

Main Roads Technical Standard

MRTS16

General Requirements Landscape and Revegetation Works

June 09



Queensland Government

IMPORTANT INFORMATION

The requirements of this document represent Technical Policy of the department and contain Technical Standards. Compliance with the department's Technical Standards is mandatory for all applications for the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

This document will be reviewed from time to time as the need arises and in response to improvement suggestions by users. Please send your comments and suggestions to the feedback email given below.

FEEDBACK

Your feedback is welcomed. Please send to mr.techdocs@tmr.qld.gov.au.

COPYRIGHT

© State of Queensland (Department of Transport and Main Roads) 2009

Copyright protects this publication. Except for the purposes permitted by and subject to the conditions prescribed under the Copyright Act, reproduction by any means (including electronic, mechanical, photocopying, microcopying or otherwise) is prohibited without the prior written permission of the department. Enquiries regarding such permission should be directed to the Road & Delivery Performance Division, Queensland Department of Transport and Main Roads.

DISCLAIMER

This publication has been created for use in the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

Where the publication is used in other than the department's infrastructure projects, the State of Queensland and the department gives no warranties as to the completeness, accuracy or adequacy of the publication or any parts of it and accepts no responsibility or liability upon any basis whatever for anything contained in or omitted from the publication or for the consequences of the use or misuse of the publication or any parts of it.

If the publication or any part of it forms part of a written contract between the State of Queensland and a contractor, this disclaimer applies subject to the express terms of that contract.

June 09

Table of Contents

	Page
1 INTRODUCTION.....	1
1.1 Standards Suite.....	1
1.2 Reference Documents	1
2 DEFINITION OF TERMS	2
3 QUALITY SYSTEM REQUIREMENTS	4
3.1 Hold Points, Witness Points and Milestones	4
3.2 Plans to be included in the Contract Plan.....	4
4 LANDSCAPE PERSONNEL	5
5 GENERAL MATERIAL REQUIREMENTS.....	5
5.1 General	5
5.2 Water.....	5
5.2.1 General	5
5.2.2 Recycled Water.....	5
5.3 Soil Amelioration Agents.....	6
5.3.1 General	6
5.3.2 Fertiliser	6
5.3.3 Soil Wetting and Water Holding Agents	6
5.3.4 Lime, Gypsum and Dolomite	6
5.3.5 Organic Soil Conditioner.....	7
5.4 Samples	7
5.5 Storage.....	8
5.6 Testing Laboratory Requirements.....	8

SUPERSEDED

SUPERSEDED

General Requirements

1 INTRODUCTION

1.1 Standards Suite

This Technical Standard 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 Standards that are known collectively as the landscape and revegetation Technical Standard suite.

The relevant landscape and revegetation Technical Standards and other associated standard Technical Standards have been cross-referenced to the typical landscape and revegetation activities listed in Table 1. This Technical Standard shall be read in conjunction with the listed Technical Standards.

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

This Technical Standard forms part of the Main Roads Specifications and Technical Standards Manual.

1.2 Reference Documents

The *Landscape and Revegetation User Guidelines* published by Transport and Main Roads provide 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 Standard.

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"> General material and sample compliance 	<ul style="list-style-type: none"> MRTS16 <i>General Requirements</i> MRTS16 <i>General Requirements – Appendix</i> 	<ul style="list-style-type: none"> MRTS01 <i>Introduction to Technical Standards</i> MRTS50 <i>Specific Quality System Requirements</i>
<ul style="list-style-type: none"> Vegetation protection 	<ul style="list-style-type: none"> MRTS16A <i>Vegetation Protection Works</i> MRTS16A.1 <i>Vegetation Protection Works - Annexure</i> 	<ul style="list-style-type: none"> MRTS16 <i>General Requirements</i> MRTS51 <i>Environmental Management</i>
<ul style="list-style-type: none"> Planting media management Ground preparation Spreading mulching Placing environmental matting 	<ul style="list-style-type: none"> MRTS16B <i>Vegetation Ground Works</i> MRTS16B.1 <i>Vegetation Ground Works - Annexure</i> MRTS16B <i>Vegetation Ground Works – Appendix</i> 	<ul style="list-style-type: none"> MRTS04 <i>General Earthworks</i> MRTS16 <i>General Requirements</i> MRTS16C <i>Vegetation Works</i> MRTS27 <i>Geotextiles (Separation and Filtration)</i> MRTS51 <i>Environmental Management</i>
<ul style="list-style-type: none"> Seeding Turfing Planting of container stock 	<ul style="list-style-type: none"> MRTS16C <i>Vegetation Works</i> MRTS16C.1 <i>Vegetation Works - Annexure</i> 	<ul style="list-style-type: none"> MRTS03 <i>Drainage, Retaining Structures and Protective Treatments</i> MRTS16 <i>General Requirements</i> MRTS16E <i>Establishing and Monitoring</i> MRTS21 <i>Bitumen Emulsion</i> MRTS51 <i>Environmental Management</i>

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

2 DEFINITION OF TERMS

Landscape and revegetation related terms and abbreviations used in this Standard are defined in Table 2. General terms are defined in Clause 2 of MRTS01 *Introduction to Technical Standards*. Guidance on generic landscape and revegetation terms is contained in the *Landscape and Revegetation User Guidelines* published by Transport and Main Roads.

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 and 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 the design speed of the road. Refer to the safety chapter in the <i>Road Landscape Manual</i> published by Transport and Main Roads.
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 and roundabout areas.
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.
environmental weeds	A plant that invades native plant communities, farmland and urban areas. Refer to the Department of Natural Resources and Water and relevant local councils.
FC	Field capacity. The percentage of water remaining in a soil after the soil has been saturated and allowed to freely drain until flow has practically ceased.
hydraulic seeding and mulching	The collective term for various hydraulically applied materials including hydroseeding, hydromulching and straw mulching.
hydromulching single pass	A single-pass operation consisting of the hydraulic application of a slurry of water, fibre, binder, seed, fertiliser and other soil amelioration agents.

