Aquatic Plant Installation Standard

Melbourne Water is owned by the Victorian Government. We manage Melbourne's water supply catchments, remove and treat most of Melbourne's sewage, and manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.

Melbourne Water
Enhancing Life and Liveability

Table of contents

Executive Summary

The purpose of this document is to provide Melbourne Water's stakeholders with a clear set of specifications for the effective installation of >550cm3 aquatic plants in line with Melbourne Waters *Wetland Design Manual Part A2: Deemed to comply design criteria*.

The success of projects is strongly influenced by a number factors including but not limited to:

- site preparation
- seedling and seed quality
- planting technique
- species suitability
- species location and niche requirements
- seasonal conditions/moisture availability
- level of ongoing maintenance.

Factors such as operator skill and experience are a variable which are managed by training and competency auditing. The aim of this standard is to clearly specify Melbourne Waters requirements so that operator error is mitigated; ensuring the quality of aquatic planting is of the highest standard.

Introduction

Melbourne Water invests substantial resources annually into the construction and management of Water Quality treatment Systems (constructed wetlands) across its operating area.

The quality of plants installed within these wetlands is a key determinant of plant establishment and survival and ultimately project success. Given the scope of these works and the amount of money invested, it is critical that Melbourne Water has clear standards articulating the organisation's needs, also adhering to the highest industry standards.

Aquatic plants installed on Melbourne Water projects will adhere to the requirements of this standard and also the *Wetland Design Manual. Part A2: Deemed to comply design criteria*. (See Appendix A for info).
To provide a clear description of how to install > 550cc pots in aquatic environments.

Overview

Constructed wetland plantings are natural filters used to treat stormwater. The planting contractor is to establish dense swards of vegetation in the Shallow and Deep marsh zones and around the perimeter of the waterbodies (ephemeral zone).

The aquatic plant installation standard provides a framework to manage the challenges to wetland plant establishment which need to be considered and managed by the planting contractor.
Key constraints to establishing wetland vegetation include:

- Top soil quality and depth
- Weed competition
- Site preparation.
- Weed control post planting
- Availability of water
- Depth of water in planting zones
- Frequency and duration of inundation
- Post planting wetland depth management
- Season of planting
- Plant selection and provenance
- Quality of plants
- Installation technique.
- Grazing by water fowl.
- Carp

At the end of the planting establishment period (13 weeks) there must be >80% vegetation cover and <5% weeds in these zones.

Pre-planting site preparation:

Of critical importance is ensuring enough pre-planting preparation time is available. Truncating preparation time in order to satisfy tight timelines inevitably leads to unsatisfactory outcomes. The preferred months for aquatic plant installation as well as the risks associated with planting out of season can be found in Appendix B.

Weed control prior to planting

Weed species compete with desirable plant species for light, water and nutrients which greatly impacts on the success of the project. Good quality site preparation will provide developing plants with the best possible conditions for growth and make ongoing maintenance easier and more cost effective.

Optimal requirements for site preparation are the establishment of a planting niche 12 months prior to plant installation. Weed control must be undertaken to deplete and prevent establishment of a site weed seed bank, leaving < 5% cover of weeds.

Weed competition will limit the establishment of the installed plants and reduce the performance of the wetland system. A systematic weed control program that prevents the establishment of a weed seed bank (activity/spray records) is to be provided prior to plant installation.

Soil preparation

The specification for soils and landscaping of constructed Melbourne Water assets must be utilised for appropriate soil preparation standards. Large scale soil preparation methods rely on machinery which cause significant disturbance, increased likelihood of weed invasion and significant changes in compaction and soil profile mixing which all need to be managed.

Poor quality topsoil will not support healthy plant growth. Insufficient depth will mean the plants will not have adequate material to be bedded into and leave the plant root-ball exposed.

The planting consultant and contractor are to review the quality of topsoil present and ensure there is adequate depth and quality for planting prior to installation occurring. While the planting contractor may not be tasked with laying the topsoil they take control of the site in the planting phase and should ensure they have received a site suitable to plant into as they are responsible for plant establishment. Should the topsoil not be acceptable, the planting consultant and contractor must notify Melbourne Water immediately so that it can be rectified prior to installation occurring.

