Wetland Design Manual Part A2: Deemed to Comply Design Criteria
Manual

December 2020

VICTORIA State Government

Melbourne Water makes a vital contribution to the famous Melbourne lifestyle through the supply of high-quality water, reliable sewerage services, integrated drainage and flood management services and by enhancing our waterways and land for greater community use.

Melbourne Water
Enhancing Life and Liveability

Table of Contents

1. Purpose

This section presents an overview of the design criteria that need to be met to satisfy the Deemed to Comply assessment pathway. Please refer to **Part B** for more information on the Deemed to Comply approach and the Alternative Approach as part of the design acceptance process. Clear links between the design criteria and core outcomes are illustrated, assisting the designer to check that their design is meeting Melbourne Water's requirements.

2. Scope

These design criteria are expanded upon in this part of the manual and are also included in the relevant sections of **Part C** as part of the technical design approach. The Deemed to Comply conditions are also included in the design checklists (for both civil and planting works) available on Melbourne Water's Building and Works website.

The Deemed to Comply design criteria are prescriptive for a reason and additional design considerations and minimum standards are provided in **Part A3** to assist designers plus provide more guidance if the alternative approach is required.

Demonstration of compliance with only some of the Deemed to Comply criteria is required for concept and functional design acceptance. Please refer to the right-side column in the tables provided in this part or the various design checklists for each stage of the design acceptance process to see which conditions apply at each stage:

- Concept design deemed to comply checklist
- Functional design deemed to comply checklist
- Detailed design deemed to comply checklist

Where applicable, crosslinks have been provided to Melbourne Water standard drawings relevant to specific Deemed to Comply design criteria to assist with detailed design documentation.

3. Deemed to Comply Criteria

3.1 General

GN1	The treatment and flow regime performance of the wetland must be modelled in MUSIC, or similar conceptual modelling software as approved by Melbourne Water.	**Concept** **Functional** **Detailed**
GN2	The meteorological data in the conceptual modelling data or software (i.e. MUSIC) must be: • Based on at least 10 years of historical records • Recorded at six minutes intervals • Sourced from a pluviographic station as close as possible to the wetland site • Have a mean annual rainfall depth within 10% of the long term rainfall depth at the rainfall station closest to the wetland site	**Concept** **Functional** **Detailed**
GN3	The system configuration shown on the design plans must be consistent with the conceptual modelling parameters (e.g. MUSIC) (including the stage/discharge relationship) and sediment pond calculator/calculations.	**Concept** **Functional** **Detailed**
GN4	Peak design flows must be estimated in accordance with methods in Australian Rainfall and Runoff.	**Concept** **Functional** **Detailed**

3.2 Maintenance Provisions

MN1	Sediment ponds must be able to be drained whilst maintaining the macrophyte zone water level at normal water level. This is achieved by having the sediment pond transfer pit RL 100mm higher than the inlet pool NWL. Refer Standard Drawing 7251/12/001.	**Functional** **Detailed**
MN2	All parts of the base of a sediment pond must be accessible: • Within seven metres of a designated hard stand area for excavation vehicles ("edge cleaned") OR • Via a maintenance access ramp into the base of the sediment pond. Refer Standard Drawing 7251/12/013	**Functional** **Detailed**
MN3	The sediment pond base material must extend vertically up the batter by 300 mm and comprise of: • Steel reinforced concrete – steel reinforced, minimum 150 mm thick; OR • 400 mm compacted rock. Approximately 50% 300mm in size. The remaining 50% made up of 0-100mm graded rock,	**Detailed**

	premixed with 300 dia rocks and spread and tracked so as to form a compacted base. Refer Standard Drawing 7251/12/012	
MN4	'Edge cleaned' sediment ponds must have hardstand areas (e.g. crushed rock) for excavation vehicles. A maintenance track must be provided around the entire perimeter of the sediment pond. Refer Standard Drawing 7251/12/013	**Detailed**
MN5	Maintenance access ramps are required on all sediment ponds that cannot be 'edge cleaned'. The maintenance access ramp into a sediment pond must: • Extend from the base of the sediment pond to at least 0.5 metres above TEDD, • Be at least 4 metres wide, • Be no steeper than 1:5, (1:12 cross fall or flatter) • Be capable of supporting a 20 tonne excavator, • Constructed of compacted 200 mm deep layer of rock: -Bottom layer is 100mm depth of 0-100mm FCR; top layer is 100mm of 0-40mm NDCR (6% cement stabilised below NWL), • Have a barrier to prevent unauthorised vehicle access (e.g. gate, bollard and/or fence). Refer Standard Drawing 7251/12/013	**Functional** **Detailed**
MN6	A maintenance access track must be provided to the sediment pond maintenance access ramp and to enable maintenance vehicles to safely access and exit the site. The maintenance access track must: • Be at least 4 metres wide, Comprise of compacted 200 mm deep layer of rock. Bottom layer is 100mm depth of 0-100mm FCR; top layer is 100mm of 0-40mm NDCR, • Be reinforced to take a 20 tonne vehicle, • At the road edge, have an industrial crossover to Council standard and rolled kerb adjoining it, • Have a barrier to prevent unauthorised vehicle access (e.g. gate, bollard and/or fence). Refer Standard Drawing 7251/12/013	**Concept** **Functional** **Detailed**
MN7	A hardstand area with a minimum turning circle appropriate to the types of maintenance vehicles to be used must be provided adjacent to the sediment pond maintenance access ramp to enable maintenance vehicles to safely reverse and exit the sediment loading area. (Designers should seek advice from Melbourne Water on the types of maintenance vehicles that will be used.) **Note:** The turning circle must be in accordance with the Austroads Design Vehicles and Turning Path Templates Guide.	**Concept** **Functional** **Detailed**

MN8	Intersections between pedestrian pathways and site maintenance access tracks should be reinforced to take a 20 tonne vehicle.	**Detailed**
MN9	Dedicated sediment dewatering areas must be provided and: • Be accessible from the maintenance ramp/track, • Have a length to width ratio no narrower than 10:1, • 1:12 cross fall or flatter. • Be able to contain all sediment removed from the sediment accumulation volume spread out at a maximum of 500 mm depth, • Be located above the peak 10 year ARI water level and within 25 metres of each sediment pond, • Be located at least 15 metres from residential areas, public access spaces (playgrounds, sports fields etc.), and consider potential odour and visual issues for local residents, • Address public safety and potential impacts on public access to open space areas, • Be free from above ground obstructions (e.g. light poles) and be an area that Melbourne Water has legal or approved access to for the purpose of dewatering sediment. Refer resetting sediment ponds best practice guideline for additional information.	**Concept** **Functional** **Detailed**
MN10	The wetland must be configured to enable maintenance vehicles to drive around at least 50% of the wetland perimeter. Note: This can be achieved via subdivisional road networks. Vehicular access must be provided as close as possible to wetland structures that may catch debris (e.g. provide access to the closest bank where structures are within the water body).	**Concept** **Functional** **Detailed**

3.3 Sediment Pond

SP1	Sediment ponds must be located offline of waterways[1] but online to the pipe or lined channel they are treating water from. Refer to **Part A3** of this Manual for guidance on offline configurations.	**Concept** **Functional** **Detailed**
SP2	Sediment ponds must be located at each point stormwater enters the "wetland system" unless: • The catchment of the incoming stormwater is < 5% of the total wetland catchment OR	**Concept** **Functional** **Detailed**

[1] A waterway is defined as either a natural or constructed waterway. Melbourne Water's Development Services Schemes define a 'Constructed Waterway' as reaches of a waterway that are required to be fully or partially constructed to service new development.

	• The incoming stormwater has already passed through a bioretention system or wetland immediately upstream	
SP3	Sediment ponds must be sized to: • Capture 95% of coarse particles ≥ 125 µm diameter for the peak three month ARI • ≤ than 1.6m deep • Provide adequate sediment storage volume to store five years of sediment. The top of the sediment accumulation zone must be assumed to be 500 mm below NWL (refer to Figure 1). • Ensure that velocity through the sediment pond during the peak 100 year ARI event is ≤ 0.5 m/s. (The flow area must be assumed to be the EDD multiplied by the narrowest width of the sediment pond, at NWL, between the inlet and overflow outlet) Sediment ponds must be ≤ 120% of the size needed to meet the limiting of the above three criteria. Compliance with the above criteria must be demonstrated using the methods described in WSUD Engineering Procedures: Stormwater (Melbourne Water, 2005). Alternatively, the velocity criteria can be checked using a hydraulic model such as HEC-RAS. Refer to **Part D** of this Manual for guidance on undertaking velocity checks).	**Functional** **Detailed**
SP4	The sediment pond EDD must be ≤ 350 mm.	**Concept** **Functional** **Detailed**

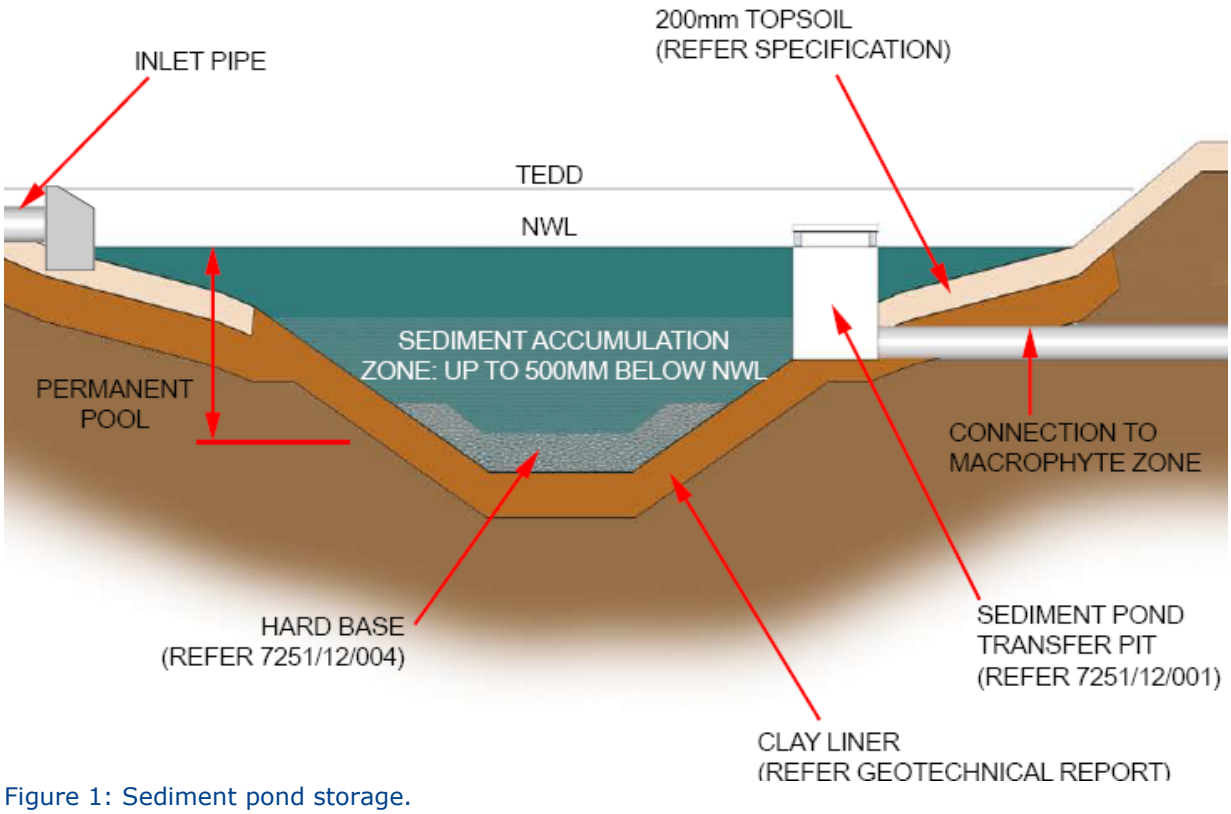


Figure 1: Sediment pond storage.

