

### 1. The core conservation areas (and associated buffer zones) of the alluvial fan

The core conservation areas should include all of the Bush Forever sites (BFS 387, BFS 53, BFS 320, BFS 50, BFS 51); the high conservation areas identified in this survey in the MKSEA; other bushland areas identified in Perth Biodiversity Project in the area (such as the Reheboth School bushland in Kenwick Rd) that have high conservation values; areas with other values such as indigenous heritage and geoheritage sites; and the riparian zones of waterways including Yule Brook, Woodlupine Brook, Crystal Brook and Bickley Brook. All of these core areas within the alluvial fan should be resumed for conservation (if possible) and the land uses in areas that are not resumed should be strictly regulated.

The buffer areas that are designated around the core conservation areas (including foreshore reserves and undeveloped floodplains adjacent to the waterways) should be replanted and otherwise rehabilitated where necessary; they should be managed to conserve and enhance natural values. The land uses in these areas will require strict regulation. There should be no further development in these buffer areas; any incompatible land uses should be phased out, and any existing infrastructure should be gradually removed.

### 2. The ecological linkage areas between the core conservation areas

The core conservation areas of the alluvial fan should be connected into a network of ecological linkage corridors that provide connectivity between Canning River and the Darling Range. There should be no further development in these ecological linkage areas, and existing land uses that are incompatible with resource enhancement in these areas should be strictly regulated and phased out.

### 3. The remainder of the alluvial fan

Any planned development within the remainder of the alluvial fan (outside of the core conservation areas, buffer zones and linkage areas, as above) should be reviewed against carefully-constructed objectives designed to sustain the ecological processes, biodiversity, geoheritage and cultural heritage of the core conservation units.

**Table 7.1:** Summary of the conservation values found in the current survey in the MKSEA (values not currently represented in BFS 387 or BFS 53 are underlined)

Values	Description
National Significance Threatened Flora	<i>Calytrix breviseta</i> subsp. <i>breviseta</i> (Endangered), <i>Conospermum undulatum</i> (Vulnerable) and <i>Lepidosperma rostratum</i> (Endangered).
National Significance TECs	<ol style="list-style-type: none"> <li><u>Shrublands and Woodlands on Muchea Limestone of the SCP (Endangered).</u></li> <li><i>Corymbia calophylla</i> – <i>Kingia australis</i> Woodlands on Heavy Soils of the SCP (Endangered).</li> </ol>
State Significance Declared Rare & Priority Flora	<u><i>Eremophila glabra</i> subsp. <i>chlorella</i></u> (DRF, considered in this survey as eligible for Endangered or Critically Endangered under national criteria), <i>Schoenus pennisetis</i> (P1), <u><i>Lepyrodia curvescens</i> (P2)</u> , <i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564) (P2), <i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444) (P3), <u><i>Cyathochaeta teretifolia</i> (P3)</u> , <u><i>Calothamnus rupestris</i> (P4)</u> , <i>Grevillea thelemanniana</i> (P4, considered in this survey as eligible for DRF and Endangered or Vulnerable under national criteria) and <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> (P4).
State Significance TECs	<ol style="list-style-type: none"> <li>Herb-rich Saline Shrublands in Claypans (FCT 7) (Vulnerable).</li> <li>Herb-rich Shrublands in Claypans (FCT 8) (Vulnerable).</li> <li>Shrublands on Dry Clay Flats (FCT 10a) (Endangered).</li> <li><u>Eastern Banksia Woodlands (FCT 20a) (Endangered).</u></li> </ol>
Significant Vegetation of the eastern SCP	Riparian vegetation adjacent to the Yule Brook and all other native vegetation in good condition in the MKSEA.
Conservation Category Wetlands (CCW) and Resource Enhancement Wetlands (REW)	<p>There are about 70 wetland areas in the MKSEA (including six CCWs) that are currently identified under Unique Function Identifiers (UFIs) in the WA DEC SCP Wetlands Dataset. In the current survey 18 wetlands in the MKSEA were assessed as CCWs. These included the following proposed changes to the SCP Wetlands Dataset:</p> <ol style="list-style-type: none"> <li>Seven wetland areas in the MKSEA (UFIs 7635, 8050 and five areas of the extensive palusplain 14122) that are currently mapped as REWs but are recommended for CCW status in this survey;</li> <li>Another wetland (UFI 7800) that is currently MUW is recommended for CCW status in this survey; and</li> </ol>

Values	Description
	<p>3. An area at Lot 101 Victoria Rd that was mapped as upland in the SCP Wetlands Dataset but is recommended for CCW status in this survey.</p> <p>Also, in the current survey, there were 19 wetlands in the MKSEA that were assessed as REWs. These included the following proposed changes to the SCP Wetlands Dataset:</p> <ol style="list-style-type: none"> <li>1. Wetland UFIs 8047, 7645 and part of 7783 that are currently MUWs, are recommended for REW status in this survey.</li> <li>2. Parts of UFI 13362 adjacent to Yule Brook that are currently MUW were also recommended for REW status in this survey (as part of a restoration of the Yule Brook floodplain, local hydrological regime amelioration and to support catchment management objectives of the Swan-Canning River system).</li> </ol>
Ecological linkages including waterways and their buffers that connect high conservation areas (EPA, 2008) as proposed by the Bush Forever Project (Government of Western Australia, 2000) and the Perth Biodiversity Project (Del Marco <i>et al.</i> , 2004).	<ol style="list-style-type: none"> <li>1. Yule Brook - BFS 387 Greenway. The Yule Brook forms a natural ecological linkage between the Canning River Regional Park, The Greater Brixton Street Wetlands (BFS 387), Hartfield Park (BFS 320), Welshpool Road Bushland (BFS 50), the Darling Range Regional Park and the Lesmurdie Falls National Park. There is sufficient undeveloped land flanking Yule Brook west of Welshpool Rd to reserve a substantial foreshore buffer and to restore some of the Yule Brook floodplains. This will increase the connectivity of BFS 387 to Yule Brook and other reserves, maintain and restore some of the ecological processes of the alluvial fan complex that are important in maintaining long term viability of BFS 387, allow for the protection of indigenous heritage areas and support catchment management objectives of the Swan-Canning River Water Quality Improvement Plan.</li> <li>2. BFS 387 - BFS 53 Greenway. The Yule Brook - BFS 387 Greenway (as above) can also be linked, to wetlands of high conservation significance (including Muchea Limestone springs) along the interface of the Bassendean Sands and Pinjarra Plain in the MKSEA, to the Clifford Street Bushland (BFS 53), the White Road Bushland (BFS 51) and the Darling Range Regional Park. This will require the revegetation of wetland buffer zones along the interface of the dunes and the plain in Precincts 1 and 2 of the MKSEA.</li> </ol>
Significant trees and other natural resources not classed as 'bushland'	Stands of native trees or scrub with little or no native understorey such as Flooded Gum ( <i>Eucalyptus rudis</i> ), Marri ( <i>Corymbia calophylla</i> ), Modong ( <i>Melaleuca preissiana</i> ), Tuart ( <i>Eucalyptus gomphocephala</i> ), Freshwater Paperbark ( <i>Melaleuca raphiophylla</i> ) and the conifer <i>Actinostrobus pyramidalis</i> , seasonally flooded paddocks and some dams within the MKSEA, whilst not classed as 'bushland', have important ecological functions and augment regionally scarce native fauna habitat.

Within the more narrow scope of the current survey, several general recommendations resulting from the current survey are presented below, including a summary of the wetland management category changes recommended in the current survey (Table 7.2) and a full list of the conservation values found in the MKSEA study sites of the current survey and the recommendations with regard to these sites (Table 7.3). Finally, three major recommendations that sum up the conclusions of the current survey with regard to planning issues are also presented.

## 7.1 General Recommendations

### 7.1.1 Rare Flora

Very little is known about the biology or autecology of any of the Threatened Flora, Declared Rare Flora or Priority Flora of the MKSEA. The WA Department of Environment and Conservation has not formulated recovery plans for any of these taxa except for *Calytrix breviseta* subsp. *breviseta*. Currently, none of the rare flora species (except perhaps *Calytrix breviseta* subsp. *breviseta*) are monitored with regard to population size or other demographic or habitat variables. Most of the Threatened, Rare and Priority Flora found in the MKSEA in the current survey (particularly *Calytrix breviseta* subsp. *breviseta*, *Eremophila glabra* subsp. *chlorella* and *Lepidosperma rostratum*) appear to have a very precarious existence locally and regionally. The local populations of these taxa were shown to be very small in the current field survey. The desktop investigation indicated that few other populations of these taxa are still extant elsewhere on the SCP. In the absence of the essential information that is needed to characterise the habitats and define the ecological requirements of the rare flora of the area, there is high uncertainty about the current viability of this flora and the potential effects of additional development in the MKSEA. Urgent recovery efforts are currently needed to prevent the local extirpation of several of the Threatened Flora species.

The population of *Calytrix breviseta* subsp. *breviseta* in BFS 387 has been subject to some recovery efforts in BFS 387, including attempts at translocation to a nearby site in BFS 387 and weed control. However, these attempts were unsuccessful, as seen in a field inspection of the translocation site and the extant population that was conducted in the current survey.

*Eremophila glabra* subsp. *chlorella* is very close to being locally extinct. A recently recorded occurrence of this taxon in BFS 387 (Tauss, 2009) was extirpated very soon after it was reported, probably due to human intervention. The two other confirmed occurrences of this species in BFS 387 recorded by Goble-Garratt (1994) and Keighery (1983, specimen in WA Herbarium, 2009) have not been relocated for many years and are considered to be extirpated (B.J. Keighery, pers. comm., 2008). The population found in the MKSEA in the current survey was very small and could be extirpated at any time as it is unfenced and vulnerable to fire.

Similarly, there are no reliable data regarding the prevalence of *Lepidosperma rostratum* in the area or its habitat requirements. In the current survey, this sedge was recorded in very low numbers and many of the individual plants were adversely affected by the drought experienced in the area in 2006. This species appears to be particularly vulnerable to changes in the hydrological regime of the area.

Recovery plans are required for most of the rare flora of the MKSEA and BFS 387 as a preliminary assessment of the factors that may adversely affect these taxa under various scenarios for the development in the area. Urgent recovery actions, such as the collection of germplasm material as insurance against local extirpation, are needed for at least three out of the four Threatened and Rare Flora that occur in the MKSEA. As most of the Threatened and Priority Flora of the area are ground water and surface water-dependent taxa, it is very important to fully survey the populations of these taxa locally and to understand the hydrological mechanisms that maintain the wetlands they inhabit and the potential impact of development on the hydrological regime prior to implementing planning decisions. It would also be prudent to reserve some areas of degraded but undeveloped wetlands in the MKSEA to expand the area of occupation of some of these taxa. As detailed habitat data are not available for any of these taxa it is not, as yet, possible to match (site for site) the areas currently inhabited by the rare species with areas in the MKSEA that may have equivalent habitat in terms of landform, hydroperiod, soils etc. However, the broad plant habitat zones represented by the topographic zones of the alluvial fan (Figure 7) could serve as a preliminary guide to identifying suitable habitat extension zones for such rare taxa.

### 7.1.2 Vegetation of the Guildford Vegetation Complex

There are about 45.6 ha of native vegetation of the Guildford Vegetation Complex remaining in the MKSEA that are not completely degraded. All of this vegetation is of, at least, regional significance. In addition, there are numerous remnant stands of native trees and shrubs throughout the area that are also important as they assist in sustaining ecological functions and augmenting regionally scarce native fauna habitat.

The remnant native vegetation of the MKSEA and of both Bush Forever Sites (particularly BFS 387) are subject to levels of stress that are unacceptably high, given the national significance of these values. Most of the threatening processes currently operating in the area (including unauthorised vegetation clearing, burning, grazing, de-watering and filling of wetlands, general soil disturbance, the indiscriminate driving of vehicles through bushland, nutrient enrichment of waters, rubbish dumping and weed invasion) are directly attributable to landowners. There is an urgent need to publicise and enforce more actively the Native Vegetation Clearing Regulations that apply to all of the local vegetation in order to communicate to the landowners the statutory importance of this vegetation and the penalties attached to the transgression of the regulations.

Regardless of the outcomes of the current planning process with regard to the MKSEA, in order to comply with the existing provisions of the EPBC Act regarding the currently listed values in BFS 387 and BFS 53, the existing land uses within the MKSEA should be audited to determine the activities that are incompatible with the conservation of the local biodiversity, wetland values and sustainable catchment management. Existing land uses and infrastructure incompatible with this should be regulated and/or removed.

### 7.1.3 Wetlands and Hydrology

Hydrological features of high conservation significance were found in the current survey of the MKSEA that were not known previously in either the MKSEA or the Greater Brixton Street Wetlands. A number of changes to the SCP Wetlands Dataset with regard to wetland boundaries, geomorphic classification and the management categories of wetlands within the MKSEA were recommended as a result of the fine-scale ground-truthing and biological data collected in the current survey (Table 7.2; Figures 11, 12). As the alluvial fan system of the MKSEA is a complex stratigraphic and hydrological environment, a significant amount of additional information would be required, above the data provided in the current report, for preparation of any formal proposals to DEC to amend the Swan Coastal Plain Wetlands Dataset. This additional documentation should include:

1. Hydrological monitoring, at a fine scale, of the ground and surface waters across the Bassendean Sands/Pinjarra Plain boundaries in Precincts 1 and 2 and detailed topographic survey of the landforms associated with the above. This would be required to accurately delineate the wetland boundaries in these areas.
2. More detailed description of the wetland sediments and aquifers of the area and the mapping of these features in the MKSEA and in BFS 387 and BFS 53 (if appropriate). This applies particularly to the Muchea Limestone, which requires mapping so that any development does not disrupt artesian aquifers that maintain important areas of native vegetation in the MKSEA and BFS 387.
3. Field fauna studies (particularly of invertebrates) to determine the fauna conservation values and fauna habitats of the wetlands.

The predominantly biological emphasis of the current survey and the low intensity and narrow scope of the wetlands component of the above was not sufficient to adequately characterise (for the purposes of informing the planning process) the essential features of the hydrological cycle in the target area and the hydrological interactions between the MKSEA and the Greater Brixton Street Wetlands. Similarly, it is considered that, due to its broad scale and low intensity, the wetland monitoring programme commissioned by the City of Gosnells in 2009 will not provide the necessary data to answer these important questions. An appropriately designed, specialist study to characterise the hydrological processes that sustain the high conservation significance biota of the area and to develop objectives for remediating the current hydrological regime should be conducted. This study should be at a fine scale, commensurate with the scale of the stratigraphic and hydrological complexity of the area and at a similar intensity to the baseline study conducted by VCSR (2001) in BFS 387.

**Table 7.2:** Summary of wetland management category changes recommended in the current survey

UFI	Proposed management category change (and geomorphic classification)
7635	REW→CCW (palusplain/floodplain)
8050	REW→CCW (palusplain)
14122	REW→CCW (palusplain)
14122	REW→CCW (palusplain)
14122	REW→CCW (palusplain)
14122	REW→CCW (palusplain)
14122	REW→CCW (floodplain)
7800	MUW→CCW (palusplain)
8046	MUW→CCW (palusplain)
No UFI	Upland →CCW (palusplain)
7645	MUW→REW (sumpland)
7783	MUW→REW (palusplain)
8047	MUW→REW (dampland)
13362	MUW→REW (floodplain)
13362	MUW→REW (floodplain)
13362	MUW→REW (floodplain/ palusplain)
13362	MUW→REW (palusplain)
13362	MUW→REW (dampland)
13362	MUW→REW (creek)

## 7.1.4 Buffer Zones and Ecological Linkages

In the current survey, buffer zones were mapped around all areas of high conservation significance in the MKSEA. These buffers are intended to protect values (such as groundwater quality) of Conservation Category and Resource Enhancement Wetlands, improve ecological functions (such as the infiltration of run-off into groundwater) and increase the connectivity of MKSEA blocks with other remnant vegetation blocks in the MKSEA and with the nearby Bush Forever sites. Buffer zones are areas where groundwater pollution activities should be prohibited and revegetation (to the extent possible, given existing development) should be mandatory. The existing land uses within the wetland buffer zones defined in the current survey should be audited to determine any activities within them that are incompatible with the principles that apply to buffer zones (EPA, 2008). Such activities should be regulated and ultimately removed. New or additional infrastructure or developments in the buffer zones should not be permitted.

There were two ecological linkage corridors (greenways) proposed in the vicinity of the MKSEA prior to the current survey (Government of Western Australia, 2000; and Del Marco *et al.*, 2004) and these greenways are considered below with regard to the findings of the current survey.

### 1. The Yule Brook – BFS 387 Greenway

BFS 387 is part of a natural ecological linkage corridor between the Darling Range and the Canning River that was recognised by Government of Western Australia (2000). The current survey identified additional areas with high conservation values and undeveloped floodplain areas that are adjacent to Yule Brook (in Precinct 3 of the MKSEA). These additional areas should be managed as CCW or REW floodplains and linked to BFS 387 via a foreshore reserve of 50-200 m on either side of Yule Brook (between Welshpool Rd and Roe Highway) where possible.

### 2. The BFS 387 – BFS 53 Greenway

In the current survey, there were many highly significant conservation values (that are not currently represented in BFS 387) identified within Precincts 1 and 2 of the MKSEA. These values were found in bush remnants that were previously flagged by Del Marco *et al.* (2004) as locally significant and potentially requiring incorporation into an ecological linkage corridor that extended from BFS 387 to BFS 53 and hence to the Darling Range (Figure 4). Some of the high conservation areas identified in the current survey in Precinct 2 of the MKSEA should be incorporated into BFS 387. The ecological linkage corridor proposed by Del Marco *et al.* (2004) should be supported in principle and adjusted to connect areas with high conservation values of Precincts 1 and 2 to BFS 387 and BFS 53. It is particularly important to link the Muchea Limestone, spring-fed, CCW wetlands along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 to each other and to BFS 387 and BFS 53.

In addition to the ecological linkage benefits, the revegetation of the currently degraded areas in the two ecological linkage corridors referred to above (the Yule Brook Greenway and the BFS 387 to BFS 53 Greenway), the revegetation of buffer zones around CCWs and REWs and the revegetation of all road verges in the MKSEA with local provenance native vegetation would provide substantial environmental and aesthetic benefits to the Maddington and Kenwick area.

## 7.2 Major Recommendations

Three major recommendations with regard to planning and development in the MKSEA are listed below.

### 7.2.1 Recommendation 1

Given the significant conservation values within the proposed MKSEA and in the adjacent wetlands listed in the EPBC Act (and the potential for these values to be adversely impacted by the proposal), the City of Gosnells is advised of its obligation to refer the proposal to re-zone and develop these rural lands to:



- The Federal Department of Environment, Water, Heritage and the Arts ( DEWHA) under the statutory requirements of the Federal Environmental Protection and Biodiversity Conservation Act, 1999; and
- The Western Australian Environmental Protection Authority under the statutory requirements of the Western Australian Environmental Protection Act, 1986.

### 7.2.2 Recommendation 2

The City of Gosnells is advised that further detailed studies are required to understand the hydrogeology of the highly water-dependent ecosystems of the MKSEA and the Greater Brixton Street Wetlands and to provide the data required to remediate the hydrological regime of the area and, in general, for ecologically-compatible planning.

Decision making in the MKSEA should be carried out in accordance with a comprehensive plan based on the above in order to conserve, restore and manage sustainably the natural and cultural heritage of the remaining core conservation units of the alluvial fan complex of Kenwick, Wattle Grove and Maddington (that includes the Bush Forever sites, the MKSEA, Yule Brook and any other areas of high conservation significance in this alluvial fan) and the associated buffer zones and ecological linkage areas.

This plan and the objectives and methods necessary to manage the alluvial fan complex should be developed by a scientific panel in consultation with various stakeholders (including the City of Gosnells, Federal Department of Environment, Water, Heritage and the Arts, Western Australian Department of Environment and Conservation, University of Western Australia, Kings Park, Shire of Kalamunda, Swan River Trust and community).

### 7.2.3 Recommendation 3

In the absence of a long-term comprehensive plan to conserve and manage the natural heritage of the area (as above) the City of Gosnells is advised to consider the recommended revisions (below) to its Concept Plan for the MKSEA (Figure 3; City of Gosnells, 2008).

#### Precinct 1 (south east of Victoria Rd)

This precinct includes a number of areas of high conservation significance. These areas require reservation, protection from development by revegetated buffer zones (that are free of all development or infrastructure) and linkage with each other and with the conservation areas in Precinct 2 and BFS 387 via a greenway corridor (in which land-uses and activities are regulated to be compatible with the protection of conservation values).

One of the areas indicated as an “Eco-industry Precinct” in the Concept Plan (Figure 3; City of Gosnells, 2008) is located within REW 8050, a wetland that is recommended in the current survey as eligible for CCW status. The second Eco-industry Precinct in the amended plan is located within the buffer zone of Bush Forever Site 53 (City of Gosnells, 2008). The City of Gosnells is advised that the Eco-industry Precincts in these locations do not support the conservation of biodiversity of UFI 8050 and BFS 53 and are not appropriate.

The planned development is expected to produce considerably greater volumes of polluted run-off water than is currently drained from Precinct 1 into Yule Brook (GHD, 2005). The scale and location of the planned development and the predominantly clay soils (Cs) of Precincts 1 and 2 are considered in this survey to be impediments to the use of water sensitive urban design principles in the treatment of run-off water in Precincts 1 and 2. The Concept Plan (Figure 3; City of Gosnells, 2008) shows run-off from Precinct 1 being conveyed by gravity down to a drainage facility in the low lying area around Wetland 8050. The latter is expected to require a large excavated retention basin to accommodate the volume of run-off that will be produced. As the area is underlain by clay soils and has a pre-existing, naturally high water table the infiltration of additional run-off into groundwater will not be feasible. The overflow that will inevitably occur (very frequently) from the above facility will require conveyance via the existing network of excavated

drainage channels (and possibly a second similarly inefficient retention basins in Precinct 2) into Yule Brook (through Bush Forever Site 387) or alternatively into Bickley Brook.

It is not acceptable to perpetuate and increase the negative effects of the current (highly modified) hydrological regime of the area (via the proposed drainage measures above) on the conservation values of BFS 387 and the water quality in the Swan-Canning River system. The drainage objectives for Precinct 1 should be revised to allow the restoration of a hydrological regime that is closer to the original conditions of the area (in line with best-practice water sensitive design drainage principles).

Wetland 8050 and BFS 53 are of high conservation significance and they (and their buffer zones) should not be used for drainage purposes. These wetlands should be protected from industrial development by buffer zones about 200 m in width that are revegetated and do not include drainage facilities or other infrastructure.

Development in Precinct 1 should be confined to the Bassendean Dunes area where run-off can be successfully infiltrated (at source) into the adjoining deep sands (above any wetland buffer zones). Such infiltration will support the natural recharge of the high conservation significance wetlands along the Bassendean Sands/Guildford Formation interface in the MKSEA.

### Precinct 2 (Brook Rd to Victoria Rd)

A number of nationally significant conservation values (that are linked ecologically with the Greater Brixton Street Wetlands) were found in the current survey in the extensive wetland between Boundary Rd and Victoria Rd. Nationally significant areas of high biodiversity including EPBC listed flora, TECs and CCW wetlands are located in the MKSEA Boundary Rd and Victoria Rd. Wetlands listed on the Register of the National Estate (with similar values as the MKSEA areas above) are located in BFS 387 between Brook Rd and Boundary Rd. The City of Gosnells is advised that the areas required to reserve important conservation values and to protect these values will require most of the MKSEA area in this precinct.

Precinct 2 is linked to BFS 387 by flow of groundwater and superficial aquifers. The areas of high conservation significance in this precinct found in the current survey are mostly unrepresented in BFS 387; they should be reserved as part of BFS 387 and managed for conservation. The remainder of Precinct 2 should be managed as part of a groundwater control area and buffer zone for BFS 387.

Most of Precinct 2 (including some areas of BFS 387) is currently very poorly managed. Some unregulated problems in the area include the dewatering of superficial aquifers and the salinization of land by the excavated drainage system; the dumping of fill, refuse and hazardous materials in wetlands; the overstocking of paddocks; the incursion of stock into BFS 387; groundwater and surface water pollution and nutrient enrichment; excavation of wetlands; unregulated clearing and burning of native vegetation and weed proliferation.

The existing land uses within this precinct should be audited to determine the activities that are currently incompatible with the objectives of conservation and restoration of native vegetation, the improvement of groundwater quality and the maximum infiltration of rainfall into groundwater. Additional development should not occur in Precinct 2 and existing land uses that are incompatible with conservation and resource enhancement wetland management and wetland buffer zones should be regulated and slowly phased out.

### Precinct 3A and Precinct 3B (Yule Brook)

The City of Gosnells is supported in its 2008 Concept Plan to exclude Precinct 3B from development. However, the Concept Plan for the southwest end of Precincts 3A and for Precinct 3B should be revised. This revision should allow for the protection of the conservation values in this area, the restoration of the floodplains of the Yule Brook, the improved linkage of Yule Brook with BFS 387, the general remediation of the hydrological regime of the MKSEA and BFS 387 and the restoration of Yule Brook as a living stream (from its current function as a waste water drainage channel).

In the current survey, the areas bordering Yule Brook (in or near to the south-west part of Precinct 3A) were found to include significant conservation values. As this area is relatively undeveloped, it represents one of the few remaining opportunities on the SCP to fulfil objectives of the Swan-Canning River system Water Quality Improvement Plan (Swan River Trust, 2009) in restoring floodplains. It also presents an opportunity

to improve the ecological connectivity between conservation reserves of the Darling Range, the Swan-Canning River system and other conservation reserves (including, most importantly, BFS 387) as envisioned by the Perth Biodiversity Project (Del Marco *et al.*, 2004).

Yule Brook was fundamental to the development of the complex natural habitats of the alluvial fans of the area and the biodiversity they support. In this regard the natural history of Yule Brook parallels the indigenous cultural heritage beliefs associated with this wetland ecosystem. Yule Brook remains important for the highly water-dependent ecosystems of the area and as a regional ecological linkage corridor. It is currently used as a *sink* for surface water and groundwater (that is drained out of BFS 387 and the MKSEA via constructed drainage channels) and to export water out of the area. Yule Brook requires biophysical restoration to resume its role as a *source* of water, sediments and other natural resources (such as plant propagules) to the highly water-dependent ecosystems of its former floodplains.

The Yule Brook riparian area should be more closely linked to the remaining high biodiversity floodplains in BFS 387 (particularly in the vicinity of the intersections of Brook Rd and Grove Rd and of Brook Rd and Bickley Rd). The roads in the area above are poorly designed and hazardous and they fragment the Yule Brook floodplains in an ecologically sensitive area. Traffic reduction measures, including the closure of parts of these roads and the reclamation of some of the road surfaces to bushland, would support environmental values in this area.



**Table 7.3:** Summary of conservation values and management recommendations for MKSEA sites

(Precincts as per Figure 3, City of Gosnells Draft MKSEA Plan, July 2008.) The figure 6% for remaining Guildford Complex vegetation is the figure given in *Bush Forever* (Government of Western Australia, 2000, Volume 1, Table 4); the actual current percentage remaining is probably much less.

