SPECIFICATION 304

LANDSCAPING AND REVEGETATION

REVISION REGISTER			
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SPECIFICATION 304

LANDSCAPING AND REVEGETATION

GENERAL

304.01 SCOPE

1. The work under this specification consists of the supply of all products, materials and equipment, all preparation and construction, all revegetation and landscaping operations required to complete the Works as shown in the Drawings, Revegetation 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:

Australian Standards

AS 2032	Installation of uPVC pipe systems
AS 1477	uPVC pipes and fittings for pressure applications
AS 1610	Brass couplings for taps & watering appliances
AS 2566	Plastic pipe laying design
AS 2303	Tree stock for landscape use
AS 3743	Potting mixes
AS 4419	Soils for landscaping and garden use
AS 4454	Composts, soil conditioners and mulches

Australian/New Zealand Standards

AS/NZS 3500	Part 1.2 Water Supply – Acceptable Solutions

Other Publications

Health (Pesticides) Regulations, 2011

NATSPEC Guide: Specifying Trees, ISBN 0 9586187 7 1

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

Main Roads Template – Landscaping Handover Report

MAIN ROADS Test Methods

WA 0.1	Random Sample Site Location

MAIN ROADS Standard Drawings

Segmental Paving Details Drawing No. 200331-154, -155 and -156

Guide Sign – Roadside Landscaping (temporary) 202428-0306

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

MAIN ROADS Guideline Drawings

Vegetation Placement Drawings – 201928-0052 to 201928-0059 and 201928-0062 to 201928-0074

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

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 501	PAVEMENTS
Specification 505	SEGMENTAL PAVING
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:

Advanced Plants	are those supplied in containers with a soil capacity of five litres or more.
Establishment	means the continuing care and maintenance of the revegetation and landscaping 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 revegetation and landscaping 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 revegetation and landscaping works as specified in the Contract.
Landscaping	is defined as the ground surface treatment in urban and built-up areas, applied to back of kerbs, road shoulders and batters. Landscaping can be both Hard Landscaping and Soft Landscaping.
Mulch	refers to inorganic or organic material spread as a soil surface protection measure, to suppress weeds, retain moisture and or as a decorative surface treatment.
Revegetation	is the reinstatement of a cover of vegetation, via direct seeding and/or planting seedlings, that is suited to the location (roadsides and other disturbed areas).
Transplanting	is the relocation of vegetation from the cleared area suitable for replanting into landscaping 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 landscape 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 revegetation and landscape 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:

   (a) hygiene awareness for dieback and weed management;

   (b) preservation of remnant vegetation and significant flora.

Induction and Training

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. Timed-release water (water storage crystals/gel) if specified must be manufactured for the purpose and delivered on site in sealed containers. ***Timed-release Water***

7. 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***

8. 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.

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

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

11. Existing grass trees marked for reuse located within the projects cleared area must be retained where possible, by lifting and temporarily storing and maintain before final transplanting into the landscaped areas. A storage site, or sites, of sufficient size, cleanliness and security must be confirmed with the Superintendent prior to the grass trees being removed. This storage site can be a nursery. ***Grass Trees***

12. Imported material for use as topsoil must comply with AS 4419. The Contractor must supply to the Superintendent an analysis of its content ***Imported Topsoil***

undertaken by a laboratory to confirm that the imported topsoils to be used in the Works are dieback free and comply with AS 4419.

13. 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***

14. 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***

15. 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***

16. 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. ***Placement of Large Rocks and Boulders***

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.

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. ***Inorganic Mulch***

2. Organic mulch may include natural or composted organic materials. This includes chipped or shredded vegetation and or composted vegetative material, sourced from site vegetation and or naturally occurring within the local area and or imported for other locations. ***Organic Mulch***

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. Decorative organic mulch may include natural materials, such as pine bark, wood chips or manufactured materials. Decorative organic mulch must meet the criteria in Table 304.1, unless specified otherwise, be clean and washed, screened and composed of particle sizes in even proportions as shown in the Drawings or nominated in Annexure 304B. ***Decorative Organic Mulch***

10. 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 100 mm. ***Mulch Size***

11. 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		
	Feature	**Erosion Control**	**Revegetation**
Purpose of mulch	Decorative surface treatment	Soil surface stabilisation	Surface protection, retain moisture, suppress weed growth
Attributes	No fines or fibrous materials	Coarse, no fines or fibrous materials	Coarse
Particle Size Distribution (% screened on a dry weight basis)	10 mm to 60 mm 90% pass 40 mm 20% pass 20 mm 1% pass 16 mm Max length 100 mm <0% Impurities - glass, metal and plastics	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	+100 mm on surface	75 mm on surface
Other Properties	To comply with AS 4454 as applicable		

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

304.09 WEED CONTROL MATTING

1. Weed control matting must be manufactured for weed suppression and unless detailed otherwise in the Drawings or in Annexure 304B made from stable long-life materials such as polypropylene fabric, heavy weight jute or coir.

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.

Erosion Control Cells

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.

304.11 ROOT BARRIER

1. Where identified on the drawings or within Annexure 304B, root barriers are to be installed for existing trees that are being retained or for advanced/transplanted trees.

2. Root barriers must be environmental suitable for the location and not inhibit plant growth or leach chemicals into the surrounding soils and can be made from plastic sheeting designed for this application, limestone

trenching or liquid protection coatings. Root barrier is to be installed as per the manufacturer's published instructions.

3. All products to be used are to be approved by the Superintendent prior to use.

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. ***Cellulose Fibre***

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. ***Straw***

3. Binders, tackifiers, or emulsions used must be manufactured for the purpose of hydro-seeding and hydro-mulching used in the Contract and 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. ***Binder***

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 guidelines under the Native Seed Accreditation System unless specified otherwise. ***Seed Purity Testing***

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***

304.13.02 PLANTS

1. The Contractor must supply plants of the species, size and number as shown in the Drawings or specified in Annexure 304B. The Contractor must order or arrange for the propagation of all plant species and quantities to ensure that the correct numbers of plants will be available by the projected date of planting. ***Plant List and Propagation***

2. All plants supplied by the Contractor to be obtained from nurseries complying with the hygiene criteria of the Nursery Industry Accreditation Scheme of Australia. ***Plant Supply and Propagation***

3. Plant seed must be germinated, and cuttings sown in sufficient time to ensure the suitable maturity of the stock for mass planting at the optimum planting time for the Region as nominated in Annexure 304B.

