

<b>G. LANDSCAPING</b>
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**7 LANDSCAPE - SOILS****7.1 STANDARDS****Soils**

Site and imported topsoil: To AS 4419 (2018).

**7.2 INTERPRETATION****Definitions**

General: For the purposes of this worksection, the definitions given in AS 4419 (2018) and the following apply:

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is, or becomes, soft, wet or unstable.
- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
  - . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
  - . Medium: Sandy loam, fine sandy loam.
  - . Coarse: Sand, loamy sand.
- Site rock: Rocks selected for salvage.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
  - . Stones more than 25 mm diameter.
  - . Clay lumps more than 50 mm diameter.
  - . Weeds and tree roots.
  - . Sticks and rubbish.
  - . Material toxic to plants.
- Soil blend: A landscape soil derived from the blending of two or more of sand, natural soil material or organic materials, and with a bulk density and organic matter content to meet site specific requirements.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

**7.3 SITE INVESTIGATION****Notice**

Requirement: If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies.
- Rock.
- Springs, seepages.

- Topsoil less than 100 mm deep.

**7.4 SUBMISSIONS****Certification**

Compost: Submit certification as evidence of compost pH value.

**Execution details**

Program: Submit a work program in the form of a bar chart, for the landscape works.

**Products and materials**

Supplier's data: Submit supplier's data including the following:

- Material source of supply.
- Type tests: Submit test results for the following:
  - Imported topsoil: To **TESTING**.

**Samples**

Requirement: Submit samples to **PRODUCTS, Samples**.

**Subcontractors**

General: Submit names and contact details of proposed suppliers and evidence of the following, if appropriate:

- Experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of materials to the site.

**Tests**

Site tests: Submit test results for the following:

- Site topsoil: To **TESTING**.

**7.5 INSPECTION****Notice**

Inspection: Give notice so that inspection may be made of the following:

- Subgrades cultivated or prepared for placing topsoil.
- Topsoil spread before planting.
- Grassing bed prepared before turfing, seeding or temporary grassing.

**7.6 PRODUCTS****Samples**

Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, provide a 1 kg sample of each type documented.

**7.7 TOPSOIL****General**

Properties: Conform to the following:

- Decompacted.
- Aerated.
- Free draining.
- Free of contamination from construction waste.

Deliveries: Documentation to AS 4419 (2018) clauses 6 and 7.

Additives: If using additives to ameliorate topsoil conform to the relevant criteria of AS 4419 (2018).

Compost: Well-rotted vegetative material or animal manure, free from harmful chemicals, grass and weed growth to AS 4454 (2012) and to the organic content by mass, as documented.

**Source**

General: If the topsoil of documented quality cannot be provided from material recovered from site, provide imported topsoil.

Mix proportion (loam:sand): 1:1.

**Site topsoil**

Requirement: Site topsoil, as documented.

Soil blend: If required, stripped natural soil with sand and/or organic matter and recommended ameliorants.

**Imported topsoil**

Requirement: Imported topsoil to AS 4419 (2018) Tables 1, 2 and 3, and as documented.

**Imported topsoil particle size table (% passing by mass)**

Sieve size (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

**Imported topsoil nutrient level table**

Nutrient	Unit	Sufficiency range
Nitrate-N (NO <sub>3</sub> )	mg/kg	> 25
Phosphate-P (PO <sub>4</sub> ) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO <sub>4</sub> ) – P sensitive	mg/kg	< 28
Phosphate-P (PO <sub>4</sub> ) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulfate-S (SO <sub>4</sub> )	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

**Method References**

pH in H<sub>2</sub>O (1:5), pH in CaCl<sub>2</sub> (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1.  
 Soluble Nitrate-N by APHA 4500.  
 Soluble Chloride by Rayment and Lyons 2011 modified method 5A2.  
 Extractable P by Mehlich 3 – ICP.  
 Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP.  
 Extractable S by Mehlich 3 – ICP.  
 Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP.

**7.8 STRUCTURAL SUPPORT SOIL**

**General**

Requirement: To AS 4419 (2018) Tables 4 and 5, and as documented.

**7.9 TESTING**

**Topsoil tests**

Sampling: To the recommendations of AS 4419 (2018) Appendix A.

Method: Test as follows:

- Landscape soils: To AS 4419 (2018) Table 1.
- Low density soils: To AS 4419 (2018) Table 2.
- Soils for turf and lawns: To AS 4419 (2018) Table 3.
- Structural support soils: To AS 4419 (2018) Table 4.

**Test report**

Requirement: Prepare a test report including the following:

- General:
  - . Suitability of the soil for documented use.
  - . Suitability for establishment and ongoing viability of the documented site vegetation.
  - . Presence of any weed propagules or contaminants.
- Site topsoil:
  - . Contaminant removal.
  - . Weed eradication: Species and eradication method.
  - . Soil amelioration: If required, the source of ameliorant materials, rates and methods of incorporation and recommendations for use in bushland restoration areas, planting on grade and grass mixes.
- Imported topsoil:
  - . Similarity to naturally occurring local soil.
  - . Soil amelioration: If required, the source of ameliorant materials, rates and methods of incorporation.

**7.10 PREPARATION**

**Vegetative spoil**

Spoil suitable for bushland restoration: Spread freshly harvested native plant biomass, free of weed propagules.

Unsuitable material: Remove vegetative spoil from site. Do not burn.

**Embankment stabilisation**

Requirement: If necessary to prevent erosion or soil movement, stabilise embankments with matting.

Matting overlay material: Biodegradable fibre reinforced with lightweight polymer mesh, coir.

- High erosion zones: Flexible carbon black UV stabilised interwoven nylon mesh.

Matting overlay pegs: U-shape galvanized steel, at 1000 x 1000 mm intervals generally, 250 mm at overlaps.

Matting overlay installation:

- If seeding is required, sow before installing lightweight matting.
- If planting is required, plant after installing medium or heavy weight matting.
- Peg the matting into 300 x 300 mm anchor trenches at top and bottom, backfill the trenches with soil and compact.

### 7.11 ROCK WORK

#### New rock work

Erosion control: Protect the weathered faces from damage.

Site rock: Stockpile for future placement and accessibility for lifting. Dispose of other rock off site.

Imported rock: Provide rock that has been selected before delivery.

### 7.12 EARTH MOUNDS

#### Construction

Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1 (2007). Minimise slumping and further compacting.

Edges: Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles with no distinct joint.

Existing trees: Maintain the natural ground level under the canopy.

Pipes, culverts and associated structures: Construct mounding to avoid unbalanced loading.

Drainage: Construct mounds to allow free drainage of surface water and to eliminate ponding.

### 7.13 SUBSOIL

#### Ripping

General: Rip parallel to the final contours. Do not rip if the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Subsoil: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

#### Planting beds

Excavated: Excavate to reduce the subsoil level to at least 300 mm below finished design levels.

Shape the subsoil to fall to subsoil drains, if required. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, rubbish and other debris. Reduce the planting bed level to 75 mm below finished design levels.

#### Cultivation

Requirement: As documented.

Minimum depth: 100 mm.

Services and roots: Do not disturb services or tree roots. If required, cultivate these areas by hand.

Cultivation: Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

#### Additives

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented.

Gypsum: Incorporate at the rate of 0.25 kg/m<sup>2</sup>.

#### Herbicides

General: Before spreading topsoil apply a herbicide treatment.

### 7.14 PLACING TOPSOIL

#### Site topsoil preparation

Screening: By a power hydraulic screen capable of handling 100 tonne per hour, with sieves grading from 20 to 15 mm.

Additives: During the screening process add the following:

- 15% by weight coarse sand minimum particle size 0.2 mm.
- Ameliorants materials to the recommendations of the test report.
- Additives program: 8 weeks before stolonising or turfing.

Waste: Remove from site all clay lumps, balled compacted particles greater than 20 mm, stones and rubbish foreign to the normal composition of soil.

Contamination: If diesel oil, cement or other phytotoxic material has been spilt on the site topsoil, excavate the contaminated soil and dispose of the soil off-site.

#### Placing topsoil

Topsoil: Do not incorporate topsoil into the works until soil testing results have been approved. Remove unauthorised material from the site.

Spreading: Spread the topsoil on the prepared subsoil and grade evenly, making allowances, if appropriate, for the following:

- Required finished levels and contours after light compaction.
- Grassed areas finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Steep batters: If using a chain drag for spreading, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

#### Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface that has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

#### Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:

- . Organic mulch: 225 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds and public parks): 200 mm.
- Non-irrigated grass areas: 100 mm.
- Earth mounds:
  - . Mass planted surfaces: 300 mm.
  - . Grassed surfaces: 100 mm.
- Top dressing: 10 mm.

**Surplus topsoil**

General: Spread surplus topsoil on designated areas on-site or dispose off-site.

**7.15 PLACING STRUCTURAL SUPPORT SOIL****Preparation**

Existing soil: Remove.

Subsoil: Break up the surface and shape to drains. Remove rock.

**Construction**

Spreading: Maintain a self-draining surface.