MKSEA Precinct	Study Site or other Location	Conservation values and recommendations
Precinct 3A and 3B	Site 4	<p><u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Baeckea</i> sp. Perth Region (P3), <i>Grevillea thelemanniana</i> (P4, eligible for DRF). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Threatened Ecological Community:</u> EPBC Endangered listed TEC (Woodlands and shrublands on Muchea Limestone of the SCP).</p> <p><u>Vegetation Condition:</u> Very good. Very species-rich, structure recovering due to recent fire. Excellent fauna habitat. This is the best remaining area of native vegetation adjacent to Yule Brook.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good condition. This site has very high conservation value as very little of this wetland suite (&lt;&lt;6%) remains in as good condition.</p> <p><u>Recommendation to WA DEC Wetlands Dataset:</u> Change UFI 7635 from REW →CCW; palusplain/floodplain.</p> <p><u>Part of Yule Brook Regional Ecological Linkage:</u> Riparian vegetation of foreshore reserve of high conservation significance due to ecological linkage. Important role in supporting water quality objectives for the Swan-Canning River system. Indigenous heritage importance.</p> <p><u>Recommended Management:</u> Conservation of existing vegetation. Weed control, exclusion of fire and livestock, replanting of adjacent riparian vegetation and linkage to Yule Brook &amp; BFS 387.</p>
Precinct 3A and 3B	Site 5	<p><u>WA DEC Listed Flora:</u> <i>Grevillea thelemanniana</i> (P4, eligible for DRF). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex. High conservation significance, 6% remains on SCP.</p> <p><u>Threatened Ecological Community:</u> EPBC listed TEC (Woodlands and Shrublands on Muchea Limestone of the SCP).</p> <p><u>Vegetation Condition:</u> A mosaic of good and degraded (species-rich in parts, closed structure, some parts disturbed by fire and some localised excavations). Excellent fauna habitat. This is one of the only remaining sites adjacent to Yule Brook where the vegetation of the floodplain and a natural tributary of Yule Brook remain in good condition.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in good condition. Keysbrook Consanguineous Suite with vegetation in very good condition. This site has very high conservation value as very little of this wetland suite (&lt;&lt;6%) remains in this good condition.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> Change UFI 7635 from REW →CCW; floodplain/creek.</p> <p><u>Part of Yule Brook Regional Ecological Linkage:</u> Riparian vegetation of foreshore reserve is of high conservation significance due to ecological linkage and to support water quality objectives for the Swan-Canning River system. Indigenous heritage importance.</p> <p><u>Management:</u> Conservation of existing vegetation. Weed control, exclusion of fire and livestock, replanting of adjacent riparian vegetation and linkage to Yule Brook and BFS 387. Restoration of Yule Brook to a living stream i.e. no excavation or clearance of natural debris from watercourse, firebreak between Yule Brook and the native vegetation to be allowed to naturally regenerate, replanting in some areas.</p>
Precinct 3A and 3B	Yule Brook floodplains	<p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation completely degraded except for remnant stands of Marri, landforms mostly intact, soils partially modified, wetland functions partially modified but able to be restored. This is the last area of undeveloped floodplain adjacent to Yule Brook.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> Change UFI 13362 from MUW →REW; floodplain/creek.</p> <p><u>Part of Yule Brook Regional Ecological Linkage:</u> Undeveloped floodplain area requires enhancement and replanting and will then contribute positively to the water quality objectives for the Swan Canning River system. Indigenous heritage importance.</p> <p><u>Recommended Management:</u> Enhancement of remnant vegetation, exclusion of livestock, general revegetation and linkage to Yule Brook, water sensitive design of tributary upper reaches to restore quality of water that recharges the floodplain, restoration of landforms (e.g. reclamation of the natural land contours where there is currently a low raised area of track through the paddocks and removal of culvert under track). Regulation of land uses within buffer zone to creek and floodplain. The revegetated floodplain may be suitable as a passive recreation area where the public can have controlled access (via board walks) to view the flora/fauna that needs to be protected from public access elsewhere in BFS 387.</p>

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Precinct 3B	Site 1	<p><u>WA DEC Listed Flora</u>: <i>Schoenus pennisetis</i> (P1). Most of other flora regionally significant.</p> <p><u>Vegetation</u>: Guildford Vegetation Complex. Regional conservation significance (not allocated to an FCT).</p> <p><u>Vegetation Condition</u>: Degraded but soil undisturbed so good potential for restoration, given appropriate weed control. Good fauna habitat.</p> <p><u>Wetlands</u>: Keysbrook Consanguineous Suite. Resource enhancement significance as &lt;&lt;6% remains undeveloped on SCP.</p> <p><u>Recommendation to WA DEC Wetlands Database</u>: Change UFI 13362 from MUW →REW; palusplain/floodplain/creek.</p> <p><u>Part of Yule Brook Regional Ecological Linkage</u>. Riparian vegetation of foreshore reserve for waterway of high conservation significance due to ecological linkage and water quality objectives for the Swan-Canning River system.</p> <p><u>Recommended Management</u>: Enhancement of remnant vegetation, restoration of Yule Brook to a living stream, i.e. discontinue the excavation of the bed of the creek, the clearance of natural debris from watercourse, the ploughing and mowing of firebreaks adjacent to creek. Control weeds and replant and allow natural regeneration of riparian vegetation.</p>
Precinct 3B	Site 2	<p><u>WA DEC Listed Flora</u>: <i>Calothamnus rupestris</i> P3 (probably planted).</p> <p><u>Vegetation</u>: The riparian vegetation is Guildford Vegetation Complex. Regional conservation significance.</p> <p><u>Vegetation Condition</u>: Part degraded (riparian vegetation) and part no longer bushland. Good fauna habitat.</p> <p><u>Wetlands</u>: Most of wetland is highly modified by filling, excavation, loss of native vegetation and weed invasion.</p> <p><u>Recommendation to WA DEC Wetlands Database</u>: Change UFI 13362 from MUW →REW; palusplain/floodplain/creek. This area requires enhancement of the natural values to support the other parts of this regional ecological linkage.</p> <p><u>Part of Yule Brook Regional Ecological Linkage</u>. Riparian vegetation of foreshore reserve is part of ecological linkage and should be enhanced to support water quality objectives for the Swan-Canning River system.</p> <p><u>Recommended Management</u>: Restoration of Yule Brook to a living stream, i.e. no excavation or clearance of natural debris from watercourse, weed control and replanting of riparian vegetation.</p>
Precinct 3B	Site 3	<p><u>Vegetation</u>: The riparian vegetation and sumpland vegetation can be classed as bushland of Guildford Vegetation Complex. Regional conservation significance</p> <p><u>Vegetation Condition</u>: Degraded or completely degraded. Regionally significant native flora. Good fauna habitat.</p> <p><u>Wetlands</u>: Most of wetland is modified by grazing, loss of native vegetation and weed invasion.</p> <p><u>Recommendation to WA DEC Wetlands Database</u>: Change UFI 13362 from MUW →REW; palusplain/floodplain/creek. Change small part of MUW UFI 13362 to REW sumpland. This area requires enhancement of the natural values to support the other parts of this regional ecological linkage.</p> <p><u>Part of Yule Brook Regional Ecological Linkage</u>. Riparian vegetation of foreshore reserve for waterway of high conservation significance due to ecological linkage and water quality objectives for the Swan-Canning River system.</p> <p><u>Recommended Management</u>: Regeneration of the sumpland/palusplain/creek vegetation: exclusion of livestock, weed control and replanting. Restoration of Yule Brook to a living stream, i.e. no excavation or clearance of natural debris from watercourse, weed control and replanting of riparian vegetation. No firebreaks and/or mowing of a service corridor adjacent to brook required.</p>
Precinct 3B	Site 20	<p><u>WA DEC Listed Flora</u>: <i>Eremophila glabra</i> var. <i>chlorella</i> (DRF), <i>Grevillea thelemanniana</i> (P4), and regionally significant native flora.</p> <p><u>Vegetation</u>: Guildford Vegetation Complex, very high conservation significance as &lt;&lt; 6% remains on SCP.</p> <p><u>Threatened Ecological Community</u>: EPBC listed TEC (Woodlands and shrublands on Muchea Limestone of the SCP). Conservation Status: Endangered.</p> <p><u>Vegetation Condition</u>: Good to completely degraded.</p> <p><u>Wetlands</u>: Keysbrook Consanguineous Suite with vegetation in good condition. High conservation significance as &lt; 6% remains undeveloped on SCP and most of the remaining area is more degraded than this.</p>

MKSEA Precinct	Study Site or other Location	Conservation values and recommendations
		<p><u>Recommendation to WA DEC Wetlands Dataset:</u> CCW UFI 7778, palusplain →floodplain.</p> <p><u>Part of Yule Brook Regional Ecological Linkage.</u> Important role in supporting water quality objectives for the Swan-Canning River system.</p> <p><u>Recommended Management:</u> Conservation of existing vegetation. Enhancement of the remainder of the site. Weed control, exclusion of fire and livestock, replanting of adjacent riparian vegetation and linkage to Yule Brook and BFS 387. Hydrology needs to be investigated to determine links with BFS 387. Rare flora requires fencing, urgent recovery plan and recovery actions such as preservation of germplasm. Link the CCW wetland to other Yule Brook floodplains.</p>
Precinct 2	Site 6	<p><u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Baeckea</i> sp. Perth Region (P3), <i>Grevillea thelemanniana</i> (P4), <i>Verticordia lindleyana</i> subsp. <i>lindleyana</i> (P4). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, &lt;&lt; 6% remains on SCP.</p> <p><u>Threatened Ecological Community:</u> Part is: Herb rich saline shrublands in claypans/Herb rich shrublands in claypans (FCTs 7 or 8). Conservation Status: Vulnerable B) [W.A]. Another part is: Shrublands on Dry Clay Flats (FCT10a). Conservation Status: Endangered B) ii [W.A]</p> <p><u>Vegetation Condition:</u> Very good to degraded.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good condition. This site has high conservation value as very little of it (&lt;&lt;6%) remains in good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Dataset:</u> Change UFI 7800 from REW →CCW over much of this block. The part of the area that is inundated in winter should be changed to sumpland or floodplain. Change part from REW UFI 14122, palusplain →CCW; sumpland. On Lot 234, change MUW UFI 7805; palusplain →REW; sumpland. Part of area is very degraded by excavations and is flooded in winter. Regulate land uses to avoid further modification and negative impact on adjoining CCW 7800. Revegetate to promote groundwater recharge and provide fauna habitat.</p> <p><u>Recommended Management:</u> Part of groundwater and surface water control area for BFS 387. Conservation of existing vegetation. Weed control. Fencing. Removal of livestock and replanting of vegetation on Lot 234 Bickley Rd to reduce potential nutrient enrichment of Lot 233. Investigate hydrology of this area that previously formed the headwaters of a creek that drained to BFS 387 but now this creek has been interrupted and converted to a drain that crosses Brentwood Rd near Bickley Rd and proceeds to BFS 387 in the Wanaping Rd bushland.</p>
Precinct 2	Sites 8, 9, 10	<p><u>EPBC and DRF-Listed Flora</u> <i>Calytrix breviseta</i> var. <i>breviseta</i> (EPBC Endangered and DRF), <i>Lepidosperma rostratum</i> (EPBC Endangered), <u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Trichocline</i> sp. Treeton (P2), <i>Baeckea</i> sp. Perth Region (P3), <i>Grevillea thelemanniana</i> (P4). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance; 6% remains on SCP.</p> <p><u>Threatened Ecological Community:</u> Shrublands on Dry Clay Flats (FCT10a). Conservation Status: Endangered B) ii [W.A].</p> <p><u>Vegetation Condition:</u> Excellent (E) very species-rich.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good condition. This site has high conservation value as very little of it (&lt;&lt;6%) remains in excellent condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Dataset:</u> CCW UFI 7785 palusplain confirmed. Very high conservation values found here in current survey. Extend current CCW over northern half of this block, change part of REW UFI 14122 →CCW.</p> <p><u>Recommended Management:</u> Part of groundwater and surface water control area for BFS 387. Conservation of existing vegetation. Weed control (particularly *<i>Gomphocarpus fruticosus</i> and * <i>Hyparrhenia hirta</i> on totally degraded southern part of block). Fencing, replanting of vegetation on degraded areas.</p>
Precinct 2	Site 11	<p><u>EPBC and DRF-Listed Flora:</u> <i>Lepidosperma rostratum</i> (EPBC Endangered), <u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Baeckea</i> sp. Perth Region (P3), <i>Grevillea thelemanniana</i> (P4). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Threatened Ecological Community:</u> Shrublands on Dry Clay Flats (FCT10a). Conservation Status: Endangered B) ii [W.A].</p> <p><u>Vegetation Condition:</u> Excellent (E) very species-rich.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good condition. This site has high conservation value as very little of it (&lt;&lt;6%) remains in excellent condition as this wetland.</p>

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		<p><u>Recommendation to WA DEC Wetlands Dataset:</u> The currently mapped conservation category wetland on this block UFI 7785 should be recommended to be extended to include this part of the palusplain (currently mapped as REW 14122). Very high conservation values found here in current survey.</p> <p><u>Recommended Management:</u> Part of groundwater and surface water control area for BFS 387. Conservation of existing vegetation. Weed control (particularly *<i>Gomphocarpus fruticosus</i> and *<i>Hyparrhenia hirta</i> on totally degraded southern part of block). Fencing. Part of groundwater control area and buffer zone for BFS 387. Regulate land uses to avoid further modification and negative impact on adjacent CCW in BFS 387, revegetate degraded areas to promote groundwater recharge and provide fauna habitat.</p>
Precinct 2	Site 12	<p><u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Baeckea</i> sp. Perth Region (P3). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Vegetation Condition:</u> Mosaic of very good to degraded, predominantly good. Very species-rich.</p> <p><u>Threatened Ecological Community:</u> Mosaic of :</p> <ol style="list-style-type: none"> <li>1. <i>Eucalyptus</i> (<i>Corymbia calophylla</i> –<i>Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain (FCT 3a). Conservation Status: EPBC Endangered; and</li> <li>2. Shrublands on Dry Clay Flats (FCT10a). Conservation Status : Endangered B) ii [W.A.]; and</li> <li>3. Herb rich shrublands in claypans (FCT 8). Conservation Status: Vulnerable B) [W.A].</li> </ol> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good to degraded condition. This site has high conservation value as very little of it (&lt;&lt;6%) remains in excellent condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Dataset:</u> CCW UFI 8033, palusplain confirmed. REW UFI 8034, sumpland confirmed.</p> <p><u>Recommended Management:</u> Part of groundwater and surface water control area for BFS 387. Conservation of existing vegetation. Weed control (particularly *<i>Hyparrhenia hirta</i> on totally degraded eastern part of block). Fencing. Regulate land uses to avoid further modification and negative impact on adjacent CCW in BFS 387, revegetate degraded areas of wetland heath and <i>Melaleuca</i> closed forest to promote groundwater recharge and provide fauna habitat. Map interface of Bassendean Sands and Pinjarra Plain more accurately in vicinity, delineate sumpland edge and investigate maintenance of wetland to develop management objectives.</p>
Precinct 2	Sites 14, 15, 16	<p><u>EPBC and DRF-Listed Flora:</u> <i>Lepidosperma rostratum</i> (EPBC Endangered). <u>WA DEC Listed Flora:</u> <i>Schoenus pennisetis</i> (P1), <i>Cyathochaeta teretifolia</i> (P3). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP. ML in wetlands and Central <i>Banksia attenuata</i>- <i>B. menziesii</i> woodlands FCT 23a on dune. The vegetation at this site is maintained by active mound spring(s) and has not previously been described within the FCTs of the SCP study of Gibson <i>et al.</i> (1994). It is likely to be very uncommon.</p> <p><u>Vegetation Condition:</u> Very good to good, (but the FCT 23a is degraded).</p> <p><u>Threatened Ecological Community:</u> EPBC listed TEC (Woodlands and shrublands on Muchea Limestone of the SCP). Conservation Status: Endangered.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in very good to good condition. This site has very high conservation value as very little of it (&lt;&lt;6%) remains in very good to good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> CCW UFI 13827 confirmed, geomorphic classification requires further study. Probably change palusplain →paluslope/floodplain. REW UFI 13826 confirmed.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> REW UFI 8038 on Lot 223 requires further study and maybe change to CCW sumpland.</p> <p><u>Recommended Management:</u> <u>Area 1.</u> This wetland area is of high conservation significance. Urgently, as an interim measure until informed recovery and management measures are developed, fence the wetland and inform landowners that any excavation or other further modification of the wetland is subject to high penalties under the EPBC Act. Investigate hydrology, map interface of Bassendean Sands and Pinjarra Plain more accurately to delineate wetland edge and develop management objectives. Investigate invertebrates and stygofauna. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this CCW and adjacent CCW in BFS 387. Conservation of existing vegetation. Weed control (particularly *<i>Acacia longiflora</i>, *<i>Cortaderia selloana</i>, *<i>Schinus terebinthifolius</i>. Part of groundwater and surface water control area for BFS 387.</p>

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		<p>Area 2. Although most of the vegetation has been cleared in this wetland and the palusplain has been excavated to form a series of dams, this wetland area is of high conservation significance as processes here maintain adjacent high conservation significance vegetation and require careful investigation and management. Urgently, as an interim measure until informed recovery and management measures are developed, fence the wetland and inform landowners that any excavation or other further modification of the wetland is subject to high penalties under the EPBC Act. Regulate surrounding land use to avoid further modification and negative impact on surrounding CCW vegetation. Also part of groundwater and surface water control area for BFS 387.</p> <p>Link the CCW wetlands to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>
Precinct 2	Sites 17, 26	<p><u>Vegetation</u>: Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP. Most of flora regionally significant. The <i>Eucalyptus decipiens</i> mallee formation on this site is a rare vegetation type and has not previously been described in the FCTs of the SCP study of Gibson <i>et al.</i> (1994).</p> <p><u>Vegetation Condition</u>: Good to degraded.</p> <p><u>Threatened Ecological Community</u>: EPBC listed TEC (Woodlands and shrublands on Muchea Limestone of the SCP). Conservation Status: Endangered.</p> <p><i>Eucalyptus (Corymbia) calophylla</i> –<i>Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain (FCT 3a). Conservation Status: EPBC Endangered.</p> <p><u>Wetlands</u>: Keysbrook Consanguineous Suite with vegetation in good condition. This site has very high conservation value as very little of it (&lt;&lt;6%) remains in very good to good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database</u>: Change part of REW UFI 14122 →CCW, palusplain confirmed.</p> <p><u>Recommended Management</u>: This area is of high conservation significance. Urgently, as an interim measure until informed recovery and management measures are developed, fence the native vegetation and inform landowners that any excavation or other further modification of the wetland is subject to high penalties under the EPBC Act. Investigate hydrology. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this CCW and adjacent CCW in BFS 387. Conservation of existing vegetation. Weed control. Part of groundwater and surface water control area for BFS 387.</p> <p>Link the CCW wetlands to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>
Precinct 2	Site 19	<p><u>EPBC and DRF-Listed Flora</u>: <i>Conospermum undulatum</i> (EPBC Vulnerable, WA Declared Rare Flora), <u>WA DEC Listed Priority Flora</u>: <i>Trichocline</i> sp. Treeton (P2), <i>Grevillea thelemanniana</i> (P4). Most of other flora regionally significant</p> <p><u>Vegetation</u>: Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP. The vegetation at this site is maintained by unusual hydrological factors and has not previously been described within the FCTs of the SCP study of Gibson <i>et al.</i> (1994). It is likely to be very uncommon.</p> <p><u>Vegetation Condition</u>: Very good (to degraded)</p> <p><u>Threatened Ecological Community</u>: EPBC listed TEC (Woodlands and shrublands on Muchea Limestone of the SCP). Conservation Status: Endangered.</p> <p><u>Wetlands</u>: Keysbrook Consanguineous Suite with vegetation in good condition. This site has very high conservation value as very little of it (&lt;&lt;6%) remains in very good to good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database</u>: Change MUW UFI 8046→CCW, palusplain confirmed. MUW UFI 8047→REW, dampland confirmed.</p> <p><u>Recommended Management</u>: This area is of high conservation significance. Urgently, as an interim measure until informed recovery and management measures are developed, fence the native vegetation and inform landowners that any excavation or other further modification of the wetland is subject to high penalties under the EPBC Act. Investigate hydrology. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this CCW. Conservation of existing vegetation. Weed control. Part of groundwater and surface water control area for BFS 387.</p> <p>Link the CCW wetlands to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>
Precinct 2	Site 27	<p><u>Vegetation</u>: Guildford Vegetation Complex, very high conservation significance, &lt;&lt; 6% remains on SCP. The vegetation at this site is unusual and has not previously been described within the FCTs of the SCP study of Gibson <i>et al.</i> (1994). It is likely to be very uncommon.</p> <p><u>Vegetation Condition</u>: Good to degraded.</p> <p><u>Wetlands</u>: Keysbrook Consanguineous Suite with vegetation in good condition. This site has very high conservation value as very little of it (&lt;&lt;6%) remains in very</p>



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		<p>good to good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> No wetland is currently mapped here in atlas. Amend to CCW, palusplain and assign a new UFI.</p> <p><u>Recommended Management:</u> This area is of conservation significance and requires hydrogeological study to determine factors that maintain the wetland. Regulate land uses in this and adjacent area to avoid further modification and negative impact on this CCW. Conservation of existing vegetation. Weed control. Part of groundwater and surface water control area for BFS 387.</p> <p>Link the CCW wetland to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>
Precinct 1	Site18	<p>At time of survey, vegetation condition was good and it was assessed as part of DEC TEC (VN B) (Herb-rich Shrublands in Claypans, FCT= 8) with regionally significant native flora species. Now completely cleared of vegetation.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> At time of survey, it was considered that the MUW UFI 13369 palusplain at this location should be changed to REW. However, as it is now cleared the MUW category of UFI 13369 palusplain is confirmed.</p> <p>Clearance of the vegetation should be further investigated by DEC with regard to the Vegetation Clearing Regulations.</p>
Precinct 1	Site 22	<p><u>Flora:</u> Many flora regionally significant</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Vegetation Condition:</u> Very good, very species-rich.</p> <p><u>Threatened Ecological Community:</u> WA DEC TEC (EN B ii) (<i>Banksia attenuata</i> woodlands over species- rich dense shrublands, FCT 20a)</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> No wetland here, confirmed.</p> <p><u>Recommended Management:</u> This area is of high conservation significance. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this vegetation. Fencing and protection from fire. Conservation of existing vegetation. Weed control: spray <i>Ehrharta calycina</i> with selective herbicide to reduce fire hazard. Establish 50-200 m buffer zone around this bushland and link to other areas of this vegetation nearby..</p>
Precinct 1	Site 23	<p><u>Flora:</u> Some flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, regional conservation significance.</p> <p><u>Vegetation Condition:</u> Degraded, weed invaded.</p> <p><u>Threatened Ecological Community:</u> WA DEC TEC (EN B ii) (<i>Banksia attenuata</i> woodlands over species- rich dense shrublands, FCT 20a)</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> No wetland here, confirmed.</p> <p><u>Recommended Management:</u> Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this vegetation. Fencing and protection from fire. Conservation of existing vegetation. Weed control- woody weeds and grasses. Manage this block as part of 50-200 m buffer zone around adjacent block with this vegetation type..</p>
Precinct 1	Site 24	<p><u>EPBC and DRF-Listed Flora:</u> <i>Conospermum undulatum</i> (EPBC Vulnerable, WA Declared Rare Flora). Also <i>Isopogon drummondii</i> (P3) reported by Cardno BSD (2005) but this was not able to be confirmed by current survey as site access was limited. Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Vegetation Condition:</u> Very good, very species-rich.</p> <p><u>Threatened Ecological Community:</u> WA DEC TEC (EN B ii) (<i>Banksia attenuata</i> woodlands over species- rich dense shrublands, FCT 20a).</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> No wetland here, confirmed.</p> <p><u>Recommended Management:</u> This area is of very high conservation significance. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this vegetation. Fencing and protection from fire. Conservation of existing vegetation. Weed control: spray <i>Ehrharta calycina</i> with selective herbicide to reduce fire hazard. Establish 50-200 m buffer zone around this bushland and link to adjacent block with this vegetation type..</p>

MKSEA Precinct	Study Site or other Location	Conservation values and recommendations
Precinct 1	Site 28	<p><u>WA DEC Listed Priority Flora:</u> <i>Lepyrodia curvescens</i> (P2), <i>Calothamnus rupestris</i> (P4). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Vegetation Condition:</u> Very good to degraded.</p> <p><u>Threatened Ecological Community:</u></p> <p>EPBC listed TEC: <i>Eucalyptus (Corymbia) calophylla – Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain (FCT 3a). Conservation Status: Endangered.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in good condition. This site has high conservation value as very little of it (&lt;&lt;6%) on the SCP remains in very good to good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> Change REW UFI 8050 sumpland →CCW, palusplain.</p> <p><u>Recommended Management:</u> This area is of high conservation significance. Investigate hydrology. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this CCW. Conservation of existing vegetation. Weed control.</p> <p>Link the CCW wetland to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>
Precinct 1	Site 30	<p><u>WA DEC Listed Priority Flora:</u> <i>Verticordia lindleyana</i> subsp. <i>lindleyana</i> (P4), <i>Calothamnus rupestris</i> (P4). Most of other flora regionally significant.</p> <p><u>Vegetation:</u> Guildford Vegetation Complex, very high conservation significance, 6% remains on SCP.</p> <p><u>Vegetation Condition:</u> Very good to degraded.</p> <p><u>Threatened Ecological Community:</u> EPBC listed TEC: <i>Eucalyptus (Corymbia) calophylla – Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain (FCT 3a). Conservation Status: Endangered.</p> <p><u>Wetlands:</u> Keysbrook Consanguineous Suite with vegetation in good condition. This site has high conservation value as very little of it (&lt;&lt;6%) on the SCP remains in good condition as this wetland.</p> <p><u>Recommendation to WA DEC Wetlands Database:</u> Change MUW UFI 13369 palusplain →CCW, palusplain confirmed.</p> <p><u>Recommended Management:</u> This area is of high conservation significance. Regulate land uses in this and adjacent areas to avoid further modification and negative impact on this CCW. Conservation of existing vegetation. Weed control.</p> <p>Link the CCW wetland to other native vegetation along the interface of the Bassendean Sands and Pinjarra Plain in Precincts 1 and 2 by revegetating buffer zones and ecological corridor.</p>

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## 10. List of Shortened Forms

The following list is of most, but not all, abbreviations and acronyms used in the report. Abbreviations that are only in tables and the appendices may not be in this list.

