Appendix B Plant Lists

Suggested plant species for WSUD treatment elements

B.1 Introduction

This appendix provides a list of plants that are suitable for different WSUD treatment elements, including:

- Sediment basins
- Bioretention swales
- Bioretention basins
- Swales and buffer strips
- Wetlands
- Ponds.

A table of suggested species is provided in this Appendix and can be used as a guide to select appropriate species to perform a water quality function. Once species are selected from these tables they should be checked for consistency with local recommended species. Indigenous nurseries and/or other relevant agencies (Councils, DEP, DPIWE) should be consulted as part of the plant selection process. Local Landcare and Bushcare groups may also prove invaluable in choosing appropriate local species.

The table includes plants suitable for sediment basins, wetlands, swales, bioretention and ponds. These plant species are principally categorised according to their water depth. Littoral vegetation can be planted around all of the systems. Ponds will have submerged vegetation. Wetlands that have a full depth range will include plants recommended for all of the six zones (littoral, ephemeral marsh, shallow marsh, marsh, deep marsh and pool (submerged marsh species)).

All of the species listed occur in Tasmania. Many species that will also be suitable for planting in WSUD elements will occur on a regional basis.

Rather than solely using plants with a wide distribution, plants can be used that are local to a particular bioregion. Plants that occur in a particular bioregion will be well-adapted to the local conditions and will add and enhance regional biodiversity. Use of locally occurring plants, some of which might be endemic, will encourage regional fauna.

B.2 Bioretention systems, swales and buffer strips

These WSUD elements typically treat stormwater close to its source (surfaces that water runs off). They include bioretention swales, bioretention basins, swales and buffer strips. Swales and buffer strips are typically constructed using local soils whereas soils in bioretention systems require specific hydraulic characteristics and local soils may require adaptation. In some cases imported soils will be required.

Bioretention soils must meet filter media specifications (primarily a prescribed hydraulic conductivity) in addition to supporting plant growth (see Chapters 4 and 5).

Sandy loam soils are commonly used in bioretention systems because they typically have particle size distributions similar to suspended solids in urban stormwater runoff and therefore provide good retention of suspended particles. While sandy loams are usually used, other soil types can be used that suit the local vegetation, if they will support plant growth and are amended to meet the system requirements.

B.2.1 Constructing suitable soil filter media

To ensure the soil/filter media provides for a design hydraulic conductivity and is able to support plant growth the following approach is suggested:

- Identify if local top soil is capable of supporting vegetation growth and if there is enough top soil (some top soils are very shallow) to be used as a base for the filter media (may require active collection of top soil during the construction process). Any topsoil found to contain high levels of salt, extremely low levels of organic carbon (<5%), or any other extremes which may retard plant growth should be rejected. If the top soil is not suitable, a sandy loam soil can be purchased from a supplier for use as a base soil.
- Conduct laboratory tests to estimate the saturated hydraulic conductivity of the top soil/base soil using standard testing procedures (AS 4419-1998).
- If the soil needs to be amended to achieve the desired design saturated hydraulic conductivity either mix in a loose non-angular sand (to increase saturated hydraulic conductivity) or a loose soft clay (to reduce saturated hydraulic conductivity).
- The required content of sand or clay (by weight) to be mixed to the base soil will need to be established in the laboratory by incrementally increasing the content of sand or clay until the desired saturated hydraulic conductivity is achieved (within reasonable bounds). The sand or clay content (by weight) that achieves the desired hydraulic conductivity should then be adopted on-site.
- The base soil should have sufficient organic content to establish vegetation on the surface of the bio-retention system. If the proportion of base soil in the final mix is less than 50% then it may be necessary to add in additional organic material to the mix but should not result in more than 10% organic content (measured in accordance with AS1289 4.1.1).
- The pH of the soil mixture for the filtration layer is to be amended to between 6 and 7, before delivery to the site.

B 2.2 Importance of vegetation

Vegetation is an integral component of the treatment systems. The vegetation needs to fulfil several functions such as:

- Provide a surface area to trap suspended solids and other pollutants as the water flows horizontally through the treatment systems.
- Provide a biologically active root zone to help the removal of pollutants as water infiltrates vertically. This function is crucial for bioretention systems.
- Reduce soil compaction and maintenance of infiltration rate.
- Reduce flow velocities and bind and stabilise the substrate thereby limiting erosion.

Provide a prominent and diverse landscape element in the development and enhance local biodiversity.

B 2.3 Required plant characteristics

Species included in Table B.2 have been specifically selected, based on their life histories, physiological and structural characteristics, to meet the functional requirements of WSUD systems. Other species can be used as long as they can fulfill the functional roles described below.

In general, species that satisfy the roles have the following general features:

- Plants need to be able to tolerate short periods of inundation punctuated by longer dry periods. These dry periods may be reasonably severe due to the free draining nature (relatively low water holding capacity) of bioretention filter media
- Plants can be either prostrate or erect
- Prostrate species would typically be low mat-forming stoloniferous or rhizomatous plants (e.g. *Cynodon dactylon*, *Phyla nodiflora, Dichondra repens*)
- Erect species would typically be rhizomatous plants with simple vertical leaves (e.g. *Juncus spp, Carex spp*)
- Desirable species should have spreading rather than clumped growth forms
- Species should be perennial rather than annual
- Species should have deep, fibrous root systems
- Shrubs and trees should be accompanied by species with the above characteristics as an understorey.

