

SUPERSEDED

**Technical Specification**

**Transport and Main Roads Specifications  
MRTS16 General Requirements Landscape and  
Revegetation Works**

**April 2012**

SUPERSEDED

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# 1 Introduction

## 1.1 Specifications suite

This technical specification applies to the general requirements of landscape and revegetation works for road construction and associated works. It provides the general requirements to the five technical specifications that are known collectively as the Landscape and Revegetation Works technical specifications suite.

The relevant Landscape and Revegetation Works technical specifications and other associated technical specifications have been cross-referenced to the typical landscape and revegetation activities listed in Table 1.2. This technical specification shall be read in conjunction with the listed technical specifications.

The technical specification suite shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other specifications as appropriate.

This technical specification forms part of the Transport and Main Roads Specifications Manual.

## 1.2 Reference documents

The Landscape and Revegetation User Guidelines published by the department provides guidance for many aspects of landscape and revegetation. The user guidelines are provided as a guide only. The Contractor is responsible for achieving the outcomes stated in the technical specification.

**Table 1.2 – Landscape Revegetation Activities and Relevant Standards**

Landscape and Revegetation Activities	Standards, Annexures and Appendices	Associated Standards
<ul style="list-style-type: none"> <li>General material and sample compliance</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16 General Requirements</li> <li>MRTS16 General Requirements – Appendix</li> </ul>	
<ul style="list-style-type: none"> <li>Vegetation protection</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16A Vegetation Protection Works</li> <li>MRTS16A.1 Vegetation Protection Works - Annexure</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16 General Requirements</li> <li>MRTS51 Environmental Management</li> </ul>
<ul style="list-style-type: none"> <li>Planting media management</li> <li>Ground preparation</li> <li>Mulching</li> <li>Environmental matting</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16B Vegetation Ground Works</li> <li>MRTS16B.1 Vegetation Ground Works - Annexure</li> <li>MRTS16B Vegetation Ground Works – Appendix</li> </ul>	<ul style="list-style-type: none"> <li>MRTS04 General Earthworks</li> <li>MRTS16 General Requirements</li> <li>MRTS16C Vegetation Works</li> <li>MRTS27 Geotextiles (Separation and Filtration)</li> <li>MRTS51 Environmental Management</li> </ul>
<ul style="list-style-type: none"> <li>Seeding</li> <li>Turfing</li> <li>Planting of container stock</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16C Vegetation Works</li> <li>MRTS16C.1 Vegetation Works – Annexure</li> </ul>	<ul style="list-style-type: none"> <li>MRTS03 Drainage, Retaining Structures and Protective Treatments</li> <li>MRTS16 General Requirements</li> <li>MRTS16E Establishing and Monitoring</li> </ul>

Landscape and Revegetation Activities	Standards, Annexures and Appendices	Associated Standards
		<ul style="list-style-type: none"> <li>MRTS21 Bitumen Emulsion</li> <li>MRTS51 Environmental Management</li> </ul>
<ul style="list-style-type: none"> <li>Planting bed edging</li> <li>Irrigation system installation</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16D Hardscape Works</li> <li>MRTS16D.1 Hardscape Works - Annexure</li> </ul>	<ul style="list-style-type: none"> <li>MRTS03 Drainage, Retaining Structures and Protective Treatments</li> <li>MRTS16 General Requirements</li> <li>MRTS95 Switchboards and Cables</li> </ul>
<ul style="list-style-type: none"> <li>Pest and diseases control</li> <li>Slashing and brushcutting</li> <li>Establishment of landscape and revegetation works</li> <li>Monitoring of landscape and revegetation works</li> </ul>	<ul style="list-style-type: none"> <li>MRTS16E Establishment and Monitoring Works</li> <li>MRTS16E.1 Establishment and Monitoring Works - Annexure</li> <li>MRTS16E Establishment and Monitoring Works – Appendix</li> </ul>	<ul style="list-style-type: none"> <li>MRTS04 General Earthworks</li> <li>MRTS16 General Requirements</li> <li>MRTS16C Vegetation Works</li> <li>MRTS51 Environmental Management</li> </ul>

## 2 Definition of terms

Landscape and revegetation works related terms and abbreviations used in this specification are defined in Table 2. General terms are defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Guidance on generic landscape and revegetation terms is contained in the department's *Landscape and Revegetation Works User Guideline*.