4. All seed used must meet the provenance requirements of the project if nominated in Annexure 304B. Any proposed variation to the nominated plant species must be submitted to the Superintendent for approval.

5. Plants must be grown in potting mix meeting the requirements of AS 3743 and be supplied in industry-approved containers.

6. ***Inspection of Nursery***

   The Superintendent reserves the right to inspect the development of seedlings during the period of propagation. The Superintendent reserves the right to inspect 100% of the total number of seedlings to be used in the Works. The presence of declared weeds in the soil accompanying plants or at the nursery will be a cause for rejection of any or all plants.

7. All plants must have been grown in their final containers for not less than eight weeks, be true to species name and be well-formed nursery stock.

8. ***Hardening off***

   All plants must be hardened off by growing in open areas receiving sun for around 75% of the day for at least eight weeks prior to delivery on site and reducing fertiliser at least two weeks prior to delivery on site. Soil in containers at the time of delivery must be free of weeds, insects and disease.

9. ***Plant Condition***

   The Contractor must ensure all supplied plants are in good condition and:

   (a) all plants must be vigorous and healthy;

   (b) the root system must be fibrous and firmly established but not root bound and with no large roots growing out of the container;

   (c) the root mass must retain its shape and hold 90% of the root ball material when removed from the container;

   (d) leaves must be of normal size, colour and texture for the specified species;

   (e) the quality of all supplied advanced species must conform to the current requirements of AS 2303; and

   (f) all plants must be free from damage from staking, tying or any other horticultural techniques used throughout production.

10. ***Warranty for Plants***

    The Contractor must obtain written warrants from the nursery suppliers attesting that the plants are true to the specified species, size and free from disease, pests and weeds and forward the warrants to the Superintendent upon request.

11. ***Delay in Plant Supply***

    The Superintendent must be notified of any plant supply delays. No extension of time for Practical Completion will be granted if plant materials are not available due to late ordering.

12. ***Substitution***

    No substitutions shall be made without written approval from the Superintendent. Any proposed substitutions must include details of the species, size, number and be forwarded to the Superintendent for approval. Should the Superintendent consider the substitutions not adequate then the originally specified plants must be grown and planted in the next years planting season.

13. All individual plant containers and trays of plants must have nametags that are water resistant and tied securely to the plant or inserted into the plant container/tray. Labelled trays must contain only one species of plant. ***Plant Labels***

14. Unless otherwise specified in the Drawings, all stakes must be durable, straight, free from knots and twists and pointed at one end and flat at the other end, stakes must not be made of metal i.e. star pickets. Plant ties must be a minimum 25 mm rubber or hessian cloth, rubber ring lock or other approved non-abrasive material. ***Stakes and Ties***

304.13.03 GRASS

1. Grass (turf, stolons or seed) supplied by the Contractor must be of the species, variety and quantities listed in Annexure 304B. ***Grass***

2. All grass materials must be free from weeds, fungus, insect pest, or other deleterious matter. The Contractor must obtain a written warranty from the grass suppliers attesting that the grass is true to the specified species, size and free from disease, pests and weeds and forward the warrants to the Superintendent upon request. ***Warranty for Grass***

3. Only grass turf that is older than 10 months must be supplied for use in the Contract. The grass turf must be sourced from a commercial supplier and certified true to the specified variety, the age and quality and date the turf was cut. The turf must be machine cut to a uniform thickness of 16 mm or more excluding the top growth and thatch in segments no less than 1 m^2 of surface area. Broken pieces, torn or uneven ends must not be accepted by the Superintendent. ***Turf***

4. Grass stolons (runners, sprigs or rhizomes) must be derived from shredded turf and must be well-established fibrous length of 50-100 mm with healthy leaf material. The Supplier must certify that the grass stolons are true to specified variety and the date on which the cuttings were taken. ***Stolons***

5. Turf and grass stolons must be kept continuously moist during transport and must be planted within 24 hours of being cut. ***Transport***

6. Grass seed for use in hydro-mulching or direct seeding must be certified to be not older than 18 months prior to the planting date and delivered on site in a standard sealed container labelled with the name of the supplier, species and variety of seed by weight, percent pure live seed, date of testing, origin of seed. The seed must not be sprouting, mouldy, or show evidence of having been wet or damaged. ***Grass Seed***

7. Turf, stolons or seed not meeting the specifications and deemed unsuitable by the Superintendent will not be accepted. Rejected materials must be replaced by approved stock at no additional cost to the Principal. ***Rejection of Grass***

304.14 IRRIGATION MATERIALS

1. The Contractor must supply all equipment, materials and accessories required in this Contract to conform to AS/NZS 3500 Part 1.2, AS 2032, AS 1477, AS 1610, AS 2566 and comply with Local, State and Federal Authorities requirements.

304.15 – 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) irrigation and hard landscaping;

   (d) preparation of batters and ground surfaces, including additional weed control;

   (e) seeding, planting and grassing;

   (f) establishment of vegetation.

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

2. The revegetation and landscaping 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 revegetation of all disturbed soil areas. ***Timing of Works***

3. The Contractor is responsible for ensuring adequate additional watering of any grassing operations undertaken outside this period at the Contractor's expense.

304.27 WEED CONTROL

1. Revegetation and Landscaping 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 Landscaping and revegetation 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. Where nominated in the Drawings or as specified in Specification 301 VEGETATION CLEARING AND DEMOLITION Annexure 301A, the Contractor must undertake the lifting, transport and storage of selected vegetation using accepted industry practices. The replanting of this vegetation must be in accordance with this specification at the locations as shown in the Drawings or in Annexure 304B. ***Transplanting***

2. 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. ***Salvage of Tree Trunks***

3. 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 or in the landscaping works parallel to the contours. ***Placement of Tree Trunks***

304.30 ROOT BARRIERS

1. Root barriers are to be installed where identified on the drawings or within Annexure 304B or when existing trees are within 3 m of the kerb or seal edge, including for any PSP.

2. Root barriers must be installed along the length of the typical root zone for the tree species or the drip line at a minimum, and to the depth required for that tree species, at a minimum 600 mm. Where the root barrier type used is plastic sheeting, for individual trees the barrier is to be one continuous sheet and for longer sections, when joining the barrier it must be as per the manufacturer's published instructions with a sufficient overlap (minimum 300 mm) and be joined with butyl tape.