Well-established uniform vegetation is crucial to the successful operation of drainage swale and bioretention systems. As a result, species selection needs to consider both the Aesthetic and functional requirements of the systems.

Swale/bioretention system vegetation can be either single or mixed species designs. Herbaceous groundcover species (e.g. *Phyla nodiflora, Brachyscome multifida, Dichondra repens*) are nearly always best planted as mixtures. Grasses, rushes, sedges and lilies can typically be planted as single (e.g. *Carex appressa*) or mixed species (e.g. *Pennisetum alopecurioides, Dichelachne crinata, Microlaena stipoides*) stands depending on the landscaping requirements. Some of the prostrate shrubs that form scrambling thickets may be better suited to single species planting (e.g. *Hibbertia scandens, Hardenbergia violacea*) in isolated areas for aesthetic impact. These species may also require pruning to ensure even plant cover and to maintain an even root distribution below ground.

Planting density generally varies depending on the species and the type of stock specified. Some lawn and turf species could be established from seed, hydroseeding or established as rolled on turf. Native grasses, rushes, sedges and lilies are typically supplied in small tubes (35-60mm). In drainage swale/bioretention systems this stock should be planted at high densities (12-16plants/m^2). Dicotelydon species (e.g. *Goodenia hederacea, Hibbertia scandens*) are typically supplied in pots (50mm). In drainage swale/bioretention systems this stock should also be planted at high densities (8-10 plants/m^2). These high densities are required to ensure runoff does not establish preferential flow paths around the plants and erode the swale surface. High density planting is also required to ensure a uniform root zone in the bioretention systems.

B 2.4 Plant species selection

Plant species suitable for use in bioretention systems, buffer strips and swales are listed in Table B.2. Most of the species are widespread but some only occur in specific regions or in certain conditions (e.g. substrate type, salinity). Species' ranges should therefore be checked before they are recommended for a particular site.

The plant list in Table B.1 is not exhaustive. A diverse and wide-range of plants can be used for WSUD elements (subject to the characteristics described in Section B.2.3). Table B.1 only includes indigenous plants. Non-indigenous natives and exotics should only be considered when there is a specific landscape need and the species has the appropriate growth form, habit and patterns of wetting and drying.

If non-indigenous natives and exotics are chosen, careful consideration should be given to the potential impacts on downstream drainage systems. For example, *Nandina domestica* (Japanese Sacred Bamboo) and *Phyla nodiflora* (Carpet Weed) are both suitable for use in onsite WSUD elements. Similarly, species that are endemic to particular regions within Victoria (i.e. indigenous but not widespread) can be used.

Plant species should be selected based on a number of factors:

- the objectives, besides treatment function, of the WSUD element (e.g. landscape, Aesthetics, biodiversity, conservation and ecological value)
- the region, climate, soil type and other abiotic factors

- the roughness of the channel (if a conveyance system)
- the extended detention depth.

Species that have the potential to become invasive weeds should be avoided.

The typical heights of the plant species (listed in Table B.2) will help with the selection process. Low-growing and lawn species are suitable for conveyance systems that require a low roughness coefficients. The treatment performance of bioretention systems, in particular, requires dense vegetation to a height equal to that of the extended detention depth. Therefore, a system with a 300 mm extended detention should have vegetation at least 300 mm high. All of the selected plant species are able to tolerate periods of both wetting and drying.

Included in Table B.1 is the recommended planting density for each of the species. The planting densities recommended should ensure that 70-80 % cover is achieved after two growing seasons (2 years).

Although low-growing plants (like grasses, sedges and rushes) are usually used, trees and shrubs can be incorporated into WSUD elements. If using trees and shrubs in bioretention systems, they should be planted in the local soil adjacent to the filter medium, so that the roots do not interfere with the perforated pipes. Shrubs listed provide a wide range of sizes from small to large. Geotechnical advice may be required if using trees in some systems.

B 2.5 Vegetation establishment and maintenance

Conventional surface mulching of swale/bioretention systems with organic material like tanbark etc, should not be undertaken. Most organic mulch floats and runoff typically causes this material to be washed away with a risk of causing drain blockage.

New plantings need to be maintained for a minimum of 26 weeks. Maintenance includes regular watering, weed control, replacement of dead plants, pest monitoring and control, and rubbish removal. Once established lawn, grass and groundcover plantings will need to be mown to maintain the design vegetation height.

B.3 Sediment basins, wetlands and ponds

These WSUD elements typically treat stormwater away from its source. Stormwater may be transported through a conventional drainage system or it may be transported via WSUD elements, so would receive some pre-treatment.

B 3.1 Importance of vegetation

Sediment basins are designed to trap coarse particles (> 125 μm) before the stormwater enters a wetland. Aquatic vegetation is therefore not specified for the sediment basins except in the littoral zone around the edge of the basin. The littoral vegetation is not part of the water quality treatment process in sediment basins so is not essential. However, plants can stabilise banks, so vegetation should be prescribed if erosion is a potential problem. Dense planting of the littoral berm zone also inhibits public access to the treatment elements, minimising the safety risks posed by water bodies. It can also improve the Aesthetics and screen basins, which are typically turbid.

