



mainroads
WESTERN AUSTRALIA

SPECIFICATION 304

REHABILITATION OF DISTURBED AREAS

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SPECIFICATION 304

REHABILITATION OF DISTURBED AREAS

GENERAL

304.01 SCOPE

1. The work under this specification consists of the supply of all products, materials and equipment, all preparation and construction, and all rehabilitation operations required to complete the Works as shown in the Drawings, Rehabilitation Plan or specified in the Contract.

304.02 REFERENCES

1. Australian Standards, Main Roads Western Australia Test Methods, Main Roads Western Australia Standards and Main Roads Western Australia Specifications are referred to in abbreviated form (e.g. AS 1234, MRS 67-08-43 or WA 123). For convenience, the full titles are given below:

Other Publications

Health (Pesticides) Regulations, 2011

Native Seed Accreditation System 2016, Revegetation Industry Association of Western Australia (RIAWA)

MAIN ROADS Test Methods

WA 0.1 Random Sample Site Location

MAIN ROADS Standard Drawings

Guide Sign – Roadside Revegetation (temporary) 202428-0306

Guide Sign – Roadside Revegetation (permanent) Standard Drawing
No. MR-GM-14

MAIN ROADS Guideline Drawings

Stockpiling on Site – Mulch, Topsoil and Overburden – 201928-0002

Material Pits - Vegetation, Topsoil & Overburden Stockpiles – 201928-0003

Batters – Typical Detail for Benching/Stepping Batters – 201928-0005

MAIN ROADS Specifications

Specification 202 TRAFFIC MANAGEMENT

Specification 204 ENVIRONMENTAL MANAGEMENT

Specification 301 VEGETATION CLEARING AND DEMOLITION

Specification 302 EARTHWORKS

Specification 601 SIGNS

304.03 DEFINITIONS

1. Unless otherwise detailed in the Contract, the meaning of terms and definitions in this specification are as follows:

Establishment	means the continuing care and maintenance of the rehabilitation works by accepted horticultural practises, as well as rectifying any defects that become apparent in the Works under normal use.
Establishment Period	means the period starting from the completion of the rehabilitation works and extending for a duration as nominated in Annexure 304A.
Installation Period	means the period starting from the commencement through to the end of the rehabilitation works as specified in the Contract.
Mulch	refers to inorganic or organic material spread as a soil surface protection measure, to suppress weeds, retain moisture and increase the success of rehabilitation works.
Rehabilitation	is the earthworks, ripping and resspreading of topsoil/application of seed to aid in the reinstatement of a cover of vegetation, that is suited to the location (roadsides and other disturbed areas).

304.04 GENERAL REQUIREMENTS

1. The Contractor is required to carry out all activities necessary to establish and promote the growth of all plant materials and maintain all Works in good order and functional condition during the Installation Period and Establishment Period.

304.04.01 PERSONNEL

1. The Contractor must ensure that personnel under the sole responsibility and supervision of the Contractor must be competent, experienced, and skilled in all aspects of the required preparation, installation and establishment practices.

***Skilled
Personnel***

304.04.02 TRAFFIC MANAGEMENT

1. The Contractor must ensure that all traffic management and control measures necessary to undertake the Works are implemented in accordance with Specification 202 TRAFFIC MANAGEMENT.

***Traffic
Management***

304.04.03 INDUCTION AND TRAINING

1. Prior to the commencement of any Works, all site personnel must have undergone relevant site induction course(s) and be appropriately trained with respect to care of the environment in accordance with the Environmental Management Plan, particularly for:

***Induction and
Training***

- (a) hygiene awareness for dieback and weed management;
- (b) preservation of remnant vegetation and significant flora.

304.04.04 PLANT AND EQUIPMENT

1. The Contractor must supply all plant, labour and equipment required to achieve the Works of this Contract including safety equipment and signage.
2. All plant and equipment must be suitable for the requirements of this contract, sufficient size/horsepower to achieve ripping depth and be maintained in a safe and sound working condition at all times during the contract.
3. The Contractor must remove from the work site any plant or equipment considered by the Superintendent to be unsuitable for carrying out the work specified.

304.05 NOT USED

PRODUCTS AND MATERIALS

304.06 GENERAL

1. The manufacturer's published product details and instructions for use must be provided to the Superintendent upon request for any products and materials used.
2. Water used to establish and maintain vegetation must be potable water where available or obtained from a source containing no substances detrimental to seed germination or vegetation growth. **Water**
3. Only pesticides registered for the treatment of pests and weeds in Western Australia can be used for the Works. The supply, storage, handling and use of any product must comply with regulations, restrictions and government policy relating to pesticides and be in accordance with manufacturer's published specification. **Pesticides**
4. Unless specified otherwise in Annexure 304B only a low phosphorous, slow release fertiliser suitable for native plants must be used for the planting works. **Fertiliser**
5. Fertiliser must be delivered on site in unopened bags or containers bearing the manufacturer's description, analysis of constituents and quantity. Fertiliser must be stored, handled and applied in accordance with the manufacturer's published specifications.
6. Soil wetting agents must be active in the soil for a minimum of six months, must be non-ionic, non-toxic, pH neutral range of 6-8 and must be applied in accordance with the manufacturer's published specifications. **Soil Additives**
7. Soil bio-amendments and inoculates must be free of any substances detrimental to plant life, and only be applied in accordance with the manufacturer's published specifications.
8. Unless otherwise specified in the Contract, imported soil conditioners (for sub surface application) must comply with AS 4454 and be applied in accordance with the manufacturer's published specifications. The **Soil Conditioners**

Contractor must supply to the Superintendent certified test reports that the soil conditioners to be used in the Works comply with AS 4454.

9. The phosphate content of soil conditioners must not exceed three percent and the pH must be in the neutral range of 6-8.

10. Imported material for use as topsoil must comply with AS 4419. The Contractor must supply to the Superintendent an analysis of its content undertaken by a laboratory to confirm that the imported topsoils to be used in the Works are dieback free and comply with AS 4419.

***Imported
Topsoil***

11. The Contractor must use all topsoil stockpiled on site that has been nominated for re-use as topsoil in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION.