**Table 2 – Definition of terms**

Term	Definition
advanced plants	Plant stock shown on the drawings as being 25 litre or larger container stock.
broadacre	The area beyond the toe or top of an embankment or cutting.
clear zone	The area that commences at the edge of the traffic lane and is available for emergency use by errant vehicles; the distance that the clear zone extends from the carriage edge is dependent on many factors. Refer to the safety chapter in the <i>Road Landscape Manual</i> published by the department.
complying/non-complying soils	Complying soils satisfy the requirements of MRTS16B <i>Vegetation Ground Works</i> . Non-complying soils do not satisfy these requirements.
Contained areas	Kerbed median, roundabout areas and areas bordered by garden edging.
declared plant	Plants listed under three different classes that reflect the level of control required by law – refer to the <i>Land Protection (Pest and Stock Route Management) Act 2002</i> and the <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i> for requirements.
EMP-C	Environmental Management Plan – Construction which is required to be submitted as part of the Contract Plan. Under this Standard the EMP-C contains the PMMP-C and VPP-C.
environmental weeds	A plant that invades native plant communities, farmland and urban areas. Refer to the Department of Environment and Resource Management and relevant local councils.
FC	Field capacity. The percentage of water remaining in a soil after the soil has

Term	Definition
	been saturated and allowed to freely drain until flow has practically ceased.
Hydromulching	The collective term for various hydraulically applied materials.
hydroseeding	A single-pass operation consisting of the hydraulic application of seed, carrier, and fertiliser in a slurry of water followed by the application of a straw mulch layer.
monitoring	The term monitoring in reference to landscape and revegetation works is intended to describe the maintenance and care of installed landscape items under a Contract.
non-frangible plant species	Plants that have, or the potential to have, trunks greater than 100 mm diameter at maturity, measured 300 mm from ground level, are considered non-frangible; subsequently plants that do not exceed 100 mm in trunk diameter at any stage are considered frangible.
plant spread	The maximum horizontal diameter of a plant's foliage.
planting media	Ameliorated site soil (topsoil or subsoil) or imported soil that complies with MRTS16B <i>Vegetation Ground Works</i> .
planting media lot	A complying source of imported planting media or a volume of site stripped soil that has been ameliorated.
PMMP-C	Planting Media Management Plan – Construction. A soil management plan that identifies deficiencies in site topsoil, subsoil and imported topsoil to ensure vegetation can be established. As a requirement of this Standard, the PMMP forms a part of the EMP-C. The EMP-C is required to be submitted as part of the Contract Plan.
propagule	The reproductive part of plants including seeds, stolons, corms, bulbs and stems.
reclaimable / non reclaimable soils	A reclaimable soil is one with the potential for use as planting media after amelioration. A non-reclaimable soil is one that cannot feasibly be ameliorated. This may be due to the nature of the soil's properties, the cost and/or the constructability to ameliorate the soil.
representative soil sample	A representative soil sample is a sample that is representative of a single soil type and a single soil layer.
seed germination test	A test that shows the percentages of normal, dormant and dead seeds in a sample of seeds.
seed purity test	A test that shows the percentages of pure seed, inert matter and other crop and weed seed in a sample of seeds.
sight visibility zone	An area calculated to provide the driver with adequate time to observe the road layout, and react and stop if necessary, before entering the conflict zone. Refer to the safety chapter in the <i>Road Landscape Manual</i> published by the department.
soil – topsoil, subsoil	<ul style="list-style-type: none"> <li>• Soil refers to the solum, that is the upper part of the soil profile above parent rock</li> <li>• topsoil refers to surface soils that typically contain organic material, and</li> <li>• subsoil refers to – <ul style="list-style-type: none"> <li>• the soil beneath the topsoil layer</li> <li>• the outer embankment material, and</li> <li>• the exposed soil in areas that have been stripped of topsoil beyond embankments.</li> </ul> </li> </ul>