Ponds are principally designed to be open water features providing landscape value. Unless the ponds have hard edges, littoral vegetation should be planted along the edges. These plants will provide habitat for local fauna, will help to stabilise the banks against erosion, and will inhibit weed invasion. Littoral vegetation also plays a treatment role when the water is above normal water level. Dense planting of the littoral zone will also inhibit public access to ponds, minimising the safety risks posed by water bodies.

Submerged plants should be planted in the deep areas of ponds. Submerged plants will be seen occasionally, like after a long dry period, when they surface to flower and seed, or when birds rip up plant fragments, for example. However, in the most part they will be totally submerged and will provide an open water perspective. Submerged plants are crucial for maintaining high water quality and minimising the chance of an algal bloom. They also inhibit weed invasion.

Wetlands are dominated by emergent macrophytes (aquatic plants). Constructed wetlands are designed to trap the fine polluted particles (< 125 μm) where they can be safely stored for long periods (15-20 years). Wetland plants extract nutrients and other dissolved substances, and provide a framework for microbial biofilms. Wetlands therefore clean water through biotic absorption, ingestion and decomposition of pollutants, as well as other chemical transformations resulting from the range of oxidation states.

Vegetation should also be planted along the edges of wetlands. Littoral vegetation will help to filter and treat water during times when the water is above normal water level. Dense planting of the littoral zone will also inhibit public access to the treatment elements, minimising potential damage to the plants and the safety risks posed by water bodies.

B 3.2 Required plant characteristics

Species outlined in Table B.1 include consideration of the wetland zone/depth range and the typical extended detention time (48-72 hrs) and depth (0.5m). Other species may be used to supplement these core species, although they must be selected to suit the particular depth range of the wetland zone and have the structural characteristics to perform particular treatment processes (e.g. distribute flows, enhance sedimentation, maximize surface area for the adhesion of particles and/or provide a substratum for algal epiphytes and biofilms). In general, species that satisfy the roles have the following general features:

- Grow in water as emergent macrophytes (e.g. Marsh species) or tolerate periods of inundation (e.g. Ephemeral Marsh species), typically sedge, rush or reed species
- Desirable species generally have rhizomatous growth forms
- Species should be perennial rather than annual
- Are generally erect species with simple vertical leaves (e.g. Juncus spp, Baumea spp)
- Desirable species should have spreading rather than clumped growth forms
- Species should have a fibrous root systems
- Shrubs and trees (generally only planted in the littoral or ephemeral zones) should be accompanied by species with the above characteristics as an understorey

The locations within a wetland that are best suited to specific wetland plants are determined by the interaction between basin bathymetry, outlet hydraulics and catchment hydrology – the hydrologic regime (Wong *et al*, 1998). Individual species have evolved preferences for particular conditions within the water depth-inundation period spectrum and this must be checked (wetland plant suppliers/nurseries) prior to recommending for a particular wetland zone planting.

B 3.3 Plant species selection

The distribution of the species within the wetland relates to their structure and function. The planting densities recommended should ensure that 70-80 % cover is achieved after two growing seasons (2 years).

Suitable plant species have also been recommended for the littoral zone that will surround the wetlands, ponds and sediment basins. The littoral zone (berms or batters) refer to the perimeter of the treatment elements and extend over a depth range of 0.5 m. Plants that have a drier habit should be planted towards the top of batters, whereas those that are adapted to more moist conditions should be planted closer to the water line.

When selecting plants for wetlands, wetlands should be divided into a series of zones based on their water depth (pools (or submerged marsh), deep marsh, marsh, shallow marsh, ephemeral marsh and littoral zones). The relative size of the zones is determined by the wetland bathymetry. Table B.1 shows the typical permanent depth ranges of the six zones commonly found in wetlands. The zones referred to in Table B.2

correspond with the depth ranges shown in the table below. Some plant species can be used in more than one zone, but plant species are generally categorised into one zone based on their preferred water range.

Table B.1: Depth ranges of wetland macrophyte zones

Zone	Macrophyte Zone Type	Depth[5] (m)
P	Pool – submerged marsh	0.5 – ~ 1
DM	Deep Marsh	0.35 – 0.5
M	Marsh	0.2 – 0.35
SM	Shallow Marsh	0 – 0.2
EM	Ephemeral Marsh	+0.2 – 0
L	Littoral	+0.5 – 0

Table B.2 is just an example of some of the plants that can be used in wetlands. The plant species listed in Table B.2 are recommended as the core species for the zones, but a number of other plants could be used. The species recommended are all thought to satisfy the functional treatment requirements of the zone, and are adapted to the hydrologic conditions of the zone. Indigenous species are generally recommended as they provide habitat for native wetland fauna.

B 3.4 Wetland vegetation establishment

To maximise the success of plant establishment in wetland macrophyte zones the following vegetation establishment program is recommended. The program outlines procedures involved in site preparation, vegetation preparation, planting, and maintenance.

Plant Growth Medium – After establishing a bathymetry of the wetland, a layer of topsoil is required as a substrate for aquatic vegetation. Although there are a few plants that can grow in sub-soils such as heavy clays (e.g. Phragmites), growth is slow and the system would have low species richness, which is deemed undesirable. Wetlands should therefore have a layer of topsoil not less than 200 mm deep (deeper if possible). Topsoil removed from a site during excavation should be stockpiled for subsequent use

[5] Mean water depth at normal water level (NWL) for the summer permanent pool. Natural variation below the NWL is expected to regularly expose the shallow marsh section and much of the marsh section. During events water will temporarily be stored above the NWL and inundate the ephemeral section.

as a growth medium for wetland macrophytes. If the top soil is unsuitable, (will not support plant growth, wetland plants typically prefer silty to sandy loams) it is advisable to purchase appropriate soils from a supplier. If stockpiled topsoil is to be used it is recommended that it be screened to remove any coarse organic mater prior to placement in a wetland. Other topsoil treatment requirements are listed below.

