < 10% of the wetland boundary is surrounded by land dominated by remnant native vegetation.		L		
	Scarcity	24	The wetland supports an occurrence of Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora, or an occurrence of 3 or more significant flora taxa.	N	H		
		25	The wetland is likely to support Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora; however, the occurrence cannot be located or its habitat has been altered and is no longer in a natural state.	N	I		
		26	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	N	H		
		27	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community.	N	I		
	Representative-ness	28	The wetland is an ecological refuge for regionally significant fauna species or fauna assemblages. The wetland has the potential to be an ecological refuge but is disturbed and its attributes and functions require rehabilitation.	N N	H I		
		29	The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regionally significant native fauna. The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regional or local fauna but only in association with other surrounding natural areas.	Y N	H I	H	Primary native foraging habitat for CBC and FRTBC
	Naturalness	30	The wetland's current diversity of native fauna is similar to what would be expected in an unaltered state, or the wetland supports diverse fauna compared to other wetlands of the same type. The wetland supports a reduced diversity of fauna compared to other wetlands of the same type.	N N	H I		
			The wetland supports limited attributes and functions for fauna populations due to human induced disturbances.	Y	L	L	

Fauna	Scarcity	31	The wetland is likely to support a breeding, roosting, refuge or feeding site for populations of fauna listed by the Commonwealth (e.g. EPBC Act 1999, JAMBA, CAMBA, RoKAMBA Agreements) or the State (e.g. Threatened or Specially Protected Fauna listed under the Wildlife Conservation Act 1950).	N	H		One potential BC nesting tree occurs but no confirmed breeding
		32	The wetland supports a breeding, roosting, refuge or feeding site for Priority 1, Priority 2, Priority 3 or Priority 4 fauna.	N	H		
		33	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	Y	H	H	May comprise Banksia woodlands of the SCP TEC
		34	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community or a breeding, roosting, refuge or feeding site for significant fauna.	Y	I	I	May comprise Banksia woodlands of the SCP PEC
		Cultural	Representative-ness	35	The wetland or its immediate surrounds is identified for its natural values on a national or State heritage list or the wetland supports other known regional heritage values.	N	H
36	The wetland or its immediate surrounds is identified for its natural values on a municipal heritage list or the wetland supports other known local heritage values.			N	I		
37	The wetland or its immediate surrounds is identified on a national, State or local list or register for its Aboriginal cultural value (e.g. Department of Aboriginal Affairs register).			N	H		
38	The wetland is important to the local community either nationally or state wide for its natural values.			N	H		
39	The wetland is or has the potential to be a site for public or private based recreation.			N	I		

		40	<p>The wetland is the subject of a recognised ecological restoration / rehabilitation project by a community group, landowner or land manager that aims to improve the wetland's natural, heritage, cultural or social values</p> <p>The wetland is likely to support heritage, cultural or social values; however, the value cannot be confirmed or the value has been disturbed and are no longer as important or significant.</p> <p>The wetland did support heritage, cultural or social values; however, these have been significantly disturbed and are no longer important or the values have been removed.</p>	N N N	H I L	
Scientific and educational	Representativeness	41	<p>The wetland supports known important teaching or research characteristics and for this reason is an existing or potential education or research site. Note, the wetland must still support the relevant teaching or research characteristics.</p> <p>The wetland has the potential to be used as a study or research site.</p>	N N	H I	
			The wetland supports known scientific, geoheritage or geoconservation values.	N	H	

DBCA 2017

A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western Australia

SECONDARY EVALUATION TALLY

CCW UFI No. 6634

Attributes / functions / values	Scores		
	High	Intermediate	Low
Geomorphology	0	0	1
Wetland processes	0	1	1
Linkages	0	1	0
Habitats	0	1	0
Flora	1	2	1
Fauna	2	1	1
Cultural	0	0	0
Scientific and educational	0	0	0
Max of High + Intermediate 2			
Total score	3	6	4
	6		
Defining attributes/functions/values	Flora		
Applicable management category	Rehabilitation potential		

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 6641

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area s</i>) or equivalent.	N	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	N	
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	Y	As per proposed wetland boundary
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Gnangara CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6641 (Basin, Sumpland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	40.1%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	59.2%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	63.8%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Conservation category wetland
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DBCA A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA (December 2017)