3.4 Macrophyte Zone

MZ1	At least 80% of the area of the macrophyte zone at 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).	**Functional** **Detailed**
MZ2	The macrophyte zone EDD must be ≤ 350 mm.	**Concept** **Functional** **Detailed**
MZ3	Macrophyte zones must be located offline from all waterways and drains (i.e. there must be a bypass route around the macrophyte zone).	**Concept** **Functional** **Detailed**
MZ4	The length of the macrophyte zone must be ≥ four times the average width of the macrophyte zone.	**Concept** **Functional** **Detailed**
MZ5	The macrophyte zone outlet must be located at the opposite end of the macrophyte zone to the inlet(s).	**Concept** **Functional** **Detailed**

MZ6	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).	**Functional Detailed**
MZ7	Inlet and outlet pools must be ≤ 1.5 m depth.	**Functional Detailed**
MZ8	Intermediate pools (between the inlet and outlet pool) must be ≤ 1.2 m deep.	**Functional Detailed**
MZ9	Velocities in the macrophyte zone must be: • less than 0.5 m/s for the peak 100 year ARI flow • less than 0.05 m/s for the peak three month ARI Compliance with the above criteria must be demonstrated using the methods described in WSUD Engineering Procedures: Stormwater (Melbourne Water, 2005) or using a hydraulic model such as HEC-RAS or TUFLOW. Refer to **Part D** of this Manual for guidance on undertaking velocity checks.	**Functional Detailed**
MZ10	The macrophyte zone must provide a 90th percentile residence time of 72 hours (assuming plug flow between inlet and outlet through the EDD and 50% of the permanent pool volume). Refer to the Melbourne Water online tool and Part D of this Manual for guidance on determining residence time and wet spells analysis. Note: This residence time is required to ensure settling of suspended particles and pollutant removal. Criteria VG10, which relates to ensuring water levels do not drown plants, must also be met.	**Functional Detailed**
MZ11	A grade of between 1:150 and 1:400 must be provided between marsh zones (longitudinally through the macrophyte zone) to enable the wetland to freely drain. Intermediate pools will generally be needed to transition between marsh zones.	**Functional Detailed**
MZ12	A marker must be used to show wetland water level relative to NWL and EDD. The marker must be able to be read from the bank and attached to the wall of the submerged outlet pit. Refer to Standard Drawings 7251/12/005 and 7251/12/011.	**Detailed**
MZ13	Melbourne Water will not accept islands within wetlands as are difficult to maintain (need a canoe or boat) and can become easily overgrown with weeds.	**Concept Functional Detailed**

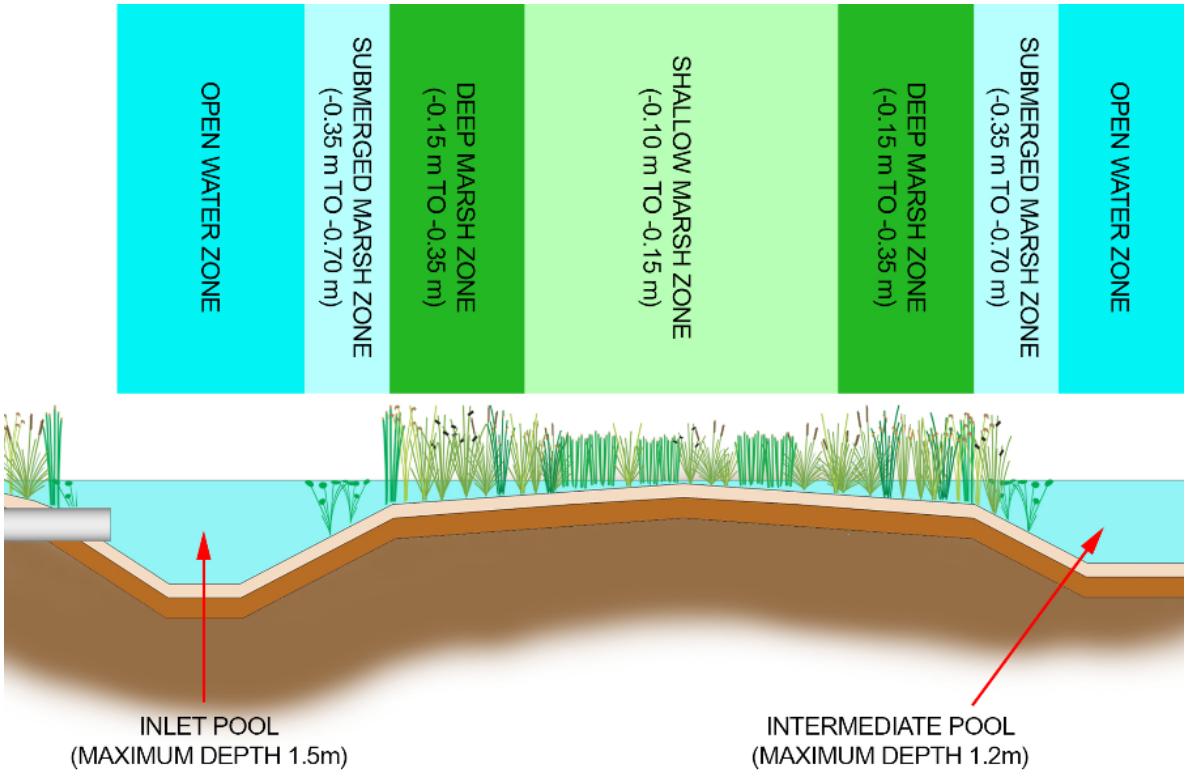


Figure 2: Macrophyte zone planting bands.

3.5 Bypass

BY1	The bypass route must be sized to convey the maximum overflow from the sediment pond that will occur during the peak 100 year ARI event. Where a sediment pond is located within a retarding basin, the bypass must convey at least the peak one year ARI flow.	**Concept** **Functional** **Detailed**

3.6 Inlets and Outlets

IO1	All pits, grilles and structures must conform to Melbourne Water's standards as shown in the Land Development Manual and Standard Drawings.	**Detailed**
IO2	Outlet structures must be easily identifiable and maintainable. They must be accessible from the bank. The edge of the outlet structure closest to the bank (maintenance access point) must be located in < 350 mm water depth. Refer Standard Drawing 7251/12/4003	**Detailed**
IO3	The Twin Chamber Outfall pit (containing the side winding penstock and gate valves) must have a grilled or grated lid to allow visual inspection and valve operation from the surface (e.g. through the grate/grille). Refer Standard Drawing 7251/12/005 and 7251/12/006 **Note:** Melbourne Water will be installing a hydraulic level sensor and data logger on all Development Services Scheme wetlands to	**Detailed**

	ensure the wetland is meeting the required hydraulic performance targets (refer Figure 3).	
IO4	The connection between the sediment pond and macrophyte zone inlet pool (sediment pond transfer pit) must be sized such that: • All flows ≤ the peak three month ARI event are transferred into the macrophyte zone (refer Figure 4), AND • 60% of the peak 1 year ARI flow overflows from the sediment pond into the bypass channel/pipe when the water level in the macrophyte zone is at TEDD (and not enter the macrophyte zone) (refer Figure 5), AND • The velocity through the macrophyte zone is ≤ 0.5 m/s during the peak 100 year ARI event: i. Assuming the macrophyte zone is at TEDD if the wetland is not within a retarding basin or flood plain ii. Assuming the water level is at the peak 10 year ARI water level if the wetland is within a retarding basin or flood plain	**Functional** **Detailed**
IO5	The submerged offtake pit connecting into the twin chamber outfall pit must be submerged to minimise blocking from floating debris. Refer to Standard Drawings 7251/12/4003 and 7251/12/035.	**Detailed**
IO6	The twin chamber outfall pit must contain both a side winding penstock valve & a gate valve so that: • When the penstock is fully open the wetland draws down to NWL quickly assisting with plant growth during the first 12 months of plant establishment. • The penstock can be fully opened or closed to assist with maintenance of the wetland. • The stage/discharge rate can be adjusted if required to achieve suitable residence times and/or inundation patterns Refer Standard Drawing 7251/12/005 & 7251/12/006 The gate valve allows full or partial draw down of the wetland to assist with maintenance.	**Functional** **Detailed**
IO7	Balance pipes must be placed between all open water zones (inlet, intermediate and outlet pools) to enable water levels to be drawn down for maintenance or water level management purposes. Refer Standard Drawings 7251/12/015 & 7251/12/035. Balance pipes must be 300mm dia RCP with the RL of the submerged offtake pit (notch cut out) no more than 300 mm above the base of the deepest point of the pool to maximise draw down and minimise blockage potential. Refer Standard Drawing 7251/12/035 for details.	**Functional** **Detailed**

Figure 3: Hydraulic level sensor & data logger

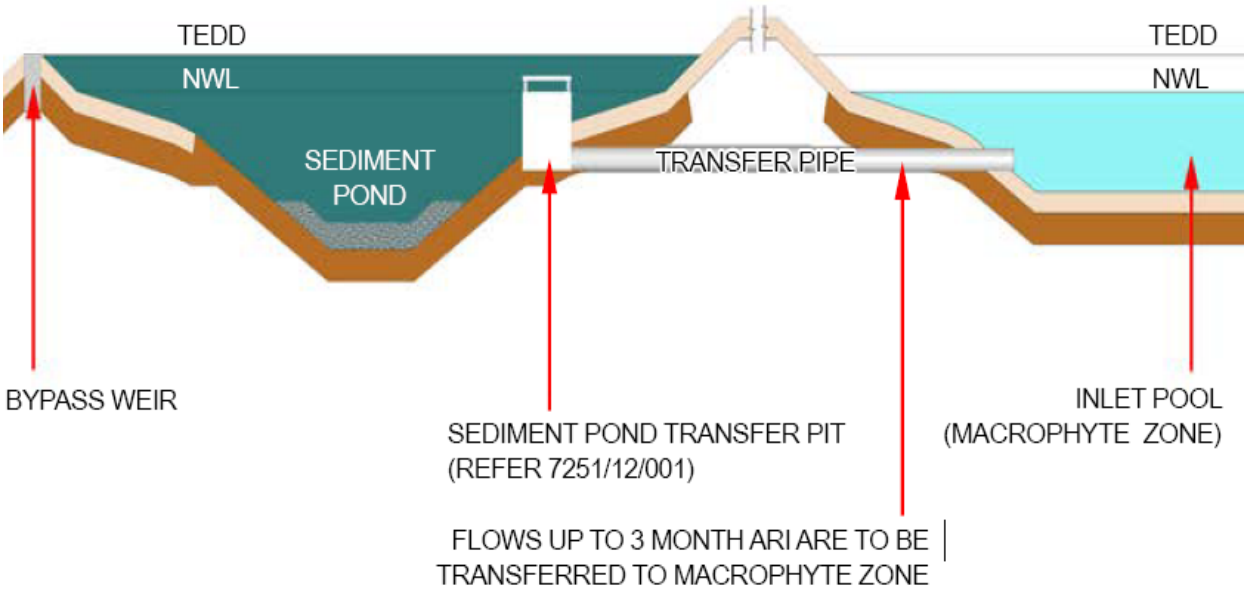


Figure 4: Connection between sediment pond and macrophyte zone – three month ARI flow check (refer to Melbourne Water Standard Drawing 7251/12/001 for more details on the connection between sediment pond and macrophyte zone).