Soil used on Melbourne Water sites must be rated as clean fill under EPA-VIC IWRG621, be free of building debris, contain no more than 5% by weight of particles >20mm and no particle size >50mm and be free of living plant propagules (weed seeds) with the exception of utilising site won material.

The prepared area must be sprayed for weeds prior to any imported or site won topsoil being placed. The sub base preparation for the aquatic zones will be ripped to a depth of not less than 100mm; Ripped to a minimum of 200mm spacing's in a 'cross hatched' fashion (preference is for vibrating type cultivation tines to be used); the moisture content of the sub base will be conducive to the sub base shattering rather than being moulded by the

ripping action; topsoil within the aquatic zones must be placed in 100mm layers followed by ripping to incorporate this layer through the sub-base interface. Ripping will be done so as to mix the interface to a 100mm depth. Once the 200mm depth is reached the surface will be lightly compacted and left in a friable tilth. Topsoil must be spread in a 200mm thick layer across the entire aquatic zones. *Note:* Ripping is undertaken to avoid topsoil shearing and to encourage anchorage of roots in the soil/substrate interface.

Climatic Conditions

Contractors must be aware of the most appropriate time for planting based on the annual soil moisture conditions and seasonal factors of their region/location.

Appendix B should be utilised to determine appropriate seasons for aquatic planting and also to assess risks with planting outside of these seasons as it may lead to a poor outcome, top up planting, extension of establishment and defects period or rejection of the asset by Melbourne Water. Any proposal to install and establish planting outside of the optimal times should be discussed with Melbourne Water prior to installation occurring.

Plant Selection

All plant material must meet Melbourne Waters standards for plant selection and provenance, supply and installation. These standards are based on the Florabank guidelines and relevant state guidelines developed in collaboration with various agencies and Catchment Management Authorities.

Melbourne Water bases its aquatic species lists on the Department of Environment, Land, Water and Planning (DELWP) Ecological Vegetation Class (EVC) templates and Melbourne Waters 20 year Vision templates for vegetation. Plant selection is made so that species are appropriate to the site considering both ecological and functional requirements. For this reason any alteration to orders (species) must be discussed with Melbourne Water prior to plant supply and installation.

Every reasonable attempt must be made to selection the list of plants as specified in the design. In some circumstances numbers and/or species may need to be altered from that which was originally ordered. Where a substitution is required the landscape consultant must provide Melbourne Water with sufficient notice of and receive acceptance to any proposed change.

Plant substitutions should ensure some diversity in the species mix and that plant form/performance is matched to the specified species. Melbourne Water must approve substitutions if a species is not being supplied at all or >10% of contract quantity is not available. See Appendix A for approved species and minimum supply heights for wetland planting.

At least 80% of the area of the macrophyte zone at Normal Water Level (NWL) must be ≤ 350 mm deep to support shallow and deep marsh vegetation. The wetland bathymetry should provide approximately equal amounts of shallow marsh (100mm - 150 mm deep) and deep marsh (150 mm to 350 mm deep).

The macrophyte zone must have a sequence and mix of submerged, shallow and deep marsh zones arranged in a banded manner perpendicular to the direction of flow. Refer Figure 2).

The shallow marsh (100 to 150mm below NWL) of the macrophyte zone and sediment pond (margin/edge) must be densely planted with 2 plants per sq.m in >550cm3 containers. 90% of the plants used in the shallow marsh must be in accordance with the species and densities shown in Table 1. A minimum of three species must be specified for the shallow marsh zone.

The deep marsh (150 to 350 mm below NWL) of the macrophyte zone must be densely planted with 2 plants per sq.m in >550cm3 containers. 90% of the plants used in the deep marsh must be in accordance with the species and densities shown in Table 2. A minimum of three species must be specified for the deep marsh zone.

The submerged marsh (350 to 700 mm below NWL) of the macrophyte zone must be planted with 1 plant per sq.m in >550cm3 container. 90% of the plants used in the submerged marsh must be in accordance with the species and densities shown in Table 3.