Soil Treatment – The topsoil covering the bed of a system (macrophyte zone an open water zones) should be treated with gypsum or lime (standard on most construction sites). By facilitating flocculation, gypsum will reduce the turbidity of the water column, which will be particularly valuable in the early stages of the wetland system establishment. With lower turbidity, higher levels of light will be able to reach the plants, thereby facilitating their growth and establishment. It is important that the gypsum not be added too far in advance of the vegetation planting; with clear water and no aquatic plants competing for resources, conditions will be favourable for algal growth, thus increasing the threat of an algal bloom. The gypsum should be applied about one week prior to planting at a rate of 0.4 kg/m^2. Subsequent application may be required at intervals depending on pond condition and the amount of exchangeable sodium. Fertilisers should not be applied to the top soil or to terrestrial areas in or around the wetland system, particularly in the early stages of plant establishment, due to the threat posed by algal blooms, particularly cyanobacteria (blue-green algae). The inadvertent addition of nutrients to the wetland system could facilitate the growth of cyanobacteria, particularly when the competing macrophytes and submerged plants are in their early developmental stages, thus raising the likelihood of algal blooms.

Plant Propagation – Plants should be ordered from a vegetation supplier prior to the time of planting to enable the supplier sufficient time to grow the required number of plants and species types and for the plants to grow to a suitable size (maturity) to ensure low mortality rates. The supplier should be made aware of the planned planting layout and schedule.

To ensure successful establishment of wetland plants, particularly in deeper marsh zones, it is strongly recommended more mature tube stock be used (i.e. at least 0.5 metres in height). For shallower zones of a wetland, younger tube stock or seedlings may suffice. As a minimum the following plant stock should be provided by a nursery:

Deep Marsh & Marsh Zone Planting

- 50mm tube stock
- 3-4 shoots or leaves
- 500-600mm height

Shallow Marsh & Ephemeral Marsh Zone Planting

- Preferably 50mm tube stock but 25mm container stock should suffice
- 4-5 shoots or leaves

- 300-400mm height

20mm seedling pots should be avoided as these seedlings are considered to be relatively immature and will result in high loss rates and patchy growth.

Planting Water Level Manipulation - To maximise the chances of successful establishment of the vegetation, water levels within a wetland system should be manipulated in the early stages of vegetation growth. When first planted, vegetation in the deep marsh and pool zones may be too small to exist in their prescribed water depths (depending on the maturity of the plant stock provided). Seedlings intended for the deep marsh sections will need to have at least one third of their form above the water level. This may not be possible if initially planted at their intended depth. Similarly, if planted too deeply, the young submerged plants will not be able to access sufficient light in the open water zones. Without adequate competition from submerged plants, phytoplankton (algae) may proliferate.

Water depth should therefore be controlled in the early establishment phase. Deep marsh zones should have a water depth of approximately 0.2 m for the first 6-8 weeks. This will ensure deep marsh and marsh zones are inundated at shallow depths and the shallow marsh zone remains moist (muddy) which is suitable for plant establishment. After this period, water levels can be raised to normal operating levels.

Planting - Planting in all zones of a wetland should occur at the same time. With water levels controlled as above, deep marsh and marsh zones will be inundated with water and the shallow marsh zone will be moist to allow appropriate growth (however some water over shallow marsh zones may be required). Planting of ephemeral zones will require irrigation at a similar rate as terrestrial landscaping surrounding the wetland.

Establish operating wetland water level - After 6-8 weeks of growth at a controlled water level, wetland plants should be of sufficient stature to endure deeper conditions so the wetland can be filled to its normal operating water level. Therefore, after eight weeks the connection between the inlet pond and the macrophyte zone should be temporarily opened to allow slow filling of the wetland to normal operating water level. Once filled to normal water level, the connection between inlet pond and macrophyte zone should again be closed to allow further plant establishment without exposure to significant water level variations.

Connect Inlet Pond to Macrophyte Zone - The temporary blockage located on the connection between the Inlet Pond and Macrophyte Zone can be removed once the building construction within the wetland catchment has been completed. At this time it will be necessary to de-silt the inlet pond which will have been operating as a sediment basin during the building phase. Planting of the zones disturbed during de-silting will be required.

Vegetation Assessment - Ensure the wetland is operating at the end of the construction landscape management period and the planted macrophytes are established and healthy at the operating water level. If successful the wetland should have a 70-80 % even macrophyte cover after two growing seasons (2 years).

B 3.5 Steps to Choosing Appropriate Vegetation

The following steps should be followed when selecting vegetation for WSUD treatment elements.