In-situ Topsoil

12. Selected fill material to be used in the Works must be clean embankment quality material in accordance with Specification 302 EARTHWORKS and must be free of any matter with a particle size greater than 50 mm, weeds and materials toxic to plant growth. Contaminated soil must not be used as fill within the Works.

Selected Fill

13. Suitable spoil material to be used in the Works must be clean material in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION and must be free of any weeds and materials toxic to plant growth. Contaminated soil must not be used as fill within the Works.

Suitable Spoil

14. The Contractor must nominate, prepare, signpost and manage all stockpiles of topsoil and/or mulch materials in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION.

***Stockpiles of
Topsoil or
Mulch***

304.07 HARD LANDSCAPING

1. Unless otherwise specified in the Drawings, all materials used for fixed items such as, but not limited to, rock pitching, segmental paving, concrete surfacing, bollards, fencing, screen walls and other hard landscaping elements must be in accordance with the relevant Main Roads specifications.
2. Any large feature rocks or boulders retained for use in the Works must be placed as shown in the Drawings ensuring they are not scarred or broken by equipment during placement.
3. Unless specified otherwise in the Drawings, each rock or boulder placed for the purpose of restricting access must be buried 10-30% below finished soil levels.

***Placement of
Large Rocks
and Boulders***

304.08 MULCH

1. Inorganic mulch may include natural materials such as crushed rock, coarse aggregate, river pebbles, pea gravels and or manufactured materials. Inorganic mulch must be clean and washed, screened and composed of particle sizes in even proportions as specified or shown in the Drawings and as nominated in Annexure 304B.
2. Organic mulch may include natural or composted organic materials. This includes chipped or shredded vegetation and or composted vegetative

***Inorganic
Mulch***

Organic Mulch

material, sourced from site vegetation and or naturally occurring within the local area and or imported for other locations.

3. All imported or site material to be used as organic mulch must comply with applicable requirements in AS 4454 as nominated, meet the criteria in Table 304.1, unless specified otherwise, and comply with quality criteria included in Annexure 304B.

4. Mulch materials must be free of all deleterious matter and extraneous materials (such as weeds, grass stolons, seeds, soil, stones, stems, large branches root matter clumps, rubbish, asbestos, vermin, insects, mould, pests and disease) and free from all matter and substances toxic to plant growth.

***Quality of
Mulch***

5. The Contractor must supply to the Superintendent a 2 kg sample of all mulch materials for approval prior to use as mulch. Unless specified otherwise, samples must be submitted to the Superintendent at least four weeks prior to their installation or use. Where mulch is deemed by the Superintendent to be unsuitable, further samples of alternative materials must be submitted.

Samples

6. Stockpiled chipped site vegetation or uncontaminated chipped vegetative material naturally occurring within the local area must be approved as suitable by the Superintendent, prior to use as mulch.

***Site Vegetation
Mulch***

7. All imported un-composted chipped vegetation material, defined as Raw Mulch (AS 4454 Clause 1.5.9) must be aged for at least three months before spreading, be free of fine or fibrous particles and live grass stolons, be dieback free, weed free (as per Appendix M of AS 4454) and approved as suitable for use as mulch by the Superintendent.

***Imported
Vegetation
Mulch***

8. All imported composted mulch materials must comply with AS 4454. The Contractor must supply to the Superintendent an analysis of its content undertaken by a certified laboratory to confirm that the imported mulch to be used in the Works is dieback free, weed free (as per Appendix M of AS 4454) and approved as suitable for use as mulch by the Superintendent.

***Imported
Composted
Mulch***

9. Unless specified otherwise in the Drawings or in Annexure 304B, the mulch material must be Coarse Mulch as defined in AS 4454 (Clause 1.5.2) with an average size of between 16 mm to 50 mm in even proportions, containing minimal fines and with no individual pieces greater than 150 mm.

Mulch Size

10. Unless specified otherwise in the Drawings or in Annexure 304B, where mulch is being used in a specific location or for a specified purpose it must comply with the parameters of Table 304.1.

***Mulch Use,
Type and
Attributes***

TABLE 304.1 MULCH USE, TYPE AND ATTRIBUTES

	Location / Purpose	
	Erosion Control	Rehabilitation
Purpose of mulch	Soil surface stabilisation	Surface protection, retain moisture, suppress weed growth
Attributes	Coarse, no fines or fibrous materials	Coarse
Particle Size Distribution (% screened on a dry weight basis)	20 mm to 100 mm 90% pass 80 mm 20% pass 40 mm 1% pass 10 mm Max length 150 mm <1% Impurities - glass, metal and plastics	10 mm to 80 mm 90% pass 60 mm 20% pass 20 mm 1% pass 5 mm Max length 150 mm <1% Impurities - glass, metal and plastics
Depth Nominal	+100 mm on surface	75 mm on surface
Other Properties	To comply with AS 4454 as applicable	

11. No substitutions of any mulch materials is to occur unless approved in writing by the Superintendent prior to use in the Works.

304.09 NOT USED

304.10 EROSION CONTROL MATTING

1. Unless detailed otherwise in the Drawings or in Annexure 304B, all erosion control matting, blanket, or netting must be manufactured from organic fibre products and be biodegradable, permeable to air and water and remain intact when wet and in contact with the soil.
2. Erosion control cells and products designed to be placed on slopes to hold topsoil and mulch must be manufactured from non-degradable, UV stabilised materials.

***Erosion
Control Cells***

304.11 NOT USED

304.12 HYDRO-MULCHING AND HYDRO-SEEDING MATERIALS

1. Cellulose fibre must be biodegradable, free of any contaminated materials and suitable for use in hydro-seeding and hydro-mulching to form a slope stabilisation mat.
2. Straw for use in hydro-mulch operations, weed control or erosion control must be derived from cereal crops and certified free of viable seed and cured to less than 20% moisture content by weight.
3. Binders, tackifiers, or emulsions used must be manufactured for the purpose of hydro-seeding and hydro-mulching used in the Contract and

Cellulose Fibre

Straw

Binder

must be miscible in water, free from components toxic to seed germination, plant growth or aquatic life and applied according to the manufacturer's published instructions for use.