Table 1 Shallow marsh plant list (100 to 150mm below NWL)

Botanical name	Common name	Minimum density (plants/m2) 550cm3 tube	Fully established plant height (m)
Baumea articulata	Jointed Club-rush	2	1.8
Bolboschoenus caldwellii	Sea Club-rush	2	1.0
Bolboschoenus fluviatilis	Tall Club-rush	2	1.8
Bolboschoenus medianus	Marsh Club-rush	2	1.5
Cladium procerum	Leafy Twig-rush	2	2.0
Eleocharis acuta	Common Spike-rush	2	0.5
Schoenoplectus tabernaemontani	River Club-rush	2	1.8
Cycnogeton procerum (syn. Triglochin procerum)	Water Ribbons	2	1.0

Table 2 Deep marsh plant list (150 to 350mm below NWL)

Botanical name	Common name	Minimum density (plants/m2) 550cm3 tube	Fully established plant height (m)
Baumea articulata	Jointed Club-rush	2	1.8
Bolboschoenus caldwellii	Sea Club-rush	2	1.0
Bolboschoenus fluviatilis	Tall Club-rush	2	1.8
Bolboschoenus medianus	Marsh Club-rush	2	1.5
Cladium procerum	Leafy Twig-rush	2	2.0
Eleocharis sphacelata	Tall Spike Rush	2	1.8
Schoenoplectus tabernaemontani	River Club-rush	2	1.8
Cycnogeton procerum (syn. Triglochin procerum)	Water Ribbons	2	1.0

Table 3 Submerged marsh plant list (350 to 700mm below NWL)

Botanical name	Common name	Minimum density (plants/m^2) 550cm^3 tube
Myriophyllum crispatum	Upright Water-milfoil	1
Potamogeton ochreatus	Blunt Pondweed	1
Vallisneria australis	Eel-grass	1

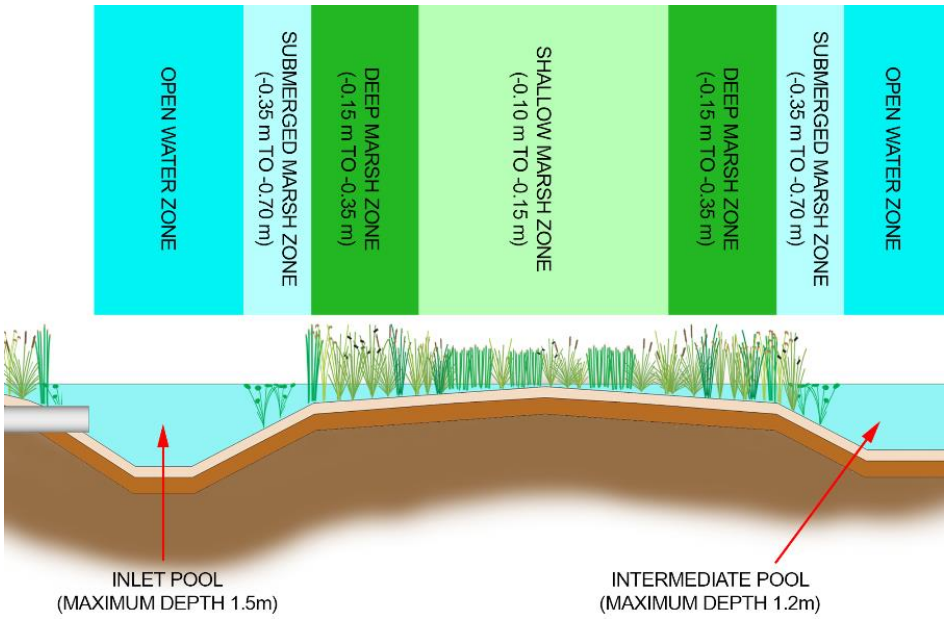

Figure 1 Macrophyte zone planting bands.

Plant quality

Plant quality is an extremely important determinant of vegetation success. Good preparation and planting technique cannot make up for poor quality plants. Melbourne Water will not accept poor quality planting stock supplied to or installed on our assets.