3. Excavation for the installation, where tree roots are found to be larger than 50 mm diameter, is to be completed via a vacuum or manual excavation. Roots required to be removed are to be clean cut, with any larger than 100 mm in diameter to be inspected by an Arboricultural Consultant to determine the method of root removal or if the root is to remain due to the trees stabilisation issues.

4. Excavated soil is be returned to the excavation area and compacted at the completion of the works to ensure large air voids are eliminated.

304.31 IRRIGATION SYSTEMS

304.31.01 PERMANENT IRRIGATION SYSTEM

1. The Contractor must install, flush, test commission and operate a permanent irrigation system as shown in the Drawings and specified in the Contract.

2. The Contractor must arrange for any necessary permits as required to install water connections and pay any application fees or charges. ***Permits***

3. All water supply connections, bores and related work must be installed in accordance with AS/NZS 3500 Part 1.2. ***Connection***

4. Prior to commencing any installation works the Contractor must undertake flow and pressure testing to verify the specified flow rates and pressure. ***Flow Rates***

5. Prior to commencing any installation works the Contractor must undertake water quality testing to verify the water supply contains no substances toxic to seeds or plant material and is suitable to establish and promote the growth of vegetation. ***Water Quality Testing***

6. All piping installation, connections and fittings and the use of primer and solvents for piping connections must be in accordance with the manufacturer's recommendations and comply with AS 2032. ***Piping Installation***

7. Thrust blocks must be placed at all points of deflection in the mainline and installed in accordance with the manufacturer's specifications. Piping must

be laid in parallel straight lines without excessive bending of pipes and changes in the direction must be with standard fittings.

8. Crossings of existing roads, paths or paved areas must be installed by horizontal boring using an approved heavy duty conduit of sufficient diameter to allow easy installation and removal of pipes, wiring and other necessary lines. Conduits must extend at least one metre beyond the toe of any embankments. The ends of conduits must project one metre above the ground surface in preparation for subsequent work. ***Crossings***

304.31.02 EXCAVATION AND TRENCHING

1. Prior to any excavation and trenching the Contractor must certify to the Superintendent that: ***HOLD POINT***

(a) All existing services are marked on the ground and the Contractor has liaised with relevant authorities as required to locate services.

(b) The run of pipes, valve locations, sprinkler heads and other components as shown in the Drawings are pegged on the site.

(c) Completed surface levels are in accordance with the Drawings.

2. The Contractor must not carry out any excavations within the drip line canopy of existing trees and care must be taken to avoid any damage to tree roots exposed in trenches. The Contractor must seek the direction of the Superintendent if any tree roots (greater than 50 mm diameter) are in conflict with the installation of the irrigation system. ***Damage to Tree Roots***

3. The Contractor must excavate by hand within one metre of any existing underground services. ***Trenches near Services***

4. Under no circumstances will trenching running parallel to a road be allowed closer than one metre from the rear face of the kerb or road shoulder.

5. The Contractor must notify and seek approval of the Superintendent of any necessary rock excavation in trenches that cannot be ripped and excavated by standard trench digging equipment. ***Difficult Excavation***

6. The Contractor must fill any over excavation below the required depth with embankment quality material as detailed in Specification 302 EARTHWORKS. ***Over Excavations***

7. Topsoil from excavation must be stripped to a nominal depth of 100 mm unless specified and stockpiled separately on site in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION and not mixed with any excavated subsoil material. ***Stripping Topsoil***

8. Trenches must be excavated to provide a minimum soil cover of 450 mm over all pipe work. Should laterals cross the mainline the trench depth must be such that the lateral has a minimum of 200 mm cover over the mainline and 450 mm cover from the finished surface levels. ***Cover***

9. The trench bottom must be continuous, firm, smooth and free from rocks, rubble and sharp objects. ***Trenching***

10. The Contractor must install and connect all fixtures in a neat waterproof manner and in accordance with standards and the manufacturer's published specifications. Spacing of sprinklers must be as shown in the Drawings unless otherwise approved by the Superintendent. ***Installation of Fixtures***

11. The Contractor must set the top level of all sprinklers flush with the adjacent finished ground level or as shown in the Drawings.

12. Where the system is connecting to an existing irrigation system the Contractor must undertake all connections and replacement of any existing components as shown in the Drawings. ***Connection to Existing***

304.31.03 FLUSHING AND TESTING

1. **Prior to backfilling the completed pipe work the Contractor must certify that the entire system is flushed clean and tested in accordance with the Contract.** ***HOLD POINT***

2. Prior to testing of the completed irrigation system the Contractor must flush the system with each water outlet device set/removed to ensure that debris is flushed from the system. During testing the Contractor must ensure. ***Testing of System***

   (a) All joints and connections are to remain visible during the flushing and testing unless specified otherwise in the Contract.

   (b) All sections (high pressure and low pressure) of the irrigation system must be tested to design operating for a minimum period of 30 minutes.

   (c) Each solenoid valve is be tested from the controller.

3. Following acceptance, the Contractor must undertake all backfilling, compaction and levelling of trenches. Trenches installed on batters must be compacted sufficiently and to the level of the surrounding soil to ensure water does not flow along the trench resulting in erosion on the batter. ***Backfilling and Compacting***

4. The Contractor must notify the Superintendent if the soil excavated from the trenches is not suitable as backfill and await approval to continue with the backfilling operation. The unsuitable and surplus excavated soil must be disposed offsite in accordance with Specification 301 VEGETATION CLEARING AND DEMOLITION. ***Unsuitable Backfill***

5. Backfill material in contact with and immediately adjacent to pipes must be clean sand free from rocks, rubble or sharp objects. ***Pipes***

6. Only selected fill material in accordance with Specification 302 EARTHWORKS, and approved by the Superintendent must be used as backfill to replace the unsuitable excavated soil. ***Replacement Backfill***

7. Subsidence of trenches after completion of the Works must be rectified at the expense of the Contractor. ***Subsidence***

304.31.04 TUNING AND COMMISSIONING

1. The irrigation system must be tuned and balanced so that each outlet device delivers the designed quantity of water with the controller set at automatic operation, or as specified. ***Tuning and Commissioning***

2. During the commissioning period the Contractor must be responsible for the repair of all leaks, equipment malfunction, surface erosion or any damage resulting from the operation of the system.