- | | |
|--|-------------------------|
| 4. All water used in hydro-seeding and hydro-mulching must be free from materials likely to be toxic to plant growth. | Water |
| 5. Coloured dye used to aid visual application of hydro-seeding and hydro-mulching must be a non-toxic water-soluble biodegradable dye. | Dye |
| 6. Dispersing agents must be free from components toxic to seed germination, plant growth or aquatic life and mixed according to the manufacturer's published instructions for use. | Dispersing Agent |
| 7. Equipment for the mixing and application of hydro-mulching and hydro-seeding must have the operating capacity to allow for the mixing of materials in continuous agitation to produce a homogeneous mixture and a discharge system to apply the mixture at a continuous and uniform rate. The Contractor must demonstrate the capacity of the equipment to the Superintendent upon request. | Equipment |
| 8. All machinery must be in good working order to uniformly mix and apply hydro-mulch and hydro-seed and the calibration of the equipment must be demonstrated to the Superintendent upon request. | Calibration |

304.13 PLANT MATERIALS

304.13.01 SEED

- | | |
|--|-----------------------------------|
| 1. The Contractor must undertake the collection and or purchase of all seed stock for use in direct seeding of the species and quantities listed in Annexure 304B. | Seed List |
| 2. The Contractor must notify the Superintendent 28 days prior to the collection of any seed stock to be supplied by the Principal. | Seed Supplied by Principal |
| 3. Prior to any seed collection the Contractor must ensure that all seed suppliers are holders of appropriate and current seed collection/supply licences. | Seed Collection Licence |
| 4. All seed collected and or supplied by the Contractor must be clean, dry, and free from mould, pest and disease to accepted industry practices for seed processing and in compliance with guidelines under the Revegetation Industry Association of Western Australia's Native Seed Accreditation System. | Seed Material |
| 5. Seed must be supplied with a certificate from the Contractor detailing the names of the suppliers, species as nominated in Annexure 304B, date and origin of seed collection and a guarantee that the seed is free of declared noxious plant seed or foreign vegetative parts. Seed quality control to comply with guidelines under the Native Seed Accreditation System. | Seed Quality Control |
| 6. Where specified, certified test reports signed by the Contractor must be supplied for each batch of seed detailing the seed purity using accepted industry practices for seed testing. Seed purity testing to comply with | Seed Purity Testing |

guidelines under the Native Seed Accreditation System unless specified otherwise.

7. Where specified, certified test reports signed by the Contractor must be supplied for each batch of seed detailing the seed viability using accepted industry practices for seed testing. Seed viability testing to comply with guidelines under the Native Seed Accreditation System unless specified otherwise.

Seed Viability Testing

8. The Contractor must store all seed in secure, dry, well-ventilated storage facilities protected from temperature extremes. The seed material is to be stored in vermin proof containers above ground level. Seed must be inspected for pest damage, mould and fungus on a regular basis and action taken to avoid seed deterioration. Seed storage to comply with guidelines under the Native Seed Accreditation System.

Seed Storage

9. Where specified, the seed must be sourced to meet the provenance requirements of the project if nominated in Annexure 304B. Any variation must be confirmed with the Superintendent.

Seed Provenance

304.14 – 304.25 NOT USED

CONSTRUCTION

304.26 SEQUENCE OF OPERATIONS

1. Unless otherwise detailed the sequence of operations must be:

Sequence of Operations

- (a) weed control;
- (b) clearing and topsoil stripping;
- (c) preparation of batters and ground surfaces, including additional weed control;
- (d) seeding (if nominated);
- (e) establishment of vegetation.

Any changes to the sequence of operations must be confirmed with the Superintendent.

2. The Works must commence as early as practicable after completion of the earthworks, and within the optimum time of year as nominated in Annexure 304B, to minimise soil erosion and ensure the effective rehabilitation of all disturbed soil areas.

Timing of Works

304.27 WEED CONTROL

1. Operations must be undertaken to meet the requirements for weed control as specified in Specification 204 ENVIRONMENTAL MANAGEMENT and in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION.
2. The Contractor must develop a weed control program, targeting those weeds nominated in Annexure 304B, and implement weed control of all

weeds and their seeds (residual control) prior to undertaking any other rehabilitation works.

3. Any changes to the timing and sequence of weed control operations must be confirmed with the Superintendent.

4. All persons engaged in spraying herbicides on site must have a current Pesticide Operator's licence in accordance with the Health (Pesticide) Regulations 2011. A copy of all the Pesticide Operator's licences is to be forwarded to the Superintendent on request.

***Operator's
Licence***

5. Existing plants to be retained and new planting areas must be protected during any herbicide spraying if necessary by fitting guards onto spray units or around existing plants.

***Protection of
Existing
Vegetation***

6. The Contractor must exercise absolute care in the application of herbicide to avoid spray drift onto private property or public thoroughfares.

***Protection of
Other Areas***

7. All herbicide operations must be recorded and provided on Main Roads' standard herbicide record sheet, as proof of works carried out. Record sheets must include date of treatment, timing and weather conditions, name of operator, license number, herbicide and rate used, and start and finish times.

Record Sheet

8. For spot spraying a non-toxic, water-soluble, biodegradable coloured dye must be added to the herbicide spray mix that will be clearly visible for at least 48 hours after the herbicide application.

Dye

9. Treated areas must remain undisturbed for 2 weeks or as recommended by the herbicide manufacturer.

Disturbance

10. Treated areas must display signs of dying off within 14 days of application as evidence of compliance. If weed mortality rate is less than 100% or weeds are germinating in areas where residual herbicide has been applied, the Contractor must repeat the application at their own expense until the desired mortality rate is achieved.

Compliance

304.28 CLEARING, TOPSOIL AND EARTHWORKS

1. All clearing, stockpiling and treatment of cleared vegetation must be undertaken in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION.

Clearing

2. All stripping and stockpiling of site topsoil must be undertaken in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION.

***Topsoil
Management***

3. Unless specified otherwise in the Drawings or in Annexure 304B, the Contractor must excavate and stockpile in accordance with Specification 302 EARTHWORKS any rock materials nominated for use in the hard landscaping.

***Salvaged
Rocks***

4. Any contaminated soil, unsuitable and surplus materials uncovered during the implementation of this specification must be disposed of by the Contractor in accordance with Specification 204 ENVIRONMENTAL MANAGEMENT.