<b>BFS</b>	Bush Forever Site
<b>CALM</b>	Department of Conservation and Land Management (WA)
<b>CCW</b>	Conservation Category Wetland (see Table 3.7)
<b>DEC</b>	Department of Environment and Conservation (WA)
<b>DEP</b>	Department of Environmental Protection (WA)
<b>DEWHA</b>	Department of Environment, Water, Heritage and the Arts (Federal)
<b>DPUD</b>	Department of Planning and Urban Development (WA)
<b>DRF</b>	Declared Rare Flora (WA)
<b>EPA</b>	Environmental Protection Authority (WA)
<b>EPBC Act</b>	Environment Protection and Biodiversity Conservation Act 1999 (Federal EPBC Act)
<b>ESCP, Escp</b>	Eastern Swan Coastal Plain
<b>FCT</b>	A particular floristic community type
<b>IBRA</b>	Interim Biogeographical Regionalisation of Australia
<b>MKSEA</b>	Maddington-Kenwick Strategic Employment Area (see Figures 1, 2, 3)
<b>ML</b>	Muchea Limestone
<b>MUC</b>	Multiple Use Corridor [for drainage and services]
<b>MUW</b>	Multiple Use Wetland (see Table 3.7)
<b>nov.</b>	New; as in 'sp. nov.', a species not formally named or described
<b>P, PF</b>	Priority (in relation to flora), Priority Flora
<b>PMR</b>	Perth Metropolitan Region
<b>REW</b>	Resource Enhancement Wetland (see Table 3.7)
<b>SCP</b>	Swan Coastal Plain, or a Swan Coastal Plain FCT
<b>SWA</b>	Swan Coastal Plain Bioregion
<b>sp.</b>	Species (singular). 'spp.' is plural.
<b>ssp., subsp., subsp</b>	Subspecies (of species of plant)
<b>(S)</b>	Spearwood Dune System
<b>TEC</b>	Threatened Ecological Community
<b>UFGI</b>	Unique Function Identifier
<b>var.</b>	Variety (of species of plant)
<b>VCSR</b>	V & C Semeniuk Research Group
<b>WA</b>	Western Australian or Western Australia
<b>WAH</b>	Western Australian Herbarium
<b>WAHERB</b>	The Western Australian Herbarium Specimen Database
<b>WAPC</b>	Western Australian Planning Commission
<b>WRC</b>	Water and Rivers Commission
<b>w.r.t</b>	with respect to

## 11. Glossary

The following glossary is of selected terms, the definitions and descriptions of which are based mainly upon entries in Government of Western Australia (2000), *Guidance No. 51* (EPA, 2004b), *Guidance No. 33* (EPA, 2008), Beard (1990) and Lincoln, Boxshall and Clark (1982). *Draft Guidance No. 33* has additional definitions of some terms and definitions of some relevant terms that are not in this glossary. Botanical terms that are only in tables and the appendices may not be in this glossary, but some are in Stearns (1983)

### **Assemblage**

A collection of individuals or of co-occurring populations (similar to ‘community’).

### **Buffer(s)**

Protection strip(s)/area(s) around REC and CCW wetlands and other conservation areas requiring reservation and protection from development and infrastructure and their effects.

### **Buffer zones**

Areas that may not include significant natural values but are required, by regulatory authorities, to be set aside from development (and certain other activities) in order to protect the values of adjacent wetlands and bushlands. All CCW and REW on the SCP are generally expected to be protected by adequate buffer zones (EPA, 2004a; EPA, 2008). However, the recommended width of these buffer zones varies according to the type of development planned adjacent to the wetland (Essential Environmental Services, 2005). As much of the MKSEA is wetland terrain, in many cases the lands adjacent to many CCW and REW are either wetlands that have been modified sufficiently to be categorised as MUW or areas of artificially raised land that may include existing developments. In the latter case, the proposed buffer zones should be treated as areas in which further development will not be permitted and existing developments will require more stringent regulation than they currently receive, in terms of both the type and the scale of activities that are permitted to take place. Ideally, these buffer zones should be areas where groundwater pollution activities will be prohibited and revegetation, to the extent possible in existing developments, will be mandatory (to improve the infiltration of run-off into groundwater and to improve the connectivity between remnant vegetation blocks in the MKSEA and these blocks and the nearby Bush Forever sites).

### **Bush Forever site**

An area of regionally significant bushland and associated wetlands, if any, designated for protection under Bush Forever (Government of Western Australia, 2000 and updates).

### **Bushland**

Land on which there is vegetation which is either a remnant of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native fauna (Government of Western Australia, 2000b, p. 473; Keighery, 1994, p. 45).

### **Condition**

A rating given to bushland to categorise disturbance related to human activities, either direct – such as clearing or burning – or indirect – such as grazing; the rating refers to the degree of change in the structure, density and species present in the bushland in relation to undisturbed bushland of the same type. The ratings used in this study are defined in Table 3.2.

### **Ecological**

Referring to biological assemblages (biota) and habitats and their interactions.

### **Ecological community**

Naturally occurring biological assemblage that occurs in a particular type of habitat.

### **Ecological linkage**

A network of native vegetation that maintains some ecological functions of natural areas and counteracts the effects of habitat fragmentation.

**Environment**

Living things, their physical, biological and social surroundings, and interactions between all of these (the term also has a special legal meaning in the *Environmental Protection Act 1986* or its regulations).

**Environmental weed**

Plants of a species not native to an area of bushland or wetland that have become established there. "...plants that invade natural areas. Any non-indigenous plant that establishes within a local ecosystem to the detriment of the indigenous flora and fauna..." (Muyt 2001, p. 2).

**Fauna**

Animal species.

**Flora**

- 1: Plant species.
- 2: All of the taxa (including species, subspecies, varieties, hybrids and ecotypes) of plants (usually only vascular plants) of a given area or habitat.
- 3: A book or article that describes (and lists) the taxa (and, generally, how to distinguish each from the others) of a given area.

**Floristic**

Referring to flora.

**Floristic Community Type**

Distinctive floristic assemblages defined by multivariate analysis of floristic lists of standard-sized areas (quadrats or other plots) for degrees of similarities and differences in presence or absence of individual species, generally of vascular plants.

**Floristics**

- 1: All of the species of plants (usually only vascular plants) of a given area or habitat.
- 2: The study of species composition of vegetation.

**Geomorphic wetlands**

Wetlands classified on the bases of water level, hydroperiod and landform according to the systems of Semeniuk (Semeniuk, 1987; Semeniuk and Semeniuk 1995; see Table 3.5 in this report). The wetland types: creeks, sumplands, damplands, palusplains, floodplains and paluslopes have been documented in the Kenwick area.

**Habitat**

The locality, site and particular type of local environment, including all living and non-living parts of it, occupied by an organism or group of organisms; a suitable place for it or them to live.

**Landform**

A combination of slope and elevation producing a particular shape and form of the land surface.

**Landscape**

The appearance of the land, whether natural or altered, including its shape, texture and colours.

**Life form**

The characteristic structural feature and method of perennation of a plant species.

**Plant association**

Group of plant communities with consistent dominants of the same or closely allied species. A ranked category in the classification of vegetation – between community and formation – characterised by (one or two or more dominant species which have the life form and structure typical of the formation to which the association belongs. The basic mapping unit of Beard (e.g. 1990, 1981, 1979a).

**Plant community**

The assemblage of plants found at any given locality. Any group of plants belonging to a number of different species that occur in the same habitat or area and interact through trophic and spatial relationships; typically characterised by reference to one or more dominant or characteristic species. All populations of all plant species at a site or locality.

**Plant formation**

Group of one or more associations having the same structure and life form.

**Plot**

A circumscribed area for sampling vegetation or flora.

**Population**

A group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups.

**Precautionary Principle**

“Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by: careful evaluation to avoid, where practicable, serious or irreversible damage to the environment, an assessment of the risk-weighted consequences of various options.” (EPA, 2008).

**Quadrat**

Plot that is square; in the case of Swan Coastal Plain floristic community type surveys, a quadrat is 10 m by 10 m.

**Relevé**

A visual description of the vegetation or the listing of the flora of a given area, sometimes in lieu of establishing and sampling a quadrat or other plot.

**Sample**

In relation to floristic community types: to compile a total list of species (generally of vascular plants, generally with plant specimens collected for identification and as vouchers) of a quadrat or other plot (to use, subsequently, in multivariate analysis).

**Significant**

A term applied to ecological communities, fauna, flora, habitats and vegetation that are threatened, poorly reserved, scarce or conform to any of the other criteria listed in this report in the definition of ‘Significant flora’ or in the glossary of *Guidance Statement No. 33* (EPA, 2008), at any level, whether, e.g., local, regional, state or national.

**Significant flora**

Vascular (and other) plant taxa, including anomalous forms, that are relictual, rare, poorly reserved or poorly known, are restricted in distribution or have some distinctive feature, and populations that are locally rare or at the southern or northern limits of the known geographic range of the taxa. Some significant metropolitan flora are conservation-coded by DEC (as Priority or Declared Rare), and more, including the conservation-coded ones, are significance-coded in *Bush Forever* (Government of Western Australia, 2000, Volume 2 Table 13). Others, mainly locally significant taxa, are not coded. Definitions of codes used in this report are given in Appendix A.

**Species**

The basic unit of biological classification (the name of a species has two words, the first being the name of the genus to which it belongs); sometimes containing two or more subspecies and/or varieties. The term ‘species’ is often used loosely, instead of the term ‘taxon’ or ‘taxa’.

**Species richness**

Average number of species per unit area; per 10 m by 10 m sampling plot or quadrat in the case of the Swan Coastal Plain.

**Stand**

A single discrete on-ground occurrence of a unit of vegetation or a population.

**Structure**

The spatial arrangement of the components of vegetation, e.g. height and canopy cover of each life form layer or stratum. The classification used in this study is defined in Table 3.1.

**Taxon (pl: taxa)**

A taxonomic group of any rank (especially genera (singular: genus), species, subspecies, varieties, hybrids and ecotypes); mainly used to include – or not distinguish between – ‘species’ and ‘subspecies’ or other infraspecific ranks, e.g. ‘variety’, ‘form’, ‘variant’. Its particular meaning is dependent upon the context in which it is used.

**Taxonomy**

- 1: The theory and practice of describing, naming and classifying organisms.
- 2: The classification of living organisms. The adjectival form of ‘taxonomy’ is ‘taxonomic’.

**Threatened Ecological Community**

Naturally occurring assemblages of plants and/or animals assessed through a procedure co-ordinated by DEC as being threatened with extinction by human activity, either direct or indirect, or in danger of being destroyed or significantly modified by development and other pressures from people. Some so-defined communities are designated or declared under a Western Australian or Commonwealth law; others are not.

**Unique Function Identifier**

A number that uniquely identifies a particular wetland, for which, generally, a geomorphic wetland classification and consanguineous suite have been assigned.

**Vascular plants**

Plants with vascular systems: fern allies, true ferns, cycads, conifers and flowering plants.

**Vegetation**

The total plant life or cover in a given area. The combinations of plant species within a given area and the nature and extent of each combination.

**Vegetation association, vegetation type**

Vegetation classification terms. See ‘plant association’.

**Vegetation complex**

The basic mapping unit of Heddlé (now Mattiske). A vegetation complex comprises a set of plant communities occurring in more or less the same relative proportion to each other throughout the occurrence of the complex. On the Swan Coastal Plain, vegetation complexes generally are defined by the landform-soil units of Churchward and McArthur (1980); and they take their names and are coincident with them. In some cases, particularly on the Swan Coastal Plain, one complex may have vegetation elements of adjacent complexes in it. (see Heddlé *et al.*, 1980).

**Vegetation unit**

A general purpose term applied to vegetation categories, with scale, rank or level not necessarily implied. In the context of this study, the level is more or less of association or community.

**Weed**

In a general sense, a plant that is considered by the user of the term to be a nuisance; unwanted plants in human-made settings, but also in parks, woods and other natural areas. Non-native (and, sometimes, native)



plants that grow and reproduce aggressively. Generally, a weed is a plant in an undesired place. In this report, the term 'weed' is usually, or always, used to refer to an environmental weed, q.v.

**Wetland**

'an area of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary' (the definition in Western Australian Environmental Protection Act, 1986, Schedule 5, Item 2. Terms used in this Schedule). Also see 'geomorphic wetlands' in this glossary.

# APPENDICES

## APPENDIX A

Desktop Study: Flora of Conservation Significance in the Maddington-Kenwick Strategic Employment Area

## APPENDIX B

Inventory of Flora recorded in the MKSEA Field Survey (2007-2009)

## APPENDIX C

Floristic Classification of the Vegetation of the MKSEA in the context of the Floristic Community Types (FCTs) of the Swan Coastal Plain (Report by E.A. Griffin & Associates and MKSEA taxon vs site matrix table)

## APPENDIX D

Obligate and Facultative Wetland Flora recorded in MKSEA Sites (2007-2009)

# APPENDIX A

## Desktop Study: Flora of Conservation Significance in the Maddington-Kenwick Strategic Employment Area

## Introduction

Appendix A has two tables. Table A1 is a list of flora of national and state conservation significance known from the eastern Swan Coastal Plain in the vicinity of the MKSEA, and Table A2 lists the flora of regional conservation significance known from the eastern Swan Coastal Plain in the vicinity of the MKSEA. The tables list conservation and/or significance codes for and give other information about each taxon listed.

There is doubt, based on discrepancies between specimen collection coordinates, stated location and recorded habitats in WA Herbarium in 2008, that eight of the Priority taxa that were listed in the DEC Priority Taxa searches have previously been recorded within the area on the SCP defined by the search coordinates. Consequently, they are not among the taxa listed in Table A1. These eight taxa are: *Acacia lasiocarpa* var. *bracteolata* long peduncle variant (GJ Keighery 5026), *Acacia oncinophylla* subsp. *patulifolia*, *Aotus cordifolia*, *Banksia pteridifolia* subsp. *vernalis*, (syn. *Dryandra pteridifolia* subsp. *vernalis*), *Lasiopetalum bracteatum*, *Templetonia drummondii*, *Tetratheca* sp. Granite (S Patrick 1224) [aff. *hirsuta*] and *Thysanotus anceps*.

Full definitions of conservation codes follow this introduction, and summary conservation and significance codes are at the beginning of each table.

The references cited in this appendix are in the last section, Section 9, of the report to which this is an appendix.

## Tables

### Definitions

#### 1. Flora of National Significance (Federal EPBC Act, 1999), Table A1 below

##### **Critically Endangered**

Taxa that have been thoroughly surveyed and found to have been subject to a major contraction in area or which were originally of limited distribution and are now facing severe modification or destruction throughout their range in the immediate future.

##### **Endangered**

Taxa that have been adequately surveyed and found to have been subject to a major contraction in area or which were originally of limited distribution and are now in danger of significant modification throughout their range in the near future.

##### **Vulnerable**

Taxa that have been adequately surveyed and found to be declining and/or have declined in distribution and/or condition and whose ultimate security has not been assured or taxa that are still widespread but are believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

#### 2. Flora of State Significance: Declared Rare Flora (WA Wildlife Conservation Act), Table A1 below

##### **DRF: Declared Rare Flora – Extant Taxa**

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

### 3. Flora of State Significance: Priority Flora Taxa (WA Department of Environment & Conservation) (Atkins, 2008), Table A1 below

#### **P1: Priority One – Poorly Known Taxa**

Taxa which are known from one or a few (generally <5) populations which are under threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

#### **P2: Priority Two – Poorly Known Taxa**

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 are in urgent need of further survey.

#### **P3: Priority Three – Poorly Known Taxa**

Taxa which are known from several populations and the taxa are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

#### **P4: Priority Four – Rare Taxa**

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 are considered to require monitoring every 5-10 years.

### 4. Flora of Regional Significance (EPA 2004), Table below

Apart from EPBC-listed, DRF and Priority Species, Guidance Statement 51 (EPA, 2004b) and Bush Forever (Government of Western Australia, 2000) define other criteria under which flora taxa (i.e. species, sub-species or varieties) or populations of these taxa may have conservation significance. In the survey of Lots 28, 32 and 36 Brook Rd, Wattle Grove (Tauss, 2009), such taxa and populations are termed "regionally significant". The criteria for significance of these elements of the flora are discussed in Section 4.1.3 in the main body of the report.



**Table A1:** Flora of National and State Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA

<b>KEY</b>		<b>Regionally Significant Flora</b> (Bush Forever, 2000a and Keighery, B.J. pers. comm.)
X	Previously recorded in BFS 387 and/or BFS 53	d Populations disjunct from their known geographic range
<b>Nationally Significant Flora</b> (DEWHA, 2008c)		eSCP Taxa endemic to the eastern Swan Coastal Plain ('e' in Bush Forever, 2000a)
CE	Critically Endangered	eSCP(P) Taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region ('E' in Bush Forever, 2000a)
EN	Endangered	p Taxa considered to be poorly reserved (applies to all DRF and Priority taxa)
VU	Vulnerable	r Populations at or near limit of their known geographic range [e.g. r (S, Kenwick SWA) means that the southern end of the taxon's range is at Kenwick in the IBRA (2000) Swan Coastal Plain Bioregion]
<b>State Significant Flora</b> (Atkins, 2008)		s Significant populations in maintaining regional presence of a flora taxon
DRF	Declared Rare Flora – Extant Taxa	t Significant taxonomically, morphological variant (not in Bush Forever, 2000a)
P1	Priority One – Poorly Known Taxa	u Uncommon in area (generally applies to disjunct populations) (not in Bush Forever, 2000a)
P2	Priority Two – Poorly Known Taxa	
P3	Priority Three – Poorly Known Taxa	
P4	Priority Four – Rare Taxa	

Species/Taxon	Cons Code	Distribution	Flower Times	BFS 387 or 53	Form/Features/Habitats
<i>Andersonia gracilis</i>	DRF EN p, s, d	Kenwick, Cannington, Badgingarra, Nambung, Cataby, Swan View	(Sep-) Oct-Nov	X	Slender erect or open straggly shrub, 0.1–0.5 (–1) m tall; flowers white, pink, purple. White/grey sand, sandy clay, gravelly loam; winter-wet areas.
<i>Anthotium junciforme</i>	P4 p, s	Kenwick, Albany, Upper Swan, Serpentine, Busselton, Scott River Plain	Dec- Mar	X	Grass-like tufted herb <40 cm tall; fls purple to pale blue (rarely white or pink), terminal on stalks > than lvs. Low in landscape in eucalypt woodlands or winter-wet flats.
<i>Aponogeton hexatepalus</i>	P4	Kenwick, Pinjarra, Capel, Bunbury, Boyanup, Nannup	Aug- Sep	X	Rooted aquatic herb, leaves straplike, floating part of leaf broader than the submerged part. Shallow winter pools on clay soils, rivers.
<i>Asteridea gracilis</i>	P3	Darling Range, Gordon River, Gosnells (DR), Bindoon	Sep-Oct		White flowering annual daisy – clay and clay over granite.
<i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444) (syn. <i>B. tenuifolia</i> )	P3 p, s, d	Kenwick, Moora, Cannington, Lancelin, Mogumber	Jan-Mar	X	Erect open shrub 40-70cm tall; flowers white, pink. Sand and clayey soils; winter-wet depressions.
<i>Banksia mimica</i> (syn. <i>Dryandra mimica</i> )	DRF VU	Wattle Grove, Kalamunda, Whicher Range, Gingin	Dec-Jan		Low, semi-prostrate shrub; flowers yellow. White or grey sand over laterite, sandy loam.
<i>Byblis gigantea</i> (syn. <i>B. lindleyi</i> )	P2 p, d, r, eSCP(P)	Kenwick, Cannington, Jandakot, Brookton Highway	Sep-Jan	X	Perennial herb to 60cm tall; leaves terete, long, with glandular hairs, insectivorous; flowers blue/pink/purple. Seasonally wet soils, sandy clay, swampy areas.
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	DRF EN p, s, eSCP(P)	Kenwick (Gosnells, Bellevue)	Sep-Oct	X	Shrub 0.4–1m tall; flowers purple, blue. Sandy clay, swampy flats.

**Table A1:** Flora of National and State Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Cons Code	Distribution	Flower Times	BFS 387 or 53	Form/Features/Habitats
<i>Caladenia huegelii</i>	DRF EN p, s, eSCP	Capel, Banjup, Canning Vale, Melville, Yallingup, Queens Park, Malaga	Sep-Oct		Geophytic orchid to about 0.4m in height. Large red and white flowers with very long fringe on labellum. Banksia woodland on dunes and around wetlands.
<i>Calothamnus rupestris</i>	P4	Ellis Brook, Boyagin Rock, Gosnells, Darling Range, Southern River	Sep-Oct		Large shrub with pink-red flowers. Darling Range and scarp, watercourses. Granite and clay.
<i>Centrolepis caespitosa</i>	P4 p, s	Kenwick (Yule Brook), South Stirling, Pearce, Meckering, (Byford)	Nov (Oct-Dec)		Tufted annual, herb (forming a rounded cushion up to 25mm across). White sand, clay; salt flats, wet areas.
<i>Chamaescilla gibsonii</i> (syn. <i>Chamaescilla</i> sp. Ellen Brook (GJK 12501))	P3 s, eSCP	Kenwick, Mogumber, Capel, Muchea, Drakesbrook	Sep	X	Tuberous herb; flowers blue. Clay -sandy clay; winter-wet flats, claypans.
<i>Comesperma rhadinocarpum</i>	P2 p, s, d	Kenwick, Mullewa, Cataby, (Greenough River Irwin River)	Oct-Nov	X	Herb; flowers blue. Sandy soils.
<i>Conospermum undulatum</i>	DRF VU p, s, eSCP(P)	Kenwick, Forrestfield, Orange Grove, Newburn, Lesmurdie	Aug-Nov	X	Erect, narrow shrub to 2m tall; leaves broad with undulate margins. Grey or yellow-orange clayey sand.
<i>Cyathochaeta teretifolia</i>	P3 p, s, u, h (mound springs BD/PP)	'Whiteman Park, Lake Gnangara, Ellenbrook, Bullsbrook, Pinjar, Wanneroo, Muchea, Denbarker, Yelverton, Warren/Blackwood locations	Dec		Densely-growing (cover 90-100%) sedges with bluntly oval (in cross section) leaves to more than 2 m long. Usually associated with artesian springs or other uncommon hydrological settings, often with paperbark trees. No longer extant in many locations on SCP, including Bassendean, Midland.
<i>Diuris drummondii</i>	DRF EN	Albany, Lake Muir, Bunbury, Mandurah, Gingin	Nov-Jan		Tall donkey orchid with pale yellow flowers, amongst sedges under Paperbarks in peaty damplands and on margins of sumplands.
<i>Diuris purdiei</i>	DRF VU p, s, eSCP	Perth - Waroona, Busselton	Sep-Oct		Slender donkey orchid with 5-10 narrow, spirally twisted leaves. Seasonally wet, recently burnt shrublands, usually <i>Regelia</i> and/or <i>Pericalymma</i> . On sand over clay.
<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	P4 p, s	Kenwick, Gingin-Pinjarra, Palgarup, Darling Range, Wattle Grove	Nov-Dec	X	Pygmy sundew with sparse, open rosette of red leaves and white to very pale pink flowers. In white peaty sand of margins of winter wet swamps
<i>Drakaea elastica</i>	DRF EN	Capel to Cataby	Sep-Nov		Small hammer orchid with small, glossy, pale green leaf being the most conspicuous and distinctive feature for most of the growing season. In humic sands on margins of peaty wetlands.
<i>Eleocharis keigheryi</i>	DRF VU	Kenwick, Lesueur, Ellenbrook, Boyanup	Aug-Nov	X	Rhizomatous, clumped perennial grass-like sedge to 40cm tall; flowers green. Clay, sandy loam; emergent in freshwater: creeks, claypans.
<i>Eremophila glabra</i> subsp. <i>chlorella</i> ms	DRF s	Kenwick-Cannington, Moora, Cataby, Mogumber	Jul-Aug	X	Shrub to 1m tall; flowers green, yellow. Sandy clay, sumplands.

**Table A1:** Flora of National and State Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Cons Code	Distribution	Flower Times	BFS 387 or 53	Form/Features/Habitats
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i> ms	P3 p, s	Kenwick, Forrestdale, Gingin, Capel, Arrowsmith	Sep-Nov	X	Herb to 50cm tall; flowers white, pale blue. <i>Melaleuca</i> shrublands and low open vegetation on winter-wet sandy-clay flats.
<i>Eryngium subdecumbens</i> ms	P3 p, s	Kenwick, Ruabon, Busselton, Kooljerrenup	Oct-Nov	X	Prostrate perennial, herb, to 15cm high; stems tubular; flowers white, green. Clay, grey sand; seasonally wet flats, claypans, swamps.
<i>Grevillea thelemanniana</i>	P4 p, s, eSCP(P)	Kenwick	Jun-Sep	X	Dense spreading shrub <1m; branchlet indumentum appressed, sparse or absent; leaves glabrous above, not pitted; flower pink-red, limb cream. Winter-wet heathland on grey sand.
<i>Haemodorum loratum</i>	P3 p, s, d	Wattle Grove, Cockleshell Gully, Mogumber, Eneabba, Bullsbrook, Boonanaring	Sep-Nov		Grey or yellow sand, gravel.
<i>Halgania corymbosa</i>	P3	Darling scarp and plateau. Gosnells, Susannah Brook, Red Hill	Oct		Small shrub with bright blue flowers. Sandy clay over granite near watercourses.
<i>Haloragis aculeolata</i>	P2 p, s, d	Gingin, North Bannister, Yalgorup, Albany	Nov-Dec		Decumbent herb of seasonal wetlands. Sand or clay over limestone. Flowers yellow-brown.
<i>Haloragis tenuifolia</i>	P3 p, s	Ruabon, Collie, Gingin, Maddington, Wooreoloo, Harvey	Sep-Nov		Decumbent herb of clay seasonal wetlands. Flowers brown-red.
<i>Hydrocotyle lemnoides</i>	P4 p, s	Kenwick, Perth-Bolgart, Lane Poole, Eneabba	Aug-Oct	X	Aquatic annual herb; flowers purple. Seasonal swamps.
<i>Hydatella dioica</i>	DRF EN	Kenwick, Upper Swan, (Midland)	Sep-Nov	X	Dioecious, tufted subaquatic herb 5cm tall; flowers red. Muddy clay, seasonal swamps.
<i>Isopogon drummondii</i>	P3 p, s, d	Forrestfield, Wattle Grove, Orange Grove, Moora, Midland, Mt Lesueur	Feb-Jun	X	Erect, lignotuberous shrub, 0.4–1m tall; flowers yellow, cream. White, grey or yellow sand, often over laterite.
<i>Lepidosperma rostratum</i>	DRF EN p, s, eSCP(P)	Kenwick, Forrestdale Lake NR	Jun-Aug	X	Erect tufts to 0.5m tall; base fibrous, dull pale brown; inflorescence erect, spicate. Palusplain grey clay to sandy clay, peaty sand.
<i>Macarthuria keigheryi</i>	DRF EN p, s, d	Perth airport, Forrestfield, Queens Park, Kenwick, Cooljarloo, Moora	Sep-Mar		Low soft shrub with hairy branches, small cream flowers. In sand, or sand over clay in Banksia woodland or sometimes on fringes of Marri-Kingia.
<i>Meeboldina decipiens</i> subsp. <i>decipiens</i> B.G. Briggs ms	P3 r, u, eSCP	South coast (West of Denmark), Capel, Waroona, Cannington		X?	Tall dioecious rush, of muddy palusplains. Poorly known. The C.A. Gardner record from 'Cannington' probably from UWA Allison Baird Reserve on Brook Road.
<i>Olox scalariformis</i>	P3 p, s, d	Eneabba-Esperance	Oct-Dec		Shrub 30-80 cm tall; flowers cream, white. Sand, sandy loam.
<i>Ptilotus sericostachyus</i> subsp. <i>roseus</i>	P1	Cannington, Armadale, Pinjarra, Kelmscott	?		Poorly known. May now be extinct in the Cannington area.