Term	Definition
soil layer	<p>Soil layers are defined as:</p> <ul style="list-style-type: none"> <li>• surface layer – the layer that extends down from the land surface and generally darkened (compared to any underlying layers) due to the accumulation of organic matter</li> <li>• subsurface layer – occurs below the surface layer and is very similar to the surface layer in texture and structure but is usually paler in colour (due to much less organic matter), and</li> <li>• subsoil – any layer below the sub-surface layer (or surface layer if there is no subsurface layer) which has much higher clay content, brighter colours or markedly different structure.</li> </ul>
stripped site soil	Non-ameliorated site soil (either topsoil or subsoil), referred elsewhere throughout the specifications as 'stripped site topsoil'.
suitable / unsuitable soil	A suitable soil (topsoil or subsoil) is soil that satisfies the planting media definition with or without amelioration. An unsuitable soil does not satisfy the definition. These terms are not to be confused with unsuitable material (refer below).
tetrazolium seed test (TZ test)	A chemical test for seed viability; this test is used for a quick indication of germination and to determine viability of seeds in dormant and problem seed lots.
unsuitable material	This is civil engineering terminology referring to earthen or rock materials not suitable for use as a foundation for earthworks (refer to MRTS04 <i>General Earthworks</i> ).
VPZ	Vegetation Protection Zone
VPP-C	Vegetation Protection Plan – Construction
weeds	Those plants which include declared plants, environmental weeds and the wrong plant in the wrong place or non specified species.

### 3 Standards

#### 3.1 Material and practices

Materials and practices shall be in accordance with, but not limited to Australian Standard AS 4454 *Compost, soil conditioners and mulches*.

### 4 Quality system requirements

#### 4.1 Hold Points and Milestones

General requirements for Hold Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points and Milestones applicable to this specification are summarised in Table 4.1.

**Table 4.1 – Hold Points and Milestones**

Clause	Hold Point	Milestone
5.1	1. Submission of materials substitute	Submission of materials substitute
5.2.2	2. Use of recycled water	Submission of a Recycled Water Assessment Report (RWAR) and a Recycled Water Management Plan (RWMP)
5.5		Submission of samples

**4.2 Plans to be included in the Contract Plan**

Depending on the nature of the project, landscape and revegetation works related plans may be required to be included in the Environmental Management Plan – Construction (EMP-C). Where required they shall be listed in Item 1 of each relevant annexure or where dependent on the Contractor's construction methods, shall be as specified in the relevant landscape and revegetation Standard.

Where the Contractor proposes to use recycled water, a *Recycled Water Management Plan - Construction* (RWMP-C), in accordance with Clause 5.2.2, is to be included as part of the EMP-C.

**5 General material requirements****5.1 General**

The material requirements generally used throughout the Landscape and Revegetation Works Specification Suite are given below. Other materials are specified in the relevant landscape and revegetation Standard dealing specifically with the supply and installation of those materials.

The Contractor shall notify the Administrator of the unavailability of a material and within seven days submit a sample of the intended substitute material for direction as to its suitability prior to use.

**Milestone**

No substitutions of any material shall be made unless the Administrator gives direction as to their suitability in writing. **Hold Point 1**

**5.2 Water****5.2.1 General**

Water used for landscape and revegetation works shall comply with the following requirements:

- the pH shall be between 6 and 8.5 (inclusive)
- the total soluble salts concentration shall be less than 1000 mg/l, and
- the water shall contain no substances toxic to plant growth.

The application of water shall not cause subsequent erosion or displacement of treated areas. Water shall not be allowed to spray onto, flow across or pond on paved areas including roadways, bikeways and footpaths.

**5.2.2 Recycled water**

Where the Contractor proposes to use recycled water in the landscape and revegetation works, the Contractor shall:

- take samples of the proposed source of recycled water



- b) carry out testing to be able to complete proforma A, in the Appendix
- c) prepare a *Recycled Water Assessment Report* (RWAR) and a *Recycled Water Management Plan* (RWMP-C), and
- d) implement the RWMP-C for the duration of the Contract.