***Disposal of
Materials***

304.29 TRANSPLANTING AND SALVAGE OF EXISTING VEGETATION

- | | |
|---|--|
| 1. The Contractor must remove tree trunks nominated for salvage as specified in the Drawings or in Specification 301 VEGETATION CLEARING AND DEMOLITION Annexure 301A. The Contractor must ensure that the tree trunks are not broken by equipment during removal, transport, storage or placement. | <i>Salvage of Tree Trunks</i> |
| 2. Unless specified otherwise in the Drawings or in Annexure 304B, the Contractor must place nominated tree trunks salvaged from clearing operations and retained for use as fauna habitat logs in the Works parallel to the contours. | <i>Placement of Tree Trunks</i> |

304.30 – 304.32 NOT USED

304.33 PREPARATION OF BATTERS, PITS AND GROUND SURFACES

- | | |
|--|---|
| 1. All areas nominated for rehabilitation must be cleared of all surface rubbish and any material that may hinder plant growth before any further surface preparation Works are commenced. | <i>Clearing Surface</i> |
| 2. For material pits the sides and floor must be formed to a flowing finish with batter slopes not steeper than 6 Horizontal in 1 Vertical. | <i>Pit Reshaping</i> |
| 3. During pit reshaping any material carted to the pit must be spread uniformly over the shaped surface. The order of spreading must be degraded topsoil and undesirable weedy vegetation (if any), removed bituminous surfacing (lump form), demolition material, rock, oversize material, unsuitable material, spoil, overburden, suitable topsoil and mulch. | <i>Order of Respreading</i> |
| 4. The Contractor must prepare all nominated finished soil surfaces where necessary by ripping, disking, harrowing, tilling, mounding, furrowing, raking, tracking or other means to form a loose and roughened surface in preparation for other rehabilitation Works to a depth of 500 mm and at not more than 500 mm spacing or as otherwise specified in the Drawings or Rehabilitation Plan. | <i>Surface Preparation</i> |
| 5. Surface preparation must be carried out along the contour unless ripping a redundant road/track or if cross ripping the floor of a material pit or detailed otherwise in the Drawings or Rehabilitation Plan. Ripping along a redundant road/track must be in a manner that prevents channelling of runoff along the road/track. | |
| 6. Unless specified otherwise in the Drawings or in Annexure 304B all batter surfaces with a slope of 4 Horizontal in 1 Vertical or flatter and more than ten metres from a shoulder or table drain must be prepared, to a minimum depth of 300 mm to alleviate compaction and prepare a loose surface. Benched and stepped batters must not be ripped prior to topsoil/mulch respread. | <i>Depth of Cultivation on Batters</i> |
| 7. Batter slopes in hard ground must be ripped and reinstated in accordance with this specification unless the Contractor can demonstrate that the material meets the requirements for the definition for rock in accordance with Specification 302 EARTHWORKS. | <i>Rocky Ground</i> |

8. The Contractor must protect all finished and prepared soil surfaces from soil erosion and weed infestation as necessary, in accordance with Specification 204 ENVIRONMENTAL MANAGEMENT until further rehabilitation Works as nominated can occur or a Certificate of Practical Completion has been issued.

**Temporary
Protection
Measures**

304.34 TOPSOIL RESPREAD

1. Approved site suitable topsoil and/or imported topsoil (as specified) must be respread as soon as practical following construction/pit operations with regard for the weed control program as nominated in Annexure 304B. Where suitable spoil has been identified from the Works this must be spread first, followed by the topsoil.
2. Topsoil must be uniformly spread over the nominated finished and prepared ground surfaces to the depth, levels and slope as shown in the Drawings or in accordance with Annexure 304B.
3. If not specified in the Drawings or Annexure 304B a nominal depth of 75 mm of topsoil but not more than 100 mm must be placed before any planting.
4. The finished surface of the placed topsoil must be free from large stones, lumps and clods.

Timing

**Respreading
Topsoil**

Topsoil Depth

304.35 SOIL IMPROVEMENTS

1. The Contractor must spread chipped vegetation mulch as an improvement to sand or any other soils as detailed in the Drawings or in Annexure 304B. Unless specified otherwise, the chipped vegetation must be spread on the soil surface to the nominated depth with suitable equipment. On steep batter slopes the chipped vegetation must be tracked into the soil by a tracked vehicle running perpendicular to the contour.

**Improvement
of Sandy Soil
Surfaces**

304.36 NOT USED

304.37 EROSION CONTROL

1. Rehabilitation operations must be undertaken to meet the requirements for erosion and sedimentation control as specified in Specification 204 ENVIRONMENTAL MANAGEMENT.
2. The Contractor must implement erosion control measures as detailed in the Drawings or Annexure 304B.
3. The product must be installed in accordance with the manufacturer's published instructions for the required site application and a copy must be provided to the Superintendent prior to installation.
4. Unless detailed otherwise in the Drawings or Annexure 304B, the Contractor must place the matting within 24 hours of surface preparation.
5. If a rainfall event occurs before the matting can be installed and results in soil erosion, the Contractor must replace the eroded material and prepare the soil surface before installing the matting.

**Erosion Control
Measures**

6. Erosion control matting sheets must be anchored, rolled out down slopes or along open drains, overlapped and fixed in accordance with the manufacturer's published specifications.
7. Disturbance of adjoining soil surfaces must be minimised during installation.
8. All surface obstructions and protuberances must be removed prior to laying out the matting. The matting sheets must be laid loosely to make good contact with the soil surface and not stretched taut over the surface. The matting must be laid to provide a complete cover over the finished surfaces with sufficient overlap along joins between sheets of matting.
9. Fixing intervals must be sufficient for the steepness and slope to maximise contact between the matting and soil and prevent runoff flows beneath the matting.
10. Unless detailed otherwise in the Drawings or Annexure 304B, the Contractor must apply a binding agent and or a complete cover of approved mulch over the matting sheets to a nominal depth of 50 mm.