3. Any station affected by repairs to the system must be re-flushed out and re-tested after reinstatement.

304.32 HARD LANDSCAPING

1. Unless otherwise specified in the Contract, all hard landscaping elements must be installed as detailed in the Drawings and constructed in accordance with the relevant Main Roads specifications.

2. Garden edging for shrub beds, tree wells and lawn areas must be installed as detailed in the Drawings. Curves where shown in the drawings must be smooth and even. Installed edging must be protected from damage during subsequent works under the Contract.

3. All concrete garden edging must be a minimum of Class N20 and be set with the top of the edging flush with the adjoining surface or pavement. ***Concrete Edging***

4. Gravel areas indicated on the Drawings for basin inverts and associated batters, must be laid to a consolidated thickness of 100 mm and consist of medium to coarse lateritic gravel of sizes ranging 16-50 mm diameter. These areas must first be scalped to achieve the desired level before placing a geofabric layer on the prepared surface, prior to spreading gravel. ***Gravel – Batters and Basins***

5. Gravel areas indicated on the Drawings for the rear of new kerbing and road shoulders, must be a naturally occurring unprocessed gravel product. The gravel must meet the Particle Size Distribution requirements for subbase gravel in Specification 501 PAVEMENTS. These areas must be compacted flush with the adjoining surface or pavement and with no raised areas that will allow water to flow off these gravel areas onto the road surface. ***Gravel – Compacted Backfill***

304.33 PREPARATION OF BATTERS AND GROUND SURFACES

1. All areas nominated for revegetation and or landscaping must be cleared of all surface rubbish and any material that may hinder plant growth before any further surface preparation Works are commenced. ***Clearing Surface***

2. 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 revegetation and landscaping Works to a depth of 500 mm and at not more than 500 mm spacing or as otherwise specified in the Drawings or Revegetation Plan. ***Surface Preparation***

3. Surface preparation must be carried out along the contour unless ripping a redundant road/track or detailed otherwise in the Drawings or Revegetation Plan. Ripping along a redundant road/track must be in a manner that prevents channelling of runoff along the road/track.

4. Surface preparation must be carried out by hand within 500 mm of paths, kerbs or structures and within the drip line of any retained vegetation.

5. Unless specified otherwise in the Drawings or in Annexure 304B all batter surfaces with a slope of 4 Horizontal in 1 Vertical or flatter, including medians or traffic islands nominated for revegetation, and more than one metre from a shoulder or rear face of kerb 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. ***Depth of Cultivation on Batters***

6. 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. ***Rocky Ground***

7. 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 revegetation and landscaping 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 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. ***Timing***

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. ***Respreading Topsoil***

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. ***Topsoil Depth***

4. The finished surface of the placed topsoil must be free from large stones, lumps and clods.

304.35 SOIL IMPROVEMENTS

1. Unless detailed otherwise in the Drawings or in Annexure 304B the Contractor must incorporate soil conditioner into the top soil surface layer as necessary to prepare all nominated areas for seeding, planting or grassing, in accordance with Specification 302 EARTHWORKS. ***Soil Conditioner***

2. The Contractor must incorporate soil additives in the topsoil and or individual planting holes, as specified in the Drawings or in Annexure 304B, in accordance with the manufacturer's published specifications. ***Soil Additives***

3. 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 WEED CONTROL MATTING

1. Weed control matting sheets must be placed and fixed in accordance with the manufacturer's published specifications.

2. 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 to ensure no open spaces between sheets of matting. Matting around individual plants must be cut and placed as detailed in the Drawings.

Laying of Matting

3. Unless detailed otherwise in the Drawings, the Contractor must spread a complete cover of suitable mulch over the matting sheets to a nominal depth of 50 mm.

Mulch Cover

304.37 EROSION CONTROL

1. Revegetation and Landscaping 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.

Erosion Control Measures

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.

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.

Installation of Erosion Control Matting

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.

Laying 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.

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. ***Timing***

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. ***Avoid Mixing Mulch***

3. Unless otherwise specified or detailed in the Drawings, 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. ***Mulch Depth***

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. ***Even Depth of Mulch***

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. ***Fertiliser***

8. The Contractor must avoid spreading mulch on plants, structures, roadways, paths, road shoulders and grassed areas, leaving the site in a neat, clean condition. Mulch must not be placed closer 50 mm from the stem of any existing vegetation or new plantings. Existing vegetation or new plants accidentally covered by mulch must be uncovered as soon as possible. ***Avoid Over-spreading Mulch***

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. ***Timing***

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. ***Obstruction***

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:** ***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) 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.

   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. ***Hydro-seeding***

2. Seed must be pre-treated as nominated in Annexure 304B.

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. ***Delineation of Areas***

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. ***Soil Preparation***

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. ***Mixing***

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. ***Application***

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. ***Thickness***

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. ***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. ***Seed Pre-treatment***

2. Seed, in separate labelled bags for each species, must be delivered for batching into the nominated seed mixes as nominated in Annexure 304B. ***Seed Batching***

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. ***Bulking of Seed Mixes***

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. ***Fertiliser***

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.

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

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. ***Delineation of Areas to be Seeded***

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. ***Soil Preparation***

5. Seed must be sown uniformly in overlapping passes to allow for complete seed coverage of the prepared surfaces, within the marked areas. ***Seeding***

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. ***Heavy Rain or Wind***

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

9. Unless detailed otherwise in the Drawings or in Annexure 304B, mulch must not be spread over any areas of direct seeding. ***No Mulch over Seed***

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. ***Calibration***

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. ***Disturbance of Seeded Areas***

304.41 PLANTING

304.41.01 GENERAL

1. The Contractor must carry out the planting operations as specified, using accepted industry practices and equipment, to achieve the completion criteria as specified in Annexure 304C. ***Completion Criteria***

2. The Contractor must ensure that all staff engaged in the planting operations are competent, and skilled in the required Works. Staff must be supervised during the Works by an experienced supervisor competent and skilled in the required landscape installation and establishment practices. ***Supervision of Staff***

3. The Contractor must undertake planting where nominated in the Drawings using the species and numbers as nominated in Annexure 304B. ***Species and Numbers***

4. Prior to purchase the Contractor must supply a list of proposed sources for all the specified plants for the Superintendents approval. The list of proposed sources must include: the name of supplier, contact details and confirmation from the nursery stating the list of plants to be supplied, size of container and date of supply. ***Ordering and Purchase***

5. **The purchase of plants must not occur until the Superintendent approves the list of plant supply.** ***HOLD POINT***

6. Unless specified otherwise in Annexure 304B, planting operations must be undertaken following construction activities, at the optimum time period to match both seasonal rainfall in the Region and the effectiveness of the pre planting weed control. ***Timing***

7. The Contractor must obtain approval from the Superintendent in writing prior to commencing any planting Works outside this period.