The pH of the recycled water shall be within the range of 6 – 8.5 (inclusive).

The Contractor shall complete Part 1 of proforma A and where the water pH is < 6.5 or > 7.5 (but inclusive to the range of 6 – 8.5) the Contractor shall complete Part 2 of proforma A.

If the recycled water pH is > 7.5 or < 6.5 (but inclusive to the complying range of 6 – 8.5), the Contractor shall complete Part 2 of proforma A.

The Contractor shall refer to proforma A and prepare a RWAR and RWMP-C, in accordance with proforma B, for submission to the Administrator for a determination as to their suitability. **Milestone**

**Hold Point 2** The RWAR and RWMP shall form part of the EMP-C.

The Principal may have tested recycled water and prepare an assessment report. The Principal's test data and / or assessment report is provided on an information only basis.

The Contractor shall ensure that relevant signage is erected in accordance with the AS/NZ 1319:1994 – *Safety Signs for the Occupational Environment*.

### **5.3 Pesticides**

A pesticide is the collective term for herbicides, insecticides and fungicides. All pesticides shall be registered for use on roadsides and rights of way under the *Chemical Usage (Agricultural and Veterinary) Control Act 1988*. Herbicides must also be registered for treatment of weeds by the Australian Pesticides and Veterinary Medicines Authority (APVMA).

All herbicides, pesticides and fungicides shall be applied as per manufacturer's instructions. The Contractor shall ensure application devices are calibrated to deliver prescribed rates of product as per manufacturer's directions. All spray applications shall be applied with biodegradable, non-toxic tracer dye to highlight areas sprayed.

#### **5.3.1 Knock-down herbicides**

Knock-down herbicides shall be a broad spectrum, non residual, glyphosate based herbicide that has been specifically manufactured for low aquatic toxicity.

#### **5.3.2 Pre-emergent herbicides**

Pre-emergent herbicide shall be oryzalin based.

#### **5.3.3 Target Herbicides**

Target herbicides shall be used exclusively for the eradication of the target plant species.

#### **5.3.4 Insecticides**

Insecticides shall be specifically selected to treat target insect species impacting landscape and revegetation works.

#### **5.3.5 Fungicides**

Fungicides shall be specifically selected to treat target fungi impacting landscape and revegetation works.

## **5.4 Soil amelioration agents**

### **5.4.1 General**

Soil amelioration agents may include fertiliser, soil wetting and water holding agents, lime, gypsum, dolomite and organic soil conditioner. To determine the amount of amelioration agent, testing of stripped site soil is required. Proposed amelioration agents and treatments shall be included in the PMMP-C. Refer to MRTS16B *Vegetation Ground Works* for details.

### **5.4.2 Fertiliser**

Uncoated (quick / uncontrolled release) inorganic type fertilisers shall not be used.

Inorganic fertilisers shall be controlled release and viable for a minimum 9 months.

Organic fertilisers shall be pelletised poultry manure and viable for a minimum 3 months.

Fertilisers shall have an N:P:K ratio within the ranges specified in MRTS16C *Vegetation Works*.

### **5.4.3 Soil wetting and water holding agents**

Soil wetting agents shall have a life in the soil of at least 3 months from the time of application and be:

- a) liquid, gel or crystal form depending on the intended application method and longevity requirements, and
- b) surface acting agents (surfactants) capable of reducing surface tension of planting media particles to allow water to be absorbed.

Water holding agents shall have a life in the soil of at least 12 months from the time of application and:

- a) be manufactured from starch, synthetic polymers, porous ceramic clays and / or mineral wash, and
- b) have the ability to hold water equal to at least 200 times their own mass.

### **5.4.4 Lime, gypsum and dolomite**

Lime shall be agricultural lime consisting of natural ground limestone (calcium carbonate –  $\text{CaCO}_3$ ).