Compaction: To **E. PRELIMINARY SITE PREPARATION, EARTHWORKS, PLACING FILL, Compaction.**

Protection: Limit the size of compaction equipment or compact by hand to prevent damage.

Moisture content: Adjust the moisture content at the time of works to 12.5% of the optimum moisture content to AS 1289.5.4.1 (2007).

Contaminated structural soil: If contamination occurs after placing, excavate and dispose off-site.

Surplus structural soil: Remove.

**8 LANDSCAPE - NATURAL GRASS SURFACES****8.1 SUBMISSIONS****Certification**

Turf: Submit the supplier's certification as evidence that turf is free from diseases, pests and weeds at the time of delivery.

**Execution details**

Program: Submit a work program for the natural grass surfaces landscape works.

Maintenance program: Submit a proposed maintenance program.

Material storage on site: Submit proposal.

**Products and materials**

Supplier's data: Submit supplier's data including the following:

- Material source of supply.
- Evidence of experience in supply of the required material.
- Production capacity for material of the required type and quantity.
- Lead times for delivery of material to the site.

**Samples**

Requirement: Submit samples to **GENERAL PRODUCTS, Samples.**

**8.2 INSPECTION****Notice**

Inspection: Give notice so that inspection may be made of the following:

- Clearing completed.
- Setting out completed.
- Grassing bed prepared before turfing.
- Grassing or turfing completed.

**8.3 PRODUCTS****Samples**

Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

**8.4 GRASS****Turf**

Supplier: A specialist grower of cultivated turf.

Quality: Provide turf of even thickness, free from weeds, pests, disease and other foreign matter.

Turf properties: Provide turf with the following properties:

- Consisting of 25 mm deep, dense, well-rooted, vigorous grass growth in 25 mm deep topsoil.
- Drought tolerant.

Turf dimension:

- Roll width: Minimum 300 mm, in sound unbroken condition.
- Length: Minimum 1.5 m.

**Stolons**

Description: Well-established fibrous runners 50 to 100 mm in length, with minimum green leaf material.

Supplier: A specialist grower of cultivated turf.

**8.5 FERTILISER****General**

Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers.

**Labelling**

General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Label type: To withstand transit without erasure or misplacement.

**8.6 ACCESSORIES****Grass reinforcement**

Description: Lightweight interlocking plastic cellular paving system suitable for pedestrian and occasional vehicular traffic including emergency vehicles.

**8.7 PREPARATION****Existing grass removal**

Herbicide: Spray existing grass with a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum rate.

Manual removal: Remove existing grass layer a minimum 2 weeks after application of herbicide.

**Weed eradication**

Herbicide: Conform to the following:

- Method: Eradicate weeds using environmentally acceptable methods conforming to the *Health (Pesticides) Regulations 2011 (WA)*, such as a non-residual glyphosate herbicide, at the recommended maximum application rate.
- Timing: With sufficient timing before establishment of turf and as recommended by the plant supplier.

Manual weeding: Remove weed growth throughout grassed areas.

**Vegetative spoil**

Disposal: Remove vegetative spoil from site. Do not burn.

**Soil preparation**

Subsoil: To LANDSCAPE - SOILS, **SUBSOIL**.

Site topsoil or imported topsoil: To LANDSCAPE - SOILS, **TOPSOIL**.

Levelling: Remove any debris. Level and shape the dry soil surface. Allow maximum 30 mm set-down to hard surfaces for turf and stolons.

**Fertiliser**

Soil improvement: Spread the fertiliser evenly over the cultivated bed a maximum 48 hours before placing grass as follows:

- Turfing and stolonising: Mix the fertiliser thoroughly into the topsoil before placing the turf or stolons.

**8.8 TURFING****Preparation for turfing**

Requirement: Prepare planting area for turfing as follows:

- Remove any rubbish, rubble, stones and roots.
- Rotary hoe: To a minimum depth of 150 mm. Provide runners with minimum 50 mm soil cover.
- Soil improver: Apply to manufacturer's recommendations.
- Wetting agent: Apply to manufacturer's recommendations.
- Watering: Keep moist to 100 mm deep before planting.
- Light rolling: Lightly roll to form an even, levelled surface without wheel ruts.
- Level: If turfing areas are adjacent to paving, make sure soil level is 50 mm below the top of paving.

**Supply**

Elapsed time: Deliver the turf and lay within 24 hours of cutting. Prevent turf from drying out between cutting and laying. If not laid within 24 hours of cutting, roll turf out on a flat surface with the grass up and water as required to maintain a healthy condition.

**Fertilising**

Requirement: Mix the fertiliser thoroughly into the topsoil before placing the turf with a slow release fertiliser applied to the manufacturer's recommendations.

**Application**

Requirement: Do not install turf on slopes steeper than 1:3.

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas and with contours on slopes.
- Finish flush, after tamping or rolling, with adjacent finished surfaces of ground, paving edging areas.

Laying: Close butt the end joints and space the turf strips 300 mm apart. Lay top dressing between the turf strips. Finish with an even surface.

Tamping or rolling: Lightly tamp or use a turf roller to provide to an even surface immediately after laying.

Stabilising on steep slopes: Peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

**Watering**

General: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

**Initial establishment**

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

**8.9 STOLONISING****Preparation**

General: Moisten topsoil to full depth.

**Supply**

Elapsed time: Deliver stolons to the site within 24 hours of harvesting and plant within 36 hours of arrival on site. Prevent stolons from drying out between harvesting and planting.

**Application**

General: As documented.

Method: Using a disk sprigger or row planter, mechanically sprig the stolons into the prepared soil to a minimum depth of half the stolon length, at maximum 150 mm centres in both transverse directions over the whole of the planting area, and extending 1 m into adjacent grassed areas.

Stimulant: Three days after planting, spray with hormone root growth stimulant.

Erosion areas, slopes and swales: Immediately after planting, spray with binder at the rate of 250 L/ha.

**Watering**

General: Water thoroughly on completion of planting. Keep the topsoil moist to full depth.

**Initial establishment**

General: Replant areas that fail to grow.

**8.10 TEMPORARY GRASSING****Preparation**

General: If a prepared area becomes compacted before sowing begins, rework the ground surface before sowing.

**Application**

General: As documented.

Method: Evenly distribute the seed using purpose made sowing machinery. Lightly rake the surface to cover the seed.

Cover crop density: Sufficient to hold the soil and prevent erosion.

Minimum coverage: No bare areas greater than 50 mm in diameter to 90% of the documented area, and no bare areas greater than 200 mm to 100% of the area.

Reseeding: Reseed areas where the seed fails to germinate within three weeks of the date of original sowing and within 3 months if required densities have not been met. Continue to reseed at minimum monthly intervals with an additional soil preparation as required, until required densities are met.

**Watering**

General: Immediately after sowing, water to a depth of 100 mm. Continue watering until germination and establishment.

After establishment: Water as required to maintain seed material in a healthy condition.

**Establishment**

General: Maintain temporary grassing areas until no longer required.

Weeding: Remove weeds that emerge in newly established areas.

Reseeding: Reseed over the course of the contract to maintain required densities.

**8.11 GRASS REINFORCING****Installation**

General: Install to the manufacturer's recommendations and as documented.

Preparation: Excavate to required levels and compact subgrade.

Base course: Place and compact either of the following:

- Non-calcareous, free-draining washed sand, comprising 80% 0.1 to 1.0 mm grading.
- 1.0 to 5.0 mm gravel aggregate.

Base course depth:

- Pedestrian walkways: 100 mm.
- Passenger vehicles: 150 mm.
- Heavy vehicles: 250 mm.

Growing media: 80:20 (sand:organic sandy soil) mix.

Grass reinforcement: Place on base course and interlock. Spread growing media over grass reinforcement to heights as follows:

- Turfed areas: 5 mm.

Protection: Prevent traffic until the root system is established and anchored to the base course.

**8.12 COMPLETION****Existing grass**

General: If existing grass is within the landscape contract area, maintain it as for the corresponding species of new grass.

**Grassed areas**

Maintenance: Start grass maintenance works at the completion of sowing and turfing. Maintain healthy weed-free growth.

**Records**

Logbook: Keep on site and make available for inspection a logbook, recording the following:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

**9 LANDSCAPE - PLANTING****9.1 SUBMISSIONS****Certification**

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Compost: Submit a certification as evidence of compost pH value.

**Execution details**

Alternative materials for ground cover: If proposed, submit proposal.

Planting machine: If a planting machine is to be used as an alternative to hand planting, submit proposal.

Spraying: Submit proposal.

Plants – open rooted stock: If open rooted stock is to be used, submit proposal.

Material storage on site: Submit proposal.

**Products and materials**

Supplier's data: Submit supplier's data including the following:

- Material source of supply.

**Samples**

Requirement: Submit samples to **GENERAL PRODUCTS, Samples**.

**9.2 INSPECTION****Notice**

Inspection: Give notice so that inspection may be made of the following:

- Plant holes excavated and prepared for planting.
- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of planting establishment work.

### 9.3 PRODUCTS

#### Samples

Requirement: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, provide a 1 kg sample of each type documented with required test results.

