ACT Government

CONSOLIDATION 09E

MUNICIPAL INFRASTRUCTURE TECHNICAL SPECIFICATION

09 - LANDSCAPE

Transport Canberra and City Services

July 2019

Publication Number:	MITS 09E Edition 1 Revision 0	
Date of Effect:	July 2019	
Supersedes:	Standard Specification for Urban Infrastructure Works Section xx Edition 1 Revision 0 September 2002	
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Document Information

Document	Key Information
Document Title	MITS 09E Water Quality Vegetation Establishment
Next review date	
Key words	
AUS-SPEC Base Document	

Revision Register

Edition/ Revision Number	Clause Number	Description of Revision	Authorised By	Date
1/0				

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1 CONSOLIDATION

1.1 General

General: This Specification comprises the conservation and remediation tasks required to establish the vegetated area of a water quality asset post construction, as defined in **Cross references, definitions.**

Requirement: Establish the vegetated areas for the following water quality asset categories:

- Biofiltration systems that include a porous filter media layer below parts of the vegetated area; or
- Wetlands that are either wholly or partially ephemeral; or
- Ponds with a permanent pool of water that is maintained between rainfall events; or
- Vegetated waterways that have been designed and constructed to perform a water quality improvement function alongside their primary stormwater conveyance function. This includes channel naturalisation where water quality specific vegetation has been included in the design.

Exclusions: As noted in the **Hold point table** the vegetated area for establishment must be agreed with the Authorised Person prior to commencement as part of the quality plan. This Specification does not include the parts of the above asset categories outside the vegetated area, including:

- GPT, flow diversion, or other above or below ground structures. Refer to *MIS 08 Stormwater* and *MITS 10 Concrete works*.
- Sediment basins where a permanent pool of water is maintained. Refer *MIS 08 Stormwater*, and *MITS 02 Earthworks*. Note that the establishment of ephemeral sediment forebays is included as part of this specification.
- Landscaped areas of an asset including grass, garden beds, and erosion protection vegetation where it has been previously handed over. Refer to *MITS 09 Landscape*.

1.1.1 Responsibilities

1.1.1.1 Objectives

Requirement: Establish the vegetated area as documented and as follows:

- Consistent with the vegetated area's intended purpose, which is to provide a water quality benefit via a variety of biological and chemical processes including the uptake of nutrients.
- Resistant to expected impacts (e.g. drought, sediment, erosion, weeds) during operation without irrigation.
- In conformance with the design species cover, weed species cover, and level tolerances specified.

1.1.1.2 Precedence

Where any document except legislation or the Territory Plan includes technical requirements that conflict with this Specification the requirements of this Specification take precedence.

1.1.2 Cross references

General: The following documents are related to this Specification:

1.1.2.1 Legislation

Road Transport (General) Act

Road Transport (Safety and Traffic Management) Act

Road Transport (Mass, Dimensions and Loading) Act

Road Transport (Safety and Traffic Management) Regulation

Planning and Development Act

Territory Plan and related Codes

Public Roads Act

Scaffolding and Lifts Act

Scaffolding and Lifts Regulation

Work Health and Safety Act

1.1.2.2 Specifications

Requirement: Conform to the following:

MITS 00	Preliminaries
MITS 09	Landscape
MITS 16	Bioretention

1.1.2.3 Design Standards

General: The following Design Standard is related to this Specification:

MIS 08	Stormwater

1.1.2.4 TCCS Reference Documents

General: The following TCCS reference documents are related to this Specification:

Reference document 4	Protection of public landscape assets
Reference document 7	Operational acceptance submissions
Reference document 8	Works as executed quality records
Reference document 9	Final acceptance submissions
Reference document 10	Landscape consolidation
Reference document 11	Drafting Standard for Civil and Landscape works

1.1.2.5 Other publications

Proprietary products: To *TCCS Products previously considered for use list*

1.1.3 Interpretation

1.1.3.1 Abbreviations

General: For the purposes of this Specification the following abbreviations apply:

AEP: Annual Exceedance Probability

GPT: Gross Pollutant Trap

ITP: Inspection and Test plan

MIS: Municipal Infrastructure Standard

MITS: Municipal Infrastructure Technical Specification

TCCS: Transport Canberra and City Services

WAE: Works As Executed

1.1.3.2 Definitions

General: For the purposes of this Specification the definitions given below apply:

Vegetated area: The planted region of a water quality asset designated to perform a water quality function, rather than a landscaping or aesthetic function. This water quality function occurs via a variety of biological and chemical processes including the uptake of nutrients. Design species in this area are expected to perform a water quality treatment function for their design life.

Quadrat: A small standard unit of area, the sampling of which is used for assessing the local distribution of plants or animals.

Cover: The percentage area occupied by a plant species.