Dolomite shall be agricultural dolomite (calcium magnesium carbonate –  $\text{CaMg}(\text{CO}_3)_2$ ).

Lime and dolomite shall meet the following parameter requirements:

- a) have a neutralising value (NV) of 90 and above determined by using the test method 19A1 from the *Australian Laboratory Handbook of Soil and Water Chemical Methods* (1992) by Rayment and Higginson
- b) have a pH value of  $8.5 \pm 0.5$  determined by using the test method for pH listed in proforma C of the Appendix of MRTS16B *Vegetation Ground Works*, and
- c) have a particle size distribution of:
  - 100% by weight to pass a 5 mm sieve
  - 95% by weight to pass a 3.5 mm sieve, and
  - 40% by weight to pass a 0.15 mm sieve.

Gypsum (calcium sulfate  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) shall be an agricultural grade material.

Gypsum shall meet the following parameter requirements:

- a) a minimum 80% of gypsum
- b) a moisture content of < 15%
- c) have a total content (xray fluorescence test) of:
  - > 20% calcium (Ca)
  - > 15% sulphur (S), and
  - < 2% sodium chloride (NaCl),
- d) if manufactured – have a total content of heavy metals:
  - < 0.001% cadmium (Cd), and
  - < 0.01% lead (Pb)
- e) have a particle size distribution of:
  - 100% by weight to pass a 6 mm sieve
  - 80% by weight to pass a 4 mm sieve, and
  - 50% by weight to pass a 2 mm sieve.

#### 5.4.5 Organic soil conditioner

Organic soil conditioner shall comply with AS 4454 Clause 3.1.1.1 (c) *composted product* and Clause 3.1.1.2 (a) *soil conditioner*.

The Contractor shall provide certification from the supplier that the product complies with the requirements of the standard.

#### 5.5 Samples

The Contractor shall submit to the Administrator, samples of materials that are shown on the Drawings and are listed in Table 5.5; and those materials as specified in Item 2.1 of each Annexure MRTS16A.1, B.1, C.1, D.1 and E.1 at least four weeks before their use, for direction as to their suitability. The Contractor shall submit to the Administrator, samples of soil amelioration agents and fertilisers, as specified in Table 5.5, at least four weeks before their use, for direction as to their suitability. **Milestone**

Where the Administrator determines the materials are unsuitable, further samples or alternative materials shall be submitted. Trial installations may be incorporated into the works when the Administrator requires evidence that the materials shall be successful.

**Table 5.5 – Samples**

Material	Sample Size	Material	Sample Size
Grass seed species	100 g	Environmental matting	1 m <sup>2</sup>
Australian native seed species	25 g	Tree mats	1 mat
Fertiliser	500 g or 500 ml	Planting bed edging	1 m
Soil amelioration agents	1 kg	Unit paver, retaining wall	1 unit
Organic mulch	1 kg	Irrigation components	1 unit
Rock mulch	5 kg		

## 5.6 Storage

Materials shall be stored to ensure no deterioration or contamination occurs, including the potential for environmental harm.

The Contractor shall comply with any relevant requirements in the Contract, and / or statutes and / or Australian Standards and / or manufacturer's instructions in relation to the proper handling and care of materials.

## 5.7 Testing laboratory requirements

Notwithstanding the requirements of MRTS50 *Environmental Management*, any testing required under the landscape and revegetation Standard suite shall only be carried out by a laboratory accredited by the National Association of Testing Authorities (NATA) or a laboratory with equivalent accreditation.

## 6 Landscape personnel

Where required in the *Supplementary Conditions of Contract*, the Contractor shall employ a suitably qualified Landscape Representative during all landscape and revegetation related activities including construction, establishment and monitoring of the landscape and revegetation works.