PRELIMINARY EVALUATION CRITERIA

CCW UFI No. 16051

No.	Criteria	Y/N	
1	The wetland is currently recognised as internationally or nationally significant for its natural values. Lists/registers include:		
	The Ramsar Convention on Wetlands	N	
	State government endorsed candidate sites for the Ramsar Convention on Wetlands	N	
	Directory of Important Wetlands in Australia	N	
	National Heritage List	N	
	Or equivalent.		
2	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is identified as significant for its natural values under one or more of the following:		
	<i>Conservation Reserves for Western Australia Systems 1, 2, 3, 5</i>	N	
	<i>Conservation Reserves for Western Australia, The Darling System – System 6</i>	N	
	<i>A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton – Walpole Region</i>	N	
	<i>The Environmental Significance of Wetlands in the Perth to Bunbury Region</i>	N	
	<i>Bush Forever, Swan Bioplan</i> (including <i>Peel Regionally Significant Natural Area</i> s) or equivalent.	N	
3	The wetland supports a breeding, roosting, or refuge site or a critical feeding site for populations of fauna listed by the Australian Government (for example, <i>Environment Protection and Biodiversity Conservation Act 1999</i> , migratory bird agreements such as JAMBA, CAMBA and RoKAMBA) or the State (for example, threatened and specially protected fauna listed under the <i>Wildlife Conservation Act 1950</i>).	N	
4	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and supports one or more of the following:		
	An occurrence of a Threatened Ecological Community	N	
	A confirmed occurrence of a Priority 1 or Priority 2 Ecological Community	N	
	A confirmed occurrence of a Declared Rare (Threatened) flora species.	N	
5	Equal to or greater than 90% of the wetland supports vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B.	N	
6	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and is known to support internationally, nationally or state-wide scientific values including geoheritage and geoconservation.	N	Stake Hill CS
7	The wetland is spatially dominated by vegetation in a good or better condition using the vegetation condition scale outlined in Appendix B and meets one of the following:		UFI 6411 Small Swamp (Basin, Sumpland)
	≤10% of wetlands of the same type are assigned Conservation management category within the Swan Coastal Plain (by area)	N	40.1%
	≤10% of all wetlands in the same consanguineous suite are assigned Conservation management category (by area)	N	86.1%
	≤10% of wetlands of the same type in its consanguineous suite are assigned Conservation management category (by area)	N	88.4%
	best representative of its type within its consanguineous suite domain.	N	No

Note: If a wetland does not satisfy any of the above preliminary evaluation criteria or, does satisfy the preliminary evaluation criteria but is not considered to be commensurate with the values of a Conservation management category wetland then a secondary evaluation including a full site assessment is required. Refer to Step 3 and 4 of the evaluation procedure which indicates the process for conducting a secondary evaluation.

Result	Secondary evaluation required
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DBCA A methodology for the evaluation of wetlands on the Swan Coastal Plain, WA (December 2017)

SECONDARY EVALUATION CRITERIA

CCW UFI No. 16051

Attributes / General functions/ criteria values		Number	Criteria	Y/N	Score if true	Score
Geomorphology	Representativeness	1	≤20% of wetlands of the same type are assigned Conservation on the Swan Coastal Plain by area.	N	H	
		2	≤20% of wetlands in the same consanguineous suite are assigned Conservation by area.	N	H	
		3	≤20% of wetlands of the same type in the same consanguineous suite are assigned Conservation by area.	N	H	
		4	The wetland is outstanding in some geomorphic aspect, for example size, origin, height relative to sea level, depth, age.	N	H	
	Naturalness	5	Alteration to the wetland's geomorphology by % area: < 25% altered (=H) 25-75% altered (=I) > 75% altered. (=L)	Y	H I L	L
	Scarcity	6	The wetland exhibits unusual geomorphology or unusual internal geomorphic features compared to other wetlands of the same type in the consanguineous suite.	N	H	
		7	The wetland is the best example of its type in its consanguineous suite.	N	H	
Wetland processes	Representativeness	8	The wetland is an important component of the natural hydrological cycle providing natural functions (e.g. flood protection and recharge/discharge). The wetland's vegetation, geomorphology, hydrology or sediments are modified; however, the wetland is still a component of the hydrological cycle providing natural and artificial functions (e.g. flood remediation, recharge/discharge and hydrological storage). The wetland's vegetation, geomorphology, hydrology or sediments are modified to the extent that the wetland's hydrological functions are artificial such as storage, or the wetland has been disconnected from the natural hydrological cycle and no longer provides natural attributes and functions.	Y	H I L	L
		9	The wetland supports a representative process (e.g. wetland process typical of the wetland's hydrological setting, sediment accretionary process typical of the wetland's geomorphic setting or hydrochemical process typical of the wetland's geological setting).	N	H	
	Naturalness	10	The wetland is not subject to altered wetland processes or, is subject to altered wetland processes and the wetland's natural attributes and functions are maintained. The wetland is subject to altered wetland processes and the wetland's natural attributes and functions have been changed; however, they have the potential to be rehabilitated.		H I	