Plant material supplied which does not comply with Melbourne Water's standard will be rejected at the expense of the supplier/contractor. It is essential that nurseries familiarise themselves with Melbourne Water plant quality requirements and satisfy these specifications.

Wetland plant installation requirements

On site storage to protect plants

Plants delivered to site should be installed as soon as possible to prevent a reduction in plant health. The planting contractor must have a dedicated space on site to hold and maintain plants prior to installation. Protection from desiccation and grazing must be provided.

Wetland zone mark out

The marking out of wetland zones for planting staff is critical to ensure plants are placed in the correct zones. The wetland bathymetry must be in line with the as constructed

drawings. Any variations in bathymetry or topsoil depth and quality that could impact on plant establishment must be reported to Melbourne Water prior to installation occurring.

Risk mitigation to control planting season threats to plant health

Aquatic plants have growth seasons and are exposed to threats to their establishment which change throughout the year. Appendix B contains seasonal risk profiles where mitigation strategies must be in place to reduce the risk of plants not establishing should the planting contractor choose to install plants outside of the recommended season. This could be winter water level management or summer watering for example. Contractors which plant in the higher risk months do so at their risk and will need to replant lost plants at their cost.

Wetland Hydraulic structures

At the time of plant installation, the contractor installing the plants must ensure the wetland has a free draining outfall in place (to enable design hydrology to be achieved) and that there is the ability to manipulate water levels in the wetland. This is achieved by completely opening the sidewinding penstock valve to pass flows above NWL as quickly as possible. The penstock valve should be fully open for the first 12 months (minimum) following installation ensuring plant emergence above the NWL while they are young and vulnerable, also ensuring submersion by flows greater than NWL are for minimal periods of time (not 72 hours) ensuring a good planting outcome by the end of the 2 year defect period. After this initial 12 month period (assuming the hydrology is correct and plants have established), the side winding penstock valve can be adjusted towards achieving the desired notch width and extended detention time (EDT) in close consultation with the data collected from Melbourne Waters hydraulic level sensor program as over inundation of wetland plants will kill the aquatic vegetation.

The gate valve can also be opened for periods of time to lower the NWL of the wetland to allow plant installation. Prior to this occurring, Melbourne Water must be consulted to ensure this is a desirable outcome.

In developing catchments there may not be enough development runoff to permanently fill the wetland to NWL in all seasons or result in appropriate water turnover. In these instances alternative water supplies or delaying the planting of the project must be considered and discussed with Melbourne Water. The planting consultant and contractor are responsible for the healthy establishment of the plants, any constraints that prevent establishment from occurring should be discussed with Melbourne Water so they can be rectified.

Plant Removal from pot

Carefully remove the plant from its pot. Plants should not be squeezed. Do not force the plant out of the pot; do not pull them out by the stem, support the plant at all times.

The plant must be cradled at all times to prevent soil collapse and root damage. A number of methods can be employed but the key point is that the root ball is adequately supported at all times.

Substrate plant installation

The plants must be bedded into the topsoil so that they are securely held in place. The root ball and potting media must to be covered with >10mm of topsoil to prevent the material from washing away. The topsoil in inundated wetlands can become unstable with installation staff moving around the wetland base installing the plants. Care must be taken to prevent topsoil movements before, during and post planting until the plant's roots begin to bind up the substrate. Consideration should be given to lowering the water level by

approximately 100mm (by opening the gate valve) to the level of the shallow marsh topsoil during planting to enable more secure planting.

Bird netting installation

Bird netting is required to protect plants from damage and being pulled out by water fowl. Some species will always require protection (eg Cycnogeton procerum - syn. Triglochin procerum) while some wetlands with resident birds will require all the plants to be protected. Bird netting if used must be installed so that it remains tight and is securely pinned to the wetland substrate. A maintenance program must be put in place to regularly check and make good the netting as required, ensuring no birds are trapped.