Foliar Cover: One method of approximating plant cover area as a vertical projection of exposed leaf area. The cover would be equivalent to the shadow cast if the sun was directly overhead.

Establishment: The process following construction of a vegetated area during which the targets set in **Responsibilities, Objectives** are achieved (i.e. to provide a water quality benefit; become resistant to the typical impacts of operation; and conform to plant coverage and level requirements). Following the correct conclusion of this phase, the vegetated area of the water quality asset transitions to a period of ongoing and less-intensive maintenance for its continuing operation.

1.1.4 Submissions

1.1.4.1 General

Conform to **Hold points and witness points**.

Checklists: Prepare and submit checklists as a record of undertakings.

Reference: Refer to **Annexure A, Establishment Inspection Checklist** and **Establishment Completion Checklist**.

1.1.4.2 Photographs

Photographs: Prepare and submit checklists with photographs to evidence undertakings.

1.1.4.3 Tests

Lot size vegetated area: Determined by 10m² quadrat selective sampling of locations in the vegetated area found to have the lowest design species foliar cover (i.e. 'worst case') based on visual inspection.

Lot size weed sampling: Determined by 10m² quadrat selective sampling of locations in the vegetated area found to have the highest weed foliar cover (i.e. 'worst case') based on visual inspection.

Sample number: A minimum of 1 quadrat per 250m² vegetated area, rounded up, must be assessed during completion testing. A minimum of 1 quadrat per 1,000m² vegetated area, rounded up, must be assessed during inspection testing.

Sample reuse: Quadrats selected for design vegetation sampling may be reused for weed sampling only where they meet the testing requirements for both purposes.

Plant count: During the initial 'plant numbers' phase (refer to **Plant replacement**) of progress payments the count of plant numbers may be approximated by ratio of an sub-area and density considered indicative of the entire area.

Minimum inspection frequency: Must be inspected not less than once per month. Frequency may be increased by the developer based on their risk assessment regarding plant loss due to site conditions such as hot and dry weather.

1.1.5 Hold points and witness points

1.1.5.1 Notice

General: Give notice so that the documented inspection and submissions may be made to the **Hold point table**, and the **Witness point table.**

Table 9E-1 Hold point table

Item	Clause title	Requirement	Notice for inspection	Release by
Execution				
9E.1	Completion - Checklist	Submit completion checklist and associated evidence along with approval of the relevant authorities.	7 days before planned completion	Authorised Person

Table 9E-2 Witness point table

Item	Clause title	Requirement	Notice for inspection
Execution			
9E.1	Inspection - Checklist	Submit checklist and associated evidence.	Within 7 days of inspection

1.2 Materials

1.2.1 Chemicals

Exclusion: herbicides, insecticides, and synthetic fertilisers are not permitted to be used within the vegetated area as part of establishment.

Approval: Approval must be received from the the Authorised Person prior to using any chemical within the vegetated area as part of establishment.

1.2.2 Mulch

Exclusion: Organic mulch is not permitted to be used within the vegetated area as part of establishment.

1.3 Execution

1.3.1 Site establishment

1.3.1.1 Survey

Requirement: Confirm site surface and benchmarks. Conform to MITS 00.

1.3.1.2 Existing conditions

Requirement: Prior to commencement, soil testing for chemical characteristics (i.e. Standard Agricultural suite of tests: pH, EC, nitrogen, phosphorus, manganese, boron at a minimum) and weed seeds and a weed survey of the site should be undertaken. Soil scientist to collect and analyse.

Qualification: Any soil sampling and analyses should be undertaken by a sufficiently qualified person (e.g. a soil scientist), in order that information from these undertakings can be properly applied.

1.3.2 Provision for traffic

Requirement: Conform to *MITS 01 Traffic Management*.

1.3.3 Plant coverage & replacement

1.3.3.1 Requirements

General: Excavation of dead plants and disposal of materials followed by replanting with acceptable species and density. Return to the site during establishment period for watering, weeding, and replanting if necessary.

Species selection: Acceptable species and density from Works as Executed (WAE) drawings. Another design species and/or density may be used with agreement from the Authorised Person where it meets the establishment objectives as defined in **Responsibilities, Objectives**.