### 9.4 SOIL CONDITIONING COMPOST

#### Compost

Type: Mature soil conditioning compost free from harmful chemicals, grass and weed growth.

Application rate: Apply at an application rate that accounts for the immediate fertiliser equivalence of the compost as part of the overall fertiliser management schedule.

Particle size as a soil conditioner, pH, physical and chemical contaminants: To AS 4454 (2012) Table 3.1(A).

Mature compost: To AS 4454 (2012) Appendix N Table N3.2.

#### Soil conditioning properties

Chlorine content: Less than 1000 mg/kg to Rayment and Lyons 2010 test method.

#### Compost fertiliser equivalence properties values

Requirement: Establish the following values for each type of soil conditioning compost to Rayment and Lyons 2010 test methods:

- Nitrogen content (kg/ton):
  - . Total N.
  - . Nitrate.
- Phosphorus content (kg/ton):
  - . Total P.
  - . Colwell P.
- Plant-available Potassium (kg/ton).

### 9.5 FERTILISER

#### General

Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers, as documented.

Application rate: Vary the application rate to allow for the plant-available immediate fertiliser equivalence value of the soil conditioning compost.

#### Labelling

General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

### 9.6 MULCH

#### General

Type: Composted or pasteurised mulch to AS 4454 (2012). Free of deleterious and extraneous matter including soil, weeds, plastic, metal, paint, rubber and sticks. Do not include fine mulch.

Particle size: ≤ 20 mm.

Physical and chemical contaminants: To AS 4454 (2012) Table 3.1(A).

#### Organic mulch types

General: Free of stones.

Brush chippings and leaf litter: Vegetative material processed through a chipper as follows:

- Material permitted: Leaf matter and tree loppings from *Eucalyptus*, *Tristania* and *Pinus* species.
- Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow, and declared (noxious) weeds.

Pine bark: From mature trees, free from wood slivers.

Pine flake: *Pinus* species sapwood slivers, including fragments of pine bark.

Straw: Cereal straw, wood fibre or other suitable vegetative material (but not meadow hay) free from weeds and seeds, applied in conjunction with a bitumen emulsion or polymer binder.

#### Inorganic mulch types

Washed river pebble: Uniform size or graded material in the size range 6 to 10 mm.

Decomposed granite gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour and low plasticity.

Crushed quartz: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Marble chip gravel: Uniform size or graded material in the size range 5 to 20 mm, of uniform colour.

Slate: Plum slate slivers in the size range 5 to 25 mm.

Shale: Uniform size or graded material, no particles smaller than 0.1 mm diameter.

Scoria: Uniform size or graded material.

#### Binders

General: Materials suitable for cold spray application to stabilise mulched surfaces on banks or high erosion areas.

### 9.7 PREPARATION

#### Weed eradication

Herbicide: Eradicate weeds using environmentally acceptable methods conforming to the *Health (Pesticides) Regulations 2011 (WA)*, such as a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum application rate.

Manual weeding: Regularly remove weed growth by hand throughout grassed, planted and mulched areas. Remove weed growth from an area of 750 mm diameter around the base of the trees in grassed areas. Continue weeding throughout the course of the works and during the planting establishment period.

#### Vegetative spoil

Disposal: Remove vegetative spoil from site. Do not burn.

#### Fertiliser

Requirement: Fertilise all new planting areas with an organic fertiliser and pelleted fowl manure.

#### Shrub planting areas

Requirement: Prepare planting areas as follows:

- Remove weeds, rubbish, rubble and other foreign materials.
- Rake the area clean and level, to the following levels:
  - . 100 mm below grassed area.
  - . 50 mm below mowing edges.
  - . Minimum one brick course below the damp-proof course of buildings.
  - . Levelled with bitumen or concrete driveways.

## 9.8 PLANTING

### General

Requirement: Provide plants to LANDSCAPE - PLANT PROCUREMENT and as documented.

Plant location and spacing: Conform to the Water Corporation's requirements. If necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly or for other reasons, give notice.

### Planting conditions

Weather: Do not plant in unsuitable weather conditions, including extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation if the soil is wet or during frost periods.

### Watering

Timing: Thoroughly water the plants at the following stages:

- Before planting.
- Immediately after planting.
- In the days leading up to the date of practical completion.
- As required to maintain growth rates free of stress.

### Preparation

Individual plantings in grassed areas: Prepare for planting as follows:

- . Shrubs and groundcover: Provide a hole with 75 to 100 mm clearance around the rootball.
- . Trees: Provide a hole twice the diameter of the rootball.
- Break up the base of the hole to a further depth of 100 mm.
- Loosen compacted sides of the hole to prevent confinement of root growth.

Ripline planting: Prepare for planting as follows:

- Rip the row and excavate a plant hole for each plant large enough to accept the rootball plus 0.1 m<sup>3</sup> of backfilling with topsoil.
- Clear weeds and other vegetative material within 300 mm radius of the plants.
- If planting holes are excavated by mechanical means, increase the hole size by 100 mm and loosen compacted sides to prevent confinement of root growth.

### Placing

General: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the rootball. Make sure that the rootball is moist.

- If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant rootball 100 to 200 mm below the finished surface of the surrounding soil.

### Fertilising

Requirement: Apply fertiliser for each plant at the time of planting.

### Backfilling

General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the rootball, so the plant stem remains the same height above ground as it was in the container. Avoid mixing mulch with topsoil.

### Watering basins for plants in grassed areas

Location: To each individual plant not located in irrigated grassed areas or naturally moist areas.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

## 9.9 MULCHING

### Placing mulch

General: Place mulch to the required depth and clear of plant stems, so that after settling it conforms to the following:

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation bed.
- Gravel mulches: Not closer to the stem than 50 mm.

Extent: Provide mulch to 750 mm diameter to surrounds of plants planted in riplines and grassed areas.

Depths:

- Organic mulch: 75 mm.
- Gravel mulch: 50 mm.

Stabilisation:

- Leaf litter, pine flake and pine bark: Provide stabilisation on slopes greater than 1:3.
- River pebbles and gravels: Do not use on slopes greater than 1:6.

Installation:

- In ripline and grassed areas: Place mulch to 750 mm diameter around plants.
- In mass planted areas: Place after the preparation of the planting bed but before planting and other work.
- In smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.



## 9.10 TREATMENT

### General

Pest attack or disease: If evidence of pest attack or disease of plant material is discovered, immediately give notice.

### Physical removal

General: Remove pest infestation and diseased plant material by hand if appropriate.

### Pesticide

Product: Spray with insecticide, fungicide or both, as required.

## 9.11 STAKES AND TIES

### Stakes

Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one-third of their length, avoiding damage to the root system. Position on the prevailing wind side of each plant.

Stake sizes and quantities:

- 13 L trees: Two 35 x 35 x 1500 mm stakes per tree.
- 45 L trees: Three 50 x 50 x 1800 mm stakes per tree.

### Ties

General: Provide durable non-abrasive plastic ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely so as not to restrict plant growth.

### Marker stakes

Material: Timber offcuts 25 x 25 x 1200 mm. Dip the top 200 mm in white paint.

Installation: Drive firmly into the ground at least 300 mm from the plant. Do not tie to the plant.

Location of marker stakes:

- Trees in grass: Mark each tree.
- Ripeline planting areas: Mark each ripeline at every fifth plant along the line.

### Protectors

Individual plantings in grassed areas: Fit with plastic stem protectors.

Trunk protection: Fit with collar guards made of 200 mm length of 100 mm diameter agricultural pipe split lengthways.

## 9.12 COMPLETION

### Cleaning

Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

### Operation and maintenance manuals

Requirement: Prepare a manual that includes recommendations for maintenance of plants.

## 10 IRRIGATION

### 10.1 RESPONSIBILITIES

#### Performance

Requirements:

- Achieve the documented flow rates over the irrigated area.
- Meet statutory requirements for backflow prevention.

### 10.2 STANDARDS

#### Water supply

General: To AS/NZS 3500.1 (2021).

Backflow prevention and water efficiency: To PCA (2022).

### 10.3 INTERPRETATION

#### Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- LDPE: Low-density polyethylene.

#### Definitions

General: For the purposes of this worksection, the following definitions apply:

- Emitter: A device used to control the rate at which water is applied to a specific area.

### 10.4 SUBMISSIONS

#### Execution details

Irrigation plan: Before installation, submit an irrigation plan in pdf format.

Programmable tap timer: If a programmable tap timer is to be used as an alternative to irrigation controllers in small garden areas, submit proposal.

#### Shop drawings

General: Submit drawings and schedules showing the layout and details of the system, including the following:

- Micro-irrigation stake layout.
- Irrigation controller cabinets.

#### Tests

Site tests: Submit results to **TESTING**.

### 10.5 INSPECTION

#### Notice

Inspection: Give notice so that inspection may be made of the following:

- Excavated surfaces ready for installation.
- Concealed or underground services ready for backfilling.

### 10.6 AUTOMATIC CONTROL VALVES

#### General

Type: 24 V solenoid actuated hydraulic valves with flow control and a maximum operating pressure rating of at least 1 MPa and able to be serviced without removal from the line.