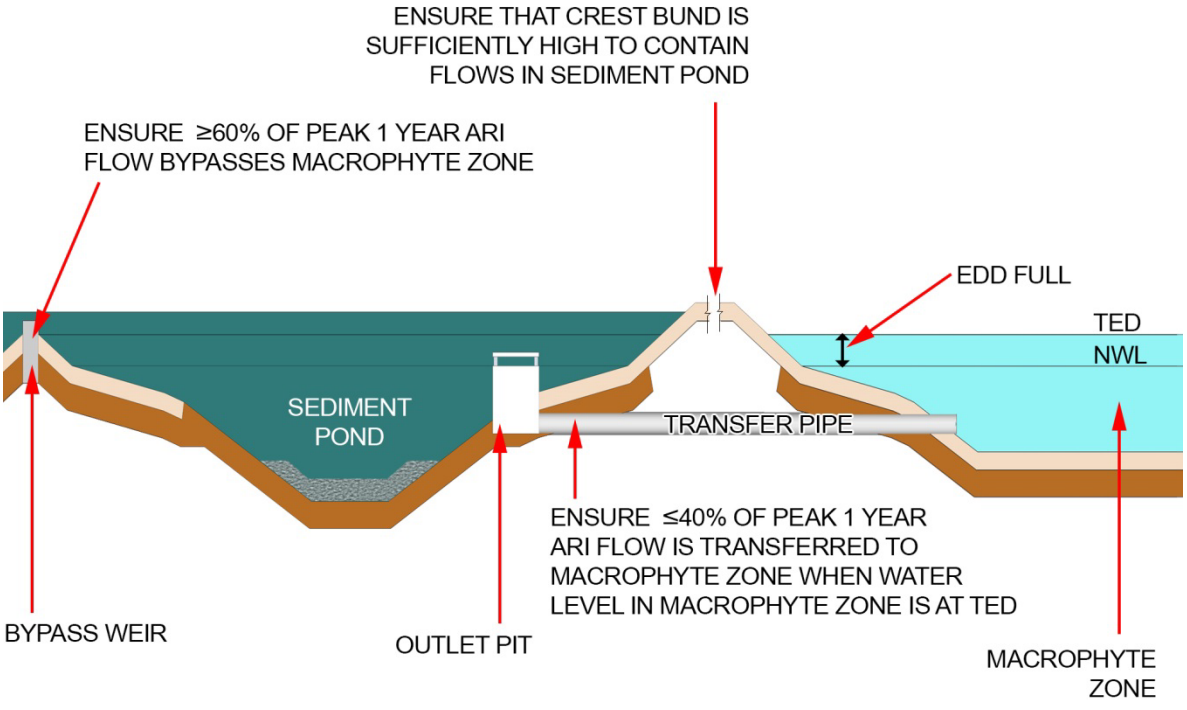


Figure 5: Figure 6 Connection between sediment pond and macrophyte zone – one year ARI flow check (Refer to Melbourne Water Standard Drawings 7251/12/001 for more details on the connection between sediment pond and macrophyte zone).

3.7 Vegetation & Landscape

VG1	The macrophyte zone must contain a minimum of 80% cover of emergent macrophytes comprising of shallow and deep marsh zones. Open water areas (maximum 20% of the wetland area) must include submerged marsh vegetation.	**Functional Detailed**
VG2	Any open water areas in excess of 20% of the macrophyte zone area (at NWL) must be located as a separate water body. These separate water bodies are not considered by Melbourne Water to be wetlands for the purpose of treating stormwater, and are therefore beyond the scope of this document. For further information, refer to **Part A3** for open water, landscape design and amenity design considerations and the Planning and Building website for ownership and maintenance responsibilities. Conceptual models of wetlands and other parts of the treatment train (e.g. MUSIC) must assume there is no reduction in pollutant loads within these separate waterbodies.	**Concept Functional Detailed**
VG3	Ephemeral batters (NWL to 350 mm above NWL) of the wetland macrophyte zone and sediment pond must be densely planted with plants at 6 plants per sqm suited to intermittent wetting. 80% of the plants used in the ephemeral batters must be in accordance with the species and densities shown in Table 1.	**Functional Detailed**
VG4	The ephemeral batters must be planted at an average density of 6 plants per sqm with individual plants grown in individual pots or tray cells that are a minimum of 90 cm^3 in volume (V93 hiko cell equivalent), however 200cm^3 (forestry tubes) are preferred.	**Detailed**
VG5	The shallow marsh (≤100 - 150mm below NWL) of the macrophyte zone and sediment pond must be densely planted with 2 pots per sqm (≥550cm^3 containers). 90% of the plants used in the shallow marsh must be in accordance with the species and densities shown in Table 2. A minimum of three species must be specified for the shallow marsh zone.	**Functional Detailed**
VG6	The deep marsh (150 to 350 mm below NWL) of the macrophyte zone must be densely planted with 2 pots per sqm (≥550 cm^3 containers). 90% of the plants used in the deep marsh must be in accordance with the species and densities shown in Table 3. A minimum of three species must be specified for the deep marsh zone.	**Functional Detailed**
VG7	The submerged marsh (350 to 700 mm below NWL) of the macrophyte zone must be planted with 1 pot per sqm (≥550 cm3 containers). 90% of the plants used in the submerged marsh must be in accordance with the species and densities shown in Table 4.	**Functional Detailed**
VG8	Emergent and submerged macrophyte seedlings must be grown in individual container/pots with a minimum volume of: • ≥550cm^3 (200cm^3 forestry tubes are not acceptable)	**Detailed**

	Note: Seedlings sourced from bare-root divisions from tub/tray grown stock or stock harvested from existing wetlands will not be accepted.	
VG9	Seedlings grown in ≥550cm^3 pots must have: • minimum stem height of 500 mm (except *Triglochin procerum* and *Eleocharis acuta* – minimum stem height of 400 mm) • total stem area must cover at least 50% of the pot surface area • well developed, healthy root system that occupies the full pot volume (i.e. the growing media must remain intact when the plant is removed from the pot) • Not have a pot depth exceeding 150mm. **Note:** The minimum stem height criteria specified for ≥550 cm3 pots does not apply to submerged macrophyte species.	**Detailed**
VG10	The effective water depth (permanent pool depth plus TEDD) must not exceed half of the average plant height for more than 20% of the time. This must be demonstrated using inundation frequency analysis assuming the plants heights are in accordance with those shown in Table 2 to Table 4. Refer to online tool and **Part D** of this Manual for guidance on the inundation frequency analysis.	**Functional** **Detailed**
VG11	For stormwater harvesting requirements please refer to the below guidelines. **Note:** the harvested water can only be extracted from the downstream chamber of the twin chamber outfall pit. Stormwater harvesting guidelines Stormwater harvesting technical guidelines Standard Drawings - Stormwater Harvesting Note: a diversion licence is required to harvest water from Melbourne Water assets.	**Concept** **Functional** **Detailed**
VG12	The wetland must have an appropriately sized outfall to ensure the planting wont drown and for Melbourne Water to accept ownership of the asset at completion of the defects period. **Note:** The developer and or their consultant is to negotiate with any downstream property owners with regard to outfall design and construction (temporary or permanent), not Melbourne Water. The developer must own and maintain any temporary outfalls until the permanent asset is constructed, not Melbourne Water.	**Functional** **Detailed**
VG13	Any grassed areas that Melbourne Water must maintain are to meet one of the below options. Councils batter grade requirements should be sought for areas they are to maintain as each council has a different requirement: 1. 1 in 5 or flatter with a 3m run out area at the bottom of the slope is to be provided so MW can mow up and down if	**Functional** **Detailed**

	necessary. Run out area is to be a maximum grade of 1:12 and be clear of rocks, trees, fences etc. 2. Maximum grade of 1:12 to allow for safe grass cutting (horizontal and vertical cutting method). No run out area is required, area must be clear of rocks, trees, fences, drops etc. **Note:** For mowing around vegetation MW requires a 3m gap between vegetation to allow mower access. Overhanging vegetation can be an access issue. Slopes steeper than 1 in 5 to be densely vegetated.	
VG14	No mulch to be placed below Q100 or frequently inundated areas. Jute mat required to be installed between NWL & TEDD, and jute mat to be used above TEDD where deemed necessary. Jute mat must be installed to the manufacturer's specifications, including fasteners.	**Functional Detailed**

Table 1: Ephemeral batter plant list (NWL to 350mm above NWL)

Botanical name	Common name	Minimum density (>90cm³ container/m²)
Baumea rubiginosa	Soft Twig-rush	6
Carex appressa	Tall Sedge	6
Carex tereticaulis	Basket Sedge	6
Cyperus lucidus	Leafy Flat-sedge	6
Juncus amabilis	Hollow Rush	6
Juncus flavidus	Yellow Rush	6
Juncus krausii	Sea Rush	6
Juncus pallidus	Pale Rush	6
Poa labillardierei	Common Tussock	6
Lomandra longifolia	Spiny-headed Matt-rush	6

Table 2: Shallow marsh plant list (100 to 150mm below NWL)

Botanical name	Common name	Minimum density (plants/m²)	Average plant height (m)
		≥550cm³ pot	
Baumea articulata	Jointed Club-rush	2	1.8
Bolboschoenus caldwellii	Sea Club-rush	2	1.0

Botanical name	Common name	Minimum density (plants/m²)	Average plant height (m)
		≥550cm³ pot	
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 3: Deep marsh plant list (150 to 350mm below NWL)

Botanical name	Common name	Minimum density (plants/m²)	Average plant height (m)
		≥550cm³ pot	
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 4: Submerged marsh plant list (350 to 700mm below NWL)