1. Determine what soil type is in the local area and if it requires amendment to meet the prescribed hydraulic conductivity (for bioretention systems) and/or amendment to support plant establishment
2. Refer to appended tables to select appropriate species for each macrophyte zone or swale/ bioretention system
3. Ensure species selection is consistent with the local hydrologic regions see Figure B.1
4. Consult local indigenous nurseries and/or other relevant agencies (Councils, DPIWE and local groups) to ensure consistency with local vegetation strategies, avoiding locally invasive or exotic species and selecting for locally indigenous species
5. Where species listed in the tables do not comply with local vegetation strategies seek advice from relevant agencies regarding alternative species with similar characteristics

B.4 Additional notes on the tables

1. The **planting stock** of the different species recommended will require differing degrees of maturity at planting. For example, even though water level management is recommended at planting times, deep marsh species will need to be more advanced stock suitable for planting in deeper water than the species recommended for the shallow marsh zone.
2. **Planting density** indicates the mean number of plants per square metre for the species spatial distribution within the zone. The planting densities recommended are suggested minimums. While planting density can be either increased or decreased depending on budget. Any reduction in planting density has the potential to reduce the rate of vegetation establishment, increase the risk of weed invasion, and increase maintenance costs.
3. The **total number of plants** required for each zone can be calculated:

Number of plants = (Recommended planting density x Section area x Proportion of section planted x Cover density).

Where *the proportion of the section* planted refers to the proportion of the section area that will be planted with the identified species; and

Where *cover density* refers to the proportional cover of that particular plant species in the designated location. The cover density of all of the plant species in a given area typically sums to 1.0.

B 4.1 Key to Plant Species Table

Table B.2 on the following pages, outlines suggested plant species for various WSUD treatment elements. The key to these tables is given below.

Type/ Zone		**Form**	
L	Littoral	E	Erect herbs
EM	Ephemeral Marsh	G	Groundcover
SM	Shallow Marsh	M	Emergent macrophytes
M	Marsh	S	Submerged macrophytes
DM	Deep Marsh	T	Shrubs and trees
P	Pool (submerged marsh)		
F	Forest		

B.5 References

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Table B.2 Plant Species for WSUD systems (indicative)

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
all	*Agrostis avenacea*	Straw blown grass	L	G	0.25		6-8	well drained	
all	*Amphibromus recurvatus*	Swamp wallaby Grass	L	G	0.5		6-8	well drained	
wet/pond	*Baumea arthrophylla*	Twig rush	M	M	0.3-1.3 (stems)	Aquatic perennial with long rhizomes	6-8	Wet soils to permanent water	Spreads quickly
wet/pond	*Baumea articulata*	Jointed Twig-rush	DM	M	1-2	Tall erect rhizomatous perennial	4	Moist soil to permanent water	Slow growth
wet/pond	*Baumea juncea*	Bare Twig-rush	L	M	0.3-1	Rush-like clump with creeping rhizomes	8	Moist to boggy soils; tolerates occasional dry periods	Slow establishment
wet/pond	*Baumea rubiginosa*	Soft Twig-rush	M	M	0.3-1	Rhizomatous perennial	6-8	Moist soils to prolonged inundation	Slow establishment
wet/pond	*Baumea tetragona*	Square Twig-rush	M	M	0.3-1	Rhizomatous perennial	6-8	Moist soils to prolonged inundation; 0.2-0.4 m depth	Slow establishment
bio/swale	*Blechnum cartilagineum*	Gristle Fern		E	0.5-1.5	Upright tufting fern with short creeping stoloniferous rhizomes, forming spreading patches	2-4	Moist, well drained soils; tolerates drier conditions once established	Aesthetic; readily available
wet/pond	*Blechnum minus*	Soft Water Fern	EM	G	0.5-1.2	Dense, erect clump forming spreading patches from	4-6	Very moist soils; tolerates wet soils	Adaptable

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
						underground stolons			
wet/pond	*Bolboschoenus caldwellii*	Sea club-rush	M	M	0.3-0.9	Aquatic to semi-aquatic rhizomatous perennial	4-6	Fresh to brackish water on heavy clay to sandy soils	Coastal/saline; rapid establishment
wet/pond	*Bolboschoenus medianus*	Marsh Club-rush	M	M	0.7-2	Aquatic to semi-aquatic rhizomatous perennial	4-6	Moist soils to permanent water	Rapid establishment; spreading
wet/pond	*Brachyscome cardiocarpa*	Swamp Daisy	L	G	0.1-0.3	Tufted perennial herb	2-4	Moist soils	Rapid establishment; aesthetic
all	*Carex appressa*	Tall Sedge	L	M	0.3-0.8	Dense, robust and tough; hairy and sticky;	4-8	Very moist soils, tolerates periods of inundation and dryness	Stabilises banks against erosion; tough; slow-growing; high surface area; dominates zones
wet/pond	*Carex bichenoviana*	Sedge	L	G	0.25-0.5 (stems)	Tufted grass-like sedge with long creeping rhizome	6-8	Moist depressions on heavy clay	May form dense carpets in shady situations
wet/pond	*Carex breviculmis*	Short-stem sedge	L	M	0-0.15	Small but densely tufted sedge	6-8	Moist to wet soils; tolerates dry periods	Very adaptable
all	*Carex fasicularis*	Tassel Sedge	SM	M	0.5-1.5	Coarse, tufted plant	6-8	Moist soils	Aesthetic
wet/pond	*Carex gaudichadiana*	Tufted sedge	SM	M	0.1-0.6	Coarse, tufted plant	6-8	Gravel or mud at water's edge	Aesthetic; tolerates