Plant density

Planting densities are to be as per the *Wetland Design Manual* part A2 and must be achieved before planting Practical Completion will be granted. This must be quantified via delivery docket records and an onsite assessment with Melbourne Waters Surveillance Officer. For reimbursable wetland projects (Drainage Schemes), Melbourne Water will also undertake and fund a drone flyover or review near map historical records to ensure correct plant format and densities have been achieved for the site. This will be completed both prior to issuance of PC and Final Completion issuance. For strategy wetland projects (non-reimbursable) the developer will need to fund this exercise rather than Melbourne Water.

Weed control post planting

The immediate three months after plants are installed is a critical time for plant survival. The level of aquatic maintenance should be greater in this period. A weed control program detailing the type of record keeping to be undertaken to monitor the site and record the activities undertaken must be developed and implemented for the post planting maintenance period from Practical Competition to issuance of Final Completion. The weed program should include monitoring of plant numbers and achievement of densities as weed competition will limit the establishment of the installed plants and reduce the performance of the wetland system. Suitably experienced personnel must be engaged to undertake the wetland vegetation maintenance as this is an uncommon maintenance activity which requires prior knowledge. Subcontracting out this activity is not accepted by Melbourne Water. Records of maintenance activities must be kept and submitted to Melbourne Water upon request detailing activity and spray records preventing the establishment of a weed seed bank and achieving a weed cover at final completion of <5%. (See Appendix D for target weed species.)

Replanting of missing plants.

Plant and weed cover is assessed throughout the project to deliver a final coverage of >80% emergent vegetation in the ephemeral, shallow and deep marsh zones at both Practical Completion and Final Completion.
Plants lost during the establishment and defect periods which impact on the cover of vegetation must be replaced. Regular reports on vegetation losses and plant cover need to be provided to Melbourne Water. Replanting can be undertaken in the low risk months as per Appendix B. Final handover of the project cannot occur within 6 weeks of a replanting activity.

Pest Animals

Browsing animals such as carp and water fowl have the ability to severely impact upon vegetation project success. A thorough site investigation must be carried out prior to undertaking aquatic planting to assess the risks posed by browsing animals. If the risk of

browsing animals has been identified as high, this can have substantial impact on plant establishment and must be managed accordingly. Further information on how to approach pest animal management may be found in the Pest Animal Strategy and Pest Animal Guidelines.

Hygiene Protocols

In order to reduce the spread of weed seed, plant and faunal diseases across sites, good hygiene practices must be demonstrated on all project sites. Vehicles, tools, boots, clothing, cuffs and pockets can be vectors for the spread of weed seeds, diseased plant material and soil and must be managed appropriately.

Definitions

Cell trays: Nursery production systems will often use cell trays to increase efficiency and reduce manual handling effort. These are trays with individual spaces (cells) to grow the plants. The minimum size cell allowed under this specification is 90cm^3.

Forestry tube: These are containers commonly used in the revegetation industry. They are individual pots >200cm^3 in size.

>550 cm3 pot: These are containers sized to allow the growth of shallow and deep marsh plants. They provide enough space to enable the growth of these plant's roots and reduce the damage experienced in earlier wetland nursery production systems.

Wild harvested plants: Plants collected from areas of communal growth either in or outside a nursery (eg reeds growing in a wetland or farm dam which are collected and replanted), which is a practice Melbourne Water doesn't accept.

Planting Contractor: Contractor installing the aquatic plants and responsible for the post planting maintenance.

References

1. Melbourne Water, 2017. *Wetland Design Manual. Part A2: Deemed to comply design criteria*.

2. Melbourne Water, 2018. *Aquatic, Ephemeral, Terrestrial Plant Supply Audit form*

3. Melbourne Water, 2018. *Aquatic & Ephemeral Plant Supply standard*

4. Mullan, G. D. and White, P. J. 2001. *Seedling Quality: Making informed choices. Bushcare and the Department of Conservation and Land Management*.

5. *Flora bank guidelines*; http://www.florabank.org.au/

Appendix A: Plant supply formats.