Size: Same as the line in which they are installed or smaller, providing that the water flow restriction does not affect the sprinkler operation.

**Materials:**

- ≤ DN 50: Dezincification resistant copper alloy body and bonnet, screwed ends. Stainless steel bonnet holding down bolts and internal metal parts.
- ≥ DN 65: Cast iron body and bonnet, flanged ends. Stainless steel bonnet holding down bolts and internal metal parts.

Isolating valve: Provide a ball or gate valve of the same size immediately upstream of each automatic control valve.

Housing: House both valves in the same valve box large enough to permit easy operation and servicing of the valves.

**10.7 FIXED SPRINKLER SYSTEMS****General**

Restrictions: Do not use microsprays.

**Heads**

Performance: Heads conforming to the following:

- Maintain a preset arc of throw.
- Adjustable for radius during watering operations.
- Vandal-resistant.
- Protected from damage in normal operation.

Pop-up type heads:

- Type: Designed to rise at least 50 mm out of the housing under supply pressure and return to flush position on removal of pressure.
- Components: Provide wiper seals, stainless steel return springs and removable internal filters.
- Playing fields: Covers designed and constructed to prevent injury.

Sprinkler heads:

- Type: Gear driven and spray sprinklers with matched precipitation rates for the various areas of throw.
- Flow rate: Adjustable down to zero.

Impact sprinkler heads: Bronze bodies in high impact plastic cases with drainage holes.

**Drippers**

Requirement: Conform to the following:

- Type: Pressure compensating type with the capacity to apply the required water volume to the shrubs/trees.
- Able to be installed directly online, buried or laid on the surface.
- With provisions for fitting the flexible riser tube to the online dripper and placed at the base of the shrubs/trees.

**Valves**

Check valves: If a rotating head is more than 300 mm below the highest head on the same automatic valve, fit an internal or external anti-drain check valve to prevent low head drainage.

Pressure regulating valves: Provide pressure regulating valves at off-take points as follows:

- Adjustable between 100 and 700 kPa.
- Complete with 800 µm filter sized to suit the flow and installed immediately upstream from the pressure regulating valve.

- Installed with isolating valves upstream from the filter and downstream from the pressure regulating valve.
- Mount the assembly in a readily accessible position in a valve box, access pit or adjacent building.

**Soil moisture sensors**

Type: Fixed ceramic moisture sensors.

Connection: Fit to the irrigation controller via moisture control units.

**Irrigation controllers**

Type: Automatic controllers that are easily programmed and include the following:

- Manual cycle and individual control valve operation.
- Manual on/off operation of irrigation without loss of program.
- ≥ 4 on/off cycles per day.
- Day omit.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- Not less than 24 hour battery program backup.
- Power surge protection.
- Mounted in a lockable cabinet of minimum IP54 to AS 60529 (2004) in external locations.
- Electrical connection: If connected to wall outlets, provide 3 core 10 A, 240 V flexible cord and plug. Provide an isolating switch at the controller.

Programming: Able to change watering times, start times or days.

**10.8 MICRO-IRRIGATION SYSTEMS****Tubing**

Type: Polyethylene micro-irrigation pipe.

**Fittings**

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

**Valve boxes**

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 200 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

**10.9 DRIP IRRIGATION SYSTEMS****Integrated drip line systems**

Type: Tubing with integral drippers inserted into the tube during manufacture.

**Discrete drip emitter systems**

Tubing: Polyethylene micro-irrigation pipe.

Drippers: Turbulent flow types, easily dismantled for cleaning.

**Emitters**

Type: If the difference in elevation between the control box and all emitters is:

- < 1500 mm: Pressure compensated or non-pressure compensated type.

- ≥ 1500 mm: Pressure compensated type only.

#### Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

#### Valve boxes

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter: 100 µm.
- Pressure-reducing valve with 170 kPa outlet pressure.

### 10.10 SUBSURFACE DRIP IRRIGATION SYSTEMS

#### Tubing

Collector and distributor mains: LDPE or PVC pipe.

Dripline: LDPE pipe.

#### Components

System requirements:

- Reduced pressure zone (RPZ) backflow prevention device.
- Electric or manual valve.
- Filter: 120 mesh screen or disc.
- Auto pressure regulator: 150 to 200 kPa.
- Air vacuum breaker.
- Automatic line flushing valve.
- Chemical injection system.

#### Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

#### Root-intrusion prevention

Requirement: To prevent root intrusion, provide one of the following:

- Herbicide impregnated emitters or filters.
- Root-intrusion chemical injection system.

#### Valve boxes

Requirement: Provide valve boxes for system components.

Low density polyethylene pipes: Minimum 19 mm when used with drippers.

### 10.11 PIPING

#### General

Materials: To AS/NZS 3500.1 (2021) clauses 2.4 and 2.5 and as documented.

#### Underground piping and PVC-U fittings

PVC-U pipes: To AS/NZS 1477 (2017).

PVC-U pipe system installation: To AS/NZS 2032 (2006).

Mainline piping: Minimum Class 12 PVC-U.

Lateral piping: Minimum Class 9 PVC-U.

PVC-U fittings: Minimum Class 18 PVC-U. Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

Low density polyethylene pipes: Minimum 19 mm when used with drippers.

### 10.12 VALVE BOXES

#### General

Construction: UV-resistant high impact plastic with high impact snap lock plastic cover and adequately sized for clear access to components inside the box.

### 10.13 EXECUTION

#### Authority requirements

General: To the Water Corporation and local water restriction requirements.

Integrated Water Supply Scheme (IWSS): Connect the irrigation system to the existing water supply.

#### Performance

Performance and efficiency of the system: Conduct a flow and pressure test and rectify system if inadequate.

#### Reticulation

Extent: To all landscaped areas including common areas.

Type: Provide as follows:

- Lawn areas: Rotator sprinklers.
- Individual plants: Drippers.

Reticulation sleeves: Provide as follows:

- 100 mm PVC-U sleeve 300 mm below driveways. Provide sleeve at the junction of driveway and carport floor.
- Provide a 90° elbow to each end, 300 mm out from the ground.
- Fit sleeves in one straight length under the driveway to allow draw wires to be easily drawn through the sleeve.

Solenoid conduit: Provide 15 mm diameter PVC conduit with draw wire from the garden reticulation cabinet, adjacent paths, hardstands and driveways to the nearest garden bed.

#### Reticulation cabinet

Requirement: Provide lockable aluminium reticulation cabinet next to the meter box. Conform to the following:

- Make sure solenoid wires can be routed from reticulation cabinet to the mains water supply water meter without being obstructed by concrete, paving or walls.
- Supply conduit and draw wire to the reticulation cabinet.
- Install a 10 amp 250 volt socket outlet in the cabinet. Position socket outlet at the bottom right hand corner of cabinet and connect to common services power circuit.
  - Provide label to socket outlet: SUPPLIED BY COMMON SERVICES POWER CIRCUIT.

#### Connection to services

Connection to main water supply: By a licensed plumber and as follows:

- Connection location: Supply from a separate cut within 2 m of the master mains water meter.
- Connection component: 25 mm tested gate valve fitted with an approved backflow prevention device.

Connection to main electrical supply: By a licensed electrician.

Metering: Provide meters to the utility service provider's requirements and as follows:

- Group dwelling sites with 2 dwellings: One meter for each dwelling. Provide reticulation to common areas from adjacent dwellings.
- Group and multiple dwelling sites with 3 dwellings or more: One meter for each dwelling. Provide common meter for common areas.

#### Backflow prevention

Requirement: To PCA (2022) and Network Utility Operator requirements.

### 10.14 SERVICE TRENCHING

#### General

Requirement: Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.
- Tree protection: To AS 4970 (2009).

#### Trench widths

General: Keep trench widths to the minimum, consistent with the laying and bedding of the relevant service and construction of access chambers and pits.

#### Trench depths

General: As required by the relevant service and its bedding method, and as follows:

- Minimum cover for mainline and PVC pipes in garden beds:
  - . Front area of dwelling: 300 mm.
  - . Rear area of dwelling: 200 mm.

#### Obstructions

General: Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600 mm clear of services. Remove other obstructions including stumps and boulders that may interfere with services or bedding.

#### Pipes and conduits

Pipes and conduits across pavement or paths: If installation across roadways, driveways or paths is required, install under the pavement/path 90° to the road/path alignment using dry trenchless methods. Do not cut sealed surface without the principal's approval.

Subsidence: If subsidence occurs, repair and reinstate pavement or paths.

### 10.15 AUTOMATIC CONTROL VALVES INSTALLATION

#### Installation

Location: Install in a valve box to **VALVE BOXES**.

Regional areas: Provide flow control valves to each station.

Valve protection: Do not use sand to cover the valves and wire junctions.

#### Wiring

Requirement: Provide low voltage solenoid wiring as follows:

- Solenoid wiring: Minimum 1 mm multi-strand cable.
  - . Common wire: Black.
- Wiring and piping: Lay wiring in trenches under and attached to piping with insulation tape at maximum 3 m spacing.
- Wiring in areas with no piping: Install in conduits.
- Wiring run: Install in continuous unbroken lengths from the controller to the solenoid valves, with 1.5 m of spare cable coiled at the valve.