**Table A1:** Flora of National and State Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Cons Code	Distribution	Flower Times	BFS 387 or 53	Form/Features/Habitats
<i>Rhodanthe pyrethrum</i>	P3 d	Kenwick, Forrestdale, Bullsbrook-Boyanup-Denmark, Capel	Sep-Oct (-Dec)	X	Erect, slender, succulent-stemmed herb to 20cm tall; flowers white, yellow. Clay, sandy-clay, winter wet depressions, clay pans, swamps.
<i>Schoenus benthamii</i>	P3 p, s	Kenwick, Mogumber, Busselton, Manypeaks, Cape Arid	Oct-Nov	X	Tufted perennial sedge 15-45cm tall; flowers brown. White, grey sand, sandy clay, winter wet flats, swamps.
<i>Schoenus capillifolius</i>	P2 p, s	Kenwick, Carousel, Waroona, Pearce, Waterloo, Beaufort River, Beverley	Sep-Nov	X	Semi-aquatic, tufted annual sedge 5cm tall; flowers green. Brown mud, claypans.
<i>Schoenus natans</i>	P4	Pinjarra, Cannington, Gingin, Lake Muir, Busselton, Beaufort R, West Dale	Aug-Nov		Aquatic annual grass-like sedge 30cm high; flowers brown. Winter-wet depressions.
<i>Schoenus pennisetis</i>	P1 p, s	Kenwick, Forrestdale, Pinjarra, Busselton, Byford, Wongan Hills	Aug-Dec	X	Annual sedge to 15cm tall; flowers dark purple, black. Grey or peaty sand, sandy clay, winter wet depressions.
<i>Schoenus</i> sp. Waroona (GJ Keighery 12235)	P3, p, s, eSCP	Kenwick, Harvey, Waroona	Oct	X	Small tufted annual. Clay or sandy clay, winter-wet flats.
<i>Stachystemon axillaris</i>	P4, r	Kalbarri, Eneabba to Forrestfield	Jul-Oct		Sparse shrub < 1.2m tall, flowers greenish. Banksia woodland, sand.
<i>Stylidium longitubum</i>	P3 p, s	Pinjarra, Pinjar, Ellenbrook, Kenwick, Yoongarillup	Oct-Feb		Slender annual herb, flowers white-pink. Clay wetlands.
<i>Tetraria australiensis</i>	DRF VU p, s, eSCP	Ambergate, Mundijong, Ruabon, Yarloop, Cardup, ?Cannington	Nov-Dec?		Tufted perennial sedge, occasionally to 1.2 x 0.5m. Leaves hairy at base. Bases of culms not bulbous. Flowers after fire.
<i>Thelymitra magnifica</i>	P3	Norwood Reserve, Maida Vale, Crystal Brook	Oct		Orchid with brown-yellow flowers. Clay and clay over granite. Foothills, scarp and plateau of Darling Range.
<i>Triglochin stowardii</i>	P3	Moora, Highbury, Meckering	Sep-Oct		Tufted annual, herb, to 10cm tall. Clay, sand; swamps, salt lakes.
<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)	P2 s, p	Beaufort R, Augusta-Perth, Kenwick	Oct-Nov	X	Tuberous, perennial, herb. Sand clay over ironstone; seasonally wet flats.
<i>Tripterococcus paniculatus</i> sp. W. R. Barker ms	P1 p, s	Pinjar, Ruabon, Canning Vale, Badjingarra, Busselton	Nov-Feb		Tuberous herb to about 1m or more in height. Flowers greenish-yellow. Margins of seasonal wetlands.
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	P4 p, s	Murray R - Moore R, Forrestdale, Kenwick, Cannington, Muchea, Gingin	May, Nov-Jan	X	Erect, more or less open shrub to 75cm tall; flowers pink, purple. Sand, sandy clay, winter wet depressions.
<i>Villarsia submersa</i>	P4	Kenwick, Forrestdale, Boyanup-Denmark, Frankland River, Lane Poole	Sep-Oct	X	Floating elliptical leaves and white fringed flowers. Shallow seasonal pools on clay depressions.

**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA

<b>KEY</b>		<b>Criteria for regional conservation significance of taxa occurring on the Eastern Swan Coastal Plain</b>	
X	Previously recorded in BFS 387	<b>d</b>	SCP populations that are disjunct from their main geographic range in other regions
<b>Locations</b>		<b>eSCP</b>	Taxa endemic to the Swan Coastal Plain ('e' in Bush Forever, 2000a)
QD	Quindalup Dunes	<b>eSCP(P)</b>	Taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region ('E' in Bush Forever, 2000a)
SD	Spearwood Dunes	<b>p</b>	Taxa considered to be poorly reserved on the SCP (applies to all DRF and Priority taxa)
BD	Bassendean Dunes	<b>r</b>	Taxa in the survey area at limit or close to limit of their known geographic range on the SCP [e.g. r (S, Kenwick SWA) means that the southern end of the taxon's range is at Kenwick in the IBRA (2000) Swan Coastal Plain Bioregion]
PP	Pinjarra Plain	<b>s</b>	Significant populations (due to size, genetic factors or other) for maintenance of taxa on the SCP
F	Foothills	<b>t</b>	Significant taxonomically; morphological or genetic variants that require further study
R	Riverine	<b>u</b>	Uncommon on the SCP (generally applies to disjunct populations but could also be due to rare habitat, lack of collections etc.)
Es	Estuarine	<b>h</b>	Confined to specific and restricted habitats e.g. h (claypans PP) = confined to claypans of the Pinjarra Plain
DR	Darling Range		

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Acanthocarpus canaliculatus</i>	s, u, h (wetlands PP)	X	Low shrub-like monocot with small white flowers.
<i>Actinostrobus pyramidalis</i>	s, h (wetlands PP)	X	Columnar conifer with dark foliage to about 10m in height; killed by fire and slow to regrow from seed.
<i>Amphibromus nervosus</i>	s, h (mud sumplands PP)	X	Tall grass of claypans; flowers in early spring when inundated.
<i>Anarthria laevis</i>	s, u, r (N, Wattle Grove, SWA), h (palusplains, PP)	X	Tufted, dioecious rush. On SCP only known from Allison Baird Reserve, Kenwick-Wattle Grove and Ruabon. More common in WAR and ESP Bioregions.
<i>Anigozanthos bicolor</i> subsp. <i>bicolor</i> (and <i>Anigozanthos manglesii</i> x <i>bicolor</i> )	u, s, r (S, Kenwick), h (palusplains PP)	X	Flowers red and paler green and smaller than those of <i>A. manglesii</i> , with which <i>A. bicolor</i> subsp. <i>bicolor</i> hybridises. Mainly in woodlands on Darling Range plateau north and south of Perth (Hopper, 1993). Uncommon on SCP (Pearce AFB, Talbot Road bushland, Brixton Street) in winter-wet heath.
<i>Anigozanthos viridis</i> subsp. <i>viridis</i>	s, u, h (palusplains PP)	X	Green-flowered Kangaroo Paw. Yoongarillup to Gingin.
<i>Angianthus preissianus</i>	u, h (wetlands, QD/PP)	X	Tiny annual daisy of saline coastal wetlands (Rottnest, Creery Islands.) and muddy clay palusplains (Gingin to Mandurah).
<i>Austrostipa mollis</i>	h (PP/F)	X	Tall grass with long dense hairy inflorescence.
<i>Banksia telmatiaea</i>	r (S,? Serpentine, SWA), p, s, u, h (wetlands PP)	X	Shrub to about 2m in height with brown flowers; forms dense stands. Because previously known most southern population may no longer be extant, Kenwick may be at or very close to southern range end. Subject to threats and poorly conserved.
<i>Boronia crenulata</i> subsp. <i>viminea</i>	r (N, Kenwick SWA) s, u, d, h (wetlands PP/BD)	X	Small fragrant-leaved shrub with deep pink flowers.
<i>Borya scirpoidea</i>	s, u, h (wetlands PP/F)	X	Low grass-like monocot to about 10cm tall with white flowers, uncommon on SCP.
<i>Borya sphaerocephala</i>	s, u, h (wetlands PP/F)	X	Low grass-like monocot to about 10cm tall with white flowers, uncommon on SCP.
<i>Brachyscome pusilla</i>	s, u, h (muddy wetlands PP/SD/Es)	X	Conspicuous annual daisy with white ray florets. Uncommon from Lancelin to Yalgorup in muddy wetlands, including estuarine setting at Alfred Cove and palusplains at Kenwick, Guildford and Caversham.



**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Burchardia bairdiae</i>	r (S, Serpentine River SWA), s, u, h (peat/mud wetlands PP/R/BD), eSCP	X	Robust geophytic herb with white flowers. Peaty or muddy damplands, palusplains, paluslopes. Regan's Ford to Serpentine River.
<i>Burchardia multiflora</i>	u, s, h (mud wetlands PP/F)	X	Geophytic herb with pink markings on flowers. More common in WAR and JF Bioregions.
<i>Calandrinia</i> sp. Kenwick (G.J. Keighery 10905) [syn. <i>C. aff. composita</i> ]	h (wetlands PP), t	X	Tiny prostrate succulent annual herb; flowers pink. Eneabba-Esperance.
<i>Calectasia grandiflora</i> subsp. <i>grandiflora</i> ms	u, s, h ( mud palusplains PP), t	X	Large-flowered Tinsel Lily. Erect, clumped perennial herb, to 0.6 m high, to 0.4 m wide. Grey/brown/black clay. Seasonally-wet or swampy areas. Restricted to a few locations on eastern SCP at Mundijong, Serpentine and Brixton Street Wetlands.
<i>Calothamnus hirsutus</i>	s, h (palusplains, PP)	X	Cooljarloo to Byford on PP. Also in Geraldton Sandplains Region.
<i>Caesia micrantha</i> (large swamp form B.J.Keighery & N. Gibson 122)	eSCP ?, h (wetlands PP), t	X	Tuberous herb with pale blue flowers; may be confined to eastern SCP; requires more study.
<i>Centrolepis mutica</i>	h (wetlands PP)		Minute sedge-like clumps.
<i>Chaetanthus aristatus</i>	s, h (wetlands PP)	X	Dioecious, perennial rush with rusty brown inflorescences. Usually forms large dense populations.
<i>Chorizandra enodis</i>	s, h (mud wetlands PP)	X	Perennial sedge with glaucous terete culms, globular inflorescences and a prominent involucre bract.
<i>Conospermum huegelii</i>	p, s, u, h (wetlands PP/F)	X	Low smoke bush with globular, white and blue inflorescences.
<i>Conostylis festucacea</i> subsp. <i>festucacea</i>	s, u, h (palusplains PP)	X	Perennial stilted herb with woolly yellow flowers; usually forms dense clumps.
<i>Cyathochaeta equitans</i> (= <i>C. clandestina</i> )	s, u, d, h (sand dunes PP/F/S/BD)		Robust, tussock-forming perennial sedge with inflorescence to about 1.5m. Sandy soils between Eneabba and Esperance, but uncommon on SCP; SCP records include. Ambergate, Pinjarra, BFS 53, Koondoola.
<i>Cytogonidium leptocarpoides</i>	r (N, Gingin SWA), s, u, h (wetlands, PP)	X	Small tufted dioecious rush; uncommon on SCP.
<i>Darwinia citriodora</i>	d, u, s, h (creek banks PP/F)		Recorded at Yule Brook near Welshpool Road (Tauss, 2007a). Most of the (few) records on SCP are old and from areas where it is probably no longer extant e.g. Guildford. Abundant in DR and scarp.
<i>Dasyogon obliquifolius</i>	s, d, u, h (sand dunes PP/F)		Robust perennial rhizomatous herb; leaves glaucous; inflorescences solitary, globular, on scapes to 1m long. White, grey or brown sand, lateritic gravel; occasionally in wet areas. Disjunct distribution with 2 centres of occurrence: Jurien-Badgingarra-Lancelin and Maida Vale-Wattle Grove. In BFS 53.
<i>Dichopogon preissii</i>	h (palusplains, PP)	X	Dainty lily with pink-mauve, pendulous flowers in spring.
<i>Dielsia stenostachya</i> (= <i>Restio stenostachyus</i> )	d, u, h (peaty damplands BD)		Rhizomatous, perennial, mat-like sedge with hairy rhizomes and usually under 20cm high. Peaty sand damplands, usually in Bassendean Dunes. Unusual in Pinjarra Plain habitats.
<i>Dodonaea ceratocarpa</i>	d, u, s, h (palusplains PP), ?t	X	Dioecious, 4-merous, hopbush with horned wings on fruit and narrow simple leaves. May be a morphological variant.
<i>Drosera bulbosa</i> subsp. <i>bulbosa</i>	u, s, h (wetlands PP/F)	X	Sundew with large flat rosette and white flowers. Probably poorly collected.

**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Drosera heterophylla</i>	r (S, Mundijong, SWA) u, s, h (palusplains PP)	X	Small erect/climbing sundew with crescent-shaped leaves, early spring flowering, white flowers.
<i>Drosera macrantha</i> (Swan Coastal Plain form BJK & NG 228) (syn: <i>D. m.</i> subsp. <i>macrantha</i> sens. lat.)	? eSCP, h (wetland, PP), ?t	X	Large many-flowered climber. Clay wetlands. Requires taxonomic study.
<i>Drosera menziesii</i> subsp. <i>menziesii</i>	u, s, h (palusplains PP)	X	Small erect/climbing sundew with round red leaves and red stems, large bright pink flowers.
<i>Drosera neesii</i> subsp. <i>neesii</i>	u, s, h (wetlands PP/BD)		Small climbing sundew with yellow, white pink flowers. Sand, swamps, granite outcrops. Cooljarloo, Muchea, Kenwick, Serpentine to Ambergate Reserve, Esperance.
<i>Drosera rosulata</i>	h (wetlands PP)	X	Sundew with leaves in flat rosettes and white flowers. Midland-Busselton-Walpole, Geraldton. Sandy and clayey soils; margins of swamps.
<i>Drosera tubaestylis</i>	u, s, h (wetland PP)	X	Sundew with flat leaf rosette and white flowers in autumn.
<i>Gahnia trifida</i>	h (saline/calc. muddy palusplains)	X	Robust clumping sedge to over 1m in height with sharp edged leaves and dark brown, dense inflorescences usually near coast.
<i>Goodenia pulchella</i> subsp. Coastal Plain B (M. Hislop 634) p.n. (= <i>G. pulchella</i> subsp. Coastal Plain A (L.W. Sage 2336))	h (wetland PP), t	X	Dainty perennial herb with yellow flowers. Generally limited to clay wetlands on eastern side of SCP.
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	u, s, h ( wetlands PP)	X	Spreading shrub to 2 m high; leaves large, bipinnatifid; <i>Flowers</i> in terminal racemes, large, green or orange or red or pink Mainly on rocky, stony soil or gravelly soil in Darling Range; few records on SCP.
<i>Hakea ceratophylla</i>	r ( N, Kewdale SWA), u, s, h (palusplains, PP)	X	Shrub to about 1.2m with brown flowers, uncommon on SCP and associated with TEC 3a. Widespread and common in Warren Region.
<i>Hakea sulcata</i>	h (palusplains, PP)	X	Sparse shrub to about 1.2 m in height with terete leaves and small, short- beaked woody fruits
<i>Haemodorum simplex</i>	h (palusplains, PP)	X	Geophytic herb with black inflorescence
<i>Hydrocotyle alata</i>	h (palusplains, PP)	X	Small herb, Bullsbrook to Ruabon. Also in Tuart Forest.
<i>Isotoma pusilla</i>	s, h (muddy sumplands, PP)	X	Tiny, purple flowering herb that forms large populations in muddy sumplands and flowers as they dry out.
<i>Isotoma scapigera</i>	d, u, h (mud sumplands & palusplains, PP)	X	Small purple flowered herb not often recorded from SCP.
<i>Jacksonia alata</i>	d, s, u (PP/F)		Small shrub less than about 40cm in height. Yellow pea flowers. Widespread in SW WA but very uncommon on SCP.
<i>Kunzea micrantha</i> subsp. <i>micrantha</i>	h (palusplains PP)	X	Shrub to about 1m in height with small pink globular inflorescences. Caversham to Dunsborough .Only 1-2 records off the ESCP (in Warren - Jarrah Forest).
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	p, s, h (colluvium, F)		Shrub to 2m, flowers yellow. Deep sands or loamy, clayey or gravelly soils, laterite, granite; base of scarp, rocky hills, plateaus. Maddington (Clifford St BFS 53), lower Darling Scarp, Whicher Range.

**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Lawrencia squamata</i>	d, s, u, r (S, Kenwick SWA), h (saline/calc. wetlands/PP)	X	Occurs in only 2 disjunct areas on SCP: Bullsbrook and Cannington-Kenwick. Otherwise widespread in semi arid and arid regions.
<i>Melaleuca brevifolia</i>	p, s, u, h (wetlands, PP)	X	Erect shrub or tree (rarely), 0.5–4m tall; flowers white, cream. White or grey sand, sandy loam, clay; swampy areas, drainage lines, salt lakes. Eneabba-Esperance.
<i>Melaleuca lateriflora</i> subsp. <i>acutifolia</i>	h (wetlands PP)	X	Shrub to about 3m.
<i>Mesomelaena tetragona</i>	u, s, h (palusplains PP/F)	X	Robust semaphore sedge with prominent dark leaf bases. Uncommon on SCP.
<i>Myriocephalus occidentalis</i>	h (muddy sumplands PP)	X	Annual herb, flowers as wetlands dry in late spring.
<i>Neurachne alopecuroidea</i>	h (PP/F)	X	Perennial grass with short, grey, dense inflorescences.
<i>Patersonia juncea</i>	s, u, r (N, ?Norwood Reserve SWA), h (wetlands PP/F)	X	Small perennial herb with purple Iris-like flowers. Old record from Midland; probably no longer extant; therefore Norwood Reserve northern range limit.
<i>Petrophile juncifolia</i> (syn. <i>P. media</i> var. <i>juncifolia</i> )	u, s, h (palusplains PP)	X	Low shrub with long narrow +/- terete leaves.
<i>Petrophile seminuda</i>	d, s, u, h (palusplains PP)	X	Shrub to about 1.2m with short cylindrical yellow inflorescences.
<i>Philydrella drummondii</i>	h (palusplains PP)	X	Small herb with yellow flowers.
<i>Philydrella pygmaea</i> subsp. <i>pygmaea</i>	h (palusplains PP)	X	Small herb with yellow flowers.
<i>Pimelea imbricata</i> var. <i>major</i>	p, s, u, eSWA, h (mud palusplains & sumplands PP)	X	Erect shrub (0.1–) 0.2–0.8(–1) m tall; flowers white. Sand or sandy clay; seasonally waterlogged depressions, watercourses. Moore River – Yalgorup, Kenwick.
<i>Podolepis capillaris</i>	d, s, u, h (palusplains PP) ?t	X	Annual daisy with wiry stems, small flowers (yellow ray florets). Very uncommon on SCP (only records from BFS387) but widespread in the drier inland areas of SW WA. ESCP form may be wetland variant.
<i>Podolepis gracilis</i> (Swamp form GJ Keighery 13 255)	s, u, h (mud sumplands & palusplains PP), t	X	Large white-pink flowering annual daisy.
<i>Pogonolepis stricta</i>	h (mud sumplands & palusplains PP)	X	Tiny, white flowering annual daisy – often a dominant species of the ground layer at mid –dense cover.
<i>Prasophyllum drummondii</i>	s, u, r (N, ?Kenwick SWA) h (wetlands PP/BD)	X	Medium height leek orchid with brownish-green flowers in spring in the absence of previous fire. Known range Muchea-Bullsbrook to Pinjarra but northern records are very old so it may no longer be extant north of Kenwick
<i>Samolus junceus</i>	s, u, h (wetlands calc., saline, SD/PP/Est /R)		Perennial herb with leafless stems and white-pink flowers. Tamala Limestone at Yalgorup, Ludlow, Dunsborough and ML at Bootine, Gingin. Also widespread in other regions.
<i>Scaevola lanceolata</i>	h (palusplains, PP)	X	Low to prostrate perennial herb with long spikes of white flowers.

**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Schoenolaena juncea</i>	u, s, h (sumplands/palusplains PP/BD)	X	Pinjar to Ludlow mainly on ESCP. Tall perennial, geophytic herb with white flowers in summer.
<i>Schoenus andrewsii</i>	d, s, h (palusplains PP)	X	Tufted perennial sedge usually about 20cm in height, with viscid culms. Occurs in wetlands in Geraldton Sandplains Region. On SCP only in BFS 387 (except old Maylands collection- but probably not extant there now).
<i>Schoenus asperocarpus</i>	h (palusplains PP)	X	Low annual tufted sedge.
<i>Schoenus bifidus</i>	h (palusplains PP)	X	Small perennial sedge with small dark terminal inflorescence
<i>Schoenus elegans</i>	u, s, r (N, Kenwick, SWA) h (muddy wetlands/PP)	X	Only seven locations shown on Florabase (Kenwick, Tuart Forest near Busselton, Helena River, Calingiri, Scott River Plain, Warren and an old Bayswater record that is probably no longer extant). Further study and upgrade to Priority Flora required.
<i>Schoenus odontocarpus</i>	h (clay sumplands palusplains PP)	X	Tiny annual sedge of wetlands of the eastern SCP.
<i>Schoenus plumosus</i>	h (palusplains and clay sumplands PP)	X	Inconspicuous small annual sedge with woolly perianth segments.
<i>Schoenus subflavus</i> subsp. <i>subflavus</i>	u, s, r (N, Kenwick, SWA) h (muddy wetlands/PP)		Rhizomatous, tufted, perennial sedge, 0.05–0.3 m high. Grey, yellow or lateritic sand, sandy clay, loam; often winter-wet. geographical range extension; previously recorded on SCP only near Mandurah (FloraBase 2008) and, possibly, Ruabon.
<i>Schoenus rigens</i>	p, s, u, eSWA, h (mud and peaty wetlands PP/BD)	X	Perennial sedge endemic to the eastern SCP.
<i>Schoenus unispiculatus</i>	u, s, h (muddy palusplains and colluvium PP/F)	X	On the SCP known from only a handful of sites Pinjarra, Mundijong, Capel, Waroona, Talbot Road, Kenwick and Carbanup. More occurrences on Darling Range and scarp.
<i>Schoenus variicellae</i>	h (palusplains/sumplands PP)	X	Tiny annual sedge.
<i>Stylidium ecorne</i>	h (palusplains/sumplands PP)	X	Small annual trigger plant about 10cm in height.
<i>Stylidium petiolare</i>	h (wetlands, PP)	X	Small annual trigger plant about 10cm in height with white flowers.
<i>Stylidium roseo-alatum</i>	p, s, h (wetlands, PP)	X	Slender annual (ephemeral) herb 3-7cm tall; flowers pink, red. Loam, clay loam, peaty sand; winter-wet depressions, swamps, creek beds. Kenwick, Toodyay, Bolgart, Armadale.
<i>Stylidium utricularioides</i>	s, h (wetlands, PP)	X	Slender annual herb to 15cm; flowers pink-white. Clay wetlands, granite. Kenwick, Helena Valley, Forrestdale, Capel, Byford, Ellenbrook, Bullsbrook.
<i>Synaphea acutiloba</i>	s, u, h (palusplains PP/F)	X	Kenwick, Talbot Road Bushland, Darling Ranges, Walyunga NP, Byford.
<i>Tecticornia lepidosperma</i>	s, u, h palusplain/floodplain PP/R)	X	On SCP only known from Pinjarra, Bennett Brook, Kenwick and Burswood Island .Widespread in other regions.
<i>Thelymitra antennifera</i>	s, h (palusplains PP)	X	Small yellow-flowered orchid (geophyte).

**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Thomasia macrocarpa</i>	d, u, s, h (riparian, PP/F)		Shrub approximately 1m in height, with large pink flowers. Recorded on banks of Yule Brook near Welshpool Road (Tauss, 2007a). Uncommon on SCP; abundant on Darling Scarp/Plateau.
<i>Thysanotus arenarius</i>	s, u, h (ML wetlands, PP)	X	Lax perennial herb with large purple fringed flowers, calcareous sand dunes of SCP and Muchea Limestone on the eastern SCP and BFS387.
<i>Thysanotus dichotomous</i>	d, s, h (riparian, PP)		Intricate robust perennial herb to over 1m in height, almost leafless, with large mauve flowers. Seasonally waterlogged clay or granite. Widespread in SW but few records on SCP, including Yule Brook (Tauss, 2007a) and Byford (Tauss, 2007b).
<i>Thysanotus rectantherus</i>	u, s, r (S, Wungong, SWA), h (palusplains PP/F)	X	Widespread in Jarrah Forest and semi-arid WA north-east of Perth. Only known SCP locations are at Kenwick and Wungong.
<i>Tremulina tremula</i>	d, p, s, u, h (sumplands/palusplains PP)	X	Robust dioecious rush with flat culms and small dark dense spikelets. Male spikelets pendulous.
<i>Tribonanthes brachypetala</i>	h (palusplains PP/F)	X	Tuberous perennial herb with yellow, reflexed perianth. Flowers in August to early September. Hybridizes with other <i>Tribonanthes</i> .
<i>Tribonanthes uniflora</i> (currently included in <i>T. longipetala</i> )	h (mud sumplands PP)	X	Geophytic herb with large white flowers with inflorescence usually a single flower.
<i>Tribonanthes violacea</i>	h (wetland PP/R)	X	Small pale mauve early flowering tuberous herb.
<i>Tricoryne humilis</i>	h (wetland PP/R)	X	Yellow-flowered perennial herb.
<i>Triglochin muelleri</i>	p, s, u, eSWA, h (clay sumplands PP)	X	Small annual herb in species-rich wetlands. Often grows with several other <i>Triglochin</i> species. Patchy records from Cooljarloo to Fish Road Reserve near Busselton.
<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> (syn. <i>T. floribundum</i> subsp. <i>floribundum</i> )	d, u, s, h (riparian PP/F)		Shrub to about 2m in height. Abundant white flowers in spring. Yule Brook near Welshpool Road (Tauss, 2007a). Uncommon on SCP, abundant on Darling Scarp/Plateau.
<i>Trithuria bibracteata</i>	s, h (palusplains/mud sumplands PP)	X	Minute tufted sedge-like plant, leaves in a rosette.
<i>Utricularia inaequalis</i>	u, s, h (wetlands PP)	X	Bladderwort with large lavender flowers. On SCP only recorded at Ellenbrook/Bullsbrook, Ruabon, Kenwick, Waroona, and Midland.
<i>Utricularia multifida</i>	u, s, h (wetlands PP/F/R)	X	Small bladderwort pink flowers. Bullsbrook to Ruabon, Alfred Cove on SCP. Widespread in other regions.
<i>Utricularia violacea</i>	u, s, h (wetlands PP/F/R)	X	Tiny bladderwort, purple flowers. Gingin to Yoongarillup on SCP. More common in Warren – Jarrah Forest
<i>Velleia</i> aff. <i>trinervis</i> (G.J. Keighery 10429) (syn: <i>V. trinervis</i> sens. lat.)	r (N, Cooljarloo SWA), s, u, h (claypan PP), t	X	Pale yellow-flowered perennial herb. Flowers in Aug-early Sept. Plentiful at Kenwick but uncommon elsewhere. One of a number of taxa thought to be included currently in the <i>V. trinervis</i> complex.
<i>Verticordia acerosa</i> var. <i>preissii</i>	s, h (wetland, PP/F)	X	Small shrub with dainty, spidery perianth. Flowers cream aging to pink.
<i>Verticordia huegelii</i> var. <i>huegelii</i>	h (wetland, PP/F)	X	Small shrub with attractive bright yellow flowers.
<i>Verticordia plumosa</i> var. <i>brachyphylla</i>	h (palusplains, PP/F)	X	Small shrub with attractive pink-purple flowers. Very easy to mistake for the DRF variety of <i>V. plumosa</i> .
<i>Villarsia capitata</i>	s, h (muddy sumplands PP)		Small perennial herb with yellow flowers that forms large populations in shallow muddy pools.