Growing formats for species specified in the *Wetland Design Manual. Part A2: Deemed to comply design criteria*.
See the manual for the correct zonation information for each species.
Species not on the list below can only be used if approved by Melbourne Water and the growing format suits their morphology.
(**Note:** Y = acceptable growing format)

Format	>90cm3 cell eg V93 Hiko	200cm3 Tube	Min. 550cm3 container	Minimum leaf height (mm)	Comments
Baumea articulata	N	N	Y	400mm	
Baumea rubiginosa	N	Y	Y	300mm in >90cm3 cells, 500mm in 200cm3 tubes or >550mm pots	V93 Hiko only suitable for Ephemeral zone Acceptable substitute Baumea arthrophylla
Bolboschoenus caldwellii	N	Y	Y	400	Plants must have grown to 400mm in the container supplied to site before dormancy.
Bolboschoenus medianus	N	Y	Y	400	Plants must have grown to 400mm in the container supplied to site before dormancy.
Carex appressa	Y	Y	N	200	
Carex fasicularis	Y	Y	N	200	
Carex tereticaulis	Y	Y	N	200	
Cladium procerum	N	Y	Y	400	
Crassula helmsii	Y	Y	N	100	
Eleocharis acuta	N	Y	Y	250	
Eleocharis sphacelata	N		Y	400	
Juncus species	Y	Y	N	200	*Juncus amabilis, J flavidus, J gregiflorus, J krausii, J pallidus, J procerus, sarophorus, J usitatus etc.*
Lomandra longifolia	Y	Y		200	
Myriophyllum crispatum	N	Y	Y	250	Plants must be protected from desiccation during transport
Myriophyllum sp	N	N	Y	250	Submerged aquatic *Myriophyllum* sp (eg *M caput-medusae, M. salsugineum, M. verrucosum*) must be protected from desiccation during transport.
Persicaria decipiens	Y	Y	N	200	
Poa labillardierei	Y	Y	N	200	
Potamogeton ochreatus	N	N	Y	250	Plants must be protected from desiccation during transport
Schoenoplectus tabernaemontani	N	N	Y	400	
Cycnogeton Procerum (syn. Triglochin procerum)	N	N	Y	250	More than 6 leaves and tubers formed on roots.
Vallisneria americana	N	N	Y	300	Plants must be protected from desiccation during transport

Appendix B: Seasonal planting risk

The table below shows months where the conditions most suit the individual species.
Conditions during winter and spring for shallow and deep marsh plants have a higher risk and chance of plant mortality as they are likely to experience extended length of elevated water levels while in they are dormant (not emergent). The risk is also very high for young plants which are more susceptible to drowning.
Some aquatic species have lower growth productivity due to colder conditions with some species such as *Bolboschoenus* sp undergoing winter dormancy. These plants are at risk for longer periods of time if planted in winter as they are not able to take root and support themselves.
Installation of ephemeral species in summer has a higher risk for installation as they are more likely to experience desiccation.
Mitigation strategies must be in place if contractors want to install plants in the higher risk months shown in the table below.

Species	**Planting season**		**Preferred months**		**High risk months**							
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
Baumea articulata												
Baumea rubiginosa												
Bolboschoenus caldwellii												
Bolboschoenus medianus												
Carex appressa												
Carex fasicularis												
Carex tereticaulis												
Cladium procerum												
Crassula helmsii												
Eleocharis acuta												
Eleocharis sphacelata												
Juncus species												
Lomandra longifolia												
Myriophyllum crispatum												
Myriophyllum sp												
Persicaria decipiens												
Poa labillardierei												
Potamogeton ochreatus												
Schoenoplectus tabernaemontani												
Cycnogeton procerum (syn. *Triglochin procerum)*												
Vallisneria americana												

Table 1: Seasonal planting risks for aquatic species

Appendix C: Minimum information to be supplied with deliveries.