Wiring protection: Use multi-core wire protected with PVC sheaths. Protect with electrical conduits or strap beneath PVC piping.

### 10.16 FIXED SPRINKLER SYSTEMS INSTALLATION

#### Sprinkler application and location

Type: Use sprinkler types as follows:

- Grassed areas (large and small): Gear driven sprinklers.
- Turfed areas: Pop-up sprinklers with minimum rise of 150 mm.
- Garden beds:
  - . Generally: Pop-up sprinklers. Provide 150 mm minimum clearance for rigid risers.
  - . Adjacent to lawn areas, driveways and paths: Pop-up sprinklers with minimum rise of 150 mm. Do not use rigid risers.
  - . Adjacent to driveways and paths, and less than 500 mm wide: Pop-up strip sprays.
- Trees: Bubblers or high flow drippers.

Sprinkler location restrictions: Conform to the following:

- Sprinklers along buildings: Position minimum 60 mm from the building.
- Sprinklers in verge areas: Do not install along kerbs facing back into the development site.

Prevention of overspray: Position sprinklers so that:

- Those in verge areas do not overspray onto roads.
- There is no overspraying onto buildings.
- Those in garden beds do not overspray onto driveways.

Sprinkler spacing: As recommended by the manufacturer for the pressure and water volume.

#### Control wiring

General: Connect the automatic control valves and soil moisture sensors to the controller as follows:

- Cable type: Double insulated.
- Cable runs: Underground in PVC conduit to AS/NZS 3000 (2018) and laid alongside piping if possible.
- Connectors: Waterproof.
- Jointing: Loop cables and join only at valves, sensors and controllers.
- Movement provision: Provide expansion loops at changes of direction and at joints.

**Quick coupling valves**

General: Provide DN 20 double lugged bronze quick coupling valves with neoprene seats mounted on DN 20 copper risers offset at least 150 mm from the supply pipe. Install in valve boxes.

**Heads**

Impact sprinkler heads: Provide granular fill for at least 75 mm around the base of the case.

Risers: Mount as follows:

- Above ground heads: Mount on fixed risers.
- Galvanized steel risers: Set in 300 x 300 x 200 mm deep concrete blocks.
- In-ground heads: Mount on reticulated risers.

**Piping**

Requirement: Provide piping for mainline up to the solenoid valves and the lawn areas.

Mainline and submains: Install 600 mm below the finished surface and lay marker tape along the top of the line.

Lateral piping for roof and planting areas: Install below the topsoil profile and anchor at 1500 mm maximum centres with U-shaped stakes.

Jointing: Join piping and associated fittings using solvent welded pressure type glue.

**Irrigation controllers**

Requirement: Provide irrigation controllers as follows:

- Individual dwellings: One controller for each dwelling.
- Common areas: One controller.

Location: Locate irrigation controllers and single socket outlet in a readily accessible location.

Power supply: For group or multiple dwelling sites, connect to the common power source.

Number of stations in the controller:  $\geq$  number of stations in the reticulation systems.

Number of controllers: Do not use more than one controller without the approval of the principal.

Controller type/product: Do not install without approval from the principal.

**Sprinkler head protection**

Requirement: Provide concrete surrounds for the following:

- Sprinklers along kerbs abutting roads, driveways or parking areas: Minimum 300 mm diameter, 90 mm thick.
- Sprinklers in lawn/grassed area: Minimum 200 mm diameter, 80 mm thick.

**North West and Goldfields region**

Requirement: Provide plastic surrounds to all sprinklers.

**10.17 MICRO-IRRIGATION SYSTEMS INSTALLATION****Installation**

General: Connect micro-tube laterals with proprietary push in or screw in fittings.

Drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Microsprays: Mount microsprays 300 mm above ground on stakes and connect to the piping with appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

**10.18 DRIP IRRIGATION SYSTEMS INSTALLATION****Installation**

Requirement: Conform to the Water Corporation's recommendations for waterwise garden irrigation.

Discrete drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

**10.19 SUBSURFACE DRIP IRRIGATION SYSTEMS INSTALLATION****Installation**

Piping: Install at least 150 mm below ground.

Automatic line flushing valve:

- Location: At the furthest point from the valve on the collector main.
- Discharge point: Locate in same plane as the pipe leading to it, so water can easily be flushed out.
- Gravel bed: Install a 0.3 m<sup>3</sup> minimum volume gravel bed in valve box. Maintain 50 mm clearance between gravel bed and the lowest discharge point of the valve.

Filter: Install in horizontal plane (or to prevent material entering mainline on cleaning) with 100 mm clearance from soil level.

**10.20 UNDERGROUND PIPING AND PVC-U FITTINGS****Installation**

PVC-U pipe system: To AS/NZS 2032 (2006).

PVC-U fittings: Allow for changes in pipework direction using fittings. Do not install pipes with excessive bending.

**10.21 VALVE BOXES INSTALLATION****Installation**

Requirement: Install with top of box flush with the surface.

Clearance: Allow 100 mm minimum clearance from filters and 50 mm minimum clearance from valves.

Base: Concrete plinth or crushed rock.

**10.22 TESTING****Site tests**

Requirement: Test the flow and pressure from the metered supply. If flow and pressure are inadequate, rectify system.

### 10.23 COMPLETION

#### General

Requirement: On completion of the irrigation system, carry out the following:

- Flush system thoroughly. Check heads, sprays and drippers and clean if blocked.
- Clean strainers.
- Adjust for even distribution with no dry areas.

Irrigation controllers: Program the controls in conformance with the Water Corporation and the local water restriction requirements, including seasonal variation requirements.

#### Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's recommendations for operation, care and maintenance of the irrigation system, including irrigation controllers.

## 11 LANDSCAPE - PLANT PROCUREMENT

### 11.1 RESPONSIBILITIES

#### Performance

Plants: Grown to a standard that allows rapid establishment and growth to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take precautions to safeguard the health and well-being of all plant materials before and including their delivery to the project site.

### 11.2 STANDARD

#### General

Tree stock supply: Conform to the recommendations of AS 2303 (2018).

### 11.3 INTERPRETATION

#### Definitions

General: For the purposes of this worksection, the definitions given in AS 2303 (2018) and the following below apply:

- Destructive inspection (of trees): The washing away of all soil from a rootball to allow inspection of rootball development.
- Investigative inspection: Any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.
- Known history: Supplier documentation, demonstrating and enabling verification that the product was grown by essentially the same processes and under essentially the same system of control.
- Locally sourced: Stock procured from district sources that is best suited to climatic, soil and environmental conditions in the immediate area of site.
- Partial inspection (of trees): A method of exposing a section of a root system to allow inspection of

root development by washing the soil away in a wedge-shaped section from the stem to the extremity of the rootball. This soil can be gently replaced so the tree is not damaged.

- Shrub: A woody perennial plant smaller than a tree, usually having permanent stems branching from or near the ground.

### 11.4 SUBMISSIONS

#### Certification

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Source location: Submit the supplier's certification as evidence that plants have been grown from locally sourced stock. If this is not achievable, give notice.

#### Photographic records

Requirement: Submit photographic records as follows:

- Rates:
  - . More than 100 plants: Submit 1%.
  - . Less than 100 plants: Submit 1 sample.
- Plant species:
  - . All palm species.
  - . 100, 200, 400 L plant species.

Identification: Submit photographs as follows:

- In colour.
- With a clearly identifiable scale reference located in the same plane as the plant stem or trunk.
- Labelled with plant species name.
- Clarity: Sufficient to be able to ascertain the species, size and quality of the subject plant.

Program: Submit within fourteen days of the date of contract.

#### Products and materials

Requirement: If non-conforming plants are proposed, submit a proposal.

Authentication: Submit a copy of the written approval of substitution with any non-conforming trees.

#### Progress reports

Content: Submit a detailed resume of the quantities, growth, general health and geographic location of the complete inventory of plant material for the works.

Purpose: To evaluate progress payments under the general conditions of contract.

Program: At 3 monthly intervals.

#### Tests

Requirement: Submit test results to **TESTING**.

### 11.5 INSPECTION

#### Notice

Inspection: Give notice so that inspection may be made of the following:

- Representative samples of all stock scheduled to establish conformity immediately before the acceptance of tender.

- Plant material after eight weeks of the growing on period.
- Plant material at 80% completion of stocking of species and numbers.
- Plant material at, as close as practicable, 100% completion of stocking of species and numbers.
- Plant material at the date of commencement of delivery.
- Plant material to assess potting on procedures, if necessary.

**11.6 ASSESSMENT CRITERIA - GENERAL**

**General**

Requirement: Supply plants with the following properties:

- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery and prevent dieback.
- Pests and disease: Free from attack by pests or disease, and resistant to polyphagous shot-hole borer (PSHB).
- Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and make sure actively feeding insects are absent.
- Waterwise: If possible, use plants identified as waterwise by Water Corporation for the particular region. (See [www.watercorporation.com.au/Waterwise/Waterwise-plants](http://www.watercorporation.com.au/Waterwise/Waterwise-plants)).
- Root system: Not root bound.