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
									drawdown
all	*Carex inversa*	Knob Sedge	L	M	0.3-0.6	Small tufted or spreading clump	10	Moist, well drained soils	Variable species; rapid establishment
wet/pond	*Centella cordifolia*	Swamp Pennywart	L	G	Prostrate	Creeping perennial herb	2-4	Moist to wet soils	Rapid growth; may become invasive
all	*Chrysocephalum apiculatum*	Common Everlasting	L	E	Prostrate- 1.2	Variable, dense spreading perennial herb	2-4	Well drained soils	Aesthetic; widespread
bio/swale	*Correa alba*	White Correa		T	0.5-1.5	Dense, spreading shrub, dwarfed by wind and salt spray	2-4	Well drained soils; tolerates inundation and dry periods once established	Useful for soil binding
bio/swale	*Correa reflexa*	Common Correa		T	Prostrate - 0.15	Very variable - open upright to spreading shrub	2-4	Well drained soils; dry shaded position	Establishes well under trees
wet/pond	*Cyperus gunnii*	Flecked Flat Sedge	EM	M	0.6-1	Densely tufted perennial herb	6-8	Moist to boggy soils	High surface area
wet/pond	*Cyperus lucidus*	Leafy Flat-sedge	SM	M	0.6-1.5	Robust, tufted perennial herb with sharply triangular stems; large; dense	6	Wet soils	Can grow as an aquatic plant; slow spreading
all	*Danthonia sp.*	Wallaby grasses	L	G	0.4-1	Clumping grass	4-8	well drained	

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
all	*Deschampsia cespitosa*	Tufted Hair Grass	L	G	0.4-1	Clumping grass	4-8		
all	*Dianella longifolia*	Pale Flax-lily	L	E	Prostrate	Tufted perennial clump with short rhizomes	8	Moist, well drained soils	Aesthetic; easy maintenance; ideal under trees
wet/pond	*Dianella tasmanica*	Tasman Flax-lily	L	M	0.6-1.5	Robust tufted perennial; may spread vigorously with strong rhizomes	6	Moist soils, prefers shaded position	Tolerant once established; adaptable (including snow cover); aesthetic
bio/swale	*Dichondra repens*	Kidney Weed		G	Prostrate	Dense spreading herb, forms mats	6-8	Moist, well drained soils; tolerates drying once established	Alternative to grass where foot traffic is light; more vigorous when cultivated; widespread
all	*Distichlis distichophylla*	Australian Salt Grass	L	G	0.4-1		4-8		
wet/pond	*Eleocharis acuta*	Common Spike-rush	SM	M	0.3-0.9	Perennial aquatic herb; slender rhizomes	6-8	Heavy damp soils to 0.20 m depth	High surface area; may spread rapidly in shallow water
wet/pond	*Eleocharis pusilla*	Small Spike-rush	L	G	0.002-0.25	Tiny perennial herb with thread-like rhizomes and stems	6-10	Moist to wet soils	Readily grown; easily controlled
wet/pond	*Eleocharis*	Tall Spike-rush	DM	M	0.5-2	Robust perennial herb with thick woody	6	Aquatic; to depth of 2 m; tolerates occasional	Plant solo, rhizomes can

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m^2)	Requirements	Comments
	sphacelata					rhizome; clumps to big dense stands;		drying	restrict growth of other plants; slow establishment
bio/swale	*Epacris impressa*	Common Heath		E	0.3-0.6, stems 0.6-1.0	Open wiry shrub	2-4	Moist, well drained soils; tolerates limited dry or wet periods once established	
all	*Ehrharta stipoides*	Weeping Ricegrass	L	G	0.3			dry to moist	
bio/swale	*Eucalyptus coccifera*	Tasmanian Snow Gum		T	25	Smooth grey bark (cf. the red bark of E. subcrenulata), fairly broad leaves with a curly tip	<1	Damp alluvial soils; deep subsoils; tolerates inundation and very dry periods once established	Aesthetic; some forms can be used to combat salinity; widespread
bio/swale	*Eucalyptus ovata*	Swamp Gum		T	0.5-10.0		<1	Moist soils; tolerates inundation and dry periods; lake edge	Aesthetic; widespread
wet/pond	*Gahnia filum*	Chaffy Saw-sedge	L		1-1.2	Perennial leafy tussock	4-6	Moist sandy soils; salt tolerant	Aesthetic fruits
wet/pond	*Gahnia grandis*	Giant Saw-sedge	SM	M	>1	perennial sedge	4-6	Moist to wet soil	Aesthetic
wet/pond	*Gahnia sieberiana*	Red-fruited Sword Sedge	L	M	1.5-3	Clumping perennial sedge	4-6	Moist soils; tolerates dry periods once established	Aesthetic; easily grown from seed
wet/pond	*Gahnia trifida*	Cutting Sedge	SM	M	>1	perennial sedge	4-6	Moist to wet soil	Aesthetic
all	*Glyceria australis*	Australian Sweetgrass		G	>0.75			Moist to wet soil, well-drained	