***Installation of
Erosion Control
Matting***

***Laying of
Matting***

304.38 MULCH RESPREAD

1. Unless detailed otherwise in the Drawings or Annexure 304B, the Contractor must spread approved mulch (as specified) as soon as is practical after surface preparation, topsoiling, soil improvements, and the placement of weed control or erosion control matting.
2. Unless specified otherwise in the Drawings or if being used as a soil improver, mulch must not be mixed in with the in situ soil or buried in the soil during the spreading operations.
3. Unless otherwise specified or detailed in the Drawings, the order of priority for spreading mulch generated from vegetation cleared as a result of work under the Contract must be; batter slopes (particularly those in soils prone to erosion), around intersections and other focal areas, parking bays and lastly flat revegetation areas, mulch must be placed before any planting.
4. If a rainfall event occurs before the mulch can be spread, creating soil erosion, the Contractor must replace the eroded material and prepare the soil surface before spreading the mulch.
5. If not specified in the Drawings or Annexure 304B a nominal depth of 75 mm of mulch but not more than 100 mm must be placed.
6. Mulch must be uniformly spread over the ground surface to an even depth by hand, machine or blower unit and if required the surface raked to present an even surface.
7. Unless specified otherwise the Contractor must apply fertiliser over mulch that has not been aged for at least three months, to neutralise any potential soil nitrogen loss.
8. The Contractor must avoid spreading mulch on plants, structures, roadways and road shoulders, leaving the site in a neat, clean condition. Mulch must not be placed closer 50 mm from the stem of any existing

Timing

***Avoid Mixing
Mulch***

***Priority Mulch
Areas***

Mulch Depth

***Even Depth of
Mulch***

Fertiliser

***Avoid Over-
spreading
Mulch***

vegetation or new plantings. Existing vegetation or new plants accidentally covered by mulch must be uncovered as soon as possible.

304.39 HYDRO-MULCHING AND HYDRO-SEEDING

304.39.01 GENERAL

1. The Contractor must carry out hydro-mulching and hydro-seeding operations where nominated in the Drawings using revegetation industry best practice and equipment.
2. Hydro-mulching and hydro-seeding mixes and rates must be as specified in Annexure 304B.
3. Hydro-mulching and hydro-seeding operations must be carried out as soon as practical following preparation of finished soil surfaces, at the optimal time for the Region as nominated in Annexure 304B to match seasonal rainfall and as soon as the local weather conditions are optimal.
4. Prior to commencing any operations the Contractor must assess the risk of surface runoff flows causing damage to any areas to be treated and confirm there are no obstruction, obstacle, hazard or factor likely to cause delays or failures of the operations. The Contractor must notify the Superintendent of any necessary works required to minimise the risk of delays or failures of the operations.
5. **Not less than 5 working days prior to commencing any hydro-mulching and hydro-seeding operations on site, the Contractor must certify to the Superintendent that:**
 - (a) the nominated areas are correctly defined;
 - (b) no obstructions, obstacles, hazards or factors likely to cause delays or failures of the operations have been identified;
 - (c) all ground works are complete including any irrigation works;
 - (d) the soil surfaces are ready for the hydro-mulching and hydro-seeding operations;
 - (e) the soil moisture content is conducive to seed germination;
 - (f) details of the procedures, materials and equipment to be used are documented and have been submitted for approval;
 - (g) equipment has been calibrated to mix and discharge a homogeneous mixture at a continuous and uniform rate; and
 - (h) a program for the hydro-mulching and hydro-seeding operations is documented and submitted for approval.

Timing

Obstruction

HOLD POINT

The Contractor must confirm with the Superintendent any changes to the operations that may be necessary following approval.

304.39.02 HYDRO-MULCH

1. Unless specified otherwise in Annexure 304B, the hydro-mulch must consist of water, cellulose fibre mulch, binder and dispersing agents.

304.39.03 HYDRO-SEED

1. Seed species (grass, native plants or other nominated plant species) and other materials as specified must be added to the hydro-mulch slurry at the rates nominated in Annexure 304B or in the Drawings.
2. Seed must be pre-treated as nominated in Annexure 304B.

Hydro-seeding

304.39.04 HYDRO-MULCH AND HYDRO-SEED OPERATIONS

1. The Contractor must delineate areas on site nominated for hydro-mulch and hydro-seed by the use of stakes or site features or other means, to suit the project site conditions and specified mix requirements, so that the areas are clearly marked prior to the start of operations.
2. The soil surface must be prepared in response to the site soil conditions to provide a suitable soil surface environment for the hydro-mulching and hydro-seeding operations.
3. Unless detailed otherwise in Annexure 304B, all materials making up the hydro-mulch and hydro-seed slurry must be mixed on site. The Superintendent may request a review of all proposed ingredients and mixing prior to the start of operations.
4. The hydro-mulch and hydro-seed slurry mix must be kept continuously agitated so the ingredients are kept uniformly dispersed throughout the slurry prior to the application.
5. The hydro-mulch and hydro-seed slurry mix must be uniformly applied to suit the size and location of the site area, the slope and soil and local weather conditions.
6. The hydro-mulch and hydro-seed slurry mix must be applied in a uniform and continuous motion in overlapping passes to achieve an unbroken surface, with no bare or incomplete areas and to prevent over saturation of the soil surface and minimise soil movement.
7. The Contractor must ensure that all reasonable precautions are taken to avoid over spraying onto adjacent vegetation, paths and sealed surfaces.
8. Unless otherwise detailed in the Annexure 304B the thickness of the hydro-mulch must be a minimum of 3 mm and no more than 5 mm.
9. Areas subject to concentrated surface runoff flows must be treated with thicker applications of hydro-mulch, or higher concentration of binder as specified.
10. Hydro-mulch must not be applied in heavy rain or when the wind speed exceeds 25 km per hour except by direct hand held hose application.

Delineation of Areas

Soil Preparation

Mixing

Application

Thickness

Heavy Rain or Wind

11. The Contractor must ensure seeded areas are not disturbed by equipment and vehicles, or by pedestrians and animal traffic during and during the Establishment Period.

Disturbance of Seeded Areas

304.40 DIRECT SEEDING

304.40.01 GENERAL

1. The Contractor must carry out direct seeding operations where nominated in the Drawings, using horticultural/revegetation industry accepted practice and equipment, to achieve the completion criteria as specified in Annexure 304C.
2. Seed mixes and rates to be used in the direct seeding operations must be as specified in the Drawings or Annexure 304B.
3. Seeding must be undertaken as soon as practical following construction activities, at the optimal time for the Region as nominated in Annexure 304B and to match seasonal rainfall.

