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Master Specification

PR-LS-C10 Installation and Maintenance of Water Sensitive Urban Design

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DEPARTMENT FOR INFRASTRUCTURE AND TRANSPORT

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Document Management

Contents

PR-LS-C10 Installation and Maintenance of Water Sensitive Urban Design

1 General

1.1 This Part specifies the requirements for the construction and maintenance of Water Sensitive Urban Design (WSUD) which includes biofiltration systems, swales, detention and retention basins and associated components.

1.2 The type and details of the WSUD treatment shall be in accordance with the Drawings and or Design Report.

1.3 All clauses of this Part apply unless otherwise specified in the Contract Specific Requirements.

1.4 Where a specification differs between the Drawing and the Design Report, the Drawing must take precedence.

1.5 If not specified in the Drawings or Design Report, the clauses in this Part shall be followed. Refer to Appendix 2 “Standard Biofiltration Drawing”.

2 Definitions

2.1 Biofiltration: The capture and removal of pollutants from liquids or gasses using living organisms or their products.

2.2 Bioretention swale: A grassed or landscaped swale promoting infiltration into the underlying medium.

2.3 Detention: Short term storage of runoff. The objective of a detention facility is to regulate the runoff from a given rainfall event and to control discharge rates to reduce the impact on downstream stormwater systems.

2.4 Rain garden: A vegetated landscape that captures, channels, diverts and makes the most of stormwater runoff.

2.5 Retention: Permanent storing of runoff indefinitely. Water is stored until it is lost through percolation, taken in by plants, through evaporation or reuse.

2.6 Runoff: Occurs as a result of rainfall and includes roof runoff (i.e. rainwater) and stormwater.

2.7 Stormwater: Runoff from an area as a result of rainfall which is discharged to drainage infrastructure.

2.8 Swale: Vegetated open channels that capture and treat stormwater runoff by means of filtering and conveyance during regular rainfall events with an average recurrence interval in the range of 3 to 6 months.

3 Extent of Works

3.1 Construction operations shall be confined within the Extent of Works area indicated on the Drawings or in the Design Report. Prior to commencing any onsite operations, the Contractor shall submit a site plan showing the proposed locations of stockpiles and machinery routes. Construction activities shall not be undertaken within the drip zone of trees and/or tree protection zone.

4 Clearing and Grubbing

4.1 The Contractor shall clear and grub the areas shown on the Drawings or in the Design Report. All deleterious material encountered in the excavation or immediately below it (including tree stumps, roots, stones and building debris exceeding 50 mm in diameter), which is unsuitable for respreading, shall be removed and disposed of in accordance with specification Part PC-ENV2 “Environmental Protection Requirements”.

5 Bioretention Systems

5.1 Soil Testing

a) The Contractor shall undertake analysis of the existing soil to determine the appropriateness of its use in media layers. Testing shall be carried out in accordance with AS 4419 “Soils for Landscaping and Garden Use”. The existing soil may be used if the hydraulic conductivity is between 150 and 350 mm/hr. If the hydraulic conductivity is outside this range, the soil shall be replaced with imported soil with hydraulic conductivity in the range of 100 to 300 mm/hr.

b) Provision of the soil test results shall constitute a **Hold Point**.

5.2 Earthworks

a) The base of Bioretention System shall be flat with a minimum longitudinal grade of 0.5 % towards the outlet point.

b) The base of swales shall be flat, and shall be evenly graded towards the outlet point. Battered edges and batter slopes of swales shall have gradients no steeper than 1v:4h.

c) Completion of the earthworks shall constitute a **Hold Point**.

5.3 Media Layers

a) General

i) All media layers shall be clean, washed, graded, be free of debris, weeds, roots or other deleterious material, plant pathogens and other pests. All Media Layers shall comply with AS 4419 “Soils for Landscaping and Garden Use”. Refer to Appendix 2 for typical bioretention system detail with media layers.

b) Filter Media (Top Layer)

i) All soil used as a filter media shall contain less than 5 % of organic matter content, less than 100 mg/kg of Phosphorus, a salt content and a pH within a range for healthy plant growth. The filter media shall be installed to the designed levels, shall be graded flat, and shall be lightly compacted.

c) Transition Media (Middle Layer)

i) The transition media shall be installed to the designed levels, shall be graded flat, and shall be lightly compacted.

d) Drainage Media (Bottom Layer)

i) The drainage media shall be installed to the designed levels, shall be graded flat, and free of fine particles.