Target – Year 1: Design species plant numbers must be maintained at or above 100% of the design number from the beginning to the end of year 1. Refer to the **Progress measurement method figure**

Target – Year 2: Design species must be established for the entire vegetated area i.e. the target is 100% design species coverage of the designated area. Conformance to this target will be determined by the total foliar cover of design species exceeding 40 percent at the beginning of year 2 and 80 percent at the end of year 2 for all 'worst case' samples taken in the vegetated area. Coverage for every 1m² 'worst case' sample must be determined by visual assessment, documented and recorded by photograph. Refer to **Testing requirements** for more detail on coverage testing. Refer to the **Progress measurement method figure.**

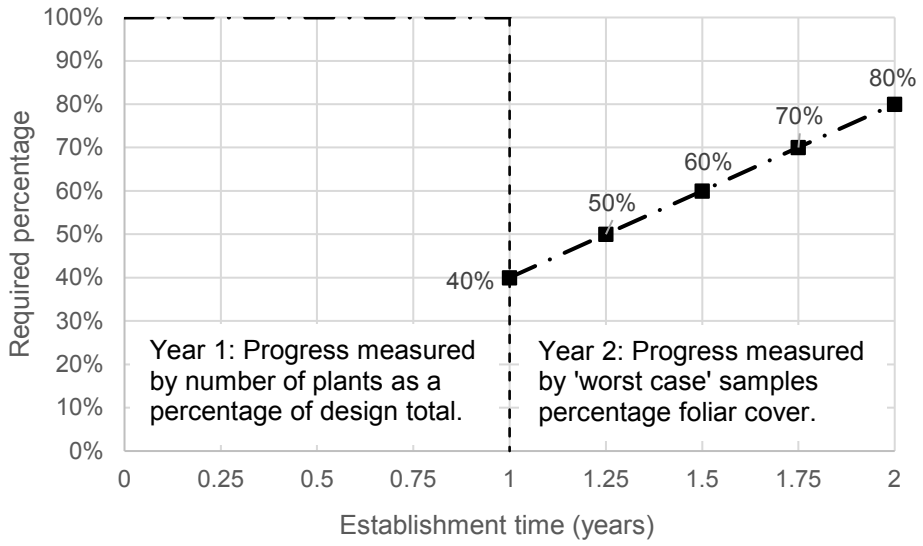

Figure 9E-1: Progress measurement method

Pond and wetlands: The water level should be adjusted during replanting as necessary to enable the survival and growth of new aquatic plants. The impact on existing aquatic plants should be minimised. This impact mitigation should be considered a higher priority than new plant growth in order to effectively establish the broadest area possible, particularly during early growth phases.

Biofilter: Filter layers must not be compromised by the plant replacement process. In the event of damage to the filter, remediation of the material must be undertaken in accordance with **Erosion repair**.

1.3.4 Erosion repair

General: In the event of any damage to the vegetated area surface or plant replacement the topsoil and substrate must be returned to its condition at the commencement of the establishment period. This includes using material with the same attributes, surface elevations, compaction and any other conditions set in design documentation and confirmed in the WAE drawings.

Waterways: Repairs of damaged vegetated area surfaces from storms shall be limited to events up to the 20% AEP event as a result of the asset's inability to have stormwater inflows diverted.

1.3.5 Irrigation

General: The irrigation regime must consider at a minimum: plant species, availability of water to plants, immediate plant health, suitable plant growth, and preparedness for stormwater only irrigation post establishment. A default irrigation regime has not been provided here due to the potentially substantial variation in plant species and conditions.

Phasing: Irrigation from the stormwater system may be phased in where the risks of weed invasion and erosion have been considered and risk mitigation measures enacted. These must be supplemented with irrigation flows to ensure that target species have sufficient access to water during the establishment period.

Non-drinking water: Where the above risks have been appropriately dealt with, the use of non-drinking water is to be maximised where possible.

Pond and wetlands: A water level regime must be provided as part of the quality plan in order to manage changes in water level and optimise plant growth.

1.3.6 Weed removal

General: Remove all parts of weeds and unwanted plants by hand intact with root system and dispose by a method approved by the Authorised Person. This method must consider reducing the probability and cover of weeds in the future.

Target: The total foliar cover of weeds must not exceed 10% in any part of the vegetated area. Weed coverage for every 1m² sample must be less than 1,000cm² (approximately equivalent to one 31x31cm weed) as determined by visual assessment and recorded by photograph.

Exclusion: Chemical weed control methods are not permitted.

Native vegetation: Avoid disturbance to desirable native vegetation.

Pond and wetlands: The decision of whether to undertake hand weeding via partial draining or via boat should be made with consideration to factors including: water level impact on design plant species, the impact of ground disturbance, and the cost of works.

1.3.7 Sediment removal

General: Dry sediment forebays must be cleared of sediment and gross pollutants if present. Collected materials must be disposed of at a licensed landfill.

Biofilter: Remove accumulated sediment from the ground surface using hand tools without removing filter material. Otherwise, scarify the surface between plants where sediment has built up. Particular attention should be given to the area around any inlets to the biofilter.

1.3.8 Litter removal

General: The vegetated area must be free of litter during the establishment period.

Target: Less than one item of litter shall be present per 100m² of vegetated area.