`Botanical name	Common name	Minimum density (plants/m²)
		≥550cm³ pot
Myriophyllum crispatum	Upright Water-milfoil	1
Potamogeton ochreatus	Blunt Pondweed	1
Vallisneria australis	Eel-grass	1

3.8 Liner and Topsoil

LN1	The exfiltration rate from the base and the sides of the wetland must be accurately represented in the conceptual modelling software analysis (e.g. MUSIC). Wetlands with a permanent NWL must have a compacted clay liner made from site soils and/or imported material where site soils are unsuitable based on the recommendations from the site geotechnical report.	**Concept** **Functional** **Detailed**
LN2	Impermeable liners (based on the recommendations from the site geotechnical report) must be used where the groundwater table is likely to interact with the wetland or where there are saline in-situ soils.	**Detailed**
LN3	At least 200mm of topsoil must be provided in all areas of the macrophyte zone; and in sediment ponds to 500mm below NWL in accordance with Melbourne Waters Topsoil specification	**Functional** **Detailed**
LN4	Topsoils used within the wetland (in situ or imported) must comply with Melbourne Waters Topsoil specification which is sub set of AS 4419 Soils for landscaping and garden use[2]. Testing must be carried out by a NATA accredited laboratory. If required, amelioration to the topsoil must be undertaken to achieve compliance with Melbourne Waters Topsoil specification	**Detailed**

3.9 Landscape Design Structures

LDS1	All boardwalks, piers, bridges and/or structurally treated edges installed and maintained by others are to meet Melbourne Waters below guideline requirements and also have heights and/or railings in accordance with relevant design codes and satisfy inundation and safety criteria. - Constructing waterway crossings guideline - Shared pathways guideline	**Detailed**

[2] The AS 4419 requirement for % organic matter content does not apply. Topsoils used in wetlands must have a minimum of 5% organic matter content.

	- Maintenance Agreements Refer to **Part A3** of this Manual for design consideration and guidance on landscape design features.	
LDS2	Boardwalks and/or viewing platforms are not permitted over sediment ponds, pipes & pits, weirs, rock chutes and EDD control structures for maintenance access reasons.	**Concept** **Functional** **Detailed**
LDS3	Vehicle exclusion bollards are required around entire wetland reserve to prevent unauthorised access and illegal rubbish dumping. Refer Standard Drawings 7251/8/204, 7251/8/205, 7251/8/207	**Functional** **Detailed**

3.10 Edge Treatment

ET1	The edge of any deep open water should not be hidden or obscured by embankments or terrestrial planting unless measures are taken to preclude access. Public access to structures, the top of weirs, orifice pits and outlet structures must be restricted by appropriate safety fences and other barriers. Permanent fencing is required adjacent to potentially unsafe structures (i.e. deep water zones, steep drops, top of weirs, outlet structures etc.).	**Functional** **Detailed**
ET2	All wetland edges must have: • Vegetated approach batters no steeper than 1:5, a 2.8 metre wide vegetated safety bench at 1:8 between NWL and 350 mm below NWL and a maximum 1:3 slope beyond 350 mm below NWL (refer • Figure 6). OR • The batter from TEDD to 350mm below NWL must contain dense impenetrable planting that is a minimum of 2.8 metres wide and 1.2 metres high (refer Figure 7 and Figure 8).	**Functional** **Detailed**
ET3	A minimum offset of 15 metres must be provided from the wetland's NWL to any allotment or road reserve (not including shared pathways). A safety design audit may be required for any proposal that does not achieve this condition. Refer to **Part A3** of this Manual for design consideration and guidance on safety in design.	**Concept** **Functional** **Detailed**

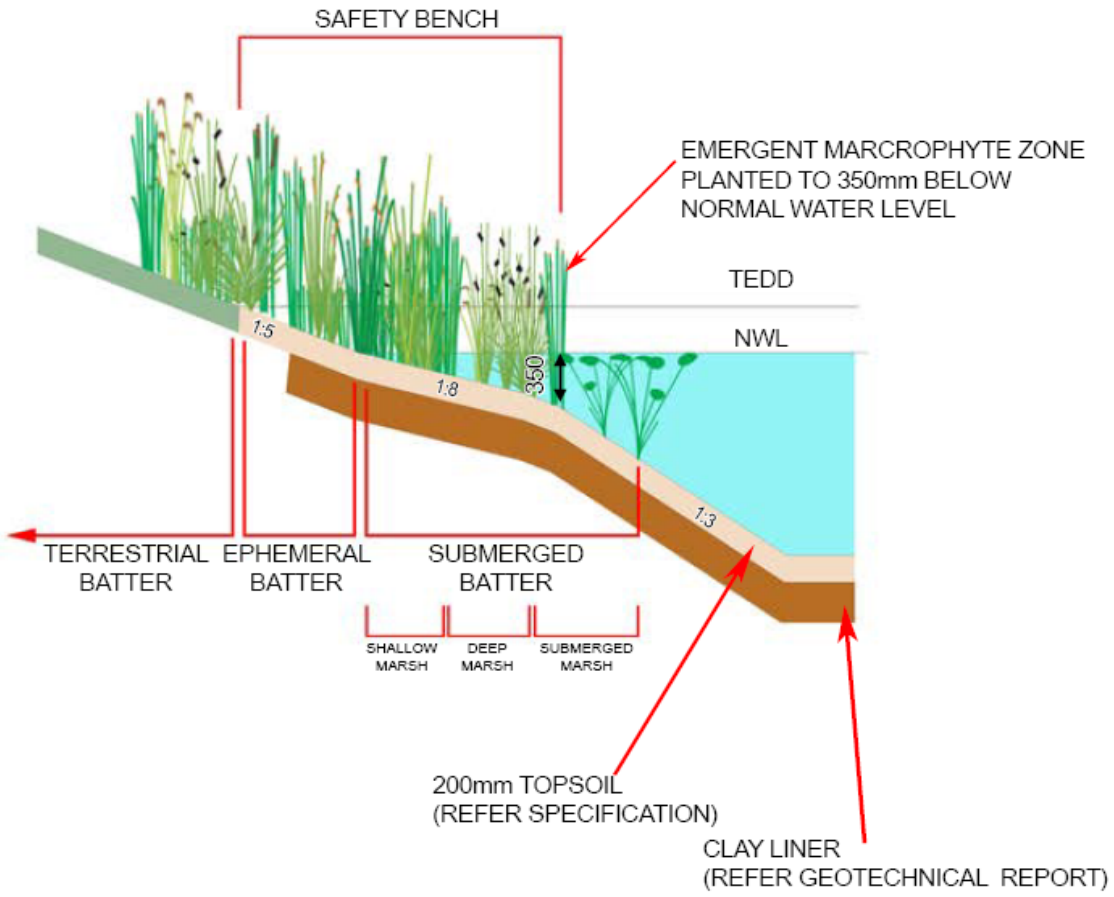


Figure 6: Indicative cross-section of vegetated wetland edge with safety bench (Refer to Melbourne Water Standard Drawing 7251/12/010 for more details).

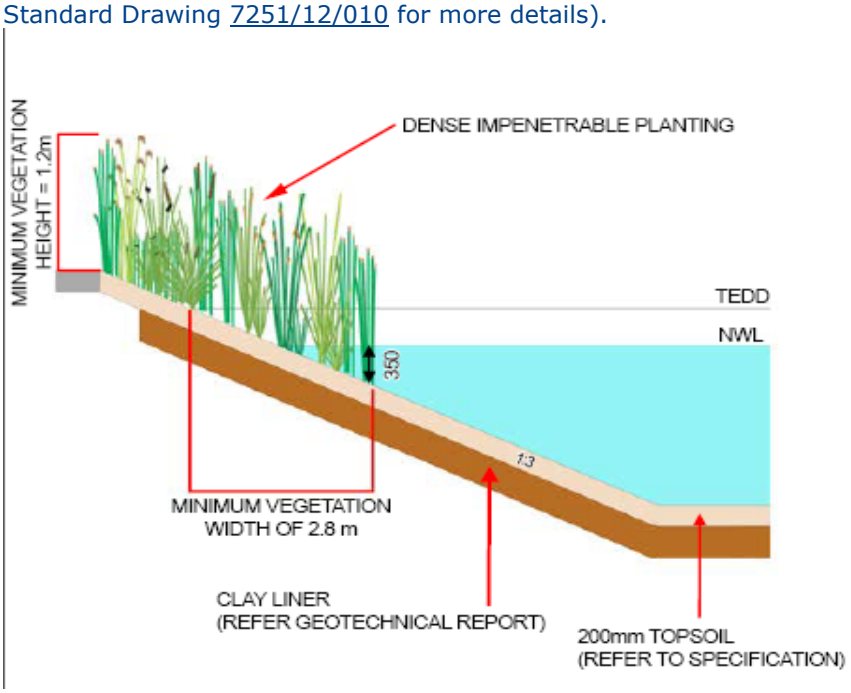


Figure 7 Indicative cross-section of vegetated wetland edge with impenetrable planting.

Figure 8: Photos showing examples of wetland edges with dense impenetrable planting

3.11 Landscape Contractor Selection, Plant Supply, Installation & Maintenance

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 an accredited nursery that grows plants to the specifications outlined within this manual (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 this manual.	**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 this manual.	**Construction**
LC7	Ensure the contractor is undertaking regular weed runs (aquatic, ephemeral and terrestrial) of the site to ensure a weed seed bank doesn't develop.	**Construction**
LC8	Undertake random audits of the accredited 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 this manual.	**Construction**
LC9	Make Melbourne Water aware of any accredited nursey's growing and supplying poor quality stock that doesn't meet the requirements of this manual.	**Construction**
LC10	Make Melbourne Water aware of any landscape contractor not sourcing, installing and maintain planting to the requirements of this manual.	**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 this manual 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.

4. References

Document title
Austroads Design Vehicles and Turning Path Templates Guide
Melbourne Water Building and Works
Melbourne Water Topsoil Specification
MUSIC Auditor Tool
Resetting Sediment Ponds Best Practice Guideline
Standard Drawing 7251/12/001
Standard Drawing 7251/12/005
Standard Drawing 7251/12/006
Standard Drawing 7251/12/012
Standard Drawing 7251/12/013
Standard Drawing 7251/12/015
Standard Drawing 7251/12/035
Standard Drawing 7251/12/4003
Standard Drawings - Stormwater Harvesting
Stormwater Harvesting Guidelines
Stormwater harvesting technical guidelines
Wetland Design Manual Part A1 - Vision Core Outcomes And Aspirational Outcomes
Wetland Design Manual Part A1- Introduction
Wetland Design Manual Part A3 - Design Considerations For Wetlands
Wetland Design Manual Part B - Design Acceptance Process
Wetland Design Manual Part C - Technical Design Construction And Establishment Approach
Wetland Design Manual Part D - Design Tools Resources Glossary
Wetland Design Manual: Supporting Document - Form and Function
Wetland Design Manual: Supporting Document - Planning Funding and Management

5. Appendices

Appendices
Appendix 1: Concept Design Example Drawings

Appendices
Appendix 1: Concept Design Example Drawings
Appendix 2: Functional Design Example Drawings
Appendix 3: Detailed Design Example Drawings

6. Document History

Date	Reviewed/ Actioned By	Version	Action
18/2/2021	Senior Asset Practitioner – Water Quality	6	Template, links and standard drawings updated.