Term	Definition
hydromulching double pass	A two-pass operation consisting of hydroseeding followed by the hydraulic application of a slurry of water, fibre and binder.
hydroseeding	A single-pass operation consisting of the hydraulic application of seed, carrier, fertiliser and other soil amelioration agents in a slurry of water; hydroseeding is typically followed by the application of a protective mulch layer.
monitoring	The term monitoring in reference to landscape and revegetation works is intended to describe the establishment 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.
PAW	Plant available water. The portion of water in a soil that can be readily absorbed by plant roots. That soil moisture held in the soil between field capacity and permanent wilting point (PAW = FC - PWP).
plant spread	The maximum horizontal diameter of a plant's foliage.
planting media	Ameliorated stripped 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. As a requirement of this Standard, the PMMP forms a part of the EMPC. The EMPC is required to be submitted as part of the Contract Plan.
propagule	The reproductive part of plants including seeds, stolons, corms, bulbs and stems.
PWP	Permanent wilting point. The moisture content of a soil at which plants wilt and fail even when placed in a saturated atmosphere.
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.
soil – topsoil, subsoil	<ul style="list-style-type: none"> • Soil refers to the solum, that is the upper part of the soil profile above parent rock; • topsoil refers to surface soils that typically contain organic material; and • subsoil refers to – <ul style="list-style-type: none"> - the soil beneath the topsoil layer; - the outer embankment material; and - the exposed soil in areas that have been stripped of topsoil beyond embankments.

Term	Definition
soil layer	Soil layers are defined as – <ul style="list-style-type: none"> • 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; • 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 • 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.
stripped site soil	Non-ameliorated site soil (either topsoil or subsoil); referred elsewhere throughout the Standards 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.

3 QUALITY SYSTEM REQUIREMENTS

3.1 Hold Points, Witness Points and Milestones

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

The Hold Points, Witness Points and Milestones applicable to this Standard are summarised in Table 3.1.

Table 3.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness 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)
5.4			Submission of samples

3.2 Plans to be included in the Contract Plan

Depending on the nature of the project, landscape and revegetation 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 required by Clause 5.2.2, the *Recycled Water Management Plan-Construction* (RWMP-C), which addresses the requirements for the management of recycled water, is to be included as part of the EMP-C.

General requirements of the EMP-C are specified in the *Supplementary Conditions of Contract*.

4 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) and Planting Media Management Plan – Construction (PMMP-C);
- c) the landscape and revegetation works are constructed directly following completion of earthworks unless otherwise specified;
- d) 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;
- e) the ordering of seed is carried out so that the specified species are available to meet the requirements of the Contract;
- f) seeding, turfing and planting operations are carried out using materials and practices which maximise the potential for early establishment and strong growth;
- g) the work operations are diligently carried out during the landscape and revegetation construction and establishment periods, and regular inspections are made of the completed landscape and revegetation works so that timely remedial works are carried out; and
- h) changes in the civil works program are coordinated with the plant and materials supplier's program.

5 GENERAL MATERIAL REQUIREMENTS

5.1 General

The material requirements generally used throughout the landscape and revegetation Standard 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 7 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 –

- a) the pH shall be between 6 and 8.5 (inclusive);
- b) the total soluble salts concentration shall be less than 1000 mg/l; and
- c) 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 –

- a) take samples of the proposed source of recycled water;

- b) carry out testing to be able to complete proforma A, in the Appendix; and
- c) prepare a *Recycled Water Assessment Report* (RWAR) and a *Recycled Water Management Plan* (RWMP).

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, 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 Soil Amelioration Agents

5.3.1 General

Soil amelioration agents may include fertiliser, soil wetting or 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 for details.

5.3.2 Fertiliser

Preferred fertilisers are slow or controlled release fertilisers which may be organic or inorganic.

Uncoated (quick / uncontrolled release) inorganic type fertilisers shall not be used in sandy soils and / or near water bodies or other nutrient sensitive areas as determined by the Administrator.

Additional types of fertiliser may be specified and shall be included in the PMMP-C.

Other fertilisers may be proposed by the Contractor and shall be included in the Fertilising Program with the PMMP-C.

5.3.3 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 or crystal form depending on the intended application method and longevity requirements indicated by the planting media test; 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.

5.3.4 Lime, Gypsum and Dolomite

Lime shall be agricultural lime consisting of natural ground limestone (calcium carbonate – 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 +/- 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.

5.3.5 Organic Soil Conditioner

Unless specified elsewhere in the contract, organic soil conditioner shall comply with each test parameter listed in proforma F of the Appendix of MRTS16B *Vegetation Ground Works*.

The Contractor shall make available composting records with reference to temperature, windrow turning, windrow tracking, liquid inputs and laboratory tests for the material supplied, if required by the Administrator.

5.4 Samples

The Contractor shall submit to the Administrator, samples of materials as specified in Item 2.1 of each Annexure MRTS16A, C, D and E.1 and Item 3.1 of MRTS16B or where not specified as listed in Table 5.4 at least 4 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 5.4 – Samples

Item	Sample Size	Item	Sample Size
Grass seed species	100 g	Environmental matting	1 m ²
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 *

Item	Sample Size	Item	Sample Size
Rock mulch	5 kg		

* A sample size of 1 unit as specified in Item 2.1 of each Annexure MRTS16A.1 – E.1.

5.5 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.

5.6 Testing Laboratory Requirements

Notwithstanding the requirements of MRTS50, 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 relevant certification.

SUPERSEDED