**Table A2:** Flora of Regional Conservation Significance known from the Eastern Swan Coastal Plain in the vicinity of the MKSEA (*continued*)

Species/Taxon	Conservation Significance Code	Previously recorded in BFS 387 or BFS 53	Notes
<i>Wilsonia backhousei</i>	d, s, u, h (saltmarsh, calc., palusplain PP/Est/R)	X	Small succulent mat plant. Kenwick is only location on the SCP that is not near the coast. Widespread in other regions in calcareous, saltmarsh, estuarine settings.
<i>Wurmbea dioica</i> subsp. Brixton (GJ Keighery 12803) = <i>Wurmbea dioica</i> subsp. aff. <i>alba</i>	r (N, Cervantes, SWA), s, u, h (mud sumplands PP), t	X	Monoecious geophyte, to about 30 cm, large white flowers/ pinkish nectaries. Confined to muddy sumplands, flowering early whilst inundated. The informal name is misleading. Requires taxonomic study.

## APPENDIX B

### Inventory of Flora recorded in the MKSEA Field Survey (2007-2009)

## Introduction

Appendix B has three parts:

- 1. Table B1 (pages 1-24): Inventory of Flora recorded in the current MKSEA Field Survey**  
This part includes a key to the table (pages 1-2) and an inventory of taxa (genera, species, subspecies and varieties) of vascular plants recorded in the MKSEA between September 2007 and July 2009 (pages 3-24).
- 2. Table B2 (pages 25-26): Numbers (Codes) and Names of Families recorded in the MKSEA**  
This lists the family code numbers and family names of the families of plants recorded in the MKSEA. It is in two parts. The first part lists the family codes in ascending numerical order. The second part lists the family names in alphabetical order.
- 3. References (page 27)**

## Key to Table B1

### Column 1: Family/Taxon Name

A list of families, genera, species, subspecies and varieties of vascular plants recorded in the current field survey, in alphabetical order by family. The nomenclature used conforms to current usage in FloraBase (Western Australian Herbarium, 2009) except for a small number of taxa listed under informal names, including the abbreviations as below or with collection numbers for the current survey. Voucher specimens of the taxa that are listed under informal names will be lodged in the WA Herbarium and will thus be available for further inspection.

Abbreviations (Lincoln *et. al.* 1982):

- preceding a name indicates a naturalised alien taxon (weed).
- ‘aff.’ (*affinis*): Akin to, having an affinity (with) but not identical (to).
- ‘cf.’ (*confer*): Compare (with).
- ‘sens. lat.’ (*sensu lato*): In the broad sense. Refers to taxa that are known to be broadly circumscribed and may be subdivided into several taxonomic entities on further study.
- ‘sens. strict.’ (*sensu stricto*): In the narrow sense, i.e. highly consistent with the published type concept

### Column 2: Not in BFS 387 or 53

Taxa found in the current field survey but NOT listed for Bush Forever Site 387 or for BFS 53 in Bush Forever (Government of Western Australia, 2000).

### Column 3: Taxonomic Notes/Synonyms

Synonyms and other issues regarding the names of taxa in the list are noted in this column. There are also a few notes on locations and other matters.

### Column 4: National Conservation Significance

Taxa currently gazetted under the Federal EPBC Act have **National Conservation Significance** in the categories of Critically Endangered (**CE**), Endangered (**EN**) and Vulnerable (**VU**). (See Appendix A for definitions of these categories.)

### Column 5: State Conservation Significance

Taxa currently gazetted under the WA Wildlife Act and listed in the DEC Priority Lists (Atkins, 2008) have **State Conservation Significance** in the categories **DRF**, and **P1, P2, P3, P4**, respectively. (See Appendix A for definitions of these categories.)

### Column 6: Regional Conservation Significance

Other taxa that have Regional Conservation Significance are defined by EPA (2004b); many of the latter categories that are relevant to the Eastern Swan Coastal Plain are listed in Government of Western Australia (2000). See also Appendix A for a comprehensive current list of these taxa known from the literature in the vicinity. These taxa are listed below with the codes **d, p, r, s, u** and **t**. These codes and the categories they refer to are defined below. (These codes are also added to the taxa marked in Columns 4 and 5 as they provide additional information about these taxa relevant to their occurrence in the MKSEA on the eastern SCP.)

#### Codes and criteria for regional conservation significance of taxa occurring on the Eastern Swan Coastal Plain

- d SCP populations that are disjunct from their known geographic range.
- eSCP Taxa endemic to the Swan Coastal Plain.
- eSCP (P) Taxa endemic to the Swan Coastal Plain in the Perth Metropolitan Region.
- p Taxa considered to be poorly reserved on the SCP (applies to all DRF and Priority taxa).
- r Taxa in the survey area at limit or close to limit of their known geographic range on the SCP (e.g. r (S, Kenwick SWA) indicates that the southern end of the taxon's range is at Kenwick in the IBRA (2000) Swan Coastal Plain Bioregion).

#### Locations

- D Quindalup Dunes
- SD Spearwood Dunes
- BD Bassendean Dunes
- PP Pinjarra Plain
- F Foothills
- DR Darling Range
- s Significant populations (due to size or other factors) for maintenance of taxa on the Eastern SCP.
- t Significant taxonomically; morphological or genetic variants that require further study.
- u Uncommon on the SCP (generally applies to disjunct populations but could also be due to rare habitat, lack of collections etc.).
- h Confined to specific and restricted habitats, e.g. h (claypans PP) = confined to claypans of the Pinjarra Plain, R= Riparian, Es = Estuarine.

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Adiantaceae</b>					
<i>Cheilanthes austrotenuifolia</i>	X				
<b>Alliaceae</b>					
* <i>Allium triquetrum</i>	X				
<b>Amaranthaceae</b>					
<i>Alternanthera nodiflora</i>					
<b>Anacardiaceae</b>					
* <i>Schinus terebinthifolius</i>					
<b>Anthericaceae</b>		including <b>Hemerocallidaceae</b> ( <i>Arnocrinum</i> , <i>Caesia</i> , <i>Corynotheca</i> , <i>Johnsonia</i> )			
<i>Arnocrinum preissii</i>					
<i>Caesia micrantha</i> sens. lat.	X	= <i>Caesia micrantha</i> Large Swamp Form (B.J. Keighery & N. Gibson 122). Part of complex of taxa currently known as <i>Caesia micrantha</i> . Also in BFS 387			eSCP, t, h (wetlands PP)
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>					
<i>Corynotheca micrantha</i>		Recorded by Keighery and Taus (2008) in BFS 387			
<i>Dichopogon capillipes</i>					
<i>Dichopogon preissii</i>					h (palusplains,PP)
<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>					
<i>Laxmannia ramosa</i> subsp. <i>ramosa</i>					
<i>Sowerbaea laxiflora</i>					
<i>Thysanotus arenarius</i>					s,u, h (Muchea Limestone wetlands, PP)
<i>Thysanotus dichotomus</i>					s,u, h (creeks,PP)
<i>Thysanotus manglesianus</i>					
<i>Thysanotus multiflorus</i>					
<i>Thysanotus rectantherus</i>					u,s r (S,Wungong, SWA), h(palusplains PP/F)
<i>Thysanotus sparteus</i>					
<i>Thysanotus thyrsoides</i>					
<i>Tricoryne elatior</i>		The form of the <i>T. elatior</i> complex that is common and widely distributed in SCP and beyond; occurs sympatrically with <i>Tricoryne</i> aff. <i>elatior</i> (C.Tauss 1905) as below.			

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Tricoryne</i> aff. <i>elator</i> (C.Tauss 1905)	X	Very scabrous, robust form of the <i>T. elator</i> complex; requires taxonomic study.			u, t, h (wetland PP)t
<i>Tricoryne tenella</i>					
<b>Apiaceae</b>					
<i>Hydrocotyle alata</i>	x	Recorded by Keighery and Tauss (2008) in BFS 387			h (palusplains, PP)
<i>Hydrocotyle diantha</i>		in Site 7			
<i>Schoenolaena juncea</i>					u, s, h (sumplands/palusplains PP/BD)
<i>Trachymene pilosa</i>					
<b>Araceae</b>					
* <i>Zantedeschia aethiopica</i>					
<b>Asclepiadaceae</b>					
* <i>Gomphocarpus fruticosus</i>					
<b>Asparagaceae</b>					
* <i>Asparagus asparagoides</i>					
<b>Asphodelaceae</b>					
<i>Bulbine semibarbata</i>					
<b>Asteraceae</b>					
<i>Angianthus preissianus</i>					u, h (wetlands, QD/PP)
* <i>Arctotheca calendula</i>					
<i>Brachyscome pusilla</i>					s, u, h (muddy wetlands PP/SD/Es)
* <i>Conyza sumatrensis</i>	X				
* <i>Cotula coronopifolia</i>					
* <i>Cotula turbinata</i>	X				
* <i>Dittrichia graveolens</i>					
<i>Gnephosis drummondii</i>		Referred to as <i>G. tenuissima-drummondii</i> complex in Keighery & Keighery (2000).			
* <i>Hypochaeris glabra</i>					
* <i>Monoculus monstrosus</i>		= * <i>Osteospermum clandestinum</i> , * <i>Tripteris clandestina</i>			
<i>Podolepis capillaris</i>		Very unusual record for SCP; this wetland form may be a Taxonomic variant of a common species of semi arid - arid regions of WA.			d, s, u, h (palusplains PP), ?t



**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Podolepis gracilis</i> sens. lat.		Referred to as <i>Podolepis gracilis</i> Swamp Form (G.J. Keighery 13126) in Keighery & Keighery (2000).			s, u, h (mud sumplands & palusplains PP), t
<i>Pogonolepis stricta</i>					h (mud sumplands & palusplains PP)
<i>Quinetia urvillei</i>					
<i>Rhodanthe citrina</i>	X	= <i>Waitzia citrina</i>			
<i>Senecio pinnatifolius</i> var. ? <i>latilobus</i>	X	= <i>S. lautus</i> sens. lat. Recorded by Keighery and Tauss (2008) in BFS 387			
<i>Senecio glomeratus</i>	X	Recorded BY Keighery and Tauss (2008) in BFS 387			
<i>Siloxerus filifolius</i>					
* <i>Sonchus oleraceus</i>					
* <i>Symphyotrichum squamatum</i>		= <i>S. subulatum</i> , ' = <i>Aster subulatus</i>			
<i>Trichocline</i> sp. <i>Treeton</i> (B.J. Keighery & N. Gibson 564)				<b>P2</b>	s, p
* <i>Urospermum picroides</i>					
* <i>Ursinia anthemoides</i>					
<b>Boraginaceae</b>					
* <i>Echium plantagineum</i>					
* <i>Heliotropium europaeum</i>	X				
<b>Boryaceae</b>		<b>Boryaceae</b> was formerly part of the Anthericaceae family			
<i>Borya scirpoidea</i>					s, u, h (wetlands PP/F)
<b>Brassicaceae</b>					
* <i>Brassica tournefortii</i>	X				
* <i>Heliophila pusilla</i>	X				
* <i>Raphanus raphanistrum</i>					
* <i>Rorippa nasturtium-aquaticum</i>					
<b>Callitrichaceae</b>					
* <i>Callitriche stagnalis</i>	X				
<b>Campanulaceae</b>					
* <i>Wahlenbergia capensis</i>					
<i>Wahlenbergia gracilentia</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Casuarinaceae</b>					
<i>Allocasuarina fraseriana</i>					
<i>Allocasuarina humilis</i>					
<i>Casuarina obesa</i>	X				
<b>Centrolepidaceae</b>					
<i>Aphelia cyperoides</i>					
<i>Centrolepis aristata</i>					
<i>Centrolepis polygyna</i>					
<b>Chenopodiaceae</b>					
<i>Tecticornia halocnemoides</i> subsp. <i>halocnemoides</i>		= <i>Halosarcia halocnemoides</i> subsp. <i>halocnemoides</i>			
<i>Tecticornia indica</i> subsp. <i>bidens</i>		= <i>Halosarcia indica</i> subsp. <i>bidens</i>			
<i>Tecticornia lepidosperma</i>		= <i>Halosarcia lepidosperma</i>			s, u, h (palusplain/floodplain PP/R)
<b>Colchicaceae</b>					
<i>Burchardia bairdiae</i>					r (S, Serpentine R. SWA), s, u, h (peat/ mud wetlands PP/R/BD), eSCP
<i>Burchardia congesta</i>		= <i>B. umbellata</i>			
<i>Burchardia multiflora</i>					u,s,h (mud wetlands PP/F)
<i>Wurmbea dioica</i> subsp. aff. <i>alba</i>		Tall, monoecious form that occurs in claypans. Also referred to as <i>Wurmbea dioica</i> subsp. Brixton (G.J. Keighery 12803)			r (N, Cervantes, SWA), s,u, h (mud sumplands PP)
<i>Wurmbea dioica</i> subsp. <i>alba</i>		Small, more common, dioecious form. Recorded in BFS 387 by Keighery and Tauss (2008).			h (palusplains, PP)
<b>Convolvulaceae</b>					
<i>Wilsonia backhousei</i>					d, s, u, h (saltmarsh, calcareous, palusplain PP/Est/R)
<b>Crassulaceae</b>					
<i>Crassula exserta</i>					
* <i>Crassula glomerata</i>	X				
* <i>Crassula natans</i> var. <i>minus</i>					
<b>Cupressaceae</b>					
<i>Actinostrobus pyramidalis</i>					s, h (wetlands PP)

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Cyperaceae</b>					
<i>Baumea arthropphylla</i>					
<i>Baumea juncea</i>					
<i>Bolboschoenus caldwellii</i>					
<i>Chorizandra enodis</i>					s, h (mud wetlands PP)
<i>Cyathochaeta avenacea</i>					
<i>Cyathochaeta equitans</i>		= <i>Cyathochaeta clandestina</i> , in part			s, u, d, h (sand dunes PP/F/S/BD)
<i>Cyathochaeta teretifolia</i>	X			<b>P3</b>	p, s, u, h (mound springs BD/PP).
* <i>Cyperus tenellus</i>					
<i>Gahnia trifida</i>					s, h (saline/ calcareous palusplains)
<i>Isolepis cernua</i> var. <i>setiformis</i>					
* <i>Isolepis marginata</i>					
<i>Lepidosperma longitudinale</i>					
<i>Lepidosperma pubisquamum</i> sens. lat.		= <i>Lepidosperma pubisquamum</i> M Hislop MK9-9			?
<i>Lepidosperma rostratum</i>			<b>EPBC EN</b>	<b>DRF</b>	EN DRF p s E
<i>Lepidosperma scabrum</i> Eastern Terete Form (BJ Keighery & N Gibson 232)		= <i>L. s.</i> (inland form)			t, s, h (palusplains,PP)
<i>Lepidosperma</i> sp. Kenwick (C.Tauss 2598)	X	An unnamed <i>Lepidosperma</i> (Det. R. Barrett) first recorded in the current survey in 2007. Later recorded in BFS 387 (Tauss 2009).			h (?palusplains,PP), t
<i>Lepidosperma squamatum</i> sens. lat.		An unnamed taxon in the <i>Lepidosperma squamatum</i> complex (Det. R. Barrett)			?
<i>Mesomelaena pseudostygia</i>					
<i>Mesomelaena tetragona</i>					u, s, h (palusplains PP/F)
<i>Schoenus asperocarpus</i>					h (palusplains PP)
<i>Schoenus caespititius</i>	X				
<i>Schoenus curvifolius</i>					
<i>Schoenus discifer</i>					
<i>Schoenus efoliatus</i>					
<i>Schoenus elegans</i>		poorly represented in WA Herbarium collections			u,s, r (N, Kenwick, SWA) h ( muddy wetlands/PP)
<i>Schoenus odontocarpus</i>					h (clay sumplands palusplains PP)

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Schoenus pedicellatus</i>					
<i>Schoenus pennisetis</i>				<b>P1</b>	p, s
<i>Schoenus plumosus</i>					h (palusplains and clay sumplands PP)
<i>Schoenus rigens</i>					p, s, u, eSWA, h (mud and peaty wetlands PP/BD)
<i>Schoenus subfascicularis</i>					
<i>Schoenus subflavus</i> subsp. <i>subflavus</i>	X	geographical range extension			u, s, r (N, Kenwick, SWA) h ( muddy wetlands/PP)
<i>Schoenus unispiculatus</i>	X				u,s,h (muddy palusplains and colluvium PP/F)
<i>Schoenus variicellae</i>					h (palusplains/sump- lands PP)
<i>Tetraria octandra</i>		= <i>Tetrariopsis octandra</i>			
<b>Dasyogonaceae</b>					
<i>Acanthocarpus canaliculatus</i>					s, u, h (wetlands PP)
<i>Calectasia grandiflora</i> subsp. <i>grandiflora</i> R.L Barrett ms		(pers. comm. R. Barrett)			u, s, h ( mud palusplains PP)
<i>Dasyogon bromeliifolius</i>					
<i>Dasyogon obliquifolius</i>					s, d, u, h (sand dunes PP/F)
<i>Kingia australis</i>					
<i>Lomandra caespitosa</i>					
<i>Lomandra hermaphrodita</i>					
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>					
<i>Lomandra nigricans</i>					
<i>Lomandra preissii</i>					
<i>Lomandra sericea</i>					
<b>Dilleniaceae</b>					
<i>Hibbertia aurea</i>					
<i>Hibbertia hypericoides</i>					
<i>Hibbertia racemosa</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Droseraceae</b>					
<i>Drosera bulbosa</i> subsp. <i>bulbosa</i>					u, s, h (wetlands PP/F)
<i>Drosera erythrorhiza</i>					
<i>Drosera gigantea</i> subsp. <i>gigantea</i>					
<i>Drosera glanduligera</i>					
<i>Drosera heterophylla</i>					r (S, Mundijong, SWA) u,s, h (palusplains PP)
<i>Drosera macrantha</i> subsp. <i>macrantha</i> sens. lat.		<i>Drosera macrantha</i> Swan Coastal Plain form (B.J. Keighery & N. Gibson 228). Very robust with prolific inflorescence; requires further taxonomic study.			? eSCP, h (wetland,PP), ?t
<i>Drosera menziesii</i> subsp. <i>menziesii</i>					u, s, h (palusplains PP)
<i>Drosera menziesii</i> subsp. <i>penicillaris</i>					
<i>Drosera neesii</i> subsp. <i>neesii</i>	X	Pink flowered form. Recorded by Keighery and Tauss (2008) in BFS 387			u, s, h (wetlands PP/BD)
<i>Drosera nitidula</i>	X				
<i>Drosera pallida</i>					
<i>Drosera ?rosulata</i>					h (wetlands PP)
<i>Drosera stolonifera</i>					
<i>Drosera tubaestylis</i>					u, h (wetland PP)
<b>Epacridaceae</b>					
<i>Andersonia lehmanniana</i> subsp. <i>lehmanniana</i>	X				
<i>Leucopogon conostephioides</i>					
<i>Leucopogon strictus</i>	X				s, d, u, h (palusplains, PP)
<b>Euphorbiaceae</b>					
* <i>Euphorbia peplus</i>	X				
* <i>Euphorbia terracina</i>	X				
<i>Monotaxis grandiflora</i> var. <i>grandiflora</i>					
* <i>Ricinus communis</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Gentianaceae</b>					
* <i>Centaurium tenuiflorum</i>	X?	Keighery and Keighery (2000) may have listed this as <i>C. erythraea</i>			
* <i>Cicendia filiformis</i>		= <i>C. filifolia</i>			
<b>Goodeniaceae</b>					
<i>Dampiera linearis</i>					
<i>Goodenia micrantha</i>					
<i>Goodenia pulchella</i> subsp. Coastal Plain B (M. Hislop 634) p.n.		= <i>Goodenia pulchella</i> subsp. Coastal Plain A (L.W. Sage 2336)			h (wetlands PP)
<i>Lechenaultia expansa</i>					
<i>Scaevola lanceolata</i>					h (palusplains,PP)
<i>Scaevola repens</i> var. <i>repens</i>	X				
<i>Velleia trinervis</i> sens. lat.		= <i>Velleia</i> aff. <i>trinervis</i> (G.J. Keighery 10429). Cream flowers, early- flowering form of the <i>V. trinervis</i> complex that is restricted to eSCP wetlands. May be taxonomic variant.			r (N, Cooljarloo SWA), s, u, h (claypan PP), t
<b>Haemodoraceae</b>					
<i>Anigozanthos manglesii</i> x <i>bicolor</i>					u, s, r (S, Kenwick), h (palusplains PP)
<i>Anigozanthos manglesii</i>					
<i>Anigozanthos viridis</i> subsp. <i>viridis</i>					s, u, h (palusplains PP)
<i>Conostylis aculeata</i> subsp. ? <i>preissii</i>	X?	Keighery and Keighery (2000) list <i>C. aculeata</i> subsp. <i>aculeata</i>			
<i>Conostylis aurea</i>					
<i>Conostylis festucea</i> subsp. <i>festucea</i>					s, u, h (palusplains PP)
<i>Conostylis juncea</i>					
<i>Conostylis setigera</i> subsp. <i>setigera</i>					
<i>Haemodorum laxum</i>					
<i>Haemodorum paniculatum</i>					
<i>Haemodorum spicatum</i>					
<i>Phlebocarya ciliata</i>					
<i>Phlebocarya filifolia</i>					



**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Tribonanthes australis</i>					
<i>Tribonanthes australis</i> x <i>brachypetala</i>					
<i>Tribonanthes brachypetala</i>					h (palusplains PP/F)
<i>Tribonanthes longipetala</i>		<i>T. l.</i> includes <i>T. uniflora</i> (FloraBase, 2009)			h (mud sumplands PP)
<i>Tribonanthes violacea</i>					h (wetland PP/R)
<b>Haloragaceae</b>					
<i>Gonocarpus nodulosus</i>					
<b>Hydatellaceae</b>					
<i>Trithuria bibracteata</i>					s, h (palusplains/mud sumplands PP)
<b>Iridaceae</b>					
* <i>Freesia alba</i> x <i>leichtlinii</i>		= <i>Freesia leichtlinii</i>			
* <i>Gladiolus angustus</i>					
* <i>Gladiolus caryophyllaceus</i>					
* <i>Gladiolus undulatus</i>					
* <i>Hesperantha falcata</i>					
* <i>Ixia maculata</i>	X				
* <i>Moraea flaccida</i>					
<i>Patersonia occidentalis</i> var. <i>angustifolia</i>	X				
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>					
* <i>Romulea rosea</i> var. <i>australis</i>	X				
* <i>Romulea rosea</i> var. <i>communis</i>					
* <i>Sparaxis bulbifera</i>					
* <i>Watsonia marginata</i>					
* <i>Watsonia meriana</i> var. <i>bulbillifera</i>		= <i>W. bulbillifera</i>			
* <i>Watsonia meriana</i> var. <i>meriana</i>					
<b>Juncaceae</b>					
* <i>Juncus acutus</i> subsp. <i>acutus</i>					
* <i>Juncus bufonius</i>					
<i>Juncus caespiticius</i>					
* <i>Juncus capitatus</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (continued)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Juncus pallidus</i>					
<i>Juncus pauciflorus</i>					
<b>Juncaginaceae</b>					
<i>Triglochin linearis</i>		= <i>T. huegelii</i> , <i>T. lineare</i> , <i>T. procerum</i> var. <i>eleutherocarpum</i>			
<i>Triglochin mucronata</i>					
<i>Triglochin muelleri</i>		= <i>T. calcitrapum</i> subsp. <i>recurvum</i> ms. = <i>T. aff. calcitrapa</i>			p, s, u, eSWA, h (clay sumplands PP)
<b>Lamiaceae</b>					
<i>Hemiandra pungens</i>					
* <i>Stachys arvensis</i>					
<b>Lauraceae</b>					
<i>Cassytha flava</i>					
<i>Cassytha glabella</i>					
<i>Cassytha racemosa</i>					
<b>Lentibulariaceae</b>					
<i>Utricularia inaequalis</i>					u, s, h (wetlands PP/F)
<i>Utricularia multifida</i>		= <i>Polypompholyx multifida</i>			u, s, h (wetlands PP/F/R)
<i>Utricularia violacea</i>					u,s, h (wetlands PP/F/R)
<b>Lobeliaceae</b>					
<i>Isotoma scapigera</i>					d, u, h (mud sumplands & palusplainsPP)
<i>Lobelia anceps</i>		= <i>L. alata</i>			
* <i>Monopsis debilis</i>					
<b>Loganiaceae</b>					
<i>Phyllangium paradoxum</i>		<i>P. divergens</i> is probably also in the MKSEA			
<b>Loranthaceae</b>					
<i>Amyema preissii</i>	X	parasitic on * <i>Chamaecytisus palmensis</i>			
<i>Nuytsia floribunda</i>					
<b>Lythraceae</b>					
* <i>Lythrum hyssopifolia</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Malvaceae</b>					
<i>Lawrenzia squamata</i>					d, s, u, r (S, Kenwick SWA), h (saline/calcareous wetlands/PP)
<b>Meliaceae</b>					
* <i>Melia azederach</i>					
<b>Menyanthaceae</b>					
<i>Villarsia capitata</i>					s, h (muddy sumplands PP)
<b>Mimosaceae</b>					
<i>Acacia huegelii</i>					
<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> sens. strict.		<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> plants recorded in the MKSEA in this survey (and all other specimens from BFS 387 in WA Herbarium examined in 2009) closely match the Maslin (1975) type concept of <i>A. lasiocarpa</i> var. <i>lasiocarpa</i> . This taxon, in the strict sense, may be restricted to the eastern SCP (B. Maslin pers. comm. 2009). In Keighery and Keighery (2000) the <i>Acacia lasiocarpa</i> in BFS 387 is identified as <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> . However, though this variety is on the eastern SCP, no specimens from Kenwick – Wattle Grove were found in the WA Herbarium in 2009; the use of this name in BFS 387 appears to have been misapplied.			s, u, h (wetland PP) t
* <i>Acacia longifolia</i> subsp. ? <i>longifolia</i>	X				
<i>Acacia pulchella</i> var. <i>glaberrima</i>					
<i>Acacia saligna</i> subsp. <i>saligna</i> ms					
<i>Acacia stenoptera</i>					
<i>Acacia willdenowiana</i>	X				
<b>Myoporaceae</b>					
<i>Eremophila glabra</i> subsp. <i>chlorella</i>		Recorded by Tauss (2009) in BFS 387 as seedlings, but no longer extant there.		<b>DRF</b> (also meets EPBC EN criteria)	s, u, h (muddy calcareous wetlands, PP)
* <i>Myoporum insulare</i>	X	Probably planted as shade plant and now Naturalised in abandoned chicken run in Lot 138 Boundary Rd			
<b>Myrtaceae</b>					
<i>Astartea affinis</i>		= <i>Astartea</i> sp. Brixton (G.J. Keighery5389) = <i>A. aff. fascicularis</i> sensu Keighery and Keighery (1995)			

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Astartea scoparia</i>					
<i>Baeckea camphorosmae</i>					
<i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444)	X	The name <i>Baeckea tenuifolia</i> (Turcz.) Domin was misapplied against this species in the past. Also recorded by Keighery&Tauss (2008) and Tauss (2009) in BFS 387.		<b>P3</b>	p, s, d
<i>Beaufortia squarrosa</i>					
<i>Callistemon phoeniceus</i>	X	planted but not Naturalised			
<i>Calothamnus hirsutus</i>					s, h (palusplains, PP)
<i>Calothamnus rupestris</i>	X			<b>P4</b>	
<i>Calytrix aurea</i>					
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>			<b>EPBC Endangered</b>	<b>DRF</b>	p, s, u, eSCP(P)
<i>Corymbia calophylla</i>		= <i>Eucalyptus calophylla</i>			
<i>Eremaea pauciflora</i> var. <i>calyptra</i>	X?				
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>					
* <i>Eucalyptus botryoides</i>	X				
* <i>Eucalyptus camaldulensis</i>					
* <i>Eucalyptus citriodora</i>					
<i>Eucalyptus decipiens</i> subsp. <i>decipiens</i>	X				d, s, u (Muccha Limestone, PP)
<i>Eucalyptus gomphocephala</i>	X	Most of these trees in MKSEA are obviously planted, but a few appear to occur naturally in calcareous sediments near Yule Brook. Should be investigated further.			d, s, u (Muccha Limestone, PP)
<i>Eucalyptus marginata</i>					
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>					
<i>Eucalyptus todtiana</i>					
<i>Hypocalymma angustifolium</i> Sand Habitat Variant (C.Tauss 1895)		= <i>H. a.</i> (SCP form). This is the common form of <i>H. angustifolium</i> on the SCP. It is in humic or peaty sand, on the margins of sumplands and in damplands. It is a small shrub to about 1m in height with widely-spaced terete leaves. It is uncommon in the MKSEA and in BFS 387.			u, h (sumplands/damplands, PP)

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Hypocalymma angustifolium</i> Mud Habitat Variant (C.Tauss 1850)		= <i>H. a.</i> (Darling Range form). Part of the <i>Hypocalymma angustifolium</i> complex but varies from the more common form on the SCP (as above) due to its more robust habit (to > 2m in height), larger flowers and flatter, more densely-arranged leaves. Although sympatric with the common SCP form, it is confined to a different habitat (wetlands underlain by muddy sand – sandy mud). It is one of the dominant species of some heath assemblages in BFS 387 and in the MKSEA.			s, h (palusplains, PP), t
<i>Kunzea glabrescens</i>		= <i>Kunzea ericifolia</i>			
<i>Kunzea micrantha</i> subsp. <i>micrantha</i>					s, h (wetlands PP/F)
* <i>Leptospermum laevigatum</i>	X				
<i>Melaleuca brevifolia</i>					p, s, u, h (wetland PP)U
<i>Melaleuca incana</i> subsp. <i>incana</i>					
<i>Melaleuca lateriflora</i> subsp. <i>acutifolia</i>		= <i>Melaleuca lateriflora</i> subsp. <i>alternifolia</i>			h (wetland, PP)
<i>Melaleuca lateritia</i>					
<i>Melaleuca osullivanii</i>		Previously included in <i>M. uncinata</i> and recorded as such in n BFS 387.			h (palusplains-floodplains PP/R)N?
<i>Melaleuca preissiana</i>					
<i>Melaleuca raphiophylla</i>					
<i>Melaleuca seriata</i>					
<i>Melaleuca viminea</i> subsp. <i>viminea</i>					
<i>Pericalymma ellipticum</i> var. <i>ellipticum</i>					
<i>Pericalymma ellipticum</i> var. <i>floridum</i>					
<i>Scholtzia involucrata</i>					
<i>Verticordia acerosa</i> var. <i>preissii</i>					s, h (wetland, PP/F)
<i>Verticordia densiflora</i> var. <i>densiflora</i>					
<i>Verticordia huegelii</i> var. <i>huegelii</i>					
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>				<b>P4</b>	p, s
<i>Verticordia plumosa</i> var. <i>brachyphylla</i>					h (palusplains, PP/F)
<b>Oleaceae</b>					
* <i>Olea europaea</i> subsp. <i>europaea</i>	X				

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Onagraceae</b>					
* <i>Oenothera laciniata</i>					
* <i>Oenothera mollissima</i>					
* <i>Oenothera stricta</i> subsp. <i>stricta</i>	X				
<b>Orchidaceae</b>					
<i>Caladenia paludosa</i>					
<i>Caladenia pectinata</i>					
<i>Caladenia serotina</i>	X				
* <i>Disa bracteata</i>		= <i>Monadenia bracteata</i>			
<i>Diuris laxiflora</i>					
<i>Elythranthera brunonis</i>					
<i>Leptoceras menziesii</i>		= <i>Caladenia menziesii</i>			
<i>Microtis atrata</i>					
<i>Microtis media</i> subsp. ? <i>media</i>					
<i>Prasophyllum drummondii</i>					s, u, r (N, ?Kenwick SWA) h (wetlands PP/BD)
<i>Thelymitra antennifera</i>					s, h (palusplains PP)
<i>Thelymitra crinita</i>					
<i>Thelymitra ?mucida</i>					
<i>Thelymitra ?vulgaris</i>					
<b>Orobanchaceae</b>					
* <i>Orobanche minor</i>	X				
<b>Papilionaceae</b>					
<i>Aotus gracillima</i>	X				
<i>Bossiaea eriocarpa</i>					
* <i>Chamaecytisus palmensis</i>		= <i>Cytisus proliferus</i>			
<i>Daviesia divaricata</i> subsp. <i>divaricata</i> ms	X				
<i>Daviesia physodes</i>					
<i>Eutaxia virgata</i>					
<i>Gastrolobium capitatum</i>					h (damplands/palusplains F/PP)
<i>Gastrolobium ebracteolatum</i>	X	= <i>Oxylobium lineare</i>			u, h (springs, PP)



**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (continued)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Gastrolobium linearifolium</i>	X?	Previously included in <i>Gastrolobium capitatum</i>			
<i>Gompholobium aristatum</i>					
<i>Gompholobium confertum</i>					
<i>Gompholobium tomentosum</i>					
<i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>					
<i>Jacksonia angulata</i>					
<i>Jacksonia floribunda</i>					
<i>Jacksonia furcellata</i>					
<i>Jacksonia sternbergiana</i>					
* <i>Lotus subbiflorus</i>		= <i>L. suaveolens</i> . FloraBase labels record this taxon for Brixton Street			
* <i>Lupinus angustifolius</i>					
* <i>Lupinus cosentinii</i>					
* <i>Lupinus luteus</i>	X				
<i>Sphaerolobium vimineum</i>	X				
* <i>Trifolium angustifolium</i>					
* <i>Trifolium arvense</i> var. <i>arvense</i>					
* <i>Trifolium campestre</i> var. <i>campestre</i>					
<i>Viminaria juncea</i>					
<b>Philydraceae</b>					
<i>Philydrella drummondii</i>					h (palusplains PP)
<i>Philydrella pygmaea</i> subsp. <i>pygmaea</i>					h (palusplains PP)
<b>Poaceae</b>					
<i>Amphibromus nervosus</i>					s, h (mud sumplands PP)
<i>Amphipogon debilis</i>					u,h (wetlands F, PP)
<i>Amphipogon turbinatus</i>					
* <i>Arundo donax</i>					
<i>Austrodanthonia acerosa</i>					
<i>Austrostipa compressa</i>					
<i>Austrostipa elegantissima</i>	X				
<i>Austrostipa</i> sp.					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
* <i>Avena barbata</i>					
* <i>Avena fatua</i>					
* <i>Briza maxima</i>					
* <i>Briza minor</i>					
* <i>Bromus diandrus</i>					
* <i>Cortaderia selloana</i>	X				
* <i>Cynodon dactylon</i>					
* <i>Ehrharta calycina</i>					
* <i>Ehrharta longiflora</i>					
* <i>Eragrostis curvula</i>					
* <i>Hyparrhenia hirta</i>					
* <i>Lolium multiflorum</i>					
* <i>Melinis repens</i>		= <i>Rhynchelytrum repens</i>			
<i>Neurachne alopecuroidea</i>					h (palusplains, PP/F)
* <i>Paspalum dilatatum</i>					
* <i>Pennisetum clandestinum</i>					
* <i>Pennisetum macrourum</i>	X				
* <i>Pennisetum purpureum</i>	X				
* <i>Pentaschistis airoides</i> subsp. <i>airoides</i>	X				
* <i>Poa annua</i>					
<i>Polypogon tenellus</i>					
<i>Sporobolus virginicus</i>					
* <i>Tribolium uniolae</i>					
* <i>Vulpia bromoides</i>	X				
* <i>Vulpia myuros</i> var. <i>myuros</i>					
<b>Polygalaceae</b>					
<i>Comesperma calymega</i>					
<i>Comesperma</i> cf. <i>polygaloides</i> (C.Tauss. 2541)	X	First recorded in the MKSEA in the current survey, in 2007. Also subsequently recorded by Keighery & Tauss (2008) and Tauss (2009) in BFS 387.			s, u, h (palusplains PP) t

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Polygonaceae</b>					
* <i>Acetosella vulgaris</i>	X	= <i>Rumex acetosella</i>			
* <i>Polygonum aviculare</i>					
* <i>Rumex crispus</i>					
* <i>Rumex conglomeratus</i>					
<b>Portulacaceae</b>					
<i>Calandrinia corrigioloides</i>					
<i>Calandrinia</i> sp. Kenwick (G.J. Keighery 10905)		= <i>C. aff. composita</i>			h (wetlands PP) t
<b>Primulaceae</b>					
* <i>Anagallis arvensis</i> var. <i>caerulea</i>					
<i>Samolus junceus</i>					s, u, h (wetlands calcareous, saline, SD/PP/Est/R)
<b>Proteaceae</b>					
<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>					
<i>Banksia attenuata</i>					
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>		syn <i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>			
<i>Banksia ilicifolia</i>					
<i>Banksia littoralis</i>					
<i>Banksia menziesii</i>					
<i>Banksia telmatiaea</i>					r (S,?Serpentine, SWA), p, s, u, h (wetlands PP)
<i>Conospermum undulatum</i>	X	also in BFS 53, Clifford Street Bushland	<b>EPBC VU</b>	<b>DRF</b>	p, s, eSCP(P)
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>					u, s, h (wetlands PP)
<i>Grevillea thelemanniana</i>				<b>P4</b> (also meets DRF & EPBC EN criteria)	p, s, eSCP(P)
<i>Hakea candolleana</i>					
<i>Hakea ceratophylla</i>					r (N, Kewdale SWA) u, s, h (palusplains PP)
<i>Hakea prostrata</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (continued)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Hakea ruscifolia</i>	X				
<i>Hakea sulcata</i>					h (palusplains, PP)
<i>Hakea trifurcata</i>					
<i>Hakea varia</i>					
<i>Petrophile juncifolia</i>					u, s, h (palusplains PP)
<i>Petrophile seminuda</i>					d, s, u, h (palusplains PP)
<i>Stirlingia latifolia</i>					
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>					
<b>Ranunculaceae</b>					
* <i>Ranunculus muricatus</i>	X				
<b>Restionaceae</b>					
<i>Alexgeorgea nitens</i>					
<i>Anarthria laevis</i>					s,u, r (N, Wattle Grove, SWA) h (palusplains, PP)
<i>Chaetanthus aristatus</i>					s, h (wetlands PP)
<i>Chordifex sinuosus</i>					
<i>Cytogonidium leptocarpoides</i>					r (N, Gingin SWA), s, u, h (wetlands, PP)
<i>Desmocladius fasciculatus</i>		= <i>Loxocarya fasciculata</i>			
<i>Dielsia stenostachya</i>	X	= <i>Restio stenostachyus</i>			d, u, h (peaty damplands BD)
<i>Hypolaena exsulca</i>					
<i>Hypolaena pubescens</i>		= <i>Loxocarya pubescens</i>			
<i>Lepyrodia curvescens</i> B.G.Briggs & L.A.S.Johnson ms	X	Poorly known species, often confused with other Restionaceae		P2	p, r (S, Kenwick SWA)
<i>Lepyrodia glauca</i>					
<i>Lyginia barbata</i>					
<i>Lyginia imberbis</i>					
<i>Meeboldina cana</i>		= <i>Leptocarpus canus</i>			
<i>Meeboldina roycei</i> L.A.S.Johnson & B.G.Briggs ms					
<i>Tremulina tremula</i>		= <i>Restio tremulus</i>			d, p, s, u, h (sumplands/palusplains PP)

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<b>Rhamnaceae</b>					
<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>	X	= <i>T. floribundum</i> subsp. <i>floribundum</i>			d, u, s, h (riparian PP/F)
<b>Rubiaceae</b>					
<i>Opercularia vaginata</i>					
<b>Rutaceae</b>					
<i>Boronia crenulata</i> subsp. <i>viminea</i>					r (N, Kenwick SWA) s, u, d, h (wetlands PP/BD)
<i>Philothea spicata</i>		= <i>Eriostemon spicatus</i>			
<b>Sapindaceae</b>					
<i>Dodonaea ceratocarpa</i>					d, u, s, h (palusplains PP), ?t
<b>Scrophulariaceae</b>					
* <i>Dischisma arenarium</i>	X				
* <i>Parentucellia latifolia</i>					
* <i>Parentucellia viscosa</i>					
<b>Solanaceae</b>					
* <i>Solanum nigrum</i>					
<b>Stackhousiaceae</b>					
<i>Stackhousia monogyna</i> sens. lat.		= <i>S. pubescens</i> . <i>S. monogyna</i> is, as treated by Barker (1984), a polymorphic species which includes the WA species <i>S. pubescens</i> A.Rich. and <i>S. huegelli</i> Endl. The MKSEA <i>Stackhousia</i> plants are atypical of <i>S. monogyna</i> .			
<i>Tripterococcus brunonis</i>					
<b>Sterculiaceae</b>					
<i>Guichenotia ledifolia</i>	X	Planted but not naturalised			
<b>Stylidiaceae</b>					
<i>Levenhookia pusilla</i>					
<i>Levenhookia stipitata</i>					
<i>Stylidium calcaratum</i>					
<i>Stylidium dichotomum</i>					
<i>Stylidium diuroides</i> subsp. <i>diuroides</i>					
<i>Stylidium divaricatum</i>					

**Table B1:** Inventory of Flora recorded in the current MKSEA Field Survey (*continued*)

Family/Taxon Name (aligned with FloraBase, 2009)	Not in BFS 387 or 53	Notes/Synonyms	National Conservation Significance	State Conservation Significance	Regional Conservation Significance
<i>Stylidium guttatum</i>					
<i>Stylidium piliferum</i>					
<i>Stylidium repens</i>					
<i>Stylidium roseoalatum</i>		= <i>S. roseo-alatum</i>			p, s, h (wetlands, PP)
<i>Stylidium schoenoides</i>					
<b>Thymelaeaceae</b>					
<i>Pimelea imbricata</i> var. <i>major</i>					p, s, u, eSWA, h (mud palusplains and sumplands PP)s
<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>	X				
<i>Pimelea sulphurea</i>		recorded in Site 24			
<b>Typhaceae</b>					
<i>Typha domingensis</i>	X				
* <i>Typha orientalis</i>					
<b>Violaceae</b>					
<i>Hybanthus calycinus</i>					
<b>Xanthorrhoeaceae</b>					
<i>Xanthorrhoea brunonis</i>					
<i>Xanthorrhoea preissii</i>					
<b>Zamiaceae</b>					
<i>Macrozamia riedlei</i>					



**Table B2:** Angiosperm families recorded in the MKSEA and the codes under which they are shelved in the WA Herbarium (in phylogenetic order)

Family Number (code) in ascending order	Family Name	Family Name in alphabetical order	Family Number (code)
007	Adiantaceae	Adiantaceae	007
016A	Zamiaceae	Alliaceae	054I
018	Cupressaceae	Amaranthaceae	106
026	Juncaginaceae	Anacardiaceae	194
031	Poaceae	Anthericaceae	054F
032	Cyperaceae	Apiaceae	281
035	Araceae	Araceae	035
039	Restionaceae	Asclepiadaceae	305
040	Centrolepidaceae	Asparagaceae	054B
040A	Hydatellaceae	Asphodelaceae	054G
050	Philydraceae	Asteraceae	345
052	Juncaceae	Boraginaceae	310
054I	Alliaceae	Boryaceae	054L
054F	Anthericaceae	Brassicaceae	138
054B	Asparagaceae	Campanulaceae	339
054G	Asphodelaceae	Casuarinaceae	070
054L	Boryaceae	Centrolepidaceae	040
054J	Colchicaceae	Chenopodiaceae	105
054C	Dasypogonaceae	Colchicaceae	054J
054D	Xanthorrhoeaceae	Convolvulaceae	307
055	Haemodoraceae	Crassulaceae	149
060	Iridaceae	Cupressaceae	018
066	Orchidaceae	Cyperaceae	032
070	Casuarinaceae	Dasypogonaceae	054C
090	Proteaceae	Dilleniaceae	226
097	Loranthaceae	Droseraceae	143
103	Polygonaceae	Epacridaceae	288
105	Chenopodiaceae	Euphorbiaceae	185
106	Amaranthaceae	Gentianaceae	303
111	Portulacaceae	Goodeniaceae	341
119	Ranunculaceae	Haemodoraceae	055
131	Lauraceae	Haloragaceae	276
138	Brassicaceae	Hydatellaceae	040A
143	Droseraceae	Iridaceae	060
149	Crassulaceae	Juncaceae	052
163	Mimosaceae	Juncaginaceae	026
165	Papilionaceae	Lamiaceae	313
175	Rutaceae	Lauraceae	131
183	Polygalaceae	Lentibulariaceae	323
185	Euphorbiaceae	Lobeliaceae	340
194	Anacardiaceae	Loganiaceae	302
202	Stackhousiaceae	Loranthaceae	097
207	Sapindaceae	Lythraceae	265
215	Rhamnaceae	Malvaceae	221
221	Malvaceae	Menyanthaceae	303A
223	Sterculiaceae	Mimosaceae	163
226	Dilleniaceae	Myoporaceae	326
243	Violaceae	Myrtaceae	273
263	Thymelaeaceae	Oleaceae	301
265	Lythraceae	Onagraceae	275
273	Myrtaceae	Orchidaceae	066
275	Onagraceae	Orobanchaceae	320
276	Haloragaceae	Papilionaceae	165
281	Apiaceae	Philydraceae	050
288	Epacridaceae	Poaceae	031
293	Primulaceae	Polygalaceae	183
301	Oleaceae	Polygonaceae	103

**Table B2:** Angiosperm families recorded in the MKSEA and the codes under which they are shelved in the WA Herbarium (in phylogenetic order) (*continued*)

Family Number (code) in ascending order	Family Name	Family Name in alphabetical order	Family Number (code)
302	Loganiaceae	Portulacaceae	111
303	Gentianaceae	Primulaceae	293
303A	Menyanthaceae	Proteaceae	090
305	Asclepiadaceae	Ranunculaceae	119
307	Convolvulaceae	Restionaceae	039
310	Boraginaceae	Rhamnaceae	215
313	Lamiaceae	Rubiaceae	331
315	Solanaceae	Rutaceae	175
316	Scrophulariaceae	Sapindaceae	207
320	Orobanchaceae	Scrophulariaceae	316
323	Lentibulariaceae	Solanaceae	315
326	Myoporaceae	Stackhousiaceae	202
331	Rubiaceae	Sterculiaceae	223
339	Campanulaceae	Stylidiaceae	343
340	Lobeliaceae	Thymelaeaceae	263
341	Goodeniaceae	Violaceae	243
343	Stylidiaceae	Xanthorrhoeaceae	054D
345	Asteraceae	Zamiaceae	016A

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## APPENDIX C

### Floristic Classification of the Vegetation of the MKSEA in the context of the Floristic Community Types (FCTs) of the Swan Coastal Plain

(Report by E.A. Griffin & Associates and  
MKSEA taxon vs site matrix table)

## Introduction

Appendix C comprises the June 2008 report produced by E.A. Griffin & Associates and the June 2008 MKSEA taxon vs site matrix table of Tauss and Weston (which has the raw data upon which this report is based).

The report by E.A. Griffin & Associates details the Floristic Community Types analysis carried out on the floristic data collected in the MKSEA study sites and relevés in the current survey, in the context of the Swan Coastal Plain dataset of Gibson *et al.* (1994) and the Floristic Community Types (FCTs) of the Swan Coastal Plain as defined by Gibson *et al.* (1994; Government of Western Australia, 2000 Volume 2).

The MKSEA taxon vs site data that were submitted to E.A. Griffin & Associates for the FCT analysis are in Table C1, which follows the E.A. Griffin & Associates report. This is the same table that was submitted to E.A. Griffin & Associates, as a Microsoft Excel spreadsheet, for floristic analysis, and it lists in which of 27 sites each taxon was recorded. This is the list referred to by E.A. Griffin & Associates, in their Section 1.4 Data provided, as the Weston and Tauss (2008) data from Kenwick. The nomenclature of the taxa in Table C1 conforms with FloraBase (Western Australian Herbarium, 2008) in June 2008, when the data were submitted to E.A. Griffin & Associates. The data of Table C1 were subsequently aligned taxonomically by E.A. Griffin & Associates (as is customary prior to Swan Coastal Plain FCT analyses) to be consistent with the nomenclature used in 1994 in the Swan Coastal Plain dataset by Gibson *et al.*

[N.B.: For the complete lists of taxa recorded during the 2007-2009 survey of the MKSEA, and current taxonomic nomenclature (as per FloraBase, 2009) see Appendix B.]

## **1.0 INTRODUCTION**

### **1.1 Purpose of this report**

The current report is intended to help clarify the assignment of Floristic Community type (FCT) designation to vegetation community (site) data. FCTs were defined by Gibson et al (1994) based on site data collected from vegetation on the Swan Coastal Plain. In particular, the potential that a Threatened Ecological Community (English and Blyth 1997) is represented by the data collected needs to be clarified.

### **1.2 Location of Kenwick Sites**

The sites were from the area known as the Maddington-Kenwick Strategic Employment Area in the City of Gosnells that were surveyed by Weston and Tauss (2008)

### **1.3 Brief background to floristic analysis of vegetation on the Swan Coastal Plain**

Floristic analysis (ie., analysis of variation in vegetation based on the species present, rather than description of structural variation and dominance) as a significant component of the understanding of the variation present in the native vegetation of the Swan Coastal Plain dates to Gibson *et al* (1994 – all references to the SCP survey in the current report refer to this publication), the first publication to document the floristics of the vegetation of a large part of the Swan Coastal Plain. While the SCP survey is based on a very significant amount of work, it must be viewed as a “first pass” survey, limited, in the context of the great variety of vegetation present in the very large area surveyed, by the relatively limited number (509) of sites (quadrats) it is based on. To a limited degree, this limitation has subsequently been addressed in an “update” to the work of the SCP survey (which describes additional units). However, there is no detailed publication of the results of this update available and the additional data used are not readily available in an appropriate form (ie., one that would enable ready comparison of new data to the overall data set).

The units described by the SCP survey are a series of “floristic community types”, a “unit” whose rank is defined by the use within a study. The SCP survey surveyed a very large survey area and defined a relatively small number of floristic community types. Consequently, the floristic community types they have described are of a very high order (see Trudgen 1999, volume 1, for further discussion of this point). This is an extremely important point to fully grasp in interpreting the analysis presented by the SCP survey and in understanding the meaning of analysis of other data sets when they are compared to the floristic community types of the SCP survey.

The important effects of the limited size data set used by the SCP survey and of the relatively small number of floristic community types defined by them, can be summarised by the following points:

1. the definition of all but two of the Threatened Ecological Communities for vegetation on the Swan Coastal Plain (English and Blyth 1997) has been based on the floristic community types of the SCP survey. It therefore follows, that with two exceptions, only vegetation units from one study that are different at a very high order of floristics are treated as rare by Government. No account is taken of other important differences, such as differences in structure and dominance;

2. for the definition of floristic community types to be robust, a sufficient sized database is needed to give adequate precision in their definition. About half of the floristics community types (or sub types) of the SCP survey are based on less than 10 sites. It is likely that with a larger data set there would be significant alteration in the classification of those floristic community types from the SCP survey based on small numbers of sites.
3. as noted above, many (if not most) of the floristic community types defined by the SCP survey are very broad. They contain very significant variation in floristics, structure and dominance. Some (or in more highly cleared parts of the Swan Coastal Plain much) of this variation may be rare by any reasonable definition, but it is currently “buried” within larger groups;
4. there is likely to be significant variation not sampled by the SCP survey. This includes some variation at a high level of floristic difference (see Trudgen 1999, volume 1, for an example of this) and undoubtedly quite significant (large!) amounts of variation at “medium” and “low” levels.
5. the document, and its use by Government, has focussed attention in the environmental impact assessment process on the high level of units described, deflecting attention from the layers of variation beneath these units that also have significant conservation value.

From these points it is obvious that there is a need for a major “upgrade” to the floristic analysis of the vegetation of the Swan Coastal Plain to provide a more detailed floristic classification that considers not only more of the variation present, but explicitly recognises more of the variation present in formally described units.

Obviously, such a reworking would have some effect on what vegetation is considered rare on the Swan Coastal Plain. It needs to be stressed that it would be very unlikely to find that any of the vegetation currently considered to be rare on the basis of the SCP survey’s classification was not rare. On the other hand, it is likely that such a review would very probably consider to be rare some vegetation which is not currently considered rare.

#### **1.4 Data provided**

It is very important in comparing different sets of floristic data that they are comparable in the application of names, in the intensity of the survey (ie., the effort of searching resulting in similar proportion of the flora at sites being recorded) and in the size of the site recorded. If the data from different data sets is not comparable in these ways, it reduces the clarity of the results of the analyses carried out. If the discrepancy in the comparability of the data sets is large, the results may become meaningless.

A brief observation of the Weston and Tauss (2008) data from Kenwick, compared to other datasets of the flora of the SCP indicates that the Kenwick sites above may be low in the numbers of orchid species recorded.



## **2.0 METHODS**

### **2.1 Data Preparation**

The data from the Kenwick sites were provided into a standard MS Access based database designed for this type of data. One virtue of the database is that the species recorded at each site are stored against standard codes (numbers, those used by the Western Australian Herbarium) for each species. This facilitates ready comparison of data from different surveys stored in the same system.

After the data were incorporated into the database (containing the data from other projects), a process of reconciliation of flora species names with those used in the SCP survey was undertaken. This step was necessary at least because of changes in nomenclature over the last ten years and the potential of survey specific variations in the application of names. The reconciliation involved:

- reducing some infra-specific names to the relevant species name,
- combining some taxa where confusion is known to have occurred in field observations and identifications, and
- omitting some names (mostly, where a species had only been identified to genus).

The reconciliation process was relatively straight forward as most of the names had already been standardised. Most reconciliation was to conform with the methods that the SCP survey used to manage confusing taxa plus some nomenclatural changes (see Appendix).

### **2.2 Comparability of datasets**

It was concluded that the datasets were probably modestly compatible to obtain reliable determinations.

### **2.3 Comparisons made**

Two sets of data were evaluated. The data from the 27 sites plus the 509 sites from the SCP survey of the southern part of the Swan Coastal Plain (south of Gingin) were combined. An alternate which only included the quadrats from Kenwick was also prepared mainly to reduce the impact of “poor” releves and large numbers of new sites from one location. These enabled various analyses to be performed.

The main purpose was intended to assign the individual sites to the Floristic Community Types (FCTs) defined in the SCP survey.

These data are provided in CT\_Kenwick.mdb.)

### **2.4 Analyses carried out**

The approach was the use of numerical classification techniques (PATN) based on the similarity of the floristic composition of the Kenwick sites to sites in the SCP survey data set.

### **2.4.1 PATN**

Several modules of the numerical classification package PATN (Belbin 1987) were used for the analyses. The parameter values were the same as used by the SCP survey used to ensure consistency of analysis with that study.

The PATN modules used were ASO (calculation of similarity matrix), FUSE (classification based on the results of ASO), DEND (representation of classification) and NNB (determination of sites most similar to each site – nearest neighbours). The results of the analyses were imported into a database (BM\_TimsThicket.mdb) so that site characteristics and previous classifications (eg., Floristic Community Types derived in earlier classifications) could be associated and various analyses based on these data could be performed.

The assignment of floristic community types to the Kenwick sites was made by summarising the results of two different methods:

- the classification, and
- the ten nearest neighbours.

Experience demonstrates that the results of these are likely to vary, but that from nearest neighbours is likely to make more sense.

To the classification dendrogram of the combined dataset the FCT assigned by the SCP survey was associated with the SCP survey sites. The apparent FCTs were assigned to the Kenwick sites by interpreting the position of these sites in the dendrogram (particularly by the way they joined to the SCP sites).

The 10 sites in the combined data set that were most similar to each of the Kenwick sites were obtained from the nearest neighbour method (NNB). By associating those nearest neighbours from the SCP survey, the most likely FCTs for each of the Kenwick sites were determined.

An attempt was then made to reconcile these different assignments of a Floristic Community Type.

### **3.0 LIMITATIONS**

It has been found in earlier projects that the addition of new sites to the SCP survey data set to produce a combined classification disrupts the original classification. The more data added, the higher the level of the disruption. This problem can make it difficult to assign Floristic Community Types to new sites using this method.

Secondly, it is common for new data to group to their cohorts. In some cases this has proven to result from common deficiencies in the data, ie. whole groups of species missing. This absence tends to draw them together. The more sites in the added batch, the tighter they draw together.

The analyses are conducted without personal knowledge of the sites and no photographs were provided.

### 4.0 RESULTS

#### 4.1 Determination of floristic community type by classification

The classifications suggested that the sites appeared to related to a range of dampland FCTs (8, 9, 11, 12) and some woodlands FCTs (3a, 20, 23) located adjacent to each other in the dendrogram (Figures 1 and 2). The relations suggested in Figure 2 are likely to be a little more reliable because the quality of the sites is higher and there are fewer sites from the one place which tends to draw sites into local nodes.

Figure 1. Relevant portions of Dendrogram all Quads and Relevés

site	FCT	sp	dendrogram						
			06/20/08 08:51:04.47 dend Tauss Kenwick with SCP June 2008						
			0.2050	0.3667	0.5283	0.6900	0.8517	1.0133	1.175
01R		28	_____						
05R		18	_____						
21R		18	_____   _____   _____						
04Q		63	_____						
08Q		61	_____   _____						
10Q		51	_____   _____						
11Q		54	_____   _____   _____						
06Q		33	_____   _____						
18R		21	_____   _____   _____						
13R		34	_____   _____   _____   _____						
ELLEN-7	6	23	_____   _____						
PEARCE-1	6	23	_____   _____   _____						
TWIN-1	6	19	_____   _____   _____						
TWIN-2	6	27	_____   _____   _____						
TWIN-3	6	43	_____   _____   _____   _____						
TWIN-4	6	23	_____   _____   _____   _____   _____						
09R		18	_____   _____						
20Q		19	_____   _____   _____   _____						
14Q		34	_____   _____   _____   _____						
BULL-6	7	38	_____   _____   _____						
BULL-8	7	42	_____   _____   _____   _____						
YULE-5	7	32	_____   _____   _____   _____						
AUSTB-1	7	24	_____   _____   _____						
site	FCT	sp	dendrogram						
03R		14	_____						
WATER-2	13	8	_____   _____						
BANK-1A	13	12	_____   _____   _____						
CAPEL-4	13	12	_____   _____   _____   _____						
RUAB-3	13	18	_____   _____   _____   _____						
C58-2	13	49	_____   _____   _____   _____						
WATER-1	13	14	_____   _____   _____   _____						
BYRD-1	9	41	_____   _____   _____						
welr 02	9	27	_____   _____   _____   _____						
WONN-3	9	27	_____   _____   _____   _____						
15Q		24	_____   _____   _____						
BULL-12	11	25	_____   _____   _____   _____						
hymus01	11	21	_____   _____   _____   _____						
hymus02	11	24	_____   _____   _____   _____						
MOD0-3	11	16	_____   _____   _____   _____						
CARAB-3	11	30	_____   _____   _____   _____						
rowe01	11	15	_____   _____   _____   _____						
low10b	11	24	_____   _____   _____   _____						
C71-1	11	51	_____   _____   _____   _____						
HARRY-6	11	25	_____   _____   _____   _____						
27Q		17	_____   _____   _____   _____						
MILT-5	14	15	_____   _____   _____   _____						
YAN-21	14	18	_____   _____   _____   _____						
16Q		9	_____   _____   _____   _____						

brick4	9	27	_____   _____
AUSTB-3	11	27	_____   _____
TWIN-11	11	23	_____   _____
hymus05	11	30	_____   _____
hymus06	11	32	_____   _____   _____
FL-10	12	17	_____   _____
RIVD-1	12	10	_____   _____   _____
CAPEL-6	12	36	_____   _____   _____
CAPEL-8	12	41	_____   _____   _____
CAPEL-9	12	26	_____   _____   _____   _____   _____
site	FCT	sp	dendrogram
12Q		49	_____   _____
17Q		32	_____   _____
26Q		24	_____   _____   _____
19Q		48	_____   _____   _____
28Q		25	_____   _____
brick5	3a	36	_____   _____
brick1	3a	65	_____   _____
brick3	3a	68	_____   _____
brick6	3a	49	_____   _____
brick7	3a	53	_____   _____
brick8	3a	59	_____   _____
waro 06	3a	47	_____   _____
BRIX-2	3a	50	_____   _____
BRIX-5	3a	61	_____   _____
MUD-4	3a	66	_____   _____
MUD-5	3a	57	_____   _____
lamb1	3a	76	_____   _____
lamb2	3a	71	_____   _____
site	FCT	sp	dendrogram
22Q		61	_____   _____
23R		34	_____   _____
24R		34	_____   _____
25R		37	_____   _____
29R		23	_____   _____
card10	6	29	_____   _____
card11	6	24	_____   _____
card4	6	26	_____   _____   _____
APBF-1	20a	75	_____   _____
APBF-2	20a	70	_____   _____
M53	20a	64	_____   _____
GOLF-1	20a	60	_____   _____
KOON-1	20a	65	_____   _____
KOON-2	20a	63	_____   _____
LAND-1	20a	71	_____   _____
brick2	20b	64	_____   _____
card1	20b	63	_____   _____
card2	20b	73	_____   _____
card5	20b	65	_____   _____
card6	20b	59	_____   _____
BURNRD01	20b	70	_____   _____
yar104	20b	67	_____   _____
card8	20b	46	_____   _____
card9	20b	54	_____   _____
talb10	20c	79	_____   _____
talb11	20c	49	_____   _____
talb3	20c	63	_____   _____
talb5	20c	60	_____   _____
talb7	20c	51	_____   _____
talb8	20c	73	_____   _____
talb9	20c	70	_____   _____
talb2	20c	79	_____   _____
talb6	20c	49	_____   _____

Figure 2. Relevant portions of Dendrogram all Quads

site	FCT	sp	dendrogram
			06/20/08 08:53:19.53 dend Tauss Kenwick with SCP June 2008 Quadrats
			0.2050 0.3678 0.5306 0.6933 0.8561 1.0189 1.181
04Q		63	_____
08Q		61	_____   _____
10Q		51	_____   _____
11Q		54	_____   _____   _____
06Q		33	_____   _____   _____
14Q		34	_____   _____   _____
20Q		19	_____   _____   _____
BRIX-1	8	48	_____   _____
BRIX-3	8	43	_____   _____
FL-3	8	50	_____   _____
ELLEN-1	8	45	_____   _____
ELLEN-5	8	45	_____   _____
ELLEN-2	8	54	_____   _____
ELLEN-3	8	48	_____   _____
ELLEN-4	8	34	_____   _____
C58-3	8	50	_____   _____
FL-7	8	28	_____   _____
MEELON-1	8	78	_____   _____
MEELON-2	8	74	_____   _____
WATER-4	8	80	_____   _____
MUD-2	8	42	_____   _____
MUD-3	8	44	_____   _____
MUD-6	8	64	_____   _____
MUD-7	8	54	_____   _____
MUD-9	8	80	_____   _____
BRIX-4	8	38	_____   _____
waro 03	8	46	_____   _____
waro 04	8	38	_____   _____
site	FCT	sp	dendrogram
15Q		24	_____
BULL-12	11	25	_____   _____
hymus01	11	21	_____   _____
hymus02	11	24	_____   _____
MOD0-3	11	16	_____   _____
CARAB-3	11	30	_____   _____
rowe01	11	15	_____   _____
low10b	11	24	_____   _____
C71-1	11	51	_____   _____
HARRY-6	11	25	_____   _____
27Q		17	_____   _____
MILT-5	14	15	_____   _____
YAN-21	14	18	_____   _____
16Q		9	_____   _____
brick4	9	27	_____   _____
AUSTB-3	11	27	_____   _____
TWIN-11	11	23	_____   _____
hymus05	11	30	_____   _____
hymus06	11	32	_____   _____
FL-10	12	17	_____   _____
RIVD-1	12	10	_____   _____
CAPEL-6	12	36	_____   _____
CAPEL-8	12	41	_____   _____
CAPEL-9	12	26	_____   _____
site	FCT	sp	dendrogram
12Q		49	_____
17Q		32	_____   _____
26Q		24	_____   _____
19Q		48	_____   _____

28Q		25		
brick5	3a	36		
brick1	3a	65		
brick3	3a	68		
brick6	3a	49		
brick7	3a	53		
brick8	3a	59		
waro 06	3a	47		
BRIX-2	3a	50		
BRIX-5	3a	61		
MUD-4	3a	66		
MUD-5	3a	57		
lamb1	3a	76		
lamb2	3a	71		
site	FCT	sp	dendrogram	
22Q		61		
M53	20a	64		
24R		34		
APBF-1	20a	75		
APBF-2	20a	70		
GOLF-1	20a	60		
KOON-1	20a	65		
KOON-2	20a	63		
LAND-1	20a	71		

(Kenwick sites \*Q and \*R)

Table 2 provides a summary of the most likely FCT for these sites from this method.

#### 4.2 Determination of floristic community type using Nearest Neighbour method

The nearest neighbour analysis suggests that the sites do not fit the FCTs well. This is a relatively common phenomenon when adding largely dampland sites to the SCP dataset. This is for two reasons; these sites can be very different and the SCP dataset has a low number of wetland types and those defined as FCTs are relatively generalised. A common occurrence is that new dampland sites tend to disrupt the SCP FCT classification.

Table 1. Results of Nearest Neighbour analysis

s	s1	fct1	v1	s2	fct2	v2	s3	fct3	v3	s4	fct4	v4	s5	fct5	v5
01R	05R		0.61	13R		0.68	04Q		0.710	ELLEN-7	6	0.75	MUD-6	8	0.752
03R	WATER-	13	0.61	RUAB-3	13	0.67	BRIX-4	8	0.686	BAMBUN-2	15	0.72	waro 04	8	0.725
04Q	08Q		0.58	13R		0.62	10Q		0.638	MUD-5	3a	0.66	11Q		0.688
05R	21R		0.58	01R		0.61	PAGA-5	17	0.724	brick4	9	0.72	PAGA-2	13	0.733
06Q	18R		0.5	13R		0.53	10Q		0.594	08Q		0.60	KOOLJ-7	10a	0.644
08Q	11Q		0.58	04Q		0.58	10Q		0.603	06Q		0.60	MUD-9	8	0.611
09R	20Q		0.64	10Q		0.68	11Q		0.731	18R		0.77	01R		0.804
10Q	11Q		0.40	06Q		0.59	08Q		0.603	18R		0.61	04Q		0.638
11Q	10Q		0.40	08Q		0.58	18R		0.605	ELLEN-5	8	0.64	YULE-5	7	0.662
12Q	MUD-4	3a	0.61	brick6	3a	0.62	28Q		0.633	17Q		0.64	brick3	3a	0.655
13R	06Q		0.53	18R		0.61	04Q		0.622	TWIN-2	6	0.66	01R		0.684
14Q	06Q		0.64	20Q		0.70	YULE-5	7	0.709	18R		0.72	BRIX-3	8	0.726
15Q	hymus02	11	0.68	BULL-12	11	0.69	hymus06	11	0.698	CAPEL-9	12	0.70	WATER-1	13	0.714
16Q	brick4	9	0.72	RIVD-1	12	0.78	15Q		0.8	WATER-1	13	0.82	welr 01	9	0.828
17Q	26Q		0.52	28Q		0.58	19Q		0.605	brick5	3a	0.60	24R		0.619
18R	06Q		0.5	11Q		0.60	10Q		0.611	13R		0.61	BRIX-1	8	0.705
19Q	17Q		0.60	MUD-4	3a	0.62	MUD-5	3a	0.650	brick5	3a	0.68	brick6	3a	0.684
20Q	09R		0.64	21R		0.65	14Q		0.708	10Q		0.75	RIVD-1	12	0.785
21R	05R		0.58	20Q		0.65	10Q		0.687	PAGA-5	17	0.72	04Q		0.733
22Q	23R		0.47	25R		0.54	BULL-3	23a	0.542	M53	20a	0.55	WIRR-2	23a	0.560
23R	22Q		0.47	24R		0.52	25R		0.6	card4	6	0.60	29R		0.653
24R	23R		0.52	25R		0.58	29R		0.6	22Q		0.61	17Q		0.619
25R	29R		0.36	22Q		0.54	THOM-2	24	0.555	WARB-1	23a	0.55	hurst02	23a	0.564
26Q	17Q		0.52	28Q		0.68	cool 09	19	0.684	yarl01	3c	0.70	29R		0.720

s	s1	fct1	v1	s2	fct2	v2	s3	fct3	v3	s4	fct4	v4	s5	fct5	v5
27Q	BULL-12	11	0.80	TWIN-2	6	0.81	MANEA-1	9	0.843	MILT-2	13	0.84	hymus02	11	0.85
28Q	17Q		0.58	brick5	3a	0.59	waro 06	3a	0.6	12Q		0.63	MOD0-1	4	0.649
29R	25R		0.36	24R		0.6	ELDO-1	23b	0.631	22Q		0.63	MILT-8	23b	0.645

Table 1 (cont)

s	s6	fct6	v6	s7	fct7	v7	s8	fct8	v8	s9	fct9	v9	s10	fct1	v10
01R	BRIX-1	8	0.75	ELLEN-6	3c	0.76	21R		0.761	11Q		0.76	welr 01	9	0.764
03R	waro 03	8	0.76	14Q		0.76	PAGA-2	13	0.769	WATER-1	13	0.77	hymus02	11	0.783
04Q	YULE-4	10a	0.70	01R		0.71	12Q		0.717	TWIN-2	6	0.71	ELLEN-5	8	0.728
05R	04Q		0.73	13R		0.75	cool 11	17	0.757	ELLIS-3	18	0.76	cool 09	19	0.764
06Q	14Q		0.64	BRIX-3	8	0.65	FISH-3	10a	0.662	KOOLJ-6	10a	0.67	FL-3	8	0.682
08Q	BRIX-1	8	0.62	KOOLJ-7	10a	0.64	MUD-6	8	0.642	ELLEN-2	8	0.64	MUD-7	8	0.663
09R	BRIX-1	8	0.81	FL-7	8	0.81	GINGIN-1	7	0.820	WATER-2	13	0.83	YULE-5	7	0.833
10Q	ELLEN-1	8	0.65	ELLEN-5	8	0.65	FL-3	8	0.670	GINGIN-1	7	0.67	09R		0.682
11Q	FL-3	8	0.68	ELLEN-1	8	0.68	04Q		0.688	BULL-8	7	0.69	MUD-2	8	0.698
12Q	FL-1	4	0.65	MUD-5	3a	0.67	MOD0-1	4	0.682	card13	3b	0.68	waro 06	3a	0.684
13R	08Q		0.69	MUD-5	3a	0.70	19Q		0.717	KOOLJ-7	10a	0.73	YULE-4	10a	0.742
14Q	BRIX-4	8	0.73	BULL-8	7	0.75	11Q		0.753	FL-7	8	0.75	KOOLJ-6	10a	0.764
15Q	CARAB-	7	0.73	AUSTB-8	7	0.73	HARRY-6	11	0.739	CAPEL-8	12	0.74	RIV-1	12	0.741
16Q	TWIN-2	6	0.83	AUSTB-3	11	0.83	rowe01	11	0.833	GINGIN-1	7	0.83	FL-2	10a	0.837
17Q	BRIX-2	3a	0.62	MUD-4	3a	0.62	brick7	3a	0.634	brick8	3a	0.64	12Q		0.641
18R	BRIX-3	8	0.71	FL-3	8	0.71	MUD-3	8	0.718	14Q		0.72	08Q		0.721
19Q	28Q		0.71	13R		0.71	waro 06	3a	0.720	brick3	3a	0.73	BRIX-5	3a	0.738
20Q	15Q		0.79	11Q		0.79	YULE-5	7	0.8	ELLEN-7	6	0.80	03R		0.806
21R	ELLEN-7	6	0.75	TWIN-4	6	0.75	MTB-5	17	0.75	13R		0.75	cool 11	17	0.757
22Q	talb11	20c	0.56	hurst03	23a	0.57	KING-2	28	0.589	talb7	20c	0.58	WHITE-1	23a	0.596
23R	WOODV-	28	0.65	WOODV-	28	0.70	WIRR-2	23a	0.703	WHITE-1	23a	0.70	THOM-2	24	0.710
24R	M53	20a	0.62	YAN-19	23b	0.67	BULL-3	23a	0.689	WATERRD1	28	0.68	WIRR-2	23a	0.692
25R	WIRR-2	23a	0.56	NINE-2	21a	0.57	FL-5	21c	0.578	GUTHR-6	21a	0.58	WIRR-1	23a	0.585
26Q	DUCK-1	3c	0.72	WATER-3	3c	0.72	12Q		0.739	24R		0.74	25R		0.75
27Q	HARRY-	11	0.85	01R		0.85	NAV-4	24	0.854	TWIN-7	21c	0.86	AUSTB-5	5	0.864
28Q	FL-1	4	0.65	brick1	3a	0.65	MUD-4	3a	0.662	brick6	3a	0.66	card12	3b	0.679
29R	THOM-2	24	0.64	FL-5	21c	0.65	23R		0.653	PLINE-2	23b	0.65	MILT-7	23b	0.662

s – the site being compared

s1 to s10 – the 1<sup>st</sup> to 10<sup>th</sup> most similar sites

f1 to f10 – the FCT of the similar sites (only for SCP sites)

v1 to v10 – the dissimilarity value between the site and the similar sites (values above 0.6 tend to indicate low similarity)

### 4.3 Combining the results

The two methods (Classification and Nearest Neighbour) that were used to analyse the same Kenwick data in this report, produced slightly differing results (compare the DEN quads column with NNB column in Table 2). Such differences are a common feature of the use of these methods. The dendrogram output of the classification often indicates a more simple (or more unequivocal) result than that indicated by the Nearest Neighbour tabular output. While both of these methods are valid the DEN can “draw” sites away from sites that they individually similar too. This tends to be a function of some locality or survey related differences. “New” groups are not easily distinguished.

Decisions made about the affiliation (or otherwise) of sites in the current Kenwick survey with FCTs of the SCP in Gibson *et al.*, 1994 should be made cautiously with the consideration of any additional data available from the sites in question (such as landforms, soils, hydrology and disturbances) that may be significant with regard to the presence or absence of individual floristic components.

Table 2 Summary of results



s	condition	DEN all	DEN quads	NNB	Summary*
01R	degraded	?6		?6/8	?6/8
03R	degraded	13		13/8	13/8
04Q		?6	?8	?3a/10a	?3a/10a
05R	degraded	?6		?17	?17
06Q		?6	?8	10a?8	10a?8
08Q		?6	?8	8?10a	8?10a
09R		?6		??8	??8
10Q		?6	?8	8	8
11Q		?6	?8	8/7	8/7
12Q		3a	3a	3a	3a
13R	? degraded	?6		6	6
14Q		?6	?8	?7/8	?7/8
15Q		11	11	?11/12	?11/12
16Q		?9/12	9/11/12	?9/12	?9/12
17Q		3a	3a	3a	3a
18R		?6		?8	?8
19Q		3a	3a	3a	3a
20Q	? degraded	?6	?8	?12/7	?12/7/8
21R	degraded	?6		?17/6	?17/6
22Q		6	20a	23a/20	20a/23a
23R	degraded	6		6?28	6?28
24R		6	20a	20a/?23	20a/?23
25R	degraded	6		24/23a	24/23a
26Q		3a	3a	?3c	?3c
27Q	degraded	11/14	11/14	??11/6/9	??11/6/9
28Q		3a	3a	?3a/4	?3a/4
29R	degraded	6		23b/24	23b/24

\* an intuitive synthesis, largely drawn from NNB.

? is an attempt to indicate uncertainty

Much of the uncertainty suggested in these analyses is likely to be a product of the sites being wetland related communities. The intrinsic diversity of these communities coupled to the relatively small number of communities in the SCP data lead commonly to high uncertainty with this style of analysis.

#### 4.0 REFERENCES

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## 5.0 APPENDIX

Appendix 1 Species combinations made to assist in reconciling taxonomic changes and identification difficulties between this survey and SCP data.

FCODE	name	lookup
026	Triglochin huegelii	Triglochin procerum
031	Amphibromus nervosus	Amphibromus neesii
031	Amphipogon setaceus	Amphipogon debilis
031	Austrostipa sp.	Austrostipa pycnostachya
031	Avena barbata	Avena barbata/fatua
031	Avena fatua	Avena barbata/fatua
031	Cortaderia seloana	
031	Lolium floribundum	Lolium multiflorum
031	Melinis repens	
031	Paspalum dilatatum	
031	Pentaschistis aeroides	Pentaschistis airoides/pallida
031	Tribolium uniolae	
032	Cyathochaeta equitans	Cyathochaeta clandestina
032	Cyathochaeta teretifolia	
032	Isolepis cernua var. setiformis	Isolepis cernua
032	Isolepis nodosa	
032	Lepidosperma aff. scabra	Lepidosperma scabrum
032	Lepidosperma rostratum	
032	Lepidosperma scabra (inland form)	Lepidosperma scabrum
032	Lepidosperma sp. Darling Range pers. comm. R. Barrett ( Syn= L. squamatum)	Lepidosperma squamatum
032	Lepidosperma squamatum sens lat. sp. 2	Lepidosperma squamatum
032	Lepidosperma squamatum sens. lat. sp.1	Lepidosperma squamatum
032	Schoenus plumosus	
032	Schoenus subflavus subsp. subflavus	Schoenus subflavus
039	Leptocarpus aristatus	Chaetanthus aristatus
039	Leptocarpus canus	Meeboldina cana
039	Leptocarpus roycei	Meeboldina roycei
039	Lepyrodia curvescens	
039	Lyginia imberbis	Lyginia barbata
050	Philydrella pygmaea subsp. pygmaea	Philydrella pygmaea
054B	Myrsiphyllum asparagoides	Asparagus asparagoides
054C	Lomandra micrantha subsp. micrantha	Lomandra micrantha
054F	Chamaescilla corymbosa var. corymbosa	Chamaescilla spiralis/corymbosa
054F	Laxmannia ramosa subsp. ramosa	Laxmannia ramosa
054F	Thysanotus manglesianus	Thysanotus patersonii/manglesianus
054F	Tricoryne aff. elatior	Tricoryne elatior
054J	Burchardia umbellata	Burchardia umbellata/congesta
054J	Wurmbea dioica subsp. alba	Wurmbea dioica subsp. aff. alba
055	Conostylis aculeata subsp. preissii	Conostylis aculeata
055	Conostylis setigera subsp. setigera	Conostylis setigera
055	Tribonanthes australis x longipetala	Tribonanthes australis
060	Gladiolus undulatus	
060	Moraea flaccida	Moraea flaccida
060	Patersonia occidentalis var. angustifolia	Patersonia sp.Swamp form(N.Gibson & M.Lyons 544)
060	Patersonia occidentalis var. occidentalis	Patersonia occidentalis
060	Romulea rosea var. australis	Romulea rosea

Fcode	name	lookup
060	<i>Romulea rosea</i> var. <i>communis</i>	<i>Romulea rosea</i>
060	<i>Watsonia bulbifera</i>	<i>Watsonia meriana/bulbifera</i>
060	<i>Watsonia marginata</i>	<i>Watsonia meriana/bulbifera</i>
066	<i>Caladenia serotina</i>	
066	<i>Monadenia bracteata</i>	<i>Disa bracteata</i>
066	<i>Thelymitra vulgaris</i>	
090	<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	<i>Adenanthos cygnorum</i>
090	<i>Dryandra lindleyana</i> var. <i>lindleyana</i>	<i>Dryandra nivea</i>
090	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	<i>Grevillea bipinnatifida</i>
090	<i>Grevillea thelemanniana</i>	<i>Grevillea thelemanniana</i> subsp. <i>obtusifolia</i>
090	<i>Grevillea thelemanniana</i> subsp. <i>preissii</i>	
090	<i>Petrophile media</i> var. <i>juncifolius</i> Ms	<i>Petrophile juncifolia</i>
103	<i>Rumex acetosella</i>	
105	<i>Halosarcia lepidosperma</i>	<i>Tecticornia lepidosperma</i>
111	<i>Calandrinia</i> sp. Kenwick (G.J. Keighery 10905)	
119	<i>Ranunculus muricatus</i>	
131	<i>Cassytha</i> sp.	
143	<i>Drosera gigantea</i> subsp. <i>gigantea</i>	<i>Drosera gigantea</i>
143	<i>Drosera macrantha</i> subsp. <i>macrantha</i>	<i>Drosera macrantha</i> (Swan coastal plain form BJK & NG 228)
149	<i>Crassula colorata</i> var. <i>acuminata</i>	<i>Crassula colorata</i>
149	<i>Crassula natans</i> var. <i>minus</i>	<i>Crassula natans</i>
163	<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>	<i>Acacia lasiocarpa</i>
163	<i>Acacia longifolia</i>	
163	<i>Acacia pulchella</i> var. <i>glaberrima</i>	<i>Acacia pulchella</i>
163	<i>Acacia saligna</i> var. <i>saligna</i>	<i>Acacia saligna</i>
165	<i>Jacksonia floribunda</i>	<i>Jacksonia densiflora</i> / <i>floribunda</i> complex
165	<i>Lotus subbiflorus</i>	<i>Lotus suaveolens</i>
165	<i>Nemcia capitata</i>	<i>Gastrolobium capitatum</i>
165	<i>Trifolium arvense</i> var. <i>arvense</i>	<i>Trifolium arvense</i>
175	<i>Boronia crenulata</i> subsp. <i>viminea</i>	<i>Boronia crenulata</i>
183	<i>Comesperma</i> aff. <i>polygaloides</i>	
185	<i>Monotaxis grandiflora</i> var. <i>grandiflora</i>	<i>Monotaxis grandiflora</i>
194	<i>Schinus terebinthifolia</i>	
215	<i>Trymalium floribundum</i> subsp. <i>floribundum</i>	
273	<i>Astartea affinis</i>	<i>Astartea</i> aff. <i>fascicularis</i>
273	<i>Astartea scoparia</i>	<i>Astartea</i> aff. <i>fascicularis</i>
273	<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	
273	<i>Eremaea pauciflora</i> var. <i>calyptra</i>	<i>Eremaea pauciflora</i>
273	<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	<i>Eremaea pauciflora</i>
273	<i>Eucalyptus botryoides</i>	
273	<i>Eucalyptus calophylla</i>	<i>Corymbia calophylla</i>
273	<i>Eucalyptus citriodora</i>	
273	<i>Eucalyptus decipiens</i> subsp. <i>decipiens</i>	<i>Eucalyptus decipiens</i>
273	<i>Kunzea glabrescens</i>	
273	<i>Kunzea micrantha</i> subsp. <i>micrantha</i>	<i>Kunzea micrantha</i>
273	<i>Leptospermum laevigatum</i>	
273	<i>Melaleuca osullivanii</i>	<i>Melaleuca uncinata</i>
273	<i>Melaleuca viminea</i> subsp. <i>viminea</i>	<i>Melaleuca viminea</i>
273	<i>Pericalymma ellipticum</i> var. <i>floridum</i>	<i>Pericalymma ellipticum</i>
273	<i>Verticordia acerosa</i> var. <i>preissii</i>	<i>Verticordia acerosa</i>
273	<i>Verticordia densiflora</i> var. <i>densiflora</i>	<i>Verticordia densiflora</i>
273	<i>Verticordia huegelii</i> var. <i>huegelii</i>	<i>Verticordia huegelii</i>

Fcode	name	lookup
273	<i>Verticordia plumosa</i> var. <i>brachyphylla</i>	<i>Verticordia plumosa</i>
288	<i>Andersonia lehmanniana</i> subsp. <i>lehmanniana</i>	<i>Andersonia lehmanniana</i>
293	<i>Anagallis arvensis</i> var. <i>caerulea</i>	<i>Anagallis arvensis</i>
301	<i>Olea europaea</i>	
302	<i>Phyllangium divergens</i>	<i>Phyllangium paradoxum</i>
313	<i>Hemiandra pungens</i>	<i>Hemiandra pungens/linearis</i>
316	<i>Bellardia trixago</i>	
326	<i>Eremophila glabra</i> subsp. <i>chlorella</i>	
341	<i>Goodenia pulchella</i> subsp. Coastal Plain B (L.W. Sage 2336)	<i>Goodenia pulchella</i>
341	<i>Velleia</i> aff. <i>trinervis</i> (GJ Keighery 10429)	<i>Velleia trinervis</i>
345	<i>Angianthus</i> sp.	<i>Angianthus drummondii</i>
345	<i>Conyza sumatrensis</i>	<i>Conyza bonariensis</i>
345	<i>Cotula turbinata</i>	
345	<i>Lagenifera huegelii</i>	
345	<i>Senecio pinnatifolius</i>	<i>Senecio lautus</i>
345	<i>Senecio</i> sp.1	
345	<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)	

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Acacia huegelii</i>																							x				x
<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> sens. strict.	x		x		x	x	x	x	x		x					x											
<i>Acacia longifolia</i>													x														
<i>Acacia pulchella</i> var. <i>glaberrima</i>																							x				
<i>Acacia saligna</i> var. <i>saligna</i>	x		x	x															x				x	x			x
<i>Acacia stenoptera</i>			x			x		x		x							x										
<i>Acacia willdenowiana</i>																										x	
<i>Acanthocarpus canaliculatus</i>	x			x		x			x																		
<i>Actinostrobos pyramidalis</i>	x		x	x		x		x	x																		
<i>Adenanthos cygnorum</i> var. <i>cygnorum</i>																				x	x	x					x
<i>Alexgeorgea nitens</i>																				x	x	x					x
<i>Allocasuarina fraseriana</i>																				x	x	x	x				
<i>Allocasuarina humilis</i>																						x					
<i>Amphibromus nervosus</i>		x																									
<i>Amphipogon setaceus</i>													x														
<i>Amphipogon turbinatus</i>																	x			x							
<i>Anagallis arvensis</i> var. <i>caerulea</i>													x														
<i>Andersonia lehmanniana</i> subsp. <i>lehmanniana</i>																	x										
<i>Angianthus preissianus</i>					x	x						x						x									
<i>Anigozanthus manglesii</i>											x																
<i>Anigozanthus viridis</i> subsp. <i>viridis</i>			x								x																
<i>Aotus gracillima</i>													x														
<i>Aphelia cyperoides</i>			x			x				x			x														
<i>Arctotheca calendula</i>			x																								
<i>Arnocrinum preissii</i>																							x				
<i>Asparagus asparagoides</i>										x									x					x			
<i>Astartea affinis</i>		x											x														
<i>Astartea scoparia</i>	x																									x	
<i>Austrodanthonia acerosa</i>			x																								
<i>Austrostipa compressa</i>			x																	x		x					
<i>Austrostipa elegantissima</i>																				x							
<i>Austrostipa pycnostachya</i>																				x							
<i>Austrostipa</i> sp.																								x			

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Avena barbata</i>			x									x	x					x	x								
<i>Avena fatua</i>			x																								
<i>Baeckea camphorosmae</i>										x					x							x					
<i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444)							x		x	x																	
<i>Banksia attenuata</i>																							x				
<i>Banksia menziesii</i>																				x	x	x	x				
<i>Banksia telmatiaea</i>			x								x						x										
<i>Baumea juncea</i>			x	x				x	x	x									x					x			
<i>Beaufortia squarrosa</i>																									x		
<i>Boronia crenulata</i> subsp. <i>viminea</i>																	x										
<i>Borya scirpoidea</i>							x								x												
<i>Bossiaea eriocarpa</i>																				x			x			x	
<i>Brachyscome pusilla</i>					x			x	x			x				x											
<i>Briza maxima</i>								x	x						x	x	x			x	x					x	
<i>Briza minor</i>			x			x		x	x	x		x	x	x		x				x	x						
<i>Bromus diandrus</i>													x					x									
<i>Burchardia bairdiae</i>															x												
<i>Burchardia multiflora</i>									x																		
<i>Burchardia umbellata</i>																				x			x				
<i>Caladenia pectinata</i>			x				x		x																		
<i>Caladenia serotina</i>			x																								
<i>Calandrinia</i> sp. Kenwick (G.J. Keighery 10905)								x				x															
<i>Calothamnus hirsutus</i>			x								x	x															
<i>Calytrix aurea</i>										x							x										
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>							9																				
<i>Cassytha racemosa</i>	x																										
<i>Cassytha glabella</i>			x									x															
<i>Casuarina obesa</i>		x																									
<i>Centrolepis aristata</i>			x		x	x		x	x	x	x		x			x											
<i>Chaetanthus aristatus</i>					x			x	x		x	x				x	x	x	x								
<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>																										x	
<i>Chordifex sinuosus</i>						x				x																	
<i>Chorizandra enodis</i>		x					x											x									



**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Cicendia filiformis</i>					x	x							x														
<i>Comesperma</i> aff. <i>polygaloides</i>								x	x								x										
<i>Conospermum undulatum</i>																	x					x					
<i>Conostylis aculeata</i> subsp. ? <i>preissii</i>										x																	
<i>Conostylis aurea</i>																				x							
<i>Conostylis festucacea</i> subsp. <i>festucacea</i>			x																					x			
<i>Conostylis juncea</i>																				x			x				
<i>Conostylis setigera</i> subsp. <i>setigera</i>											x				x		x										
<i>Conyza sumatrensis</i>																									27		
<i>Cortaderia selloana</i>													x														
<i>Corymbia calophylla</i>															x							x		x		x	
<i>Cotula turbinata</i>			x																								
<i>Crassula colorata</i> var. <i>acuminata</i>			x																								
<i>Crassula exserta</i>												x															
<i>Crassula natans</i> var. <i>minus</i>					x																						
<i>Cyathochaeta avenacea</i>	x		x	x						x	x				x		x							x	x	x	
<i>Cyathochaeta equitans</i>																				x	x	x					
<i>Cyathochaeta teretifolia</i>													x														
<i>Cynodon dactylon</i>																					x			x			
<i>Cyperus tenellus</i>						x																					
<i>Dampiera linearis</i>										x											x		x			x	
<i>Dasyogon bromeliifolius</i>																				x			x			x	x
<i>Dasyogon obliquifolius</i>																						x					
<i>Daviesia physodes</i>																	x										
<i>Desmocladus fasciculatus</i>			x							x					x		x			x						x	
<i>Dichopogon capillipes</i>				x																							
<i>Dielsia stenostachya</i>																									x		
<i>Disa bracteata</i>						x																					
<i>Dischisma arenarium</i>																				x	x		x				
<i>Diuris laxiflora</i>						x	x	x	x																		
<i>Dodonaea ceratocarpa</i>							x																				
<i>Drosera gigantea</i> subsp. <i>gigantea</i>					x	x					x			x													
<i>Drosera glanduligera</i>	x		x		x	x		x	x	x	x				x		x										

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Drosera heterophylla</i>			x						x	x																x	
<i>Drosera macrantha</i> subsp. <i>macrantha</i>						x		x	x								x									x	
<i>Drosera menziesii</i> subsp. <i>menziesii</i>			x		x	x					x						x										
<i>Drosera neesii</i> subsp. <i>neesii</i>										x																	
<i>Drosera rosulata</i>									x	x				x													
<i>Drosera stolonifera</i>																					x						
<i>Dryandra lindleyana</i> subsp. <i>lindleyana</i>			x			x				x							x									x	
<i>Ehrharta calycina</i>										x					x		x				x	x	x	x	x	x	x
<i>Ehrharta longiflora</i>										x											x	x					
<i>Eragrostis curvula</i>											x					x						x					
<i>Eremaea pauciflora</i> var. <i>calyptra</i>																							x	x			
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>																											x
<i>Eremophila glabra</i> subsp. <i>chlorella</i>																											
<i>Eucalyptus botryoides</i>																						x					
<i>Eucalyptus citriodora</i>																						x					
<i>Eucalyptus decipiens</i> subsp. <i>decipiens</i>																								x			
<i>Eucalyptus rudis</i>		x																									
<i>Eucalyptus todtiana</i>																						x	x	x			
<i>Eutaxia virgata</i>					x						x																
<i>Gahnia trifida</i>			x	x	x			x				x			x			x	x								
<i>Gastrolobium capitatum</i>										x												x					
<i>Gladiolus caryophyllaceus</i>																						x	x				
<i>Gladiolus undulatus</i>																										x	
<i>Gnephosis drummondii</i>												x															
<i>Gompholobium aristatum</i>			x																								
<i>Gompholobium confertum</i>																							x				
<i>Gompholobium tomentosum</i>																							x	x	x	x	
<i>Gonocarpus nodulosus</i>	x																										
<i>Goodenia micrantha</i>						x		x	x			x															
<i>Goodenia pulchella</i> subsp. Coastal Plain A (M. Hislop) pn					x			x				x					x										
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>																	x										
<i>Grevillea thelemanniana</i>							x																				
<i>Haemodorum laxum</i>										x					x		x										

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Haemodorum paniculatum</i>			x			x														x							
<i>Haemodorum spicatum</i>																				x							
<i>Hakea candolleana</i>						x																					
<i>Hakea ceratophylla</i>																										x	
<i>Hakea prostrata</i>																								x			
<i>Hakea ruscifolia</i>																						x	x				
<i>Hakea sulcata</i>															x		x										
<i>Hakea trifurcata</i>	x									x																	
<i>Hakea varia</i>	x															x	x										
<i>Halosarcia lepidosperma</i>																			x								
<i>Heliophila pusilla</i>			x						x	x																	
<i>Hemiandra pungens</i>																								x			
<i>Hesperantha falcata</i>						x					x									x							
<i>Hibbertia aurea</i>																	x										
<i>Hibbertia hypericoides</i>																				x				x			x
<i>Hibbertia racemosa</i>																								x			
<i>Hybanthus calycinus</i>																							x				
<i>Hydrocotyle diantha</i>						x		x																			
<i>Hypocalymma angustifolium</i> Mud Habitat Variant (C.Tauss 1850)	x		x	x	x	x		x	x	x	x					x	x			x							x
<i>Hypochoeris glabra</i>								x	x				x	x			x	x		x	x		x				
<i>Hypolaena exsulca</i>										x					x							x	x				x
<i>Isolepis cernua</i> var. <i>setiformis</i>		x			x							x															
<i>Isolepis marginata</i>			x						x																		
<i>Jacksonia angulata</i>			x			x																					
<i>Jacksonia floribunda</i>										x										x	x	x	x				x
<i>Jacksonia furcellata</i>			x																								
<i>Jacksonia sternbergiana</i>		x																									
<i>Juncus caespiticus</i>												x															
<i>Juncus capitatus</i>												x															
<i>Juncus pallidus</i>																										x	
<i>Kingia australis</i>											x																
<i>Kunzea glabrescens</i>																					x	x					
<i>Kunzea micrantha</i> subsp. <i>micrantha</i>	x		x			x					x																

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Lawrenzia squamata</i>							x	x										x									
<i>Laxmannia ramosa</i> subsp. <i>ramosa</i>			x			x																					
<i>Lechenaultia expansa</i>																					x		x				
<i>Lepidosperma scabrum</i> Eastern Terete Form (BJ Keighery & N. Gibson 232)							x													x							
<i>Lepidosperma longitudinale</i>				x	x					x	x	x	x	x										x			
<i>Lepidosperma rostratum</i>							x		x			x															
<i>Lepidosperma</i> sp. Kenwick C.Tauss 2598									x																		
<i>Lepidosperma pubisquamatum</i> sens. lat.										x						x								x		x	
<i>Lepidosperma squamatum</i> sens. lat.																					x						
<i>Leptospermum laevigatum</i>																						x		x			x
<i>Lepyrodia curvescens</i>																										x	
<i>Lepyrodia glauca</i>				x									x														
<i>Lepyrodia glauca</i>																											
<i>Leucopogon conostephioides</i>																											x
<i>Leucopogon strictus</i>						x			x																		
<i>Levenhookia pusilla</i>												x															
<i>Lobelia alata</i>													15														
<i>Lolium floribundum</i>																					x						
<i>Lolium multiflorum</i>		x	x	x								x								x							
<i>Lomandra caespitosa</i>										x											x						
<i>Lomandra hermaphrodita</i>																x					x	x	x	x	x		
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	x			x				x	x	x																x	
<i>Lomandra sericea</i>																					x						
<i>Lotus subbiflorus</i>			x				x	x	x				x			x		x	x								
<i>Loxocarya pubescens</i>											x																
<i>Lyginia barbata</i>																					x			x			x
<i>Lyginia imberbis</i>															x		x						x	x			
<i>Macrozamia reidleyi</i>																							x				
<i>Meeboldina cana</i>		x			x	x					x	x					x										
<i>Meeboldina roycei</i>		x		x									x														
<i>Melaleuca brevifolia</i>							x	x	x											x							
<i>Melaleuca lateriflora</i> subsp. <i>acutifolia</i>			x	x				x	x		x										x						
<i>Melaleuca lateritia</i>	x	x										x															

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Melaleuca osullivanii</i>	x																										
<i>Melaleuca preissiana</i>													x												x		
<i>Melaleuca raphiophylla</i>	x											x	x						x						x		
<i>Melaleuca seriata</i>						x			x														x				x
<i>Melaleuca viminea</i> subsp. <i>viminea</i>	x		x	x			x	x			x								x								
<i>Melinis repens</i>															x									x			
<i>Mesomelaena pseudostygia</i>																				x							
<i>Mesomelaena tetragona</i>										x					x		x		x	x	x					x	
<i>Microtis media</i>									x											x							
<i>Monopsis debilis</i>			x			x																					
<i>Monotaxis grandiflora</i> var. <i>grandiflora</i>																				x							
<i>Moraea flaccida</i>								x	x										x								
<i>Neurachne alopecuroidea</i>	x		x			x			x	x					x									x			
<i>Nuytsia floribunda</i>											x				x							x	x	x	x		x
<i>Olea europaea</i>															x									x			
<i>Opercularia vaginata</i>									x						x												
<i>Orobanche minor</i>																										x	
<i>Parentucellia latifolia</i>									x																		
<i>Parentucellia viscosa</i>					x				x			x				x											
<i>Paspalum dilatatum</i>																										x	
<i>Patersonia occidentalis</i> var. <i>occidentalis</i>						x									x		x			x		x	x	x			x
<i>Patersonia occidentalis</i> var. <i>angustifolia</i>										x			x														
<i>Pentaschistis aeroides</i>																				x	x						
<i>Pericalymma ellipticum</i> var. <i>floridum</i>										x	x						x									x	
<i>Petrophile juncifolia</i>																	x										
<i>Petrophile seminuda</i>						x																					
<i>Philothea spicata</i>										x										x				x		x	
<i>Philydrella drummondii</i>						x			x																		
<i>Philydrella pygmaea</i> subsp. <i>pygmaea</i>					x																						
<i>Phlebocarya ciliata</i>																				x			x				x
<i>Phlebocarya filifolia</i>																				x							
<i>Phyllangium divergens</i>						x																					
<i>Pimelea imbricata</i> var. <i>major</i>						x				x						x											
<i>Pimelea sulphurea</i>																						x					

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Podolepis gracilis sens. lat.</i>						x	x	x																			
<i>Pogonolepis stricta</i>									x			x						x									
<i>Polypogon tenellus</i>												x															
<i>Prasophyllum drummondii</i>														x													
<i>Quinetia urvillei</i>								x	x																		
<i>Ranunculus muricatus</i>		x																									
<i>Romulea rosea</i>	x	x					x																				
<i>Romulea rosea var. australis</i>															x			x									
<i>Romulea rosea var. communis</i>									x			x															
<i>Samolus junceus</i>							x	x	x									x									
<i>Scaevola lanceolata</i>			x		x	x		x																			
<i>Scaevola repens var. repens</i>																				x							
<i>Schinus terebinthifolia</i>																								x			
<i>Schoenolaena juncea</i>					x			x		x																	
<i>Schoenus asperocarpus</i>			x	x								x															
<i>Schoenus caespitius</i>																				x							
<i>Schoenus odontocarpus</i>			x		x	x		x																			
<i>Schoenus pedicellatus</i>																	x										
<i>Schoenus pennisetis</i>	x		x		x	x			x		x																
<i>Schoenus plumosus</i>			x		x	x		x	x		x	x						x									
<i>Schoenus rigens</i>			x		x	x					x				x	x	x								x		
<i>Schoenus subfascicularis</i>								x									x										
<i>Schoenus subflavus subsp. subflavus</i>						x			x	x																	
<i>Schoenus unispiculatus</i>						x											x										
<i>Scholtzia involucrata</i>																							x				x
<i>Senecio glomeratus</i>																				x							
<i>Senecio pinnatifolius var. ?latilobus</i>	x															x											
<i>Sonchus oleraceus</i>			x										x							x	x		x				x
<i>Sparaxis bulbifera</i>															x				x								
<i>Sporobolus virginicus</i>																		x									
<i>Stirlingia latifolia</i>																				x	x	x					x
<i>Stylidium calcaratum</i>						x			x			x										x					
<i>Stylidium dichotomum</i>					x		x				x																
<i>Stylidium divaricatum</i>					x			x	x							x											

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
<i>Styliidium guttatum</i>									x																			
<i>Styliidium repens</i>										x																		
<i>Styliidium roseoalatum</i>			x			x																						
<i>Synaphea spinulosa</i>																				x		x						
<i>Tecticornia lepidosperma</i>								x											x									
<i>Tetradlea octandra</i>			x												x		x							x		x		
<i>Thelymitra antennifera</i>						x		x	x																			
<i>Thelymitra crinita</i>																	x											
<i>Thelymitra ?mucida</i>										x																		
<i>Thelymitra ?vulgaris</i>								x																				
<i>Thysanotus arenarius</i>			x											x										x				
<i>Thysanotus manglesianus</i>			x			x		x	x											x					x		x	
<i>Thysanotus multiflorus</i>			x															x										
<i>Thysanotus sparteus</i>																												
<i>Thysanotus rectantherus</i>									x																			
<i>Thysanotus thyrsoides</i>																									x			
<i>Trachymene pilosa</i>																				x								
<i>Tremulina tremula</i>			x								x																	
<i>Tribolium uniola</i>										x																		
<i>Tribonanthes australis</i>						x	x	x	x	x	x	x				x												
<i>Tribonanthes australis x longipetala</i>			x		x																							
<i>Tribonanthes brachypetala</i>			x																									
<i>Tribonanthes longipetala</i>								x																				
<i>Trichocline</i> sp. Treeton (BJ Keighery & N Gibson 564)						x													x									
<i>Tricoryne</i> aff. <i>elatior</i>			x																x									
<i>Tricoryne elatior</i>										x					x							x		x		x		
<i>Tricoryne tenella</i>																				x								
<i>Trifolium arvense</i> var. <i>arvense</i>																				x	x							
<i>Trifolium campestre</i>																		x										
<i>Triglochin calcitrapa</i>												x																
<i>Triglochin huegelii</i>		x																										
<i>Triglochin mucronata</i>																			x									
<i>Tripterococcus brunonis</i>																			x									

**Table C1:** Taxon vs study site matrix for the MKSEA quadrats and relevés that were analysed to determine Floristic Community Types (*continued*)

Taxon Name/Sites	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
<i>Trithuria bibracteata</i>						x		x																			
<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>	x																										
<i>Urospermum picroides</i>																									x		
<i>Ursinia anthemoides</i>								x	x	x					x					x	x	x	x				x
<i>Utricularia inaequalis</i>												x															
<i>Utricularia multifida</i>					x	x		x	x		x	x				x											
<i>Utricularia violacea</i>					x																						
<i>Velleia trinervis</i> sens. lat.					x												x										
<i>Verticordia acerosa</i> var. <i>preissii</i>						x			x							x	x										
<i>Verticordia densiflora</i> var. <i>densiflora</i>	x		x				x			x					x							x					
<i>Verticordia huegelii</i> var. <i>huegelii</i>						x																					
<i>Verticordia plumosa</i> var. <i>brachyphylla</i>					x		x	x	x								x										
<i>Viminaria juncea</i>	x		x		x	x		x			x			x	x	x	x		x								
<i>Vulpia bromioides</i>			x					x														x					
<i>Wahlenbergia capensis</i>										x										x	x						
<i>Wahlenbergia gracillenta</i>																				x							
<i>Watsonia bulbifera</i>	x			x							x																
<i>Watsonia marginata</i>	x			x							x																
<i>Wilsonia backhousei</i>																			x								
<i>Wurmbea dioica</i> subsp. aff. <i>alba</i>		x																									
<i>Xanthorrhoea brunonis</i>																		x									
<i>Xanthorrhoea preissii</i>										x			x		x					x	x	x	x	x		x	x



## APPENDIX D

### Obligate and Facultative Wetland Flora recorded in MKSEA Sites (2007-2009)

## Introduction

Appendix D has two tables, Table D1 and Table D2.

Table D1, **Obligate and facultative wetland flora taxa recorded in the study sites of current MKSEA field survey**, lists wetland vascular plant genera, species, subspecies and varieties recorded in MKSEA study sites between September 2007 and March 2009. Table D1a lists the taxa and the sites in which they were recorded, and Table D1b gives total numbers of obligate and facultative wetland taxa recorded in each site.

Table D2, **Wetland Flora recorded opportunistically in the current MKSEA field survey**, lists other wetland flora – taxa recorded elsewhere in MKSEA – and it lists study sites nearest to which these taxa were recorded and whether the taxa are obligate or facultative wetland flora.

The names of the taxa are the same as those listed in Appendix B's Table B1, and the family codes are listed, along with their family names, in Tables B2.

Obligate wetland species are those plants generally restricted to wetland habitats; they are considered to be reliable wetland indicators (Department of Environment and Conservation 2007). Facultative species are those plants that can occur in wetland and dryland habitats; they are not reliable wetland indicators.

Table D1 is eight pages long, and Table D2 is one page long. Neither table necessarily is a complete list of wetland flora, either obligate or facultative, in the stated locations.

### Reference:

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

**Table D1a:** Obligate and facultative wetland flora taxa recorded in the study sites of current MKSEA field survey

F.C. = Family Code; \* = established alien (weed); O = obligate wetland flora; F = facultative wetland flora

F.C.	*	Taxon Name/Site Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
163		<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> sens. strict.	O			O	O	O		O	O	O	O		O					O														O		
163	*	<i>Acacia longifolia</i>															F																			
163		<i>Acacia saligna</i> subsp. <i>saligna</i> ms	F			F	F															F				F	F							F		
163		<i>Acacia stenoptera</i>				F				F		F		F							F															
163		<i>Acacia willdenowiana</i>																											F		F					
054C		<i>Acanthocarpus canaliculatus</i>	F				F			F			F																							
018		<i>Actinostrobilus pyramidalis</i>	O	O		O	O			O		O	O																							
031		<i>Amphibromus nervosus</i>				O																														
031		<i>Amphipogon setaceus</i>															O																			
293	*	<i>Anagallis arvensis</i> var. <i>caerulea</i>															F																			
039		<i>Anarthria laevis</i>																														F				
345		<i>Angianthus preissianus</i>						F		F						F						F														
055		<i>Anigozanthos viridis</i> subsp. <i>viridis</i>				O									O																					
165		<i>Aotus gracillima</i>															O																			
040		<i>Aphelia cyperoides</i>				F				F				F			F																			
054B	*	<i>Asparagus asparagoides</i>												F								F						F								
273		<i>Astartea affinis</i>				O											O																			
273		<i>Astartea scoparia</i>	O	O																													O			
031		<i>Austrodanthonia acerosa</i>				F																														
273		<i>Baeckea camphorosmae</i>												F					F							F										
273		<i>Baeckea</i> sp. Perth Region (R.J. Cranfield 444)								O			O	O																						
090		<i>Banksia telmatiaea</i>				O									O							O														
032		<i>Baumea arthropphylla</i>						O																												
032		<i>Baumea juncea</i>				F	F					F	F	F									F					F								
273		<i>Beaufortia squarrosa</i>																															F			
175		<i>Boronia crenulata</i> subsp. <i>viminea</i>																			F															
054L		<i>Borya scirpoidea</i>								F										F																
345		<i>Brachyscome pusilla</i>						O				O	O			O					O															