Appendix 1: Concept Design Example Drawings

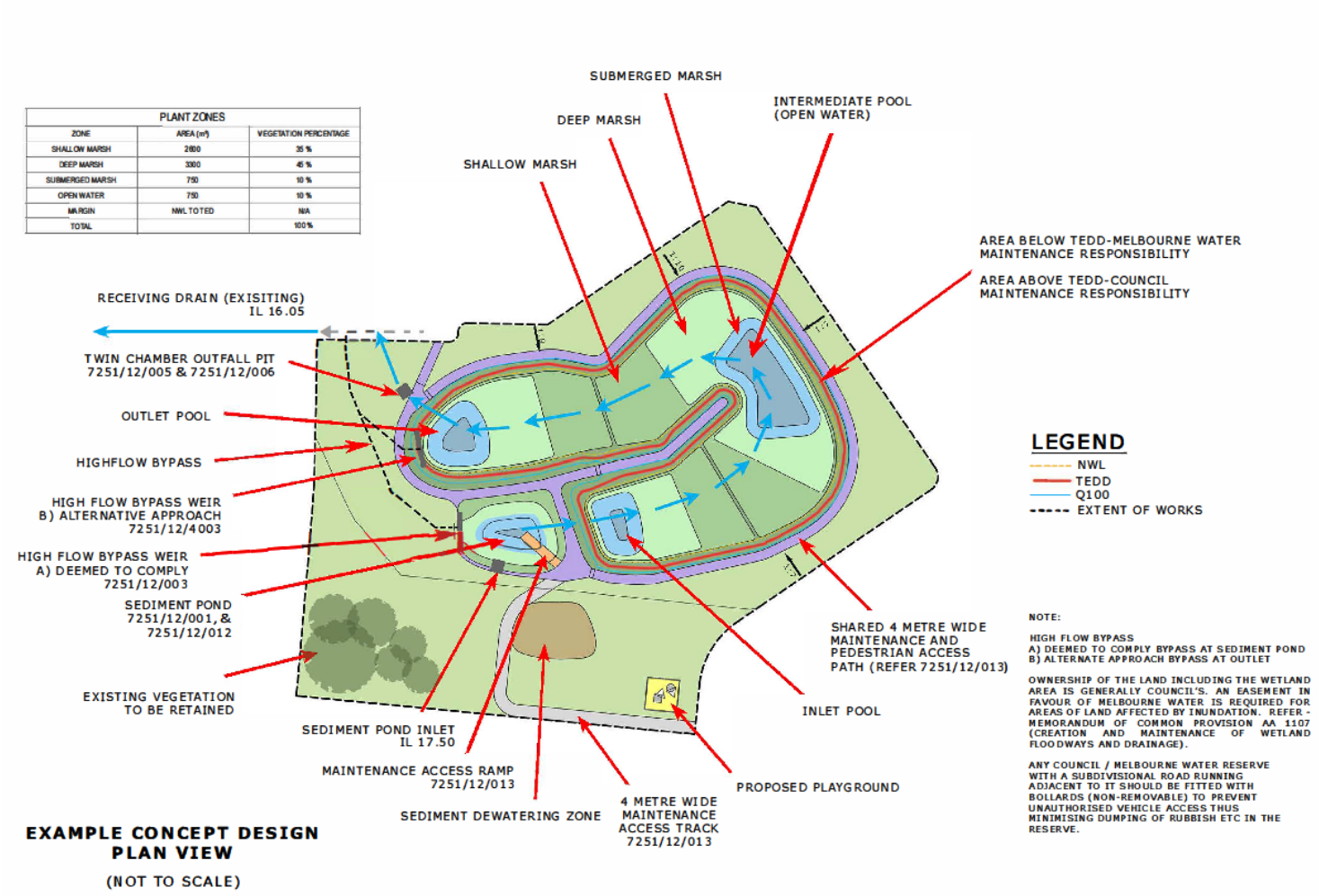


Figure 9: 7251/12/016

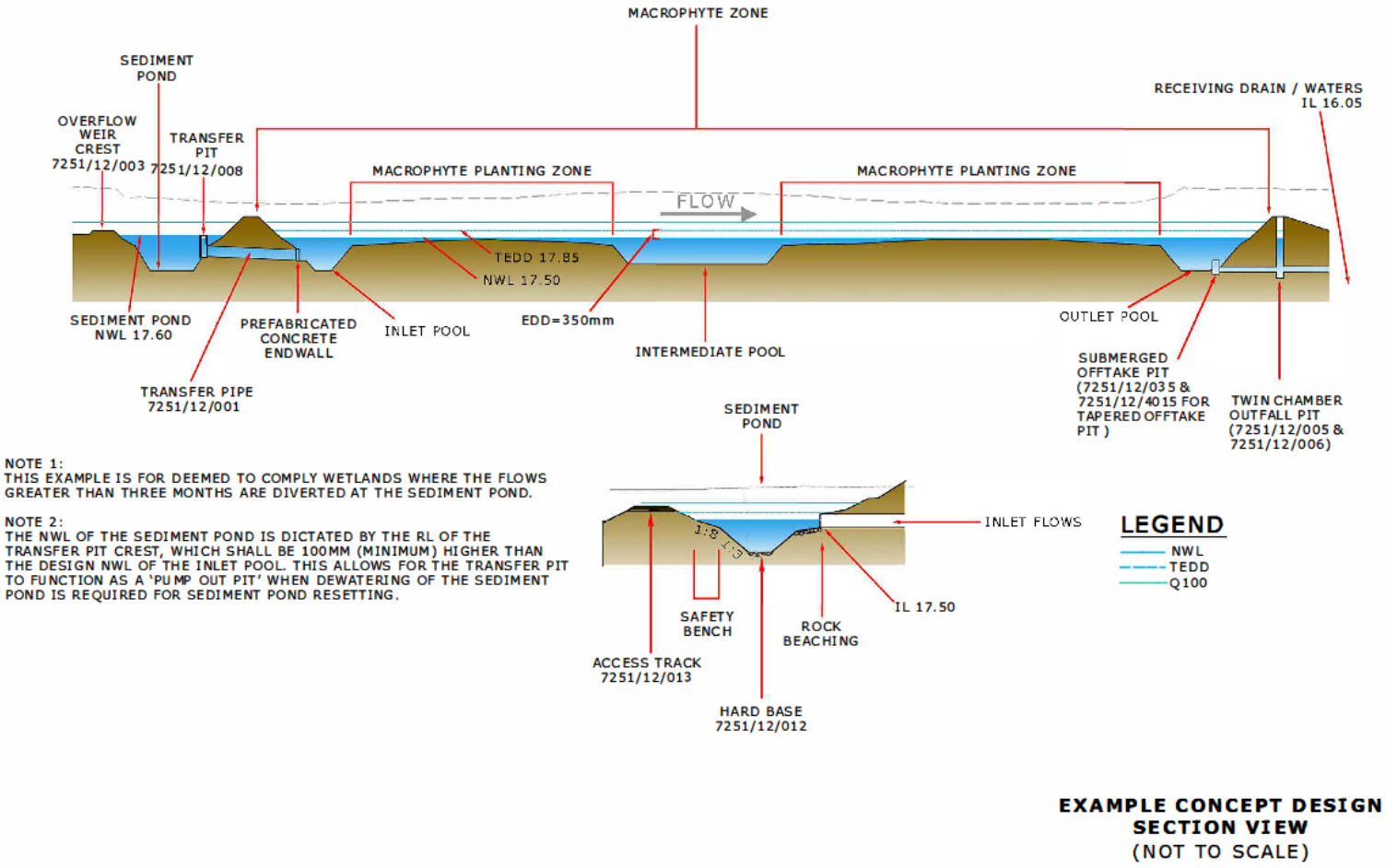


Figure 10: 7251-12-017

Appendix 2: Functional Design Example Drawings