Timing

304.40.02 PREPARATION OF SEED MATERIALS

1. Seed must be pre-treated to break seed dormancy mechanisms in preparation for sowing, using generally accepted industry practices or as specified in Annexure 304B.
2. Seed, in separate labelled bags for each species, must be delivered for batching into the nominated seed mixes as nominated in Annexure 304B.
3. The Contractor must give the Superintendent not less than five working days notice when and where the batching of seed is to occur. The Superintendent reserves the right to attend this seed batching.
4. The prepared seed mixes must be delivered on site, in containers labelled to identify seed mix and weight, ready for use in the direct seeding operations.
5. Seed mixes must be blended with a carrier-bulking agent (such as clean washed sand, vermiculite, or similar) in the proportions by volume of bulking agent to seed, to suit the project requirements and allow for the even spreading of seed.
6. Fertiliser as specified in Annexure 304B must either be mixed with the bulking agent or uniformly applied over the soil surface, as a separate operation, immediately after sowing.
7. Unless specified otherwise only a granular, low phosphorous, slow release, fertiliser suitable for native plants is to be used in the direct seeding operations.

Seed Pre-treatment

Seed Batching

Bulking of Seed Mixes

Fertiliser

304.40.03 SEEDING OPERATIONS

1. Prior to commencing any operations the Contractor must assess the presence of weed species, the soil moisture and the risk of surface runoff flows causing damage to any areas to be treated and confirm there are no obstruction, obstacle, hazard or factor likely to cause delays or failures of the operations. The Contractor must notify the Superintendent of any

Obstruction

necessary works required to minimise the risk of delays or failures of the operations.

2. **Not less than 5 working days prior to commencing any direct seeding operations on site, the Contractor must certify to the Superintendent that:**

HOLD POINT

- (a) **the nominated areas are correctly defined;**
- (b) **no obstructions, obstacles, hazards or factors likely to cause delays or failures of the operations have been identified;**
- (c) **the soil surfaces are ready for cultivation;**
- (d) **details of the seed pre-treatment and batching of the seed mixes are documented;**
- (e) **certificates of seed purity and viability are provided for each batch, if specified;**
- (f) **details of the procedures, materials and any equipment to be used are documented;**
- (g) **equipment (if required to be used) has been calibrated to uniformly apply the nominated seed; and**
- (h) **a program for the direct seeding operations is documented and submitted for approval.**

The Contractor must confirm with the Superintendent any changes to the operations that may be necessary following approval.

- 3. The Contractor must delineate areas on site nominated for direct seeding by the use of stakes or site features or other means, to suit the project site conditions and specified mix requirements, so that the areas are clearly marked prior to the start of operations.
- 4. The soil surface must be prepared in response to the site soil conditions to provide a suitable soil surface environment for seed germination and unless specified otherwise, the soil surface must be lightly cultivated immediately prior to seeding to form a loose and roughened surface.
- 5. Seed must be sown uniformly in overlapping passes to allow for complete seed coverage of the prepared surfaces, within the marked areas.
- 6. Unless detailed otherwise in the Annexure 304B, hand broadcasting, farm machinery, calibrated blower or spreader (handheld or mechanical) may be used as necessary to suit the size and location of the area to be seeded, the slope and soil and local weather conditions.
- 7. Seeding (hand or mechanical) must not occur when the wind speed exceeds 25 km per hour, or in heavy rain if a mechanical blower or spreader is used.
- 8. Unless otherwise detailed in the in the Drawings or Annexure 304B seed on batter surfaces with a slope equal to or steeper than 6 Horizontal in 1 Vertical must be covered by light harrowing, rolling, scarifying, dragging or

Delineation of Areas to be Seeded

Soil Preparation

Seeding

Heavy Rain or Wind

Covering of Seed

raking of the seeded area as soon as practical and within 24 hours of seeding.

- | | |
|---|---|
| 9. Unless detailed otherwise in the Drawings or in Annexure 304B, mulch must not be spread over any areas of direct seeding. | <i>No Mulch over Seed</i> |
| 10. All machinery must be in good working order to uniformly apply seed and the calibration of the equipment must be demonstrated to the Superintendent upon request. | <i>Calibration</i> |
| 11. The Contractor must ensure that measures are put in place to prevent the disturbance of seeded areas, by equipment, vehicles, pedestrians and animal traffic following seeding and during the Establishment Period. | <i>Disturbance of Seeded Areas</i> |

304.41 – 304.43 NOT USED

304.44 REVEGETATION SIGNS

- | | |
|--|---|
| 1. Unless detailed otherwise in the Drawings the Contractor must supply and install a Main Roads Guide Sign, Drawing No. MR-GM-14 (Roadside Revegetation Sign, with the year of the works) in the locations nominated in the Drawings or Annexure 304B and in accordance with Specification 601 SIGNS. | <i>Roadside Revegetation Signs</i> |
|--|---|

304.45 COMPLETION OF WORKS

- | | |
|--|-------------------------------------|
| 1. Prior to practical completion of the works the Contractor must remove all rubbish and surplus materials accumulated during construction and the Site must be left in a neat and tidy condition. | <i>Tidying up</i> |
| 2. Prior to the commencement of the Establishment Period the Contractor must ensure that: | <i>Completion of Works</i> |
| (a) As-constructed Drawings detailing all seeding Works are signed by a suitably experienced and qualified person, in environmental, botanical, horticultural and/or related fields who is familiar with Main Roads' requirements, have been prepared and presented to the Superintendent; | |
| (b) a Vegetation Establishment Program for the Works is documented and submitted to the Superintendent for approval; and | |
| (c) a Monitoring Program for the Works is documented and submitted to the Superintendent for approval. | |
| 3. The Contractor must give the Superintendent at least 7 days notice that the Works are ready to be inspected for completion. | <i>Notice for Inspection</i> |
| 4. The Contractor must certify to the Superintendent that all the rehabilitation works have been completed in accordance with the requirements of the Contract and seek approval to commence the Establishment Period. | <i>HOLD POINT</i> |