1. Nursery name and contact information
2. Project name
3. Date
4. Delivery number (if multiple deliveries to project)
5. Plant species name
6. Origin of genetic material (location)
7. Supply format (cell tray, container etc) quantities per species
8. Plant quantities (including container/cell tray #s) per species
9. Propagation date
10. Dates and details of hardening off/and or acclimatisation processes
11. Nursery QA sign off
12. Photos of nursery batches (to be supplied with final invoice)

Example below:

Delivery docket

Project name & section #		**Supplier**	
EPMS #		**Address**	
Estate name & stage		**Telephone #**	
Delivery Docket #		**Nursery manager**	
Date		**ABN**	
Melways ref:		**Council**	
Asset owner (Melbourne Water or Council)		**Melbourne Water surveillance officer**	
Nursery QA sign off representative		**Nursery QA sign off date**	
Photos of nursery batches (to be supplied			

Species Name	**Planting Zone**	**Propagation date**	**Hardening off/and or acclimatisation processess dates**	**Provenance (Origin of genetic material (location))**	**Quantity required**	**Quantity supplied**	**Format required**	**Format supplied**	**Minimum height requirement met (Y/N)**	**Substitutions**
Baumea articulata	Shallow marsh									
Bolboschoenus caldwellii	Shallow marsh									
Bolboschoenus fluviatilis	Shallow marsh									
Bolboschoenus medianus	Shallow marsh									
Cladium procerum	Shallow marsh									
Eleocharis acuta	Shallow marsh									
Schoenoplectus tabernaemon	Shallow marsh									
Cycnogeton procerum	Shallow marsh									
Baumea articulata	Deep marsh									
Bolboschoenus caldwellii	Deep marsh									
Bolboschoenus fluviatilis	Deep marsh									
Bolboschoenus medianus	Deep marsh									
Cladium procerum	Deep marsh									
Eleocharis sphacelata	Deep marsh									
Schoenoplectus tabernaemon	Deep marsh									
Cycnogeton procerum (syn. Triglochin procerum)	Deep marsh									
Myriophyllum crispatum	Submerged marsh									
Potamogeton ochreatus	Submerged marsh									
Vallisneria australis	Submerged marsh									

Appendix D: Maintenance (Wetland Design Manual. Part A2: Deemed to comply design criteria.

The landscape consultant must be engaged by the developer to supervise and approve the entire landscape construction process from the pre-commencement meeting through to achieving the end of defects period (a minimum of 27 months), ensuring the fellow requirements are met:

LC1	The landscape contractor awarded the wetland project is suitably qualified and experienced and has completed work on Melbourne Water wetlands historically and the work is of a high quality.	Construction
LC2	The landscape contractor awarded the wetland project must be the contractor undertaking the plant installation. Melbourne Water will not accept sub-contracting to another contractor without written approval to ensure the sub-contractor is suitably qualified, experienced and has completed work of this nature previously.	Construction
LC3	The landscape contractor awarded the wetland project must be the contractor maintaining the planting once installed. Subcontracting of the maintenance activity must be approved by Melbourne Water in writing to ensure the sub-contractor is suitably qualified and experienced and has completed work of this nature previously.	Construction

LC4	The landscape contractor awarded the wetland project must order stock from a nursery that grows plants to the specifications outlined within the wetland manual and this document (no wild stock or cutting up of planting clumps is to be installed).	Construction
LC5	Check the planting contractor's delivery dockets to ensure the number of plants and format of plants ordered and delivered matches the landscape plan and requirements of the wetland manual and this document.	Construction
LC6	Audit the quality of stock delivered to site prior to the installation occurring accepting and/or rejecting any unacceptable stock that doesn't meet the requirements of the wetland manual or this document.	Construction
LC7	Ensure the contractor is undertaking regular weed runs (aquatic) of the site to ensure a weed seed bank doesn't develop.	Construction
LC8	Undertake random audits of the nursery's they regularly source stock from to ensure the stock they are growing and supplying is of a high quality and meets the requirements of the wetland manual and this document.	Construction

LC9	Make Melbourne Water aware of any nursey's growing and supplying poor quality stock that doesn't meet the requirements of the wetland manual or this document.	Construction
LC10	Make Melbourne Water aware of any landscape contractor not sourcing, installing and maintain planting to the requirements of the wetland manual or this document.	Construction
LC11	Make Melbourne Water aware of any topsoil installation that doesn't meet the requirements of Melbourne Waters topsoil specification weather installed by the civil or planting contractor.	Construction
LC12	Make Melbourne Water aware of wetland bathymetry that doesn't meet the requirements of the wetland manual or this document resulting in reduced planting banding and wetland treatment.	Construction

Note: Should Melbourne Water feel the quality of sourced plants delivered to and installed on site don't meet the requirements of this manual, we reserve the right to engage an independent auditor to assess and make a recommendation as to the quality of the landscape planting. Any required rectification works resulting from this audit would be at the expense of the developer, not Melbourne Water.