1.4 Completion

1.4.1 Submissions

Work as Executed Records: To *MITS 00B Quality Requirements*.

Biofilter: Confirm site surface is within a 20mm tolerance of design levels. Conform to *MITS 00A General requirements*.

Checklist: Include completion survey with completion checklist. Refer to **Annexure A, Establishment Completion Checklist.**

2 MEASUREMENT AND PAYMENT

2.1 Measurement

2.1.1.1 General

Payments made to the Bill of Quantities: To *MITS 00A General requirements*, this Specification, the drawings and **Pay items**.

2.1.1.2 Methodology

Allow for all work, materials, testing and quality assurance requirements in each Pay Item.

Progress payment: Payments may be withheld by 25% for each 1% of plant numbers below the design number in year 1, or for each sample below the coverage threshold in year 2.

Plant threshold: The plant number and coverage threshold is shown diagrammatically in **Progress measurement method figure.**

Reference: Refer to **Testing requirements** for detail on how to measure.

2.2 Pay items

Table 9E-3 Pay items table

Item No	Pay items	Unit of measurement	Schedule of rates scope
9E.1	Established vegetated area – Progress payment Year 1	number of plants within the vegetation area	All activities associated with establishment works as listed in this specification including plant replacement, irrigation, weed removal, sediment removal, all reuse or disposal of materials.
9E.2	Established vegetated area – Progress payment Year 2	m^2 of established vegetation area	All activities associated with establishment works as listed in this specification including plant replacement, irrigation, weed removal, sediment removal, all reuse or disposal of materials.
9E.3	Established vegetated area – Completion payment	m^2 of established vegetation area	All activities associated with works prior to execution including planning, inspection and completion works to ensure the intent of establishment is achieved.

ANNEXURE A

Establishment inspection checklist

Table 9E-4 Establishment Inspection Checklist

Establishment Inspection Checklist		
Site name:	**Inspector name:**	**Date:**

No.	Check item	Result
1	Forebays free of sediment and gross pollutants? Confirm that dry forebays contain no sediment or litter.	☐ Yes ☐ No
2	Area largely free of litter? Confirm less than one litter item of any size per 100m².	☐ Yes ☐ No
3	Plants provided with sufficient water? Confirm that irrigation regime has been followed and is meeting goals of design species growth. **Year 1:** Percentage of design species plant numbers present? **Year 2:** Number of 10m² quadrats sampled? Average design species foliar cover? Include quadrat measurements and photographs with checklist.	☐ Yes ☐ No Year 1: ..... % Year 2: ..... %
4	Weeds removed? Confirm that weeding regime has been followed and is meeting goals of inhibiting weed colonisation. Number of 10m² quadrats sampled? Average weed cover? Include quadrat measurements and photographs with checklist.	☐ Yes ☐ No ..... No. ..... %
	Pond / wetland only	
5	Water level reduced as appropriate for weeding and planting? Provide water depth following reduction.	☐ Yes ☐ No m
6	Water level reset as appropriate for current asset growth phase? Provide water depth following reset.	☐ Yes ☐ No ..... m
	Biofilter only	
7	Sediment removed or surface scarified? Confirm that sediment has been removed from the biofilter surface where possible or scarified where not. Provide approximate area requiring treatment.	☐ Yes ☐ No ..... m²

Establishment completion checklist

Table 9E-5 Establishment Completion Checklist

Establishment Inspection Checklist		
Site name:	**Inspector name:**	**Date:**

No.	Check item	Result
1	Forebays free of sediment and gross pollutants? Confirm that dry forebays contain no sediment or litter.	☐ Yes ☐ No
2	Area largely free of litter? Confirm less than one litter item of any size per 100m².	☐ Yes ☐ No
3	Plants provided with sufficient water? Confirm that continued non-stormwater irrigation is not required for ongoing operation.	☐ Yes ☐ No
	Number of quadrats sampled?	..... No.
	Average design species foliar cover? Include quadrat measurements and photographs with checklist.	..... %
4	Weeds removed? Confirm that weeding regime has been followed and is meeting goals of inhibiting weed colonisation.	☐ Yes ☐ No
	Number of quadrats sampled?	..... No.
	Average weed foliar cover? Include quadrat measurements and photographs with checklist.	..... %
5	Survey levels maintained? Confirm that survey shows that ground surfaces have not changed by more than the 20mm tolerance since commencement. Include survey with checklist.	☐ Yes ☐ No
	Pond / wetland only	
6	Water level set as appropriate for ongoing operation	☐ Yes ☐ No
	Provide water depth set for completion	..... m
	Biofilter only	
7	Sediment removed or surface scarified? Confirm that sediment has been removed from the biofilter surface where possible or scarified where not.	☐ Yes ☐ No

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