Supply and delivery: Supply plants from a nursery with Nursery Industry Accreditation Scheme Australia (NIASA) accreditation and deliver to site with a label displaying the botanical name.

Prohibited species: Do not supply species listed on the Western Australian Organism (WAOL) database declared as 'Pest, Prohibited (s12)' or 'Pest (s22)' under the *Biosecurity and Agriculture Management Act 2007 (WA)*.

**Labelling**

General: To the recommendations of the *National Plant Labelling Guidelines (2023)*.

Label type: To withstand transit without erasure or misplacement.

Label frequency: One for each plant.

Indication of north:

- Trees in containers greater than 100 L or of Size Index greater than 140: Label the northerly aspect during growth in the nursery and maintain during transit.

**11.7 ABOVE-GROUND ASSESSMENT CRITERIA**

**Trees**

Requirement: Supply trees to AS 2303 (2018) clause 4.2 and with the following properties:

- Minimum size: 45 L bag.

- Clean stem height: Less than 40% of total tree height.
- Trunk position: Less than 10% variation in distance from centre of the trunk to the extremity of the rootball.

**11.8 BELOW-GROUND ASSESSMENT CRITERIA**

**Trees**

Requirement: Supply trees to AS 2303 (2018) clause 4.3 and with the following properties:

- Rootball occupancy:
  - . Soil retention: On shaking or handling the unsupported rootball, at least 90% of the soil volume remains intact.
- Rootball diameter:
  - . Containers less than or equal to 45 L and ex-ground stock: Not less than rootball depth.
  - . Bare-rooted tree stock with size index less than or equal to 57: Not less than 10 x calliper.

**Shrubs**

Requirement: Supply plant material with a root system as follows:

- Well-proportioned in relation to the size of the plant material.
- Free of any indication of having been restricted or damaged.

Root inspection: If investigative inspection is required, sample as follows:

- More than 100 samples: Inspect 1%.
- Less than 100 samples: Inspect 1 sample.

Sample plants: Replace plants used in investigative inspection.

**11.9 ASSESSMENT CRITERIA - BALANCE**

**Shrubs**

Containers (except tubes or plant cells) or rootballs: To remain flat on the ground when the stem, held at 80% of height above ground, is deflected 30° from the vertical, side to side.

Exempt: Species that naturally produce hard inflexible wood in the early stages of their development.

**Small container-grown shrubs table**

Container size or minimum rootball diameter	Height range above soil (m)	
	Thin-stemmed species	Thick-stemmed species
Tubes or plant cells	1.5 to 2.5 x the height of the container	
150 mm (1.8 L)	0.4 – 0.6	0.3 – 0.5
170 mm (2.6 L)	0.5 – 0.7	0.4 – 0.6
200 mm pot (4 L)	0.7 – 0.9	0.6 – 0.8
200 mm bag (5 L)	0.8 – 1.0	0.7 – 0.9
250 mm (8 L)	1.0 – 1.2	0.8 – 1.0
300 mm (15 L)	1.2 – 1.5	1.0 – 1.2

**Trees**

Size index range for trees grown in containers 18 L to 100 L and 100 L to 3000 L: To AS 2303 (2018) Appendix D Table D.1.

Minimum rootball diameter for ex-ground trees: To AS 2303 (2018) Appendix D Table D.2.

**11.10 TESTING**

**General**

Requirement: To AS 2303 (2018).

**Production tests**

Sampling: Select sample trees, of known history, at evenly distributed intervals within each batch.

Above ground tree inspection:

- Frequency: Inspect trees at dispatch.
- Sampling strategy: To AS 2303 (2018) Appendix A Table A1.
- Inspector: Supplier.

Investigative tree inspection:

- Frequency: Inspect trees before dispatch.
- Inspector: Qualified person authorised by the principal.
- Destructive inspection: Use for trees with rootballs/containers not more than 200 mm.
- Allowance: Allow for sample trees in addition to quantity ordered.
- Partial inspection: Use for trees with rootballs/containers more than 200 mm.

**Non-conformance**

Corrective action: Conform to corrective action procedures, as documented.

Rejection: If corrective actions are unsatisfactory, reject the entire batch.

Substitutions: Do not use non-conforming trees unless approved.

**Investigative tree inspection sampling table**

Number of trees per batch	Number of trees to sample
0 – 20	1
21 – 50	2
51 – 100	4
101 – 500	4 for the first 100 +2% of balance of order
501 – 2000	12 for first 500 +1% of balance of order
2001+	27 for the first 2000 +0.5% of balance of order

**11.11 COMPLETION**

**Warranties**

True-to-species: Provide at the time of each delivery as follows:

- Parties: Supplier(s) to the principal.
- Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and have been fully acclimatised for the conditions of the site.

Maintenance:

- Parties: Supplier(s) to the principal.
- Form: Maintain all plant materials sourced and secured by the supplier throughout the procurement period.
- Period:
  - . Commencement: The date of contract.
  - . Completion: To cease in respect of any particular plant material upon issue of a delivery notice issued by the contractor upon delivery to site.

**12 LANDSCAPE - ESTABLISHMENT**

**12.1 RESPONSIBILITIES**

**General**

Requirement: Provide landscape establishment to common areas and common water metered areas.

**12.2 SUBMISSIONS**

**Certification**

Replacement plants species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

**Execution details**

General: Give at least two days' notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Watering.
- Each site maintenance visit.

Reporting: Submit monthly reports by the last Friday of each month.

**Monitoring program**

General: Submit a monitoring program developed by a specialist monitoring consultant and incorporating the following:

- Photographic record including:
  - . Colour photographs.
  - . Documented monitoring locations and photograph angles.
- Reporting periods including photographic records at the following:
  - . Before commencement of the works.
  - . Date of practical completion.
  - . Three monthly intervals during the plant establishment period.
  - . End of defects liability period.
  - . Date of final completion.
  - . Benchmark definition based on remnant communities.
  - . Replicated measurements over time and comparative analysis with regard to the benchmark.

Specialist consultant: Submit the name, contact details and qualifications including research papers and scientific publication details of the specialist monitoring consultant.



**Records**

Requirement: To **COMPLETION, Records.**

**Tests**

Requirement: Submit soil property test results to **PLANTING WORKS, Fertilising** for the following:

- Landscape soils.
- Low density soils.
- Soils for turf and lawns.

**12.3 INSPECTION****Notice**

Inspection: Give notice so that inspection may be made at the following intervals:

- Date of practical completion.
- Three monthly intervals during the plant establishment period.
- End of defects liability period.

**12.4 EXECUTION****Special instructions**

Requirement: If directed, attend to identified areas and procedures as a priority. Obtain approval for additional costs before starting the works.

**Reporting**

Monthly report: Provide regular written reports each month on the following:

- General status of works.
- Soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirm in writing any disturbance or incident affecting or likely to affect the day to day scheduling of works.

**Disruption of works by others**

Requirement: Make arrangements to work around the disturbance caused by other contractors.

**Rubbish removal**

Rubbish: Remove loose rubbish such as bottles, papers, and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at fortnightly intervals.

Leaf litter: Remove from all path and lawn areas.

**12.5 PLANTING WORKS****Planting**

Requirement: Make sure the general appearance and presentation of the landscape and the quality of plant material at the date of practical completion is maintained for the planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as documented for the matching classifications of new grassland or planting.

Plant replacement: Replace failed, dead and/or damaged plants at maximum 3 weekly intervals as necessary throughout the plant establishment period. Provide replacement plants of similar size and quality, and of identical species and variety to the plants being replaced.

**Plant pruning**

Pruning: To AS 4373 (2007) and as documented.

**Fertilising**

Soil tests: Take samples from both planting beds and lawn areas and conduct tests, as follows:

- Landscape soils: To AS 4419 (2018) Table 1.
- Low density soils: To AS 4419 (2018) Table 2.
- Soils for turf and lawns: To AS 4419 (2018) Table 3.

Fertilising program: Base the program on soil testing results.

Application of fertiliser: Apply a 12 month slow release fertiliser, in two rows and cultivated into soil to a depth of 100 mm.

- Program: September and March according to seasonal growth requirement.

Sensitive native species: Apply appropriate dosage.

**Insect and disease control**

Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

**Stakes and ties**

Generally: If plants are not self-supporting or if stakes are damaged, stake or re-stake the plants as follows:

- Drive three hardwood stakes placed diagonally with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well-developed systems and no longer require support, remove stakes and ties.

**12.6 GRASS SURFACES****Mowing and trimming**

Preparation: Remove litter and fallen branches before mowing.

Grass height: Consistent with the growth habit of the grass variety and maintained at 25 to 40 mm throughout the year. Do not remove more than one-third of the grass height at any one time.

Program: Weekly during the mowing season, November to March, and at fortnightly intervals from April to October. Do not mow during wet conditions. Carry out last mowing not more than 7 days before end of plant establishment period.

Raking: Once every month before mowing from November to March, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edge trimming: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees and shrubs.

**Top dressing**

Top dressing for established lawns: Weed-free imported sandy topsoil to a depth of 5 mm.

- Program: The spring following initial establishment.

Top dressing for remediation of depressions or irregularities: Apply coarse or medium texture soil to AS 4419 (2018), suitable for application to turf areas.

### Fertilising

Application of fertiliser: Apply a slow release lawn fertiliser at the completion of the first and last mowings of the plant establishment period and at other times as required to maintain healthy grass cover.

## 12.7 WEEDING

### General

Requirement: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly, and as required to maintain the general lawn condition.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed-free when observed at fortnightly intervals.

Vigorous ground covers: Keep 200 mm clear from the base of any shrub or tree. Remove as follows:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Apply to the manufacturer's recommendations.

## 12.8 MULCHED SURFACES

### General

Inspection: Fortnightly to determine mulch requirements.

Requirement: Maintain minimum depth as follows:

- 75 mm for organic mulch.
- 50 mm for gravel mulch.

Remulching: Maintain the original ground levels around the base of plants.

Weed and grass growth in mulch areas: Control with a herbicide, approved by the principal, to the manufacturer's recommendations. Prevent herbicide contacting the new plants.

## 12.9 WATERING

### Establishment

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances toxic to plant growth.

Watering program: Minimum 3 complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall. Confirm soaked depth and record in the log book.

Water restrictions: Coordinate the water supply and conform to legislation and restrictions applying at the time.

### Hand watering

Requirement: Manually water all lawn and planting areas in absence of an irrigation system or until the proposed irrigation system is fully operational. Avoid frequent dampening of the surface. Allow the

surface of the soil to partially dry out between waterings.

### Irrigation

Irrigation system program: Adjust to suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors, seasons, evaporation, exposure, topography and local authority restrictions.
- Adjustment or shut down during and after periods of prolonged heavy rain.
- Water supply and watering regime of legislation and restrictions applying at the time.

Equipment maintenance:

- Check all components for proper operation.
- Repair or replace damaged components with parts from the same manufacturer.
- Flush any dirt or foreign matter from the system and clear all blockages.

## 12.10 CONTROL MEASURES

### Weed mats

Generally: Maintain mats in a weed-free condition and reinstate missing or damaged mats to the documented standard, until completion of the plant establishment period.

### Feral animal control

Generally: Implement feral animal control until the completion of the plant establishment period.

Feral animal guards: Maintain feral animal guards in a working upright and taut order with three stakes. Replace missing or damaged guards with materials as documented.

Removal: At the completion of the plant establishment period.

## 12.11 ROAD VERGES AND FIRE REDUCTION ZONES

### Native grass

Generally: Allow native grasses planted within 2 m of road verges or 5 m of property boundaries to grow in a form consistent with the growth habit of the species.

### Mowing

Native grasses: Maintain as follows:

- Do not damage regeneration areas, including tree saplings.
- Mow at a minimum of twice a year and at least once at the end of October, before bushfire season, as a fire reduction measure.
- Maintenance mowing: Use a single pass of a mower along medians and verges with maximum width of 1.7 m for a slasher and 1.2 m for a slope mower.
- Fire hazard reduction mowing: Use a double pass of a mower along medians and verges with maximum width of 3.4 m for a slasher and a single 1.2 m pass by a slope mower.

Other types of grass verges: Mow to maintain a maximum 250 mm height.

**Pruning**

General: Cut back tree and shrub growth to road verges, to on/off ramps, and around emergency telephones and signs as required to achieve clear sight distances when viewed from a minimum of 100 m along roadway. Cut back tree and shrub growth within fire reduction zones to minimise risk to adjoining properties.

Pruning: As documented.

**12.12 PAVING AND STRUCTURES**

**Furniture, signage and barriers**

Maintenance guidelines:

- Furniture and pots: Keep in a good condition and move as required to carry out maintenance works.

Directional and building signs: Keep in a good condition and maintain visibility.

Boundary and car park barriers: Keep in a good condition and maintain visibility.

**Drains**

Maintenance: Inspect and clean all drainage structures and pit covers and maintain in working order. Remove all organic debris.

Frequency: As required, so that all overflow drains are clear when observed at fortnightly intervals.

**12.13 COMPLIANCE**

**Criteria**

Generally: Plant establishment is complete, subject to the following:

- Repairs to plant material are complete.
- Ground surfaces are covered with the documented treatment to the documented depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and gravel mulched surfaces are in a weed-free and tidy condition and to the documented depth.
- Vegetation is weed-free, established and well formed.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and are not able to be lifted out of the planting holes.
- Vegetation is not restricting essential sight lines and signage.
- Only frangible species are growing within road side clear zones.
- Specified vegetation setbacks from services and road furniture are evident.
- All hard landscape works are installed and operating as documented.
- Litter collection and removal is complete.
- Mulch is removed from drainage and access areas.
- All non-conformance reports and defects notifications are complete.

**Plant establishment compliance table**

Plant material	Acceptable failure per area	Acceptable concentration of failure
Tube stock	< 10%	< 15% in any given location
140 mm	< 5%	< 15% in any given location
300 mm or larger	Nil	Nil
Turf	< 5%	Nil
Cells	< 5%	< 15% in any given location
Direct seeded native species and cover crop – including drilled and broadcasted areas	Not less than 3 documented species per 1 m <sup>2</sup> grid (determined on a testing frequency of 20 grid areas per 500 m <sup>2</sup> )	Nil grids with < three (3) documented plant species
Direct seeded grass species and cover crop	< 15% (determined by a 1 m <sup>2</sup> grid on a testing frequency of 1 grid area per 500 m <sup>2</sup> )	< 10%
Cover crop	< 5%	Nil

**12.14 COMPLETION**

**Records**

Logbook: Keep on site and make available for inspection a logbook, recording the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

**13 LANDSCAPE - VERGES AND STREET TREES**

**13.1 STANDARDS**

**General**

Storage and handling of pesticides: To AS 2507 (1998).

Tree stock: To AS 2303 (2018).

**13.2 INTERPRETATION**

**Definitions**

General: For the purposes of this worksection the definitions given in AS 2303 (2018) and the following apply:

- Ameliorant material: Additives used to make or improve soil.
- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
  - . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.

- . Medium: Sandy loam, fine sandy loam.
- . Coarse: Sand, loamy sand.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

### 13.3 SUBMISSIONS

#### Execution details

Soil amelioration recommendations: If required, the source of ameliorant material, rates and methods of incorporation.

Plant material: Submit details of proposed fertiliser to be used.

Soil conditioning: If other than gypsum is proposed, submit details.

#### Products and materials

Imported topsoil: Submit evidence verifying the following:

- Suitability of each soil type for its documented use.
- Similarity to naturally occurring local soil.
- Suitability for establishment and on-going viability of the site vegetation.
- Absence of any weed propagules or contaminants.

Plant species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Source location: Submit the supplier's certification as evidence that plants have been grown from locally sourced stock. If this is not achievable, give notice.

Trees: Submit evidence of conformity to AS 2303 (2018).

#### Samples

Requirement: Submit samples to **PRODUCTS, Samples**.

### 13.4 INSPECTIONS

#### Notice

General: Give notice so that inspection may be made of the following:

- Plants on arrival at site.
- Landscape planting: Set out of plants, soil conditioner and fertiliser.

### 13.5 PRODUCTS

#### Samples

General: Provide representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Provide a 5 kg sample of each type documented with required test results.

#### Transportation

Requirement: Transport plants to the site without physical damage or drying out.

### 13.6 TOPSOIL

#### General

Requirement: To LANDSCAPE - SOILS.

### 13.7 FERTILISER AND MULCHES

#### General

Requirement: To LANDSCAPE - NATURAL GRASS SURFACES.

### 13.8 PLANT MATERIAL

#### Turf

Requirement: To LANDSCAPE - NATURAL GRASS SURFACES and as follows:

- Species: Use a species approved by the local authority for verge treatments.

#### Plant supply

Requirement: Supply plants to LANDSCAPE - PLANT PROCUREMENT and conforming to the following:

- Species: Use a species approved by the local authority for verge treatments.
- Maximum height: 750 mm.
- Not hazardous (poisonous or an irritant).
- Does not obstruct pedestrians.

### 13.9 OTHER MATERIALS

#### Inorganic ground cover

Stone/rock mulch treatments: Conform to the following particle size distribution:

- River washed rounded stone:  $D_{50} < 40$  mm.
- Crushed rock:  $D_{50} < 40$  mm.
- Crusher dust:  $D_{50} < 10$  mm.

Stone aggregates, loose pea gravel or crushed brick: If proposed, obtain approval from the local authority.

Gravel treatments: Do not install if not allowed by the local authority. If allowed, install as follows:

- Depth: 100 mm.
- Edging: Make sure edging depth is sufficient to prevent loose gravel spreading onto roads, footpaths or neighbouring properties.

### 13.10 EXECUTION

#### Transport and storage

Requirement: Inspect all plants at the time of delivery and reject non-conforming plants.

#### Preparation

Existing services: Before landscaping the verge, locate existing and position new services in the verge, including contact BEFORE YOU DIG AUSTRALIA to identify locations of underground utility services pipes and cables.