304.46 ESTABLISHMENT PERIOD

- | | |
|--|---|
| <p>1. The Contractor must establish and monitor the condition and development of the Works during the Establishment Period as nominated in Annexure 304A.</p> | |
| <p>2. Prior to commencing the Establishment Period, the Contractor must provide to the Superintendent for approval, a detailed Vegetation Establishment Program of all activities, including timings, to be undertaken by the Contractor. The approved Vegetation Establishment Program must include the inspection program (at least one monthly inspection of the Works), designated activities that will be undertaken and the allocated resources to establish the vegetation in accordance with this specification.</p> | <p><i>Vegetation
Establishment
Program</i></p> |
| <p>3. The designated activities to establish the Works must include but not be limited to:</p> <p>(a) ongoing and regular weed control;</p> <p>(b) progressive repair and replace any erosion rills in soil surfaces, to meet the acceptance criteria in Annexure 304C;</p> <p>(c) top up and as appropriate replacement of mulch to maintain original mulch levels;</p> <p>(d) repairs and replacement of damaged or failed areas of seeding, hydro-mulching or hydro-seeding, to meet the acceptance criteria in Annexure 304C;</p> <p>(e) other horticultural tasks, pest control and watering as required to keep the plants in a healthy and growing condition until the end of the Establishment Period.</p> | <p><i>Establishment
Activities</i></p> |
| <p>4. During the Establishment Period the Contractor must notify the Superintendent of any vandalism of the Works, any faults or significant defects to irrigation, or any other damage within 5 days of detection. For the duration of the Establishment Period the Contractor is fully responsible for the continuing good appearance of the Works.</p> | |
| <p>5. The Superintendent may determine that non-compliance to the designated activities required to establish the Works requires an extension of the Establishment Period at the Contractor's expense.</p> | <p><i>Establishment
Period
Extension</i></p> |

304.47 MONITORING PROGRAM

- | | |
|---|---|
| <p>1. The Contractor must undertake monitoring and reporting on the condition and development of the Works during the Establishment Period as nominated in Annexure 304A.</p> | <p><i>Monitoring and
Reporting</i></p> |
| <p>2. Prior to commencing the Establishment Period, the Contractor must provide to the Superintendent, a detailed program of all the monitoring and reporting activities including timing to be undertaken by the Contractor.</p> | <p><i>Monitoring
Program</i></p> |
| <p>3. Each monitoring report must:</p> <p>(a) outline the Works undertaken during the reporting period;</p> | <p><i>Monitoring
Reports</i></p> |

- (b) compare development of rehabilitation with the relevant outcome-based completion criteria (Annexure 304C);
 - (c) providing as appendices the individual plot monitoring data and photographic record;
 - (d) identify any follow up remedial works to be undertaken; and
 - (e) set out a program for the remedial works.
- 4. Electronic copies of each report must be supplied to the Superintendent within 14 days of the end of the applicable reporting period.
 - 5. The final monitoring report at the end of the Establishment Period must be included in the handover report submitted at Final Completion.

***Final
Monitoring
Report***

304.47 – 304.80 NOT USED

AS-BUILT AND HANDOVER REQUIREMENTS

304.81 HANDOVER REQUIREMENTS

- 1. The contractor is required to complete and submit to the Superintendent a Rehabilitation Handover Report. The handover report must include:
 - (a) the final monitoring report;
 - (b) record any outstanding defects for correction and the proposed timing; and
 - (c) provide a summary of activities undertaken during the Establishment Period and detail the recommended ongoing maintenance activities for the Contract area.
- 2. The Contractor must be responsible for preparing reproducible As-constructed Drawings of the works in accordance with Main Roads Design and Drawing Presentation standards.
- 3. As-constructed Drawings must be completed detailing all rehabilitation works signed by a suitably experienced and qualified person, in environmental, botanical, horticultural and/or related fields who is familiar with Main Roads' requirements.

***Handover
Report***

***As-constructed
Drawings***

304.82 FINAL COMPLETION

- 1. The Contractor must give the Superintendent at least 7 days notice that the Works are ready to be inspected at the end of the Establishment Period.
- 2. Acceptance of the Works by the Superintendent at the end of the nominated Establishment Period, shall be subject to:
 - (a) satisfactory preparation and submission of the monitoring and handover requirements;
 - (b) satisfactory preparation and submission of As-constructed Drawings;

- (c) satisfactory completion of all additional maintenance and remedial works as directed by the Superintendent; and
- (d) the rehabilitation works meeting the completion criteria as detailed in Annexure 304C for final completion.

304.83 – 304.90 NOT USED

CONTRACT SPECIFIC REQUIREMENTS

304.91 – 304.99 NOT USED

ANNEXURE 304A

SPECIFIC REQUIREMENTS

Complete the blank template schedules to match the specific requirements of the Contract, delete this note.

1. LIST OF CONTRACT DRAWINGS

Drawing Number	Drawing Name

2. The Establishment Period is: (default 12 months)

3. Monitoring and reporting must occur during the Establishment Period and after Completion of the Works at:

Monitoring Requirements

Minimum of 2 reports per year, one at end of summer and one in spring

4. The Completion Criteria for this project are nominated in Annexure 304C.

ANNEXURE 304B**MATERIAL REQUIREMENTS**

Complete the blank template schedules to match the specific requirements of the Contract, delete this note.

1. PLANTING LIST – NOT USED

2. SEED LIST

Insert N/A if no provenance requirements for the project or for individual species.

Species	Provenance (if required)	Quantity	Pre-treatment Requirements
Or insert "Refer to Drawing Number ..."			

TOTAL SEED RATE PER HECTARE IS kg/ha (default is 4 kg/ha)

3. TOPSOIL RESPREAD REQUIREMENTS

Type/Topsoil Condition	Location	Depth (mm)
Or insert "Refer to Drawing Number ..."		