8. Prior to commencing any operations the Contractor must assess the presence of weed species, feral animals, the soil moisture and the risk of surface runoff flows causing damage to any areas to be planted and confirm there are no obstruction, obstacle, hazard or factor likely to cause delays or failures of the operations. ***Obstruction***

9. The Contractor must notify the Superintendent of any necessary works required to minimise the risk of delays or failures of the operations.

10. **Not less than 5 working days prior to commencing any planting operations on site, the Contractor must certify to the Superintendent that:** ***HOLD POINT***

    (a) the nominated areas for planting are correctly defined;

    (b) no obstructions, obstacle, 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 planting operations;

    (e) adequate soil moisture content at planting depth is present;

(f) all staff are competent, experienced, and skilled in planting operations; and

(g) a program for the planting 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.

11. The Contractor must reinstate at no cost to the Principal any other site works disturbed or damaged during the planting Works. ***Damage***

304.41.02 DELIVERY ON SITE

1. Plants must be delivered to the Site and where no onsite storage exists planted immediately and before the end of the same day. ***Delivery***

2. The Superintendent must be notified at least 24 hours before each scheduled delivery of plants to site, the Superintendent reserves the right to inspect the plant material.

3. Plants must not be damaged or allowed to dry out during transport. On arrival at the Site if not left in the transport vehicle/trailer, plants must be placed in a sheltered position and thoroughly watered from a suitable water supply and not allowed to dry out until required for planting. ***Transport***

4. If an on-site storage area for plants is necessary, the Contractor must provide details (including location, fencing and watering regime) of the proposed storage area in writing to the Superintendent for approval. ***On-site Storage***

5. Any on-site nursery for holding plants prior to planting must be a vermin proof compound of sufficient size, with provision for watering of plants and adequately protected from sun, wind, storm, theft and accidental damage by workers etc.

6. The Contractor must maintain any plants in an onsite storage area in the condition as supplied by the nursery.

7. Transplanted trees and other plant material to be replanted within the Site must receive root pruning and or preparation in accordance with accepted industry transplanting practice to ensure delivery on Site in good condition and ready for placement. ***Transplanted Stock***

8. Advanced Trees must receive root pruning or preparation in accordance with accepted industry practice prior to delivery to Site. ***Advanced Trees***

9. The Superintendent reserves the right to inspect and reject any plants not meeting the requirements of this specification. Root bound containers and plants that do not retain the root mass can be rejected by the Superintendent. Rejected plants must be replaced by approved stock at no additional cost to the Principal. ***Rejecting Plants***

304.41.03 PREPARATION OF PLANTING AREAS

1. The Contractor must ensure the accurate marking out of all planting areas, zones and edges of planting beds prior to beginning any planting operations, in accordance with the Drawings. ***Marking out Planting Areas***

2. The Contractor must confirm that adequate soil moisture is present at a minimum depth of 100 mm prior to starting any planting operations for tube and cell size plants. ***Soil Moisture***

3. Planting areas nominated in the Drawings for cultivation must be improved by the application of topsoil, fertiliser, soil additives and/or soil conditioners to the soil surface as specified and thoroughly mixed by rotor tilling the soil to 150 mm minimum depth to achieve a loose and friable condition, suitable for fine grading and planting. ***Cultivated Planting Areas/Beds***

4. In confined spaces, areas close to irrigation fixtures or inaccessible to machinery, the cultivation must be by hand.

5. Weed control matting and or mulch as specified must be applied over the cultivated surfaces of planting beds.

6. Where only individual planting holes are nominated in the Drawings, no cultivation to planting beds is to occur. ***Individual Planting Holes***

7. Only the individual planting hole is to be excavated and topsoil, soil conditioner, fertiliser and soil additives as specified must be added with the backfill.

8. Where specified weed control mats and/or mulch must be installed around each plant.

9. Areas nominated for ripline planting must be ripped to a minimum depth of 500 mm and at not more than 500 mm spacing at the layout shown in the Drawings. ***Ripline Planting***

10. Unless detailed otherwise in the Drawings rip and furrow in deep sand sites must have a furrow depth of 100 mm, with a width of 700 mm and be ripped to a minimum depth of 200 mm below the base of the furrow, at the spacing and layout shown in the Drawings. ***Rip and Furrow***

11. Unless detailed otherwise in the Drawings planting mounds must be a minimum 300 mm in height in wet areas and in dry areas 150 mm in height, at the spacing and layout shown in the Drawings. ***Mounding***

304.41.04 SETTING OUT OF PLANTING

1. The Contractor must set out individual plants within a planting area in accordance with the spacings, layout and setbacks shown in the Drawings. ***Setting out Planting***

2. For plants which have been given location coordinates, setting out will be to a tolerance of + or - 100 mm.

3. If not specified otherwise individual plants must typically be setback in accordance with Table 304.2 below. The Contractor must have regard for ***Planting Setbacks***

clear zone distances when planting non-frangible species where no safety barrier is present.

TABLE 304.2 TYPICAL PLANTING SETBACKS

Features	Shrubs or Ground Covers	Trees
Dual use paths	2 metres	3 metres
Painted edge line or kerb (with barrier), boundary fences, geodetic control points or drainage pits	3 metres	5 metres
Roadside furniture and light standards	3 metres	10 metres
Painted edge line or kerb (with no barrier)	5 metres	10 metres
Structures (with no planting under bridges)	3 metres	10 metres

4. If the placement of transplanted material or advanced plants is not nominated in the Drawings, the Contractor must request the Superintendent for direction on Site prior to setting out and planting. ***Advanced Plants***

304.41.05 PLANTING OUT – TUBE, CELL AND POTS < 140 MM

1. Prior to any planting into weed control matting, each individual planting hole must be prepared by first slitting open and laying back the matting to allow for each planting hole to be excavated and prepared for planting. ***Planting into Weed Control Matting***

2. Prior to any planting into mulch for 140 mm pots, the individual planting hole must be prepared by first moving clear sufficient mulch to allow for each planting hole to be excavated and prepared for planting and space for the excavated soil. ***Planting into Mulch***

3. For 140 mm pots any substandard excavated material from the planting hole or excess soil must be spread evenly around the planting hole, used to create a watering well around the plant or disposed of as specified. ***Sub-standard Material***

4. If not detailed in the Drawings, for cells and tubes each planting hole must be excavated vertically to accommodate the root ball of the plant, such that the top of the plant root ball finishes 15 mm below the existing ground surface and creates a watering saucer suitable for the size of the plant. ***Planting Hole***

5. If detailed in the Drawings a 10 g slow release native fertiliser tablet (low phosphorous), must be added to each planting hole or in accordance with the manufacturer's instructions. ***Fertiliser***

6. Individual plants must be removed from containers so as to minimise damage to leaves, stem and root ball. The root ball of plants must not be left exposed or allowed to dry out and planted without delay. ***Handling of Plants***

7. Individual plants must be placed in the planting hole and any backfill/surrounding material must be sufficiently firmed to eliminate air pockets and minimize settlement. Alternately plants can be watered in after planting to eliminate air pockets. ***Planting***

8. If detailed in the Drawings plant guards must be installed in accordance with the manufacturer's instructions. ***Guards***

9. The Contractor must ensure that measures are put in place to prevent the disturbance of planted areas, by equipment, vehicles, pedestrians and animal traffic following planting and during the Establishment Period. ***Disturbance of Planted Areas***

304.41.06 TRANSPLANTED AND ADVANCED PLANTS

1. Prior to installation of advanced/transplanted trees and where specified, root barriers must be installed in accordance with the manufacturer's instructions. ***Root Barriers***

2. Prior to any planting into weed control matting, each individual planting hole must be prepared by first slitting open and laying back the matting to allow for each planting hole to be excavated and prepared for planting. ***Planting into Weed Control Matting***

3. Prior to any planting into mulch, each individual planting hole must be prepared by first moving clear sufficient mulch to allow for each planting hole to be excavated and prepared for planting and space for the excavated soil. ***Planting into Mulch***

4. If not specified in the Drawings the planting holes must be excavated as per Drawing 201928-0058. ***Planting Hole***

5. For each planting hole any substandard excavated material or excess soil must be spread evenly around the planting hole, used to create a watering well around the plant or disposed of as specified. ***Sub-standard Material***

6. Rock and other unsuitable materials must be removed from the planting hole and not used as backfill or left on the surface and must be removed from site. ***Backfill***

7. Individual plants must be removed from containers so as to minimise damage to leaves, stem and root ball. The root ball of plants must not be left exposed or allowed to dry out and planted without delay. ***Handling of Plants***

8. Frayed or broken roots of bare rooted plants must be cut cleanly before planting. ***Bare Roots***

9. Plants must not be planted into standing water within an individual plant hole.

10. Individual plants must be placed in the centre of the planting hole and set plumb. The backfill must be firmed progressively and flooded with sufficient potable water after each backfill lift to consolidate the soil, eliminate air pockets and minimize settlement. ***Planting***

11. When planting on batter slopes a raised horizontal terrace must be formed as a watering saucer, down slope and equal to the diameter of the planting hole. ***Sloping Ground***

12. If not specified in the Drawings slow release native fertiliser (low phosphorous), must be added to each planting hole as per Drawing 201928-0058 in accordance with the manufacturer's instructions. ***Fertiliser***

13. Mulch must be respread so that the mulch tapers down to soil level 50 mm from the stem of the plant. ***Mulch***

14. If not specified in the Drawings plants in containers 5 litre or above, must be watered in immediately after planting in accordance with Drawing 201928-0058. ***Watering in***

15. If not specified in the Drawings plants in containers 5 litre or above, must be secured by plant ties to stakes in accordance with Drawing 201928-0058. Once installed any stakes and ties that were holding the plant from the nursery must be removed. ***Stakes and Ties***

16. If not specified otherwise in the Drawings, cables and/or guys must be installed such that the plant is held firmly with its trunk vertical. Cables in contact with the plant trunk must be covered with rubber hose or similar, to avoid damage to the plant tissue. ***Supporting Cables***

17. Tree grates; frames and/or guards must be installed as shown in the Drawings. Grates must be placed flush with the pavement and guards plumb. ***Tree Grates and Frames***

18. The Contractor must ensure that measures are put in place to prevent the disturbance of planted areas, by equipment, vehicles, pedestrians and animal traffic following planting and during the Establishment Period. ***Disturbance of Planted Areas***

304.41.07 PLANTER BOXES AND CONTAINERS

1. Planter boxes must be cleaned of any builder rubble, cement and or other materials that will be detrimental to plant health. The inside surfaces must be sealed as specified and in accordance with the sealant manufacturer's instructions. ***Planter Boxes***

2. If not specified, a blended soil mix must be prepared for raised planting beds and planter boxes that conform to the requirements of AS 4419 for organic sandy loam soils. The planter box must be backfilled with the specified soil mix, fertiliser and any specified soil additives and consolidated progressively by saturating with potable water. The soil level must be topped up to achieve the nominal finished surface level specified in the Drawings.

3. Plants must be placed and planted as specified in the Drawings.

304.42 GRASSING

304.42.01 GENERAL

1. Grass is to be established by turfing or from rhizomes (runners, stolons or sprigs) or by direct seeding or hydro-seeding as specified, using the species, variety and quantity specified in Annexure 304B.

2. The Contractor must carry out all grassing operations using horticultural best practice and equipment to achieve the completion criteria nominated in Annexure 304C.

3. Grass turf and grass runners must be kept moist at all times during transport and site storage and must be laid within 24 hours of being cut. ***Delivery on Site***

4. Grassing must be undertaken as soon as practical following construction activities to match the seasonal rainfall unless nominated otherwise in Annexure 304B. ***Timing***

5. Areas to be grassed must be treated to remove all existing grass and weeds prior to the grassing. ***Soil Preparation***

6. 75 mm of clean topsoil, soil additives and/or conditioners must be applied to the surface and thoroughly mixed by rotor tilling the soil to 150 mm minimum to achieve a loose and friable condition, suitable for fine grading and rolling.

7. The surface to be grassed must be free from debris and have a grade to allow water to drain with no surface ponding. ***Surface Grading***

8. The finish must be smooth and rolled to obtain an even well consolidated surface with no irregularities, depressions, hollows or abrupt changes in grades or levels.

9. All grading must be undertaken by hand or machine as appropriate, however only by hand within 500 mm of sprinklers or other fixed irrigation fixtures.

10. Twenty-four hours before the grassing operation, the area to be grassed must be watered thoroughly to a depth of 100 mm. ***Watering***

11. Grassing must only proceed after the completion of all necessary preliminary Works including weed control, minor earthworks, surface preparation, topsoiling and soil improvements, and the installation and commission of any specified irrigation systems.

12. Not less than 5 working days prior to commencing any grassing 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 the grassing operations;

(d) certificates are provided for each batch;

(e) details of the procedures, materials and equipment to be used are documented; and

(f) a program for the grassing 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.

304.42.02 GRASSING BY TURF

1. The areas to be turfed must be prepared and graded to a nominal soil level 50 mm below the adjacent levels to ensure the finished turf level is 25 mm below the adjacent surface level, allowing for future topdressing. ***Soil Preparation***

2. Before laying the turf, the Contractor must spread fertiliser suitable for turf grass establishment, over the surface and lightly rake the fertiliser into the surface while maintaining correct levels.

3. Immediately before laying turf, the soil must be watered to prevent drying out of grass roots.

4. The turf runs must be placed in straight line with each subsequent row parallel to, and tightly butted against each, staggering the lateral joints. ***Spreading and Rolling***

5. Turf edges must finish flush with adjoining surfaces and all joints must be tightly butted and the turf sods must not be stretched or overlapped.

6. After placement the turf must be diagonally rolled and thoroughly watered to a depth of 100 mm within two hours of laying.

304.42.03 GRASSING BY STOLONS

1. The soil surfaces to be grassed by the use of grass stolons, must be prepared and graded to provide a smooth, firm surface true to grade and finished a nominal 10 mm below adjacent surface levels. ***Soil Preparation***

2. Before spreading the stolons, the Contractor must spread fertiliser suitable for grass establishment, over the surface and lightly rake the fertiliser into the surface while maintaining correct levels.

3. Grass must be planted at the rate of 1 m² of turf shredded and applied as stolons over a maximum area of 10 m² of soil, unless specified otherwise in the Drawings or Annexure 304B. ***Grassing Rate***

4. The stolons must be spread in two equal directions in transverse directions over the area to be grassed to form an interlocking mat, with the spaces between the stolons not exceeding 300 mm in any direction. ***Spreading***

5. The stolons must then be rotary hoed into the soil to a depth of between 50 mm to 100 mm. Where necessary in confined spaces, the stolons must be spaded in by hand.

6. After planting, the area must be lightly raked and rolled to produce an even, level surface or plane, free of wheel marks, waves, depressions or other irregularities. ***Rolling***

7. All areas must be thoroughly watered to a depth of 100 mm within two hours of planting. ***Watering***

304.42.04 GRASSING BY SEED

1. Grassing of areas from seed by hydro-seeding or by dry seeding must be as specified and using horticultural best practice. ***Seeding***

304.42.05 CARE AND ESTABLISHMENT OF GRASSING

1. The Contractor must protect all newly grassed areas from trespass and traffic until the grass is well established. Protective fencing must be clearly visible to all traffic day and night, and not constitute a safety hazard. ***Protection***

2. All grass areas must be given additional applications of fertiliser in accordance with good horticultural practice during establishment. ***Fertilising***

3. Grassed areas must be watered on a regular basis as required to establish and maintain grass growth in a healthy condition. ***Watering***

4. All grassed areas must be mowed and edged as necessary to maintain a neat appearance in accordance with good horticultural practice during the Establishment Period. Grass must be maintained within the nominal height range of 30 mm to 50 mm. ***Mowing***

5. Once established, a top dressing of clean sand or topsoil as specified must be applied to a depth of 10 mm to take up any slight irregularities in the surface. ***Top Dressing***

6. Where grass fails to establish the affected areas must be retreated in accordance with the relevant clauses.

7. The Contractor must lift all failed turf and relay with new turf. ***Replacement***

304.43 TEMPORARY WATERING SYSTEMS

1. The Contractor must provide for a temporary water delivery system by sprinkler, water truck with a spray boom/hose, or other method to distribute a uniform coverage of water to those landscaped areas not nominated for an irrigation system as required during the Establishment Period. ***Temporary Water Delivery System***

2. The Contractor must supply details of the system and water source for the Superintendent's confirmation prior to use at Practical Completion. It is the Contractors responsibility for any permits, fees or charges to install water connections and draw water from these connections. ***Details of Water Supply***

3. Any temporary watering system installed must be maintained in good working order to avoid leakage, loss of water and soil erosion. Where water trucks are used these must not be driven onto the landscaped areas.

4. If not specified otherwise, all landscaped areas of the Works must be watered at sufficient frequency and rate to establish and maintain all planted and grassed areas and achieve the required standard specified for acceptance of the Works. The watering rate can include any rainfall events. ***Watering Rates and Frequency***

5. Watering of grass seeded areas must be applied in a fine spray to minimize disturbance or displacement of materials. The force of water (volume and pressure) must not cause displacement of soil. Watering must not spray onto or flow across or pond on paved areas.

6. Watering of advanced plants is to be applied so the force of water (volume and pressure) does not cause displacement or failure of the watering dish. ***Watering of Advanced Plants***

7. Any physical components installed for this temporary irrigation system must be removed at the end of the Establishment period, including disconnection any water connections. Where this removal disturbs soil levels these are to be reinstated to the original level and condition, including mulch. ***Removal***

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. ***Roadside Revegetation Signs***

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. ***Tidying up***

2. Prior to the commencement of the Establishment Period the Contractor must ensure that: ***Completion of Works***

   (a) any areas of plantings or grassing by turf must have been installed for a minimum of 7 days;

   (b) any areas of grassing by stolons must have been installed for a minimum of 14 days;

   (c) As-constructed Drawings detailing all seeding, planting and grassing 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;

   (d) any permanent irrigation system has run on a pre-defined automatic program for at least 7 full days prior to completion of Works;

   (e) any temporary system that is proposed has been run, tested and is ready for use when required;

   (f) a **Vegetation Establishment Program** for the Works is documented and submitted to the Superintendent for approval; and

   (g) 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. ***Notice for Inspection***

4. **The Contractor must certify to the Superintendent that all the revegetation and landscaping works have been completed in accordance with the requirements of the Contract and seek approval to commence the Establishment Period.** ***HOLD POINT***

304.46 ESTABLISHMENT PERIOD

1. The Contractor must establish and monitor the condition and development of the Works during the Establishment Period as nominated in Annexure 304A.

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. ***Vegetation Establishment Program***

3. The designated activities to establish the Works must include but not be limited to: ***Establishment Activities***

   (a) ongoing and regular weed control;

   (b) mowing and watering of grassed areas as per Clause 304.42.05;

   (c) regular watering of transplanted and advanced plants, pruning (if required) and maintenance of tree stakes, tree ties, tree guards and grates (including removal if required);

   (d) operation of the irrigation system, including monitoring water flows to each zone to ensure they meet the irrigation design and provide the monthly water meter readings to the Superintendent;

   (e) inspection and maintenance of irrigation system, as required adjust the height of all sprinkler heads, valve boxes and any other part of the irrigation system;

   (f) progressive repair and replace any erosion rills in soil surfaces, to meet the acceptance criteria in Annexure 304C;

   (g) top up and as appropriate replacement of mulch to maintain original mulch levels;

   (h) repairs and replacement of damaged or failed areas of grassing, seeding, hydro-mulching or hydro-seeding, to meet the acceptance criteria in Annexure 304C;

   (i) progressive replacement of both plants that have failed or damaged plants that do not meet the acceptance criteria in order to meet the acceptance criteria in Annexure 304C; and

   (j) 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.

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.

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. ***Establishment Period Extension***

304.47 MONITORING PROGRAM

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. ***Monitoring and Reporting***

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. ***Monitoring Program***

3. Each monitoring report must: ***Monitoring Reports***

   (a) outline the Works undertaken during the reporting period;

   (b) compare development of revegetation and landscaping 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 Landscaping and Revegetation Handover Report. The handover report must include: ***Handover Report***

   (a) the final monitoring report;

   (b) record the location and details of any equipment such as irrigation installed as part of the landscaping and revegetation works;

   (c) record any outstanding defects for correction and the proposed timing; and

   (d) 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. ***As-constructed Drawings***

3. As-constructed Drawings must be completed detailing all seeding, planting and grassing works signed by a suitably experienced and qualified person, in environmental, botanical, horticultural and/or related fields who is familiar with Main Roads' requirements.

4. As-constructed Drawings must be completed detailing the irrigation system showing as-constructed details, specifications and site measured locations of all main components from a permanent fixed structure.

5. If requested, the Contractor must provide training in the setup and operation (function and programming procedures) of the irrigation system to nominated representatives of the Principal before the end of the Establishment Period. ***Training in the Irrigation System***

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 landscaping and revegetation 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 24 months)

3. The Defects Liability Period for the Irrigation System is: …….. (minimum 1 year following handover)

4. 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

5. 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

Species	Size	Quantity
Or insert "Refer to Drawing Number …"		

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

Planting Location	Amount	Notes
Or insert "Refer to Drawing Number …"		

5. GRASSING REQUIREMENTS

Type	Details
Grass Turf	
Grass Stolons	
Grass Seed	

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		
Planting		
Grassing		
Transplanting		
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)

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Plants surviving (%) within each representative plot	95	80	70
Species richness (% of the species planted still present) within each nominated planting zone	100	90	85
Surviving plants meeting acceptance criteria (%)	100	95	90
Healthy foliage cover of weeds (%) within each nominated planting zone	<2	<5	<10
Foliage cover, or demonstrated progress towards this level by monitoring reports (%)	>5	>10	>50

2. PLANTINGS (IRRIGATED)

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Plants surviving (%)	95	90	85
Species richness (% of the species planted still present) within each nominated planting zone	100	95	90
Surviving plants meeting acceptance criteria (%)	100	100	100
Healthy foliage cover of weeds (%) within each nominated planting zone	<2	<5	<10
Weed free zone (0.5 m radius) around base of each plant	100	100	100

3. ADVANCED PLANTINGS

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Plants surviving (%)	100	95	95
Plants meeting acceptance criteria (%)	100	100	100
Weed free zone (1 m radius) around base of each plant	100	100	100

Acceptance criteria for all plants (non-irrigated, irrigated and advanced) is:

(a) Plants are well formed and exhibit signs of healthy growth.

(b) Plants are free of disease symptoms e.g. yellowing, wilting, etc.

(c) Plants are free from signs of insect pests.

Representative plot is two or more randomly selected plots (10 m x 10 m or equal area) per nominated planting zone/landscaping mix within the project area.

4. IRRIGATION

Acceptance criteria for irrigation is full compliance with the specifications for product, material and construction requirements, and shown to be fully functional.

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/landscaping 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/grassing zones within the project area.

8. GRASSING (IRRIGATED)

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Grass cover (%) within each representative plot	>90	>95	100
Compliance with acceptance criteria (%)	100	100	100

9. GRASSING (NOT IRRIGATED)

Criterion	12 weeks after Completion	After one Autumn	At Final Completion
Grass cover (%) within each representative plot	>70	>80	100
Compliance with acceptance criteria (%)	100	100	100

Acceptance criteria for all grass (irrigated and non-irrigated) is:

(a) Grass is well formed and exhibit signs of healthy growth.

(b) Grass is free of disease symptoms e.g. yellowing, wilting, etc.

(c) Grass is free from signs of insect pests.

Representative plot is two or more randomly selected plots (10 m x 10 m or equal area) per nominated grassing zone within the project area.

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

Criterion	12 weeks after Completion	End of second Spring	At Final Completion
Number of species within each representative plot	>1	>2	>5
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 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: **LANDSCAPING AND REVEGETATION** Revision No: _____

Project Manager: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

Contract No: _____ Contract Name: _____

ITEM	DESCRIPTION	SIGN OFF
Note: All changes/amendments must be shown in tracked changes until approved.		
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: _____