Herbicide treatment: Spray herbicide as follows:

- Type: Glyphosphate.
- Rate: 9 litres/200 litres water/ha.
- Program: Maintain sprayed areas undisturbed for 2 weeks.

Pesticide treatment: In the following form, as documented:

- Liquid:

- . Application rate: 5 litres/hydromulch/ha.
- . Powder: 10 kg/ha.

Herbicides and pesticides: To the Australian Pesticides and Veterinary Medicines Authority (APVMA) register.

Soil conditioning: Provide as follows:

- Gypsum application rate: 400 g/m<sup>2</sup>.
- Application: Conform to the following:
  - . Spread evenly over the subsoil by a mechanical spreader and topsoil on the same day.
  - . Thoroughly mix into the topsoil whilst the topsoil is being removed from stockpiles.
  - . Apply conditioners other than gypsum to the supplier's recommendations.

Fertiliser treatment: Provide as follows:

- Application rate: 1000 kg/ha.

### Watering

General: Conform to the following:

- Potable or sourced from areas without toxins, pollutants or any substance which may adversely affect plant growth.
- Initial watering: To a uniform moisture condition without run-off.
- After turfing: Re-water to a uniform moisture condition without run-off.
- After sowing: If required, re-water to a uniform moisture condition without causing rills in the surface, daily for 15 days.
- Excessive surface channelling through erosion: If watered areas result in excessive surface channelling, rehabilitate by re-preparing and re-sowing the affected area.

## 13.11 PREPARATION

### Dimension and level

Level and grade: Do not alter from existing levels.

Setback: Set verge 1.5 m from the road frontage, including for verges without footpaths.

### Surface preparation

Cultivation: Before applying topsoil, tine to a depth of 200 mm to produce a loose surface and remove all large stones, rubbish and other materials that may delay germination.

Cultivation depth: 50 mm for a roughened surface with soil lumps not exceeding 50 mm.

### Topsoil

Application: Apply uniformly to an average compacted thickness of 50 mm with a minimum compacted thickness of 30 mm at any location.

### Pesticide application

Timing: Immediately before sowing.

Pesticide type: Powder form.

### Grassing

Turfing:

- Laying: On the prepared topsoiled surface and perpendicular to the direction of water flow.
- Joints: Butt runs of turf hard against each other and top dress with topsoil.

- Slopes 5:1 to 3:1: Peg turf and remove pegs when established.

- Top dressing:

- . Timing: 4 to 6 weeks after laying turf.
- . Requirement: Correct any undulations or unevenness in the established turf.

Maximum slope for areas to be maintained by a ride-on mower with a 2 m wide deck: 4:1.

## 13.12 LANDSCAPE PLANTING

### Conditions

General: Do not carry out landscape planting when temperature is below 10°C or above 35°C.

### Preparation

Weed management: Conform to the following:

- Herbicide spray: Conform to **EXECUTION** and the following:
  - . Program: Maintain sprayed areas undisturbed for 2 weeks.
  - . Spray drift: Make sure there is no contact with planted material.
- Weed management by synthetic weed blocking fabric:
  - . Extent: 800 mm surrounding each proposed planting.

Fertilising (N:P:K): Conform to the following:

- Ratio: 63:18:28.
- Application rate: 5 kg/m<sup>2</sup>.

### Mass planting in mulched bed

Surface preparation: Rip the surface at 500 mm centres to a depth of 300 mm and break up the top 200 mm of the planting bed by cultivation to a maximum size of 50 mm.

Mulch: Spread 75 mm thick.

### Individual planting

Preparation: Loosen a planting area 600 mm diameter to a depth of 400 mm.

Mulch: Spread 75 mm thick to 600 mm radius around the plant.

### Planting

Method: Remove the localised mulch. If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil. Place the plant, backfill the planting hole with topsoil and compact lightly so as to minimise subsidence without compacting the backfill. Avoid mixing mulch with topsoil.

Stakes and ties: Advanced and super advanced stock:

- Drive stakes 300 mm deep and 200 mm clear of the plant.
- Ties: 50 mm wide hessian webbing strips, attached loosely.

Watering: 10 litres of water per hole before the mulch is respread over the disturbed area.

Mulching: Replace, and leave the plant stem clear.

### Care of landscape planting

Watering: Water all plants, from the time of planting, every second day for the first twelve weeks at the following rates, per plant:

- Tube stock: 5 L.
- Advanced trees: 10 L.
- Super advanced (25 L): 30 L.
- Semi-mature (75 to 100 L): 50 L.

Replacement: Replace missing plants, dead plants and unhealthy plants with plants of similar size and quality and of identical species and variety to the plant being replaced.

Weed and grass growth in mulched areas: Control with herbicide, in conformance with the manufacturer’s recommendations at monthly intervals during the construction period and contract maintenance period. Replace plants damaged by herbicide application.

**13.13 STREET TREES**

**Unpaved areas**

Excavation:

- Containers < 75 litre: Twice the diameter of the rootball.
- Containers ≥ 75 litre: Three times the diameter of the rootball.
- Depth: Rootball plus 100 mm. Loosen the compacted sides, and the bottom a further 100 mm.

Soil conditioning: If clay is present, add 1 kg of agricultural gypsum soil conditioning.

Accessories and drainage: Fit trunk collar guard, root barrier and subsoil drainage measures before backfilling.

Backfill: Topsoil.

Mulch: 75 mm thick and 50 mm clear of plant stem.

Initial watering: 50 litres per tree applied in stages during backfilling.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

**Paved areas**

Excavation:

- Containers < 75 litre: Twice the diameter of the rootball.
- Containers ≥ 75 litre: Three times the diameter of the rootball.
- Depth: Rootball plus 100 mm. Loosen the compacted sides, and the bottom a further 100 mm.

Accessories and drainage: Fit trunk collar guard, root barrier and subsoil drainage measures before backfilling.

Mulch: 10 mm screenings 75 mm thick.

Initial watering: 50 litres per tree applied gradually.

**Structural soil table**

Type	Description	Fertiliser	Depth	Location
Structural soil 20 mm	75% 20 mm crushed river gravel 25% filler soil of 1 part	Trace element mix: 300 g/m <sup>3</sup> Potassium nitrate: 500 g/m <sup>3</sup>	100 mm	If pavements are installed around existing trees,

Type	Description	Fertiliser	Depth	Location
	screeded dolomite to 1 part screeded sandy loam	Ammonium nitrate: 500 g/m <sup>3</sup> Superphosphate: 500 g/m <sup>3</sup> Ion sulfate: 1.5 kg/m <sup>3</sup> 8/9 month Controlled release: 2 kg/m <sup>3</sup> Gypsum: 500 g/m <sup>3</sup> Magnesium sulfate: 400 g/m <sup>3</sup> Magrilime: 600 g/m <sup>3</sup>		replace 20 mm roadbase when the total soil depth available is 100 mm or less.
Structural soil 40 mm	80% 40 mm basalt aggregate 20% filler soil of 1 part screeded dolomite to 1 part screeded sandy loam	Trace element mix: 300 g/m <sup>3</sup> Potassium nitrate: 500 g/m <sup>3</sup> Ammonium nitrate: 500 g/m <sup>3</sup> Superphosphate: 500 g/m <sup>3</sup> Ion sulfate: 1.5 kg/m <sup>3</sup> 8/9 month Controlled Release: 2 kg/m <sup>3</sup> Gypsum: 500 g/m <sup>3</sup> Magnesium sulfate: 400 g/m <sup>3</sup> Magrilime: 600 g/m <sup>3</sup>	Varies	Tree plantings in pavements, courtyards, carparks and kerbsides.

**Porous bonded gravel**

Backfill: Allow for base aggregate and gravel.

Filter fabric: Lay over growing medium and pre-cut to size.

Base aggregate: 5 to 7 mm crushed blue metal, laid 70 mm deep and hand consolidated.

Porous paving: Mix and place to the manufacturer’s recommendations.

**13.14 LOCATION OF PLANTING**

**General**

Requirement: Do not obstruct access to services or sightlines to signage. Do not obstruct pedestrian or vehicular traffic.

**Street trees**

Ground clearance:

- Clearance height at maturity: 2.4 m.
- Clearance height at time of planting: 1.5 m.

Setbacks: Locate trees to achieve mature canopy clearances from the following:

- Electricity or telecommunications poles or pillars: > 4 m.
- Streetlights: > 7.5 m.
- High voltage transmission lines: > 4 m radius.
- Stormwater drainage pits: > 2 m.
- Kerbs measured to the back of the kerb: 750 mm to 1000 mm.
- Driveways: > 3 m.
- Intersections measured from the face of the kerb of the adjoining street: > 10 m.
- Existing trees: The combined mature canopy width.

### **13.15 IRRIGATION**

#### **Installation**

Requirement: Conform to IRRIGATION and as follows:

- Location: Make sure the sprinkler system is installed in a readily accessible location.
- Water source: Supply from a point beyond the water meter and inside the site boundary, passing through a backflow prevention device.
- Reticulation pipes: Provide piping installed at minimum 300 mm below the surface ground level and pop-up sprinkler system with conduits installed under footpaths.