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
wet/pond	*Goodenia humilis*	Swamp Goodenia	L	M	0.05-.1	Suckering, matting plant	2-4	Moist to wet soil	Aesthetic; very adaptable
wet/pond	*Hemarthria uncinata*	Mat Grass			>0.2				
bio/swale	*Hibbertia prostrata*	Stalked Guinea-flower		E	0.5-1.5	Low erect sub-shrub	4-6	Moist, well drained sandy soils; not clay	Difficult in clay soils
wet/pond	*Isolepis inundata*	Swamp Club-rush	SM	M	0.05-0.3	Tufted perennial rush; small; stoloniferous	6-8	Moist to wet soils; tolerates periodic inundation	Widespread; high surface area; rapid growth
wet/pond	*Isolepis cernua*	Slender Club-rush	SM	M	0.3		6-8	Inundated	
wet/pond	*Isolepis fluitans*	Floating Club-rush	SM	M	0.3				
all	*Isolepis nodosa*	Knobby Club-rush	SM	M	0.5-1	Tall; wiry; rhizomatous; densely tufted perennial rush	6-8	Moist soils; tolerates dry periods once established	binds soils in moist areas; aesthetic
all	*Juncus amabilis*	-	EM	M	0.2-1.2	Rhizomatous tufted perennial rush	8-10	Tolerates inundation and dry periods once established	Widespread
wet/pond	*Juncus australis*	Austral Rush	L	M	0.6-1.2	Rhizomatous tufted perennial rush	6-10	Moist soils; will tolerate short, dry periods	
bio/swale	*Juncus gregiflorus*	-		M	0.5-1.4	Rhizomatous tufted perennial rush	8-10	Moist, well drained soils	
wet/pond	*Juncus kraussii*	Sea Rush	SM	M	0.6-2.3	Rhizomatous perennial	6-10	Brackish to saline	Slow growth; saline; habitat

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
						rush		conditions	only
all	*Juncus pallidus*	Pale Rush	EM	M	0.5-2.3	Rhizomatous tufted perennial rush	8-10	Grows well with periodic inundation	Rapid growth; adaptable
wet/pond	*Juncus pauciflorus*	Loose-flower Rush	L	M	0.3-1	Rhizomatous perennial rush	6-10	Moist soils; tolerates dryness once established	Adaptable
bio/swale	*Juncus procerus*	-		M	1.0-2.0	Rhizomatous tufted perennial rush	8-10	Moist, well-drained soils in a sheltered position	
wet/pond	*Juncus subsecundus*	Finger Rush	SM	M	0.5-1	Rhizomatous tufted perennial rush	6-10	Heavy, wet soils	Widespread
bio/swale	*Kunzea ambigua*	Tick bush		T	2-3	Dense to open weeping shrub	<1	Adaptable, tolerates dry periods	variable growth
bio/swale	*Lepidosperma gladiatum*	Coastal sword-sedge	Variable sword-sedge	M	0.5-1.0	Leaves wide and flat with dark green blades	6	Moist, well drained sandy soils	Sharp-edged leaves - could be used to manage pedestrian traffic
bio/swale	*Lepidosperma laterale*			M	0.6-1.7	Leaves wide and flat with dark green blades	6	Moist to wet soils but tolerates dry periods	Little maintenance once established
all	*Lepidosperma longitudinale*	Common Sword-sedge	EM	M	0.15-0.5	Sedge with long, flat, dark green blades	6	Moist to wet soils	Aesthetic
wet/pond	*Leptocarpus brownii*	Coarse wire rush	SM	M	>0.4				
wet/pond	*Leptocarpus*	Slender wire	SM	M	>0.4				

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
	tenax	rush							
bio/swale	*Leptospermum scoparium*	Prickly Tea-tree		T	<2	straggling shrub or small tree	<1	Adaptable; tolerates moisture	Aesthetic
bio/swale	*Leptospermum lanigerum*	Woolly Tea-tree		T	0.5-1.0	Dense shrub to erect small tree	<1	Moist soils	Aesthetic
bio/swale	*Leucopogon australis*	Spike Beard Heath		T	0.2-0.5	Upright shrub	2-4	Well drained damp sandy soils	Strongly perfumed flowers
wet/pond	*Linum marginale*	Native Flax	L	G	0.3-0.8	Slender erect perennial	4-6	Moist, well drained soils	Widespread
all	*Lomandra nana*	Pale Mat-rush	L	M	0.15-0.5	Small tussock with fine blades	6-8	Moist, well drained clay or sandy soils; tolerates dry shaded positions once established	Little maintenance; grows well under trees
all	*Lomandra longifolia*	Sagg / Spiny-headed Mat-rush	L	M	0.5-1.0	Large tussock	4-6	Well drained soils; tolerates dry shaded positions	Grows well under established trees
wet/pond	*Lythrum salicaria*	Purple Loosestrife	L	E	1-2	Erect, hairy perennial	2-4	Moist soils or shallow water	Dies back after summer
all	*Melaleuca ericifolia*	Swamp Paperbark	EM, L		2-9	Erect, open to bushy shrub or small tree	2-4	Moist to wet fertile soils; tolerates dry periods once established;	Very adaptable
bio/swale	*Melaleuca squarrosa*	Scented Paperbark		T	0.5-2.0	Erect, open to compact large shrub or rarely, a small tree	<1	Moist to wet soils	Aesthetic; salt tolerant; grows well in coastal