4. TRANSPLANTING REQUIREMENTS – NOT USED

5. GRASSING REQUIREMENTS – NOT USED

6. HYDRO-MULCH AND HYDRO-SEED MIX

Ingredient	Material	Rate per ha
Cellulose fibre mulch		
Tackifier/Binder		
Water	Potable	
Fertiliser		
Seed		

7. MULCH REQUIREMENTS

Type/Mulch Size	Location	Depth (mm)

8. SURFACE PREPARATION AND SOIL IMPROVEMENTS

Location	Details

9. EROSION CONTROL REQUIREMENTS

Location	Details

10. FAUNA HABITAT LOGS

Placement Location	Amount	Notes

11. TIMING OF WORKS

Item	Optimum Time Period	Notes
Seeding		
Hydro-mulching		

12. WEED CONTROL REQUIREMENTS

The Contractor must identify all weed species within the Contract area and prepare a Weed Control Program in accordance with 204 ENVIRONMENTAL MANAGEMENT.

Designated weeds nominated for removal and known locations include, but are not limited to, the listing below.

Weed Species	Location (Coordinates or Chainage)	Timing and No. of Control Events	Control Measures

13. REVEGETATION SIGNS

Sign Drawing Number	Quantity	Location and Placement Notes

ANNEXURE 304C

COMPLETION CRITERIA

Complete the schedules to match the specific requirements of the Contract, default requirements have been included for each criterion in blue, change to unhighlighted if to be used and then delete this note.

1. PLANTINGS (NOT IRRIGATED) – NOT USED
2. PLANTINGS (IRRIGATED) – NOT USED
3. ADVANCED PLANTINGS – NOT USED
4. IRRIGATION – NOT USED
5. HYDRO-MULCHING AND HYDRO-SEEDING

Acceptance criteria is full compliance with the specifications for product, material and construction requirements.

6. EROSION CONTROL

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Maximum number of active rills > 150 mm in depth within each planting zone/ mix	<2	<1	0

Acceptance criteria is full compliance with the specifications for product, material and construction requirements.

7. WEED CONTROL

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Healthy foliage cover of weeds (%) within each representative plot	<10	<5	<1
Compliance with acceptance criteria (%)	100	100	100

Acceptance criteria for weed control is:

- (a) The approved weed control program is implemented as required with documentary evidence of weed control events via vegetation control record sheets.
- (b) Treated areas display signs of dying off within 14 days of application.

Representative plot is **five** or more randomly selected plots (**10** m x **10** m or equal area) per nominated zone, i.e. hard landscaping/seeding/planting zones within the project area.

8. GRASSING (IRRIGATED) – NOT USED
9. GRASSING (NOT IRRIGATED) – NOT USED

10. DIRECT SEEDING OF PLANTS

Criterion	12 weeks after Completion	End of second Spring	At Final Completion
Mean number of stems (excluding weed species) / m ² within each representative plot	>5	>10	>10
Number of species within each representative plot	>2	>5	>5
Species richness (% of species sown) within each nominated seeding zone	>10	>50	>70
Foliage cover (or demonstrated progress towards this level by monitoring reports)	>1	>10	>25

Representative plot is two or more randomly selected plots (1 m x 1 m or equal area) per nominated seeding zone within the project area.

11. REGENERATION FROM TOPSOIL

Criterion	12 weeks after Completion	End of second Spring	At Final Completion
Mean number of stems (excluding weed species) / m ² within each representative plot	>2	>5	>5
Number of species within each representative plot	>1	>2	>3
Foliage cover (or demonstrated progress towards this level by monitoring reports)	>1	>10	>20

Representative plot is two or more randomly selected plots (1 m x 1 m or equal area) per nominated topsoil zone within the project area.

GUIDANCE NOTES

FOR REFERENCE ONLY – DELETE GUIDANCE NOTES FROM FINAL DOCUMENT

1. All edits to this specification are to be made using track changes, to clearly show added/ deleted text.
 2. If **all** information relating to a clause is deleted, the clause number should be retained and the words **“NOT USED”** should be inserted.
 3. The proposed document with tracked changes must be submitted to the Project Manager for review, prior to finalising the document.
 4. Once the Project Manager’s review is complete, accept all changes in the document, turn off track changes and refresh the Table of Contents.
 5. The Custodian of this specification is Director Environment and Heritage.
 6. For more guidance on completing this specification and the historical Author’s Notes see “Environmental Procedure Specification 304 Landscaping & Revegetation Contract Management” D18#843784.
-

CONTRACT SPECIFIC REQUIREMENTS

Place any required clauses under the CONTRACT SPECIFIC REQUIREMENTS. After inserting the clause, change the clause number and heading to style “H2 SP” (as shown below) so it appears in the Table of Contents.

XXX.XX SUB-HEADING (H2 SP)

- 1. Insert text (Main Table SP) XXXX
- 2. Insert text (Main Table SP)

XXX.XX SUB-HEADING (H2 SP)

- 1. Insert text (Main Table SP)
- 2. Insert text (Main Table SP)

AMENDMENT CHECKLIST

Specification No. **304** Title: **REHABILITATION OF DISTURBED AREAS** Revision No: _____

Project Manager: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

Contract No: _____ Contract Name: _____

ITEM	DESCRIPTION	SIGN OFF
<i>Note: All changes/amendments must be shown in tracked changes until approved.</i>		
1.	Project Manager has reviewed the specification and identified additions and amendments.	
2.	Standard clauses amended? MUST SEEK approval from the Specification Custodian.	
3.	Any unlisted materials/products proposed and approved by the Project Manager? If "Yes" provide details at 16.	
4.	Deleted clauses shown as " NOT USED ".	
5.	Ensure appropriate INSPECTION AND TESTING parameters are included in Specification 201 (test methods, minimum testing frequencies verified).	
6.	AS-BUILT AND HANDOVER requirements addressed.	
7.	CONTRACT SPECIFIC REQUIREMENTS addressed? Contract specific materials, products, clauses added? (refer Specification Guidance Notes).	
8.	ANNEXURES completed (refer Specification Guidance Notes).	
9.	Estimates Manager has approved changes to SMM .	
10.	Project Manager certifies completed specification reflects intent of the design.	
11.	Independent verification of completed specification arranged by Project Manager.	
12.	Project Manager's review completed.	
13.	SPECIFICATION GUIDANCE NOTES deleted.	
14.	TABLE OF CONTENTS updated.	
15.	FOOTER updated with Document No., Contract No. and Contract Name.	
16.	Supporting information prepared and submitted to Project Manager.	
Additional information or further action:		

Signed: _____ (Project Manager) Date: _____