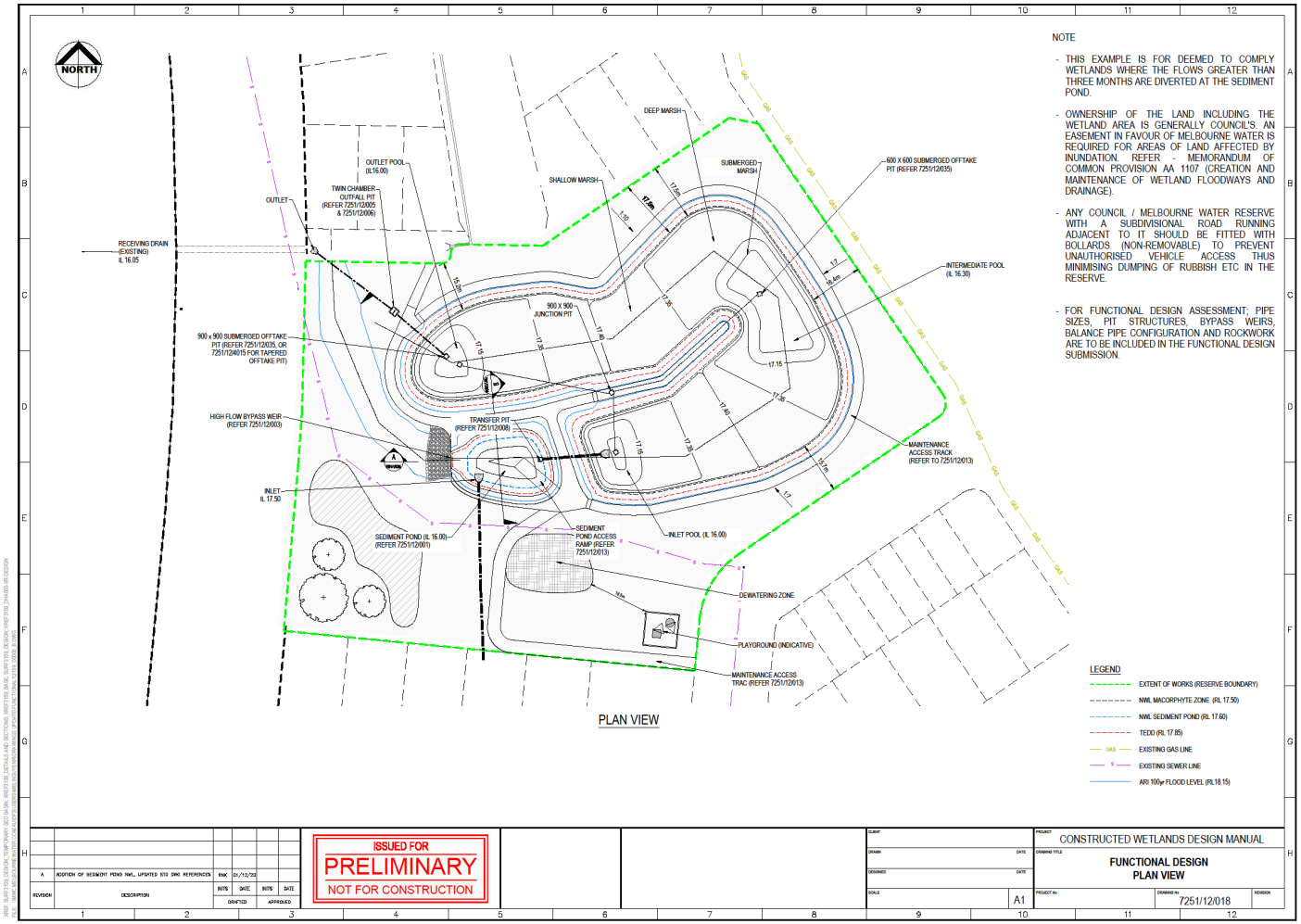


Figure 11: 7251/12/018

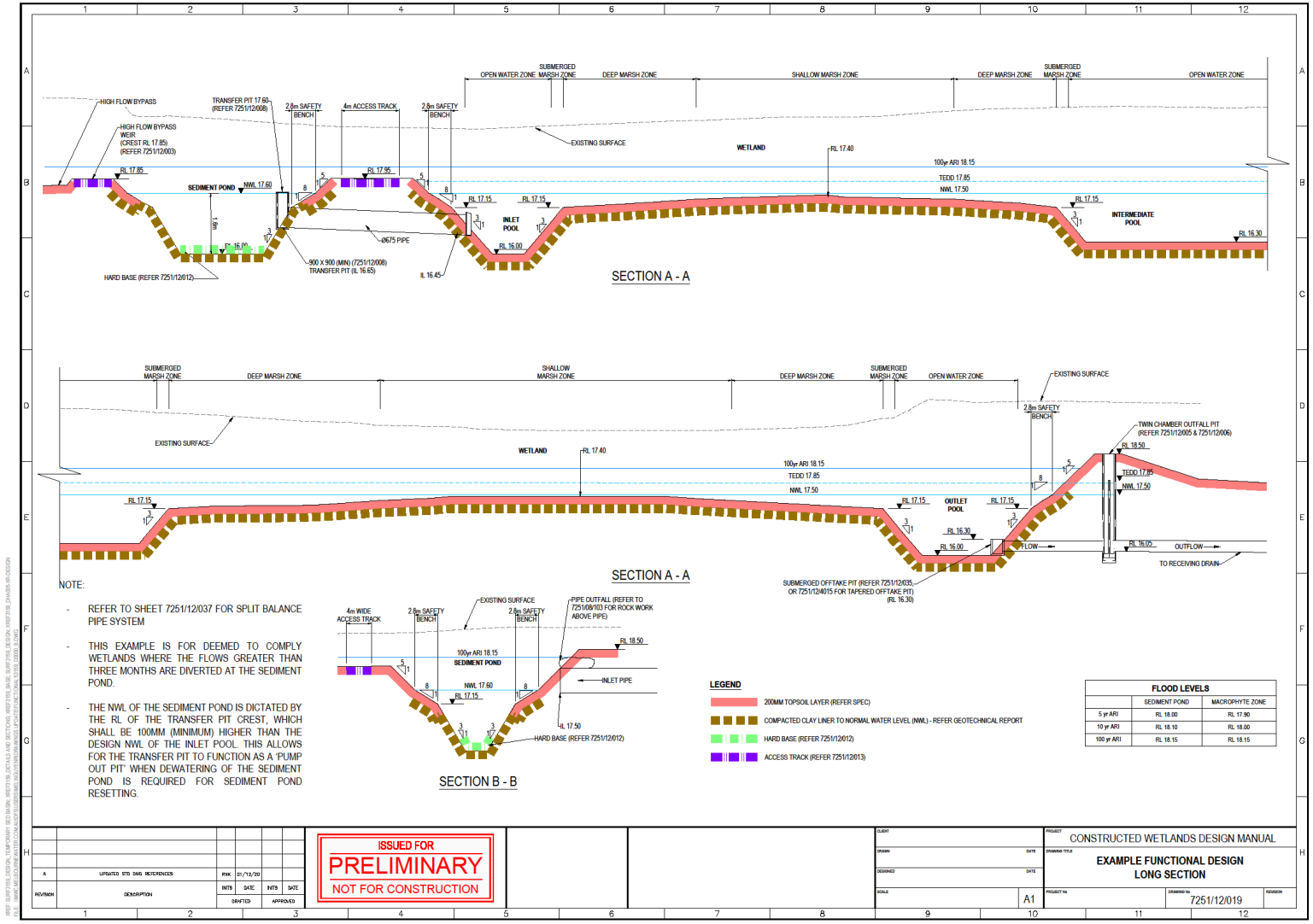


Figure 12: 7251/12/019

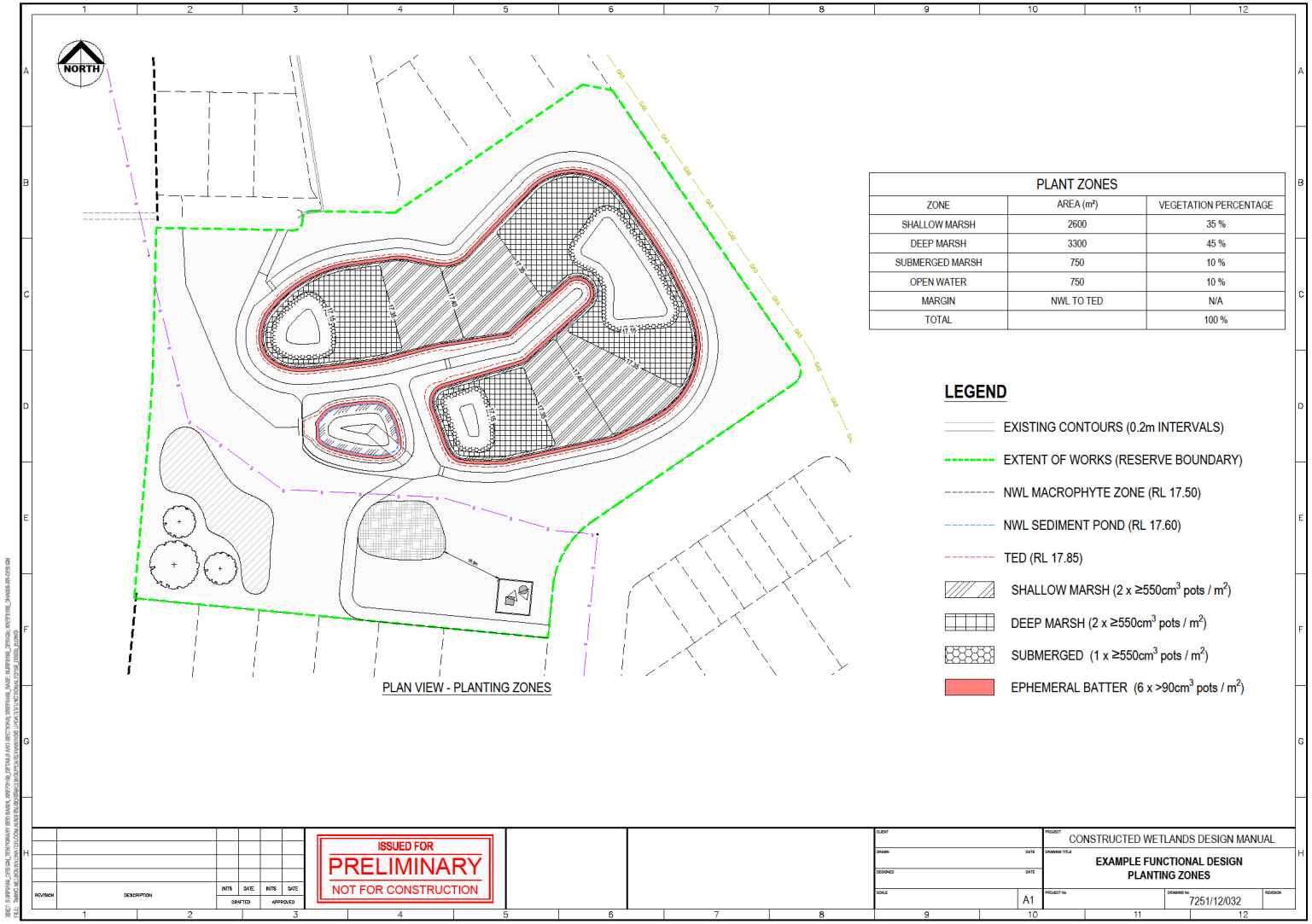
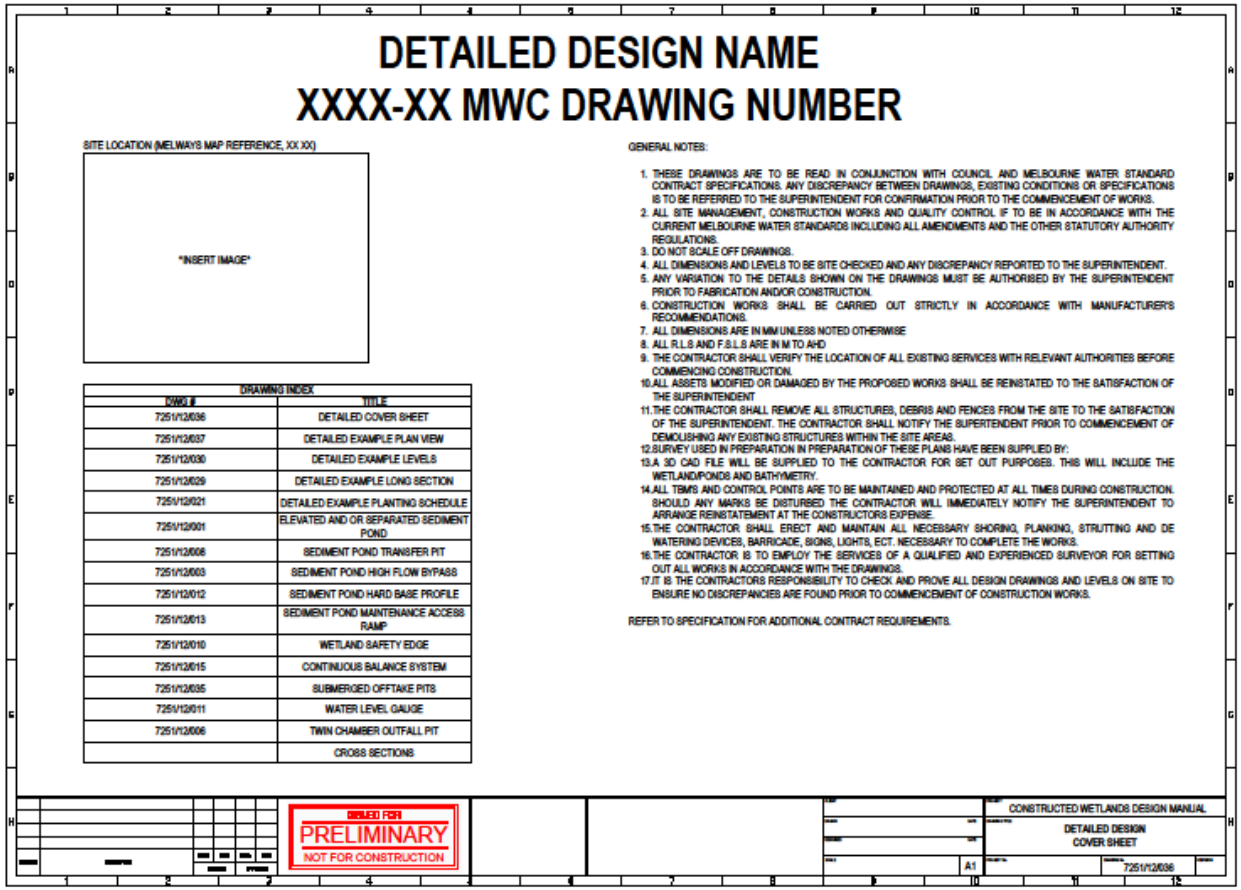