Appendix E: PRIORITY WEED SPECIES

The below is an indicative list of problem weed species, additional species may be required to be controlled depending on their impact.

State controlled and state prohibited weeds are not included however any contractor suspecting that these species are present must inform Melbourne Water and DELWP to ensure appropriate control is undertaken.

PRIMARY CONTROL USUALLY FOR SITE PREPARATION

Agrostis capillaris s.l.	Brown-top Bent
Anthoxanthum spp.	Vernal Grass
Crocosmia X crocosmiiflora	Montbretia
Cynodon dactylon var. dactylon	Couch
Cyperus eragrostis	Drain Flat-sedge
Dactylis glomerata	Cocksfoot
DOCK	Any genus eg Acetosa, Rumex etc.
Echium plantagineum	Paterson's Curse
Echinochloa spp.	Barnyard Grass
Ehrharta spp.	Veldt Grass
Galenia pubescens var. pubescens	Galenia
Genista spp.	Broom
Glyceria spp.	Eg Reed Sweet Grass
Holcus spp.	Fog Grass
Hordeum spp.	Barley Grass
Juncus spp.	Eg Jointed Rush
Leersia oryzoides	Rice Cut-grass
Myriophyllum aquaticum	Parrot's Feather
Nassella spp.	Eg Serrated Tussock, Chilean Needle Grass etc
Nasturtium spp.	Watercress
Oxalis spp. (naturalised)	Wood Sorrel
Paspalum spp.	Eg Water Couch, Paspalum
Pennisetum spp.	Eg Kikuyu
Phalaris spp.	Canary Grass
Phytolacca octandra	Red-ink Weed
Plantago spp.	Eg Ribwort
Polygonum aviculare s.l.	Prostrate Knotweed
Polypogon spp.	Beard Grass
Ranunculus spp.	Eg Creeping Buttercup
Romulea spp.	Onion Grass
Rubus fruticosus spp. agg.	Blackberry
Sagittaria spp.	Sagittaria
Sparaxis spp.	Harlequin Flower
THISTLES	Any genus eg. Cirsium, Helminthotheca, Cynara
Typha spp.	Eg Lesser Reed Mace
Vinca spp.	Periwinkle
Watsonia spp.	Watsonia
Xanthium spp.	Eg Bathurst Burr

SECONDARY CONTROL USUALLY FOR MAINTENANCE

Allium triquetrum	Three-corner Garlic
Arctotheca calendula	Cape Weed
Aster spp.	Aster
Avena spp.	Oat
Brassica spp.	Turnip
Briza spp.	Quaking Grass
Bromus spp.	Bromus
Chenopodium spp.	Fat Hen
Conyza spp.	Fleabane
Echium spp.	Bugloss
Erodium spp.	Eg Common Herons Bill
Fumaria spp.	Fumitory
Galium aparine	Cleavers
Lactuca spp.	Lettuce
Lolium spp.	Rye Grass
Lotus spp. (naturalised)	Trefoil
Medicago spp.	Medic
Ornithopus spp.	Bird's Foot
Sisymbrium spp.	Mustard
Solanum spp.	Eg Black Nightshade
Sonchus sp	Eg Common Sow Thistle
Taraxacum species group 1	Garden Dandelion
THISTLES	Any genus eg. Cirsium, Helminthotheca, Cynara
Trifolium spp.	Clover

NB Species have designated into PRIMARY and SECONDARY as an indicati of when control efforts are most likely to be required however individual sites may respond differently depending on management and external factors. Speci may be present in one or both phases and control will be required at the discretion of Melbourne Water.