Most of the wetland altered

			The wetland is subject to altered wetland processes to the extent that the wetland no longer supports natural attributes and functions.	Y	L	L	Reduced to dams and scattered Eg trees
	Scarcity	11	The wetland exhibits unusual processes (e.g. hydrological, sedimentological, chemical, biological) compared to other wetlands of the same type in the consanguineous suite.	N	H		
Linkages	Representativeness	12	The wetland is a hydrological link in a larger or more complex and intact system.	N	H		
	Naturalness	13	The wetland is part of a continuous ecological linkage or wildlife corridor, or a regionally significant ecological linkage or wildlife corridor connecting bushland or wetland areas. The wetland is part of a fragmented ecological linkage or wildlife corridor. The wetland is disturbed and isolated, surrounded by either a built or highly disturbed environment with no nearby native vegetation or waterways to support an intact or fragmented ecological linkage or wildlife corridor.	Y	H I L	L	
	Scarcity	14	The wetland has unusual hydrological, hydrochemical or ecological linkages with adjacent wetland or bushland.	N	H		
Habitats	Representativeness	15	The wetland is isolated from other undisturbed wetlands or bushland and as a result, maintains important ecological or genetic fauna or flora diversity within its consanguineous suite domain.	N	H		
		16	The wetland contains evidence of surface water or groundwater expression that is vital for maintaining regionally significant populations of native aquatic or terrestrial flora or fauna.	N	H		
			The wetland contains evidence of surface water or groundwater expression that is important for maintaining populations of native aquatic or terrestrial flora or fauna.	Y	I	I	
		17	The wetland provides a nursery for native fauna populations, or maintains fauna populations at a vulnerable stage of their life cycle.	N	H		
	Naturalness	18	The wetland supports habitats that are unaltered or the wetland has been altered and its natural habitats are maintained. The wetland supports habitats that are altered; however, the habitats are still identifiable and have the potential to be rehabilitated. The wetland is altered and as a result is no longer supporting natural habitats which can be rehabilitated.	Y	H I L	L	
	Scarcity	19	The wetland supports habitats that are unusual compared to other wetlands of the same type on the Swan Coastal Plain.	N	H		
		20	The wetland's current diversity of native flora is similar to what would be expected in an unaltered state. The wetland supports a reduced diversity of native flora due to human induced disturbances.		H I		