Figure 13: 7251/12/032

Appendix 3: Detailed Design Example Drawings



DETAILED DESIGN NAME

XXXX-XX MWC DRAWING NUMBER

SITE LOCATION (MELWAYS MAP REFERENCE, XX XX)

INSERT IMAGE

DRAWING INDEX	
DWG #	TITLE
7251/12/036	DETAILED COVER SHEET
7251/12/037	DETAILED EXAMPLE PLAN VIEW
7251/12/030	DETAILED EXAMPLE LEVELS
7251/12/029	DETAILED EXAMPLE LONG SECTION
7251/12/021	DETAILED EXAMPLE PLANTING SCHEDULE
7251/12/001	ELEVATED AND OR SEPARATED SEDIMENT POND
7251/12/008	SEDIMENT POND TRANSFER PIT
7251/12/003	SEDIMENT POND HIGH FLOW BYPASS
7251/12/012	SEDIMENT POND HARD BASE PROFILE
7251/12/013	SEDIMENT POND MAINTENANCE ACCESS RAMP
7251/12/010	WETLAND SAFETY EDGE
7251/12/015	CONTINUOUS BALANCE SYSTEM
7251/12/035	SUBMERGED OFFTAKE PITS
7251/12/011	WATER LEVEL GAUGE
7251/12/006	TWIN CHAMBER OUTFALL PIT
	CROSS SECTIONS

GENERAL NOTES:

1. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH COUNCIL AND MELBOURNE WATER STANDARD CONTRACT SPECIFICATIONS. ANY DISCREPANCY BETWEEN DRAWINGS, EXISTING CONDITIONS OR SPECIFICATIONS IS TO BE REFERRED TO THE SUPERINTENDENT FOR CONFIRMATION PRIOR TO THE COMMENCEMENT OF WORKS.
2. ALL SITE MANAGEMENT, CONSTRUCTION WORKS AND QUALITY CONTROL IF TO BE IN ACCORDANCE WITH THE CURRENT MELBOURNE WATER STANDARDS INCLUDING ALL AMENDMENTS AND THE OTHER STATUTORY AUTHORITY REGULATIONS.
3. DO NOT SCALE OFF DRAWINGS.
4. ALL DIMENSIONS AND LEVELS TO BE SITE CHECKED AND ANY DISCREPANCY REPORTED TO THE SUPERINTENDENT.
5. ANY VARIATION TO THE DETAILS SHOWN ON THE DRAWINGS MUST BE AUTHORISED BY THE SUPERINTENDENT PRIOR TO FABRICATION AND/OR CONSTRUCTION.
6. CONSTRUCTION WORKS SHALL BE CARRIED OUT STRICTLY IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
7. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE
8. ALL R.L.S AND F.S.L.S ARE IN M TO AHD
9. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING SERVICES WITH RELEVANT AUTHORITIES BEFORE COMMENCING CONSTRUCTION.
10. ALL ASSETS MODIFIED OR DAMAGED BY THE PROPOSED WORKS SHALL BE REINSTATED TO THE SATISFACTION OF THE SUPERINTENDENT
11. THE CONTRACTOR SHALL REMOVE ALL STRUCTURES, DEBRIS AND FENCES FROM THE SITE TO THE SATISFACTION OF THE SUPERINTENDENT. THE CONTRACTOR SHALL NOTIFY THE SUPERTENDENT PRIOR TO COMMENCEMENT OF DEMOLISHING ANY EXISTING STRUCTURES WITHIN THE SITE AREAS.
12. SURVEY USED IN PREPARATION IN PREPARATION OF THESE PLANS HAVE BEEN SUPPLIED BY:
13. A 3D CAD FILE WILL BE SUPPLIED TO THE CONTRACTOR FOR SET OUT PURPOSES. THIS WILL INCLUDE THE WETLAND/PONDS AND BATHYMETRY.
14. ALL TBM'S AND CONTROL POINTS ARE TO BE MAINTAINED AND PROTECTED AT ALL TIMES DURING CONSTRUCTION. SHOULD ANY MARKS BE DISTURBED THE CONTRACTOR WILL IMMEDIATELY NOTIFY THE SUPERINTENDENT TO ARRANGE REINSTATEMENT AT THE CONSTRUCTORS EXPENSE.
15. THE CONTRACTOR SHALL ERECT AND MAINTAIN ALL NECESSARY SHORING, PLANKING, STRUTTING AND DE WATERING DEVICES, BARRICADE, SIGNS, LIGHTS, ECT. NECESSARY TO COMPLETE THE WORKS.
16. THE CONTRACTOR IS TO EMPLOY THE SERVICES OF A QUALIFIED AND EXPERIENCED SURVEYOR FOR SETTING OUT ALL WORKS IN ACCORDANCE WITH THE DRAWINGS.
17. IT IS THE CONTRACTORS RESPONSIBILITY TO CHECK AND PROVE ALL DESIGN DRAWINGS AND LEVELS ON SITE TO ENSURE NO DISCREPANCIES ARE FOUND PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS.

REFER TO SPECIFICATION FOR ADDITIONAL CONTRACT REQUIREMENTS.