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
									areas
bio/swale	*Microlaena stipoides*	Weeping Grass		G, E	0.3-2.0	Highly variable in size	turf or seeds	Moist, well drained soils	Aesthetic; suitable as a lawn grass; widespread
bio/swale	*Myoporum parvifolium*	Creeping Boobialla		G	12-50	Dense matting groundcover	4-6	Well drained soils, tolerates dry periods once established	Adaptable groundcover; layering habit useful for soil binding
wet/pond	*Myriophyllum pedunculatum*	Mat Water-milfoil	P	S	prostrate	Perennial herb, aquatic or fully emergent; stems up to 1 mm diam., prostrate with erect laterals	1	Deep fast-flowing water to shallow brackish or calcareous water	Heterophyllic
wet/pond	*Nymphoides exigua*	Tasmanian Marshwort	SM	M		Single pale-yellow flowers	1	waterlooged soils	Aesthetic
bio/swale	*Patersonia occidentalis*	Long Purple-flag		M	8-30	Compact clumping perennial herb	6-8	Tolerates inundation and dry periods	Aesthetic; may not persist
wet/pond	*Persicaria decipiens*	Slender Knotweed	L	M	Prostrate - 0.6	Glabrous, erect to spreading annual herb	2-4	Semi-aquatic to aquatic	Low surface area; aesthetic
wet/pond	*Phragmites australis*	Common reed	SM	M	>1.5	erect perennial, rapid colonising			Invasive
bio/swale	*Pimelea glauca*	Smooth Rice-flower		T	2-5	Erect, many-branched glabrous shrub	2-4	Well drained soils	Aesthetic

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
bio/swale	*Pimelea linifolia*	Slender Rice-flower		E	1-4	Variable prostrate erect or clump-forming, depending on habitat	4-6	Well drained soils	Pruning encourages branching
bio/swale	*Poa labillardierei*	Common Tussock Grass		M	2-6	Large, coarse densely tufted tussock	6-8	Adapts to moist or slightly dry soils	Widespread
wet/pond	*Poa tenera*	Slender Tussock Grass	L	G	0.05-0.2	Trailing, sometimes forms open tussocks	6-8	Moist, well drained soils	Very effective when trailing down embankments
wet/pond	*Potamogeton crispus*	Curly Pondweed	P	S	To 4.5	Perennial, rhizomatous aquatic herbs	1	Aquatic; deep permanent water	Growth can be dense
wet/pond	*Potamogeton ochreatus*	Blunt Pondweed	P	S	To 4.5	Annual or perennial, rhizomatous aquatic herbs; submerged floating annuals	1	Aquatic; deep permanent water	Rapid growth; aesthetic; seasonal; salt tolerant (2000 ppm)
wet/pond	*Potamogeton pectinatus*	Fennel Pondweed	P	S	Stems to 3	Perennial, rhizomatous aquatic herbs; submerged	1	Aquatic; deep permanent water	Saline (thrive in >5000 ppm dissolved salt); rarely recommended; not aesthetic; often invasive
wet/pond	*Potamogeton tricarinatus*	Floating Pondweed	P	S	stems to 2.7	Perennial rhizomatous aquatic herb; submerged or attached floating	1	Aquatic; shallow semi-permanent water	Seasonal

Suitability	Scientific Name	Common Name		Form	Height(m)	Description	Planting Density (plants/m²)	Requirements	Comments
bio/swale	*Pultenaea daphnoides*	Large-leaf Bush-pea		T	2-9	Erect branching shrub	2-4	Moist, well drained soils; tolerates dry periods once established	Aesthetic
wet/pond	*Ranunculus inundatus*	River Buttercup	L	G	0.05-0.3	Slender, stoloniferous perennial herb; often forms large mats	2-4	Semi-aquatic to aquatic	Rapid establishment
wet/pond	*Schoenoplectus pungens*	Sharp Club-rush	M	M	0.3-0.6	Robust, tufted rhizomatous herb	4-6	Wet soils to permanent water	Become rare due to urbanisation; rapid establishment
wet/pond	*Schoenoplectus validus*	Lake Club-rush	DM	M	0.8-2	Rhizomatous, robust perennial, grass-like or herb (sedge)	4	Moist soil to permanent water	Rapid establishment
wet/pond	*Schoenus apogon*	Common Bog-rush	L	G	0.05-0.3	Slender perennial tufted herb	8-10	Moist or wet soils	Variable; widespread
bio/swale	*Schoenus lepidosperma*		SM	M	0.1-0.6	Perennial, tufted or with short rhizome	6-8	Moist soils	Tough; spreads to form dense clumps
wet/pond	*Triglochin procerum*	Water -ribbon	M	M	0.2-0.5	Aquatic or amphibious perennial herb with erect or floating leaves	4	Semi-aquatic to aquatic to depth of 1.5m	Aesthetic; spreading
wet/pond	*Vallisneria gigantea*	Ribbonweed	P	S	to 3	Submerged, dioecious tufted stoloniferous perennial with floating flowers	1	Open water; depth of <0.1-4m	Rapid growth; salt tolerant (1500 ppm)

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wet/pond	*Villarsia exaltata*	Yellow Marsh Flower	SM	M	0.3, stems to 1.5	Tufted herb; broad basal leaves	6-8	Wet soils to 1 m depth	Leaves float if growing in water
wet/pond	*Villarsia reniformis*	Running Marsh Flower	L	M	0.4	Tufted; stoloniferous if growing in water	6-8	Moist to wet soils	Aesthetic
all	*Viola hederacea*	Native Violet	L	G	Prostrate - 0.15	Stoloniferous herb forming a dense mat	2-4	Moist to wet soil	Rapid growth; aesthetic; prolific growth once established