5.4 Moisture Control

a) Where Moisture Control is specified in the Drawings or in the Design Report, installation shall be in accordance with the manufacturer’s instructions for protection of road pavements, buildings and other constructions. The moisture barrier shall not be present underneath the planting layout.

b) Completion of the moisture barriers shall constitute a **Hold Point**.

5.5 Temporary Sediment Control

a) A temporary sediment control shall be installed immediately after the construction of the individual WSUD treatment to keep it free from silt and debris until it is fully operational.

5.6 Mulch

a) All mulch material shall slope toward the centre of the Water Sensitive Urban Design system and/or the base of the plants and shall be raked to an even surface flush with the surrounding finished levels. The mulch shall be well washed, free from deleterious material such as soil, weeds, sticks and sawdust. Mulch material shall be laid after planting.

5.7 Drainage

a) The contractor shall construct the drainage system in accordance with the designed levels.

b) Underdrainage Pipework and fittings shall comply with AS 2439 Part 1 “Perforated plastics drainage and effluent pipes and fittings – Perforated drainage pipe and associated fittings”, and shall slope towards the overflow pit at a minimum of 0.5 % longitudinal grade.

c) Outlet pipework and fittings shall comply with AS 1254 “PVC pipes and fittings for storm and surface water applications”.

d) An overflow system shall be installed which is free-draining and be positioned above the receiving waterway.

e) Erosion Control Protection Measures shall be used where there are inlet and outlet structures and in areas that are vulnerable to erosion.

f) Each WSUD treatment area shall have one screw capped 100 mm uPVC pipe extended vertically from the underdrainage pipework to 150 mm above the surface of the treatment as an inspection pit.

g) Completion of the drainage shall constitute a **Hold Point**.

6 Maintenance

6.1 Visual Inspection

a) The Contractor shall undertake visual inspections of the completed WSUD treatments at intervals not longer than 3 months and as soon as practicable following storm events during working hours and not later than the following day. At a minimum inspections must be undertaken at the beginning and end of winter.

b) At a minimum, the visual inspection shall examine sediment build-up, system blockages including vegetative growth, litter and debris, scour, structural integrity, and vandalism. The Contractor shall report on visual inspections using the form in Appendix 1 “Inspection Report”.

6.2 Remedial Action

a) The Contractor shall undertake remedial action to restore the WSUD treatment to its original design intent when any of the following are observed:

i) sediment coverage exceeds 50 % of the treatment area;

ii) sediment depth is within 100 mm of the outlet/ overflow level;

iii) blockages to the inlets, outlets and inspection pits;

iv) vegetation inhibits the designed hydrological function of the system;

v) plant and weed species present that were not included in the design documentation;

vi) litter and debris accumulates to greater than 30 mm depth;

vii) scour and rilling;

viii) vandalism; or

ix) decline in the structural integrity of the treatment.

7 Hold Points

7.1 The following is a summary of Hold Points referenced in this Part:Table PR-LS-CS10 7-1 Hold Points

Ref.	Hold Point	Response Time
5.1	Completion of Soil Testing	5 Working Days
5.2	Completion of Earthworks	1 Working Day
5.4	Installation of Moisture Barriers	1 Working Day
5.7	Installation of Drainage components	1 Working Day

Appendix 1: Inspection Report

PROJECT TITLE:		ROAD NAME:	DATE OF INSPECTION:	
LOCATION:		ROAD No:	INSPECTION BY:	
FILE No.		MM:		

INSPECTION TYPE:
□ Immediately after a storm event during working hours
□ During a storm event within working hours
□ As soon as practicable following storm events outside working hours and not later than the following day
□ Every 3 months

DEFECT	REQUIRED CONDITION	ACTUAL CONDITION	MAINTENANCE REQUIRED (Y/N)	ACTIONS (Description of required maintenance & timeframe)	MAINTENANCE COMPLETED (Y/N)
Sediment Buildup	• Sediment coverage less than 50% of treatment area; and/or • Sediment depth less than 100mm of outlet/ overflow level.				
System Blockages	• No debris, rubbish, vegetation or silt obstructing the movement of water.				
Litter & Debris	• No presence of litter; and/or • Debris less than 30mm depth.				
Scour	No evidence of scour or rilling within treatment system.				
Structural Integrity	All structures and associated operations as per designed specifications.				
Vandalism	No vandalism present.				
Other					

Appendix 2: Typical Biofiltration Drawing