ISSUED FOR PRELIMINARY NOT FOR CONSTRUCTION

CONSTRUCTED WETLANDS DESIGN MANUAL

DETAILED DESIGN COVER SHEET

A1

7251/12/036

Figure 14: 7251/12/036

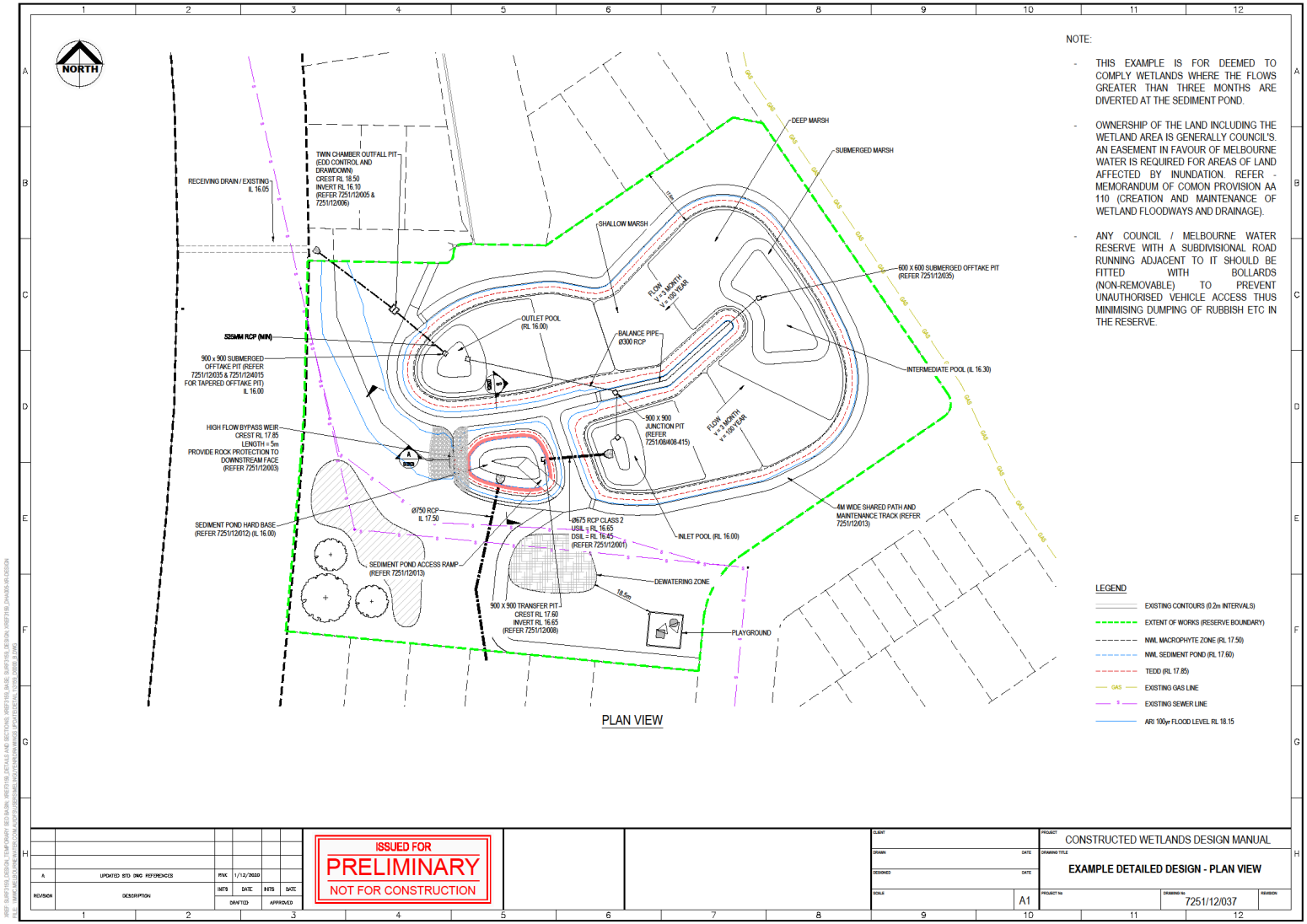


Figure 15: 7251/12/037

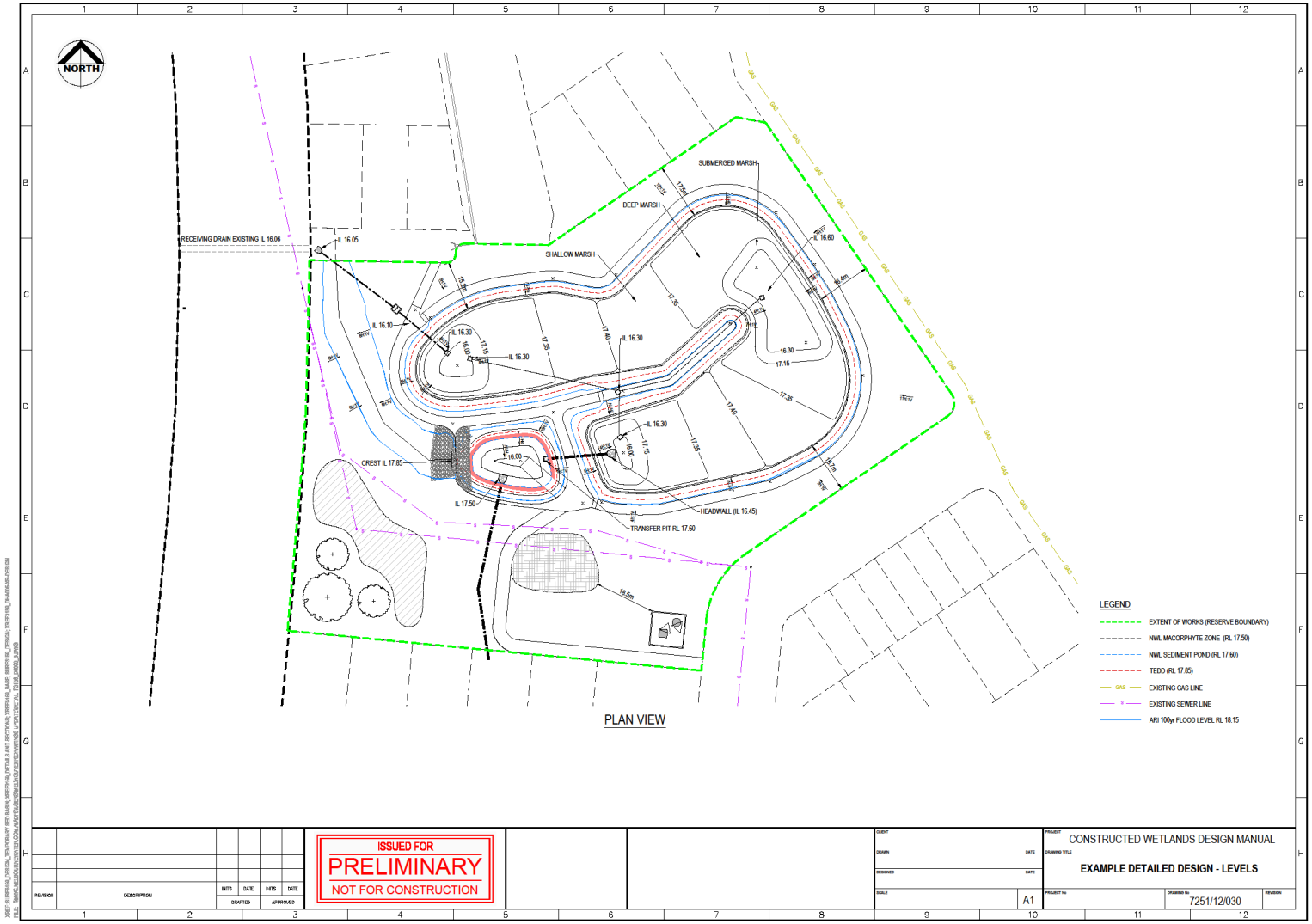


Figure 16: 7251/12/030

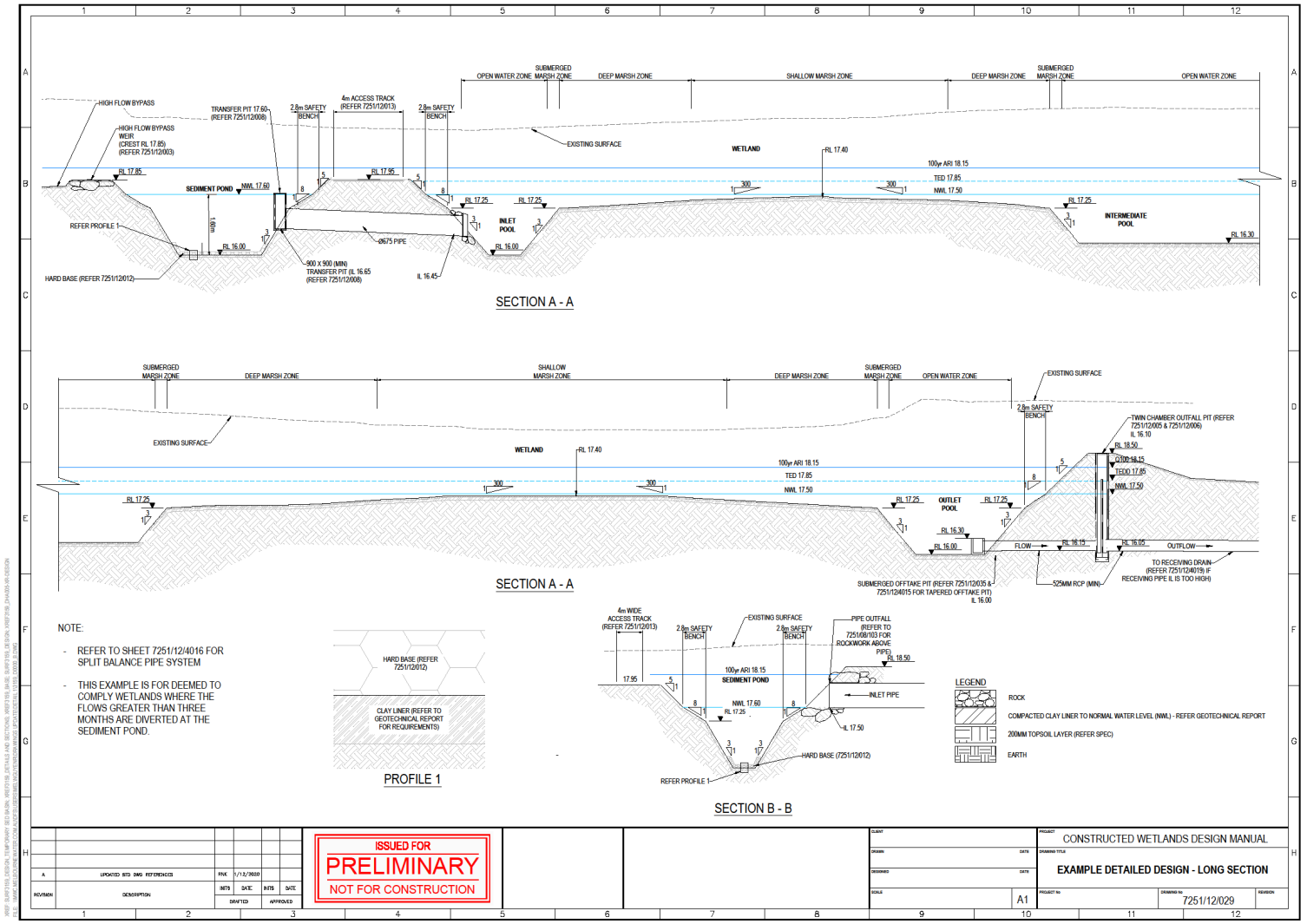


Figure 17: 7251/12/029

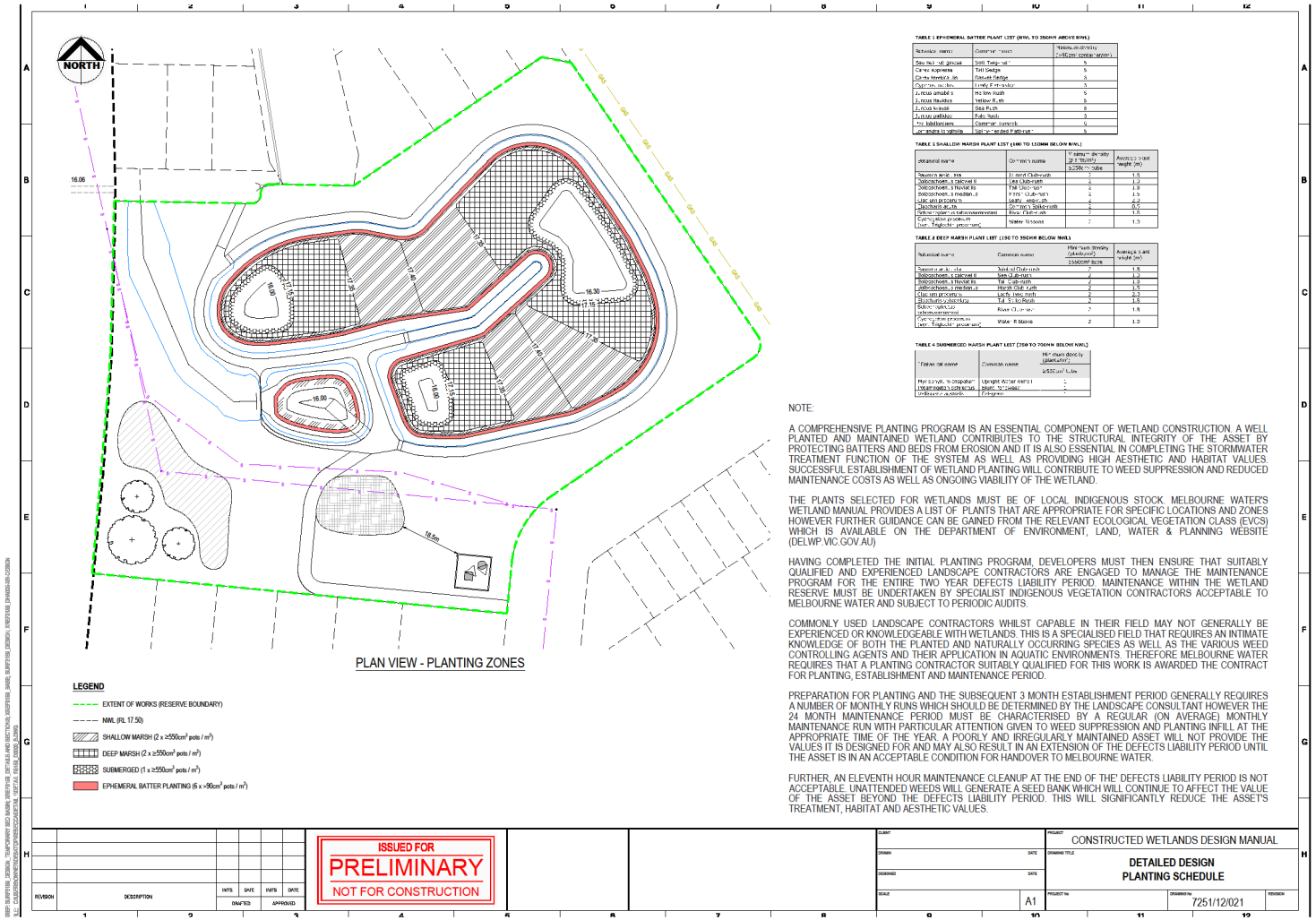


Figure 18: 7251/12/021