Flora	Representative-ness		The wetland supports a significantly reduced diversity of native flora species due to human induced disturbances.	Y	L	L	Karrakata
		21	The wetland is identified in a vegetation complex (Hedde et al. 1980) which is represented by: ≤30% of the pre-European extent 30-50% of the pre-European extent.	Y	H I	H	
	Naturalness	22	Using the vegetation condition scale outlined in Appendix B, the wetland's vegetation condition by area is: ≥ 75% Good, Very Good, Excellent or Pristine 25-75% Good, Very Good, Excellent or Pristine < 25% Good, Very Good, Excellent or Pristine.	Y	H I L	L	
		23	The wetland or ≥ 50% of the wetland boundary is surrounded by land dominated by remnant native vegetation. The wetland or 10-50% of the wetland boundary is surrounded by land dominated by remnant native vegetation. The wetland or < 10% of the wetland boundary is surrounded by land dominated by remnant native vegetation.	Y	H I L	I	
	Scarcity	24	The wetland supports an occurrence of Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora, or an occurrence of 3 or more significant flora taxa.	N	H		
		25	The wetland is likely to support Declared Rare, Priority 1, Priority 2, Priority 3 or Priority 4 flora; however, the occurrence cannot be located or its habitat has been altered and is no longer in a natural state.	N	I		
		26	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	N	H		
		27	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community.	N	I		
	Representative-ness	28	The wetland is an ecological refuge for regionally significant fauna species or fauna assemblages. The wetland has the potential to be an ecological refuge but is disturbed and its attributes and functions require rehabilitation.	Y	H I	I	
		29	The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regionally significant native fauna. The wetland supports a permanent or seasonal feeding, breeding, roosting or watering site for regional or local fauna but only in association with other surrounding natural areas.	N N	H I		
	Naturalness	30	The wetland's current diversity of native fauna is similar to what would be expected in an unaltered state, or the wetland supports diverse fauna compared to other wetlands of the same type. The wetland supports a reduced diversity of fauna compared to other wetlands of the same type.		H I		

Fauna			The wetland supports limited attributes and functions for fauna populations due to human induced disturbances.	Y	L	L
	Scarcity	31	The wetland is likely to support a breeding, roosting, refuge or feeding site for populations of fauna listed by the Commonwealth (e.g. EPBC Act 1999, JAMBA, CAMBA, RoKAMBA Agreements) or the State (e.g. Threatened or Specially Protected Fauna listed under the Wildlife Conservation Act 1950).	N	H	
		32	The wetland supports a breeding, roosting, refuge or feeding site for Priority 1, Priority 2, Priority 3 or Priority 4 fauna.	N	H	
		33	The wetland supports an occurrence of a Threatened Ecological Community, Priority 1 or Priority 2 ecological community.	N	H	
		34	The wetland supports an occurrence of a Priority 3 or Priority 4 ecological community or a breeding, roosting, refuge or feeding site for significant fauna.	N	I	
Cultural	Representative-ness	35	The wetland or its immediate surrounds is identified for its natural values on a national or State heritage list or the wetland supports other known regional heritage values.	N	H	
		36	The wetland or its immediate surrounds is identified for its natural values on a municipal heritage list or the wetland supports other known local heritage values.	N	I	
		37	The wetland or its immediate surrounds is identified on a national, State or local list or register for its Aboriginal cultural value (e.g. Department of Aboriginal Affairs register).	N	H	
		38	The wetland is important to the local community either nationally or state wide for its natural values.	N	H	
		39	The wetland is or has the potential to be a site for public or private based recreation.	N	I	
		40	<p>The wetland is the subject of a recognised ecological restoration / rehabilitation project by a community group, landowner or land manager that aims to improve the wetland's natural, heritage, cultural or social values</p> <p>The wetland is likely to support heritage, cultural or social values; however, the value cannot be confirmed or the value has been disturbed and are no longer as important or significant.</p> <p>The wetland did support heritage, cultural or social values; however, these have been significantly disturbed and are no longer important or the values have been removed.</p>	Y	L	L
Scientific and education	Representative-ness	41	The wetland supports known important teaching or research characteristics and for this reason is an existing or potential education or research site. Note, the wetland must still support the relevant teaching or research characteristics.	N	H	

al		The wetland has the potential to be used as a study or research site.	N	I	
		The wetland supports known scientific, geoheritage or geoconservation values.	N	H	

DBCA 2017

A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western

SECONDARY EVALUATION TALLY

CCW UFI No. 16051

Attributes / functions / values	Scores		
	High	Intermediate	Low
Geomorphology	0	0	1
Wetland processes	0	0	2
Linkages	0	0	1
Habitats	0	1	1
Flora	1	1	2
Fauna	0	1	1
Cultural	0	0	1
Scientific and educational	0	0	0

Max of High + Intermediate 1

Total score	1	3	9
	9		
Defining attributes/functions/values	Habitats		
Applicable management category	Multiple use		

Applicable management category	Multiple use
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Updated from DBCA 2017

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