The Contractor shall be responsible for ensuring:

- a) the concepts and design intent of the landscape and revegetation works shown on the Drawings are implemented on the site
- b) the implementation of the Vegetation Protection Plan – Construction (VPP-C), Planting Media Management Plan – Construction (PMMP-C) and Recycled Water Management Plan - Construction (RWMP-C)
- c) the landscape and revegetation works are constructed directly following completion of earthworks unless otherwise specified
- d) the landscape and revegetation works operations occur within the timeframes outlined
- e) the ordering, selection, delivery, handling, storage, acclimatisation, growing-on and protection of plant stock is carried out so that sufficient plants of the specified quality and condition are available to meet the planting requirements of the Contract
- f) the ordering of seed and plants is carried out so that the specified species are available to meet the requirements of the Contract
- g) seeding, turfing and planting operations are carried out using materials and practices which maximise the potential for early establishment and strong growth
- h) the work operations are diligently carried out during the landscape and revegetation construction and establishment and monitoring periods, and monthly inspections and associated reporting are undertaken so that timely remedial works are carried out, and
- i) changes in the civil works program are coordinated with the plant and materials supplier's program.

**Appendix A – Proforma for Testing of Recycled Water – Part 1 & 2**

Site Sample Identification	
Project Name:	Sample Location:
Job / Contract No:	Site / Water Source No:
Date Tested:	Depth (from surface in mm):

Testing Laboratory Sample Identification	
Laboratory No:	Sample No:

**Part 1**

*The Contractor shall complete **Part 1** and where water pH is < 6.5 or > 7.5 (but inclusive to the range of 6 - 8.5) the Contractor shall complete **Part 2**.*

Water Quality Parameter	Parameter Requirement	Parameter Test Result
E. coli (median) cfu / 100 mL	< 10	
Turbidity NTU 95% ile (max.)	< 5	
SS mg / L median	5	
Chlorine residual	< 1 mg / L	
BOD <sub>5</sub>	< 10 mg / L	
Total Dissolved Salts	< 1000 mg / L with Chloride < 500 mg / L	
Total Nitrogen	< 10 mg / L	
Total Phosphorus	< 2 mg / L	
pH	6 – 8.5	

The parameters and result requirements listed in Part 1 have been adapted from the Victoria EPA *Guidelines for Environmental Management, Use of Reclaimed Water and Queensland Watering Recycled Guidelines*.

**Part 2**

Water Quality Parameter	Water Test Result
<i>Where the pH of water is &lt; 6.5 the Contractor shall test the following concentrations of:</i>	
Chloride (Cl)	
Sulfates (SO <sub>4</sub> )	
<i>Where the pH of water is &gt; 7.5 the Contractor shall test the following concentrations of:</i>	
Carbonates (CO <sub>3</sub> )	
Bicarbonates (HCO <sub>3</sub> )	
Calcium (Ca)	
Magnesium (Mg)	
Sodium (Na)	
Sodium adsorption ratio (SAR)	

Water Quality Parameter	Water Test Result
Chloride (Cl)	
The test method for the Water Quality Parameters concentrations shall be in accordance with the American Public Health Association (APHA) Test Method 4500 or equivalent.	

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## Appendix B - Proforma for Recycled Water Assessment Report and Management Plan

Site Sample Identification	
Project Name:	Sample Location:
Job / Contract No:	Site / Water Source No:
Date Tested:	Depth (from surface in mm):

Testing Laboratory Sample Identification	
Laboratory No:	Sample No:

### Recycled Water Assessment Report

The Contractor shall refer to proforma A for *Testing of Recycled Water* and prepare a *Recycled Water Assessment Report* (RWAR) that identifies:

- the effect of the recycled water on the topsoil and subsoil layers and vegetation relevant to the anticipated watering regime and soil and vegetation types; and
- the proposed mitigation measures to overcome these effects to satisfy the compliance requirements.

### Recycled Water Management Plan

The Contractor shall refer to the proforma A and the RWAR and prepare a *Recycled Water Management Plan* (RWMP) that addresses:

- the development, during the period that recycled water is used, of methods to ensure that the topsoil and subsoil EC and pH parameters are maintained within the limits given in proforma C of Appendix MRTS16B *Vegetation Ground Works*; and
- the programming of a testing scheme of topsoil and subsoil layers that shall be carried out weekly for the first month after commencement of the use of recycled water, and monthly thereafter.

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