



# **FNQROC DEVELOPMENT MANUAL**

## **SPECIFICATION**

**S8**

## **LANDSCAPING**

**Version No. 11/19**

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## GENERAL

### S8.01 SCOPE

1. This specification details all requirements pertaining to Tree Planting, Grassing, Turfing, Hydromulching and Irrigation works associated with permanent and temporary revegetation works.
2. Where there is any conflict determined between the requirements specified herein and the requirements of any referenced Australian Standard, Statutory Authority Standards or otherwise, the requirements specified herein shall apply.

### S8.02 REFERENCE DOCUMENTS

**Note: Where Acts or reference documents are updated, reference should be made to the current version.**

#### Australian Standards

- AS 1432 Copper tubes for plumbing, gasfitting and drainage applications
- AS 1477 PVC pipes and fittings for pressure applications
- AS 2032 Installation of PVC pipe systems
- AS 2303 Tree Stock for Landscape Use
- AS 2507 The storage and handling of pesticides
- AS 2845 Water Supply – Back Flow Prevention Devices
- AS 4419 Soils for landscaping and garden use
- AS 4454 Composts, soil conditioners and mulches
- AS 3879 Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
- AS 3500 Plumbing and Drainage

Crime Prevention through Environmental Design (CPTED) - Guidelines for Queensland (Part A).

**S8.03 GRASS SEEDING**

1. The grass seeding species mix shall consist of the following:
  - a. 30% Cynodon Dactylon (green couch) - hulled
  - b. 30% Cynodon Dactylon (green couch) - unhulled
  - c. 30% Axonopus Affinis (carpet grass)
  - d. 10% (Tetila Rye (in dry season) (Japanese Millet (in wet season)
2. The accepted final mix shall be dependent upon local conditions, soil properties, and method of works.

**S8.04 TURFING**

1. Turf shall consist of 25mm depth of dense, well rooted, vigorous grass growth with 25mm depth of topsoil. It should be free from any material toxic to plant growth, declared weeds, seeds or roots including nut grass and oxalis. The soil attached to the turf shall be free from rubbish, sticks and other deleterious material.
2. The turf shall be supplied as rolls in long lengths of uniform width, not less than 300mm, and shall be in sound unbroken condition.
3. The moisture level in the cut turf should be kept relatively consistent so that it is not saturated or severely dried out when laying. Both of these situations can cause turf to fall apart during laying.
4. The type of grass turf to be used shall as stated on the approved Project Drawings, where not stated broad leaf buffalo shall be used for un-irrigated areas and couch for irrigated areas.
5. Acceptable species for this region are as follows:
  - a. Axonopus compresus (Broad leaf buffalo)
  - b. Digitaria didactylia (Blue Couch)
  - c. Cynodon dactylon (Bermuda Couch / Green Couch).
6. Zoysia matrella and Zoysia nara or an approved equivalent shall be installed as an alternative turf species in public open space areas where soils and aspect is suitable, subject to Council approval. Council may request for a specific cultivar to be specified that has been proven successful in an area with similar site conditions.

**S8.05 HYDROMULCH AND BONDED FIBRE MATRIX**

1. The hydromulching mixture shall consist of the following:

**Mulch**

Pulped Paper / Bagasse or Cane fibre

**Fertiliser**

Broad spectrum type CK55 or equivalent.

**Seed**

- 33% Cynodon Dactylon (Green Couch) - hulled
- 33% Cynodon Dactylon (Green Couch) - unhulled
- 33% Axonopus Affinis (Carpet Grass)

**Water**

Water used to establish and maintain the grassing shall have a pH of between 5.0 and 8.0, a total soluble salts concentration less than 1000mg/l and contain no chemicals or compounds toxic to growth.

**Binder / Tackifier**

Binder is to be non-toxic, inert, water soluble and non-flammable, eg. Curasol or equivalent.

Tackifier is to be a non-toxic and biodegradable eg Envirotack or equivalent.

**Bonded Fibre Matrix (BRM)**

Bonded Fibre Matrix (BFM) may be an alternative to hydromulch for erosion control and revegetation on steep slopes and areas where heavy rainfall could dislodge loose mulch or hydromulch. Application rate and surface cover must be in accordance with the manufacturer's specifications. Treated soil shall not be visible after application of the BFM.

**S8.06 PLANT STOCK**

1. All trees sourced for any landscaping on any existing and future Council managed land must comply with Australian Standard AS2303 – Tree Stock for Landscape Use.
2. All plant species shall be as detailed on the approved Project Drawings. There shall be no substitution of any species without Council approval.
3. All palms, trees, shrubs and groundcovers shall be true to name. The root system of each plant shall be conducive to successful transplantation, all specimens shall be free from pests and disease, especially Phytophthora, palm beetle, sooty mould and scale, and all containers shall be free from pernicious weeds.
4. All plants shall be grown in containers and shall comply with the following minimum size requirements:
  - a. Trees - 25 litre /300mm container for street tree planting and revegetation stock
  - b. Trees - 45 litre container for medians, tree guards, traffic islands and roundabouts
  - c. Single stemmed palms - 45 litre container
  - d. Clumping Palms - 45 litre container
  - e. Shrubs - 200mm container
  - f. Groundcovers – 140mm container.
5. Plants shall be watered before transportation to the planting site, and shall be delivered to the site in a covered vehicle or where transporting large trees, the tree/s shall be covered adequately to prevent sun and wind scorch/burn. During loading and unloading damage in handling shall be avoided.
6. Species identified in the following are prohibited from use:
  - a. Biosecurity Regulation Schedule 4 Category 3 Restricted Matter: Section 13 part 1 Invasive Plants,
  - b. Species identified in the Local governments Biosecurity Plans, and
  - c. Publication “Agricultural and Environmental Weeds – Far North Queensland” (Wet Tropics Management Authority and Department of Natural Resources and Mines)

**S8.07 SOIL MIX**

1. A good quality landscaping soil mix shall be imported from an approved source to the planting site for backfilling the planting pits.
2. Specification for the landscaping soil mix are as follows:
  - a. It shall contain approximately 70% sandy loam and 30% composted or mature organic matter;

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- b. It shall be friable and not contain any clay;
- c. The pH shall be between 5.5 and 7.0;
- d. It shall be free from contaminants such as the seed of declared weeds, rocks sticks and salts;
- e. It shall not contain any chemical fertilisers.

## S8.08 FERTILISER

1. Fertiliser shall conform to the requirements stated in Table S8.01.

**Table S8.01 Fertiliser Types**

Location	Chemical Type	Type of Application	NPK Analysis
Grass Seeding (Complete lawn fertiliser)	Inorganic	Surface broadcast	N 15 to 24 P 6 to 9 K 10 to 20
Turfing (Complete lawn fertiliser)	Inorganic	Surface broadcast	N 15 to 24 P 6 to 9 K 10 to 20
Tree Planting (Controlled Release Fertiliser)	Organic or inorganic	Organic based fertiliser and water gell crystals, mixed into backfill as per manufacturer's recommendation specific to soil structure and texture.	N 15 to 25 P 3 to 9 K 5 to 18
Planting Beds (Controlled Release Fertiliser)	Organic or Inorganic	Granular	N 18 to 25 P 3 to 7 K 9 to 18

## S8.09 IRRIGATION PIPEWORK<sup>CRC</sup>

1. All below ground pipework shall be unplasticised Poly-vinyl Chloride (uPVC) unless otherwise approved. All pipes shall be Class 12 minimum with Class 18 fittings.
2. All above ground pipe work shall be copper tube (hard drawn) Type D manufactured in accordance with AS 1432 by an Australian Standards quality endorsed company.

## S8.10 LATERAL LINE PIPEWORK FLOWS AND SIZING

Cairns Regional Council only

**Table S8.03 Lateral Line Pipework Flows and Sizing**

Diameter(mm)	Material Type	Flow (l/min)
20	PVC CLASS 12	30
25	PVC CLASS 12	60



25	MDPE PN 20	25
32	PVC CLASS 12	90
32	MDPE PN 20	50
40	PVC CLASS 12	130
40	MDPE PN 20	60
50	PVC CLASS 12	180
50	MDPE PN 20	120
63	MDPE PN 20	180

**S8.11 GRASS SEEDING**

1. Prior to grass seeding all weeds shall be killed by spraying a non-residual aquatic friendly suitable glyphosate based herbicide . Sprayed areas shall remain undisturbed for two weeks.
2. Prior to grass seeding the ground surface shall be lightly turned to a depth of 100mm below finished surface levels. All large stones, rubbish and other materials that may hinder germination shall be removed before topsoiling.
3. Topsoil shall be uniformly applied to provide an average thickness of 75mm with a minimum compacted thickness of 40mm at any location and graded to even-running contours, so that no ponding or waterlogging occurs across the surface of the grassed area.
4. Grass seeding applied by drill seeding at the minimum rate of 50kg per hectare using the species mix specified.
5. Fertiliser should be applied following seeding at a minimum rate of 350kg per hectare, subject to specific site conditions, soil analysis and desired outcomes.
6. Seed and fertiliser should be applied at an even rate using a calibrated disc drill seeder followed by a chain and roller.
7. Disc's should cut approximately 12mm and create enough friable material for chains to cover the seed.
8. Where one pass fails to develop enough friable material a second pass should be made in a transverse direction.
9. Watering is the application of 10mm of water to the total area in not less than one hour and shall include any natural rainfall. The frequency of watering shall comply with the following minimum requirements:-

<b>Periods after grassing</b>	<b>Watering(s)</b>
Immediately	Once
Week 1	Twice / day during hot dry windy periods Once / day during cool / overcast periods
Weeks 2	Once / day
Weeks 3 & 4	Once every second day
Week 5 until necessary	Twice a week Or as necessary to ensure 80% minimum strike rate.

10. Acceptance shall be the achievement of a minimum vegetative cover of 80% of both the annual and perennial grass cover over the whole area. Grassed areas shall exhibit signs of healthy growth and shall be free of weeds, stones, sticks and other deleterious material. Maximum deviation from finished ground levels 50mm in any 2 metres

**S8.12 TURFING**

1. Prior to turfing all weeds shall be killed by spraying a suitable non-residual aquatic friendly suitable glyphosate based herbicide . Sprayed areas shall remain undisturbed for two weeks.
2. Topsoil shall be uniformly applied to provide an average thickness of 50mm with a minimum compacted thickness of 25mm at any location and graded to even-running contours, so that no ponding or waterlogging occurs across the surface of the grassed area.
3. The prepared surface shall be watered within twenty four (24) hours prior to turfing at an application rate of 10mm of water in not less than 1 hour. Watering is to be carried out in such a way as not to cause any scouring or erosion.
4. After watering an approved lawn pesticide shall be applied at the rate specified by the supplier and in accordance with the Agricultural Chemicals Distribution Contract Act and Regulations.
5. Fertiliser should be applied prior to laying turf at a minimum rate of 350kg per hectare, subject to specific site conditions, soil analysis and desired outcomes.
6. Topsoil shall be raked before turf is laid. Turf shall be laid in straight lines with staggered cross joints on the general line of the contour of the slope. The gaps between adjacent sections of turf should not exceed 5mm.
7. A light top dressing shall be worked into the open joints between the turf and then the turf lightly rolled with one pass of a roller weighing about 80kg on a 1m width of roller.
8. On steep slopes turf may be held in position by softwood pegs or stakes, located at each end of the turf sections.
9. Watering is the application of 10mm of water to the total area in not less than one hour and shall include any natural rainfall. The frequency of watering shall comply with the following minimum requirements:-

<b>Periods after grassing</b>	<b>Watering(s)</b>
Immediately	Once
Week 1	Once every second day
Weeks 2, 3 and 4	Three times each week
Weeks 5 to 12	Twice a week

10. Acceptance shall be the achievement of an even green colour with a dense continuous sward over the whole area. Turf shall exhibit signs of healthy growth and shall be free of weeds, stones, sticks and other deleterious material. Maximum deviation from finished ground levels 50mm in any 2 metres.

**S8.13 HYDROMULCHING**

1. Prior to hydromulching all weeds shall be killed by spraying an non-residual aquatic friendly suitable glyphosate based herbicide . Sprayed areas shall remain undisturbed for two weeks.
2. Batter slopes less than 20% shall then be lightly tyned to a depth of 100mm to produce a loose surface and all large stones, rubbish and other materials that may hinder germination shall be removed before topsoiling.
3. Where batters have been stepped, the steps shall be loosely filled with topsoil. Elsewhere, topsoil shall be uniformly applied to provide an average thickness of 75mm with a minimum compacted thickness of 40mm at any location.
4. Dry surfaces shall be watered by a fine spray before the application of the hydromulch.

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5. The slurry mixture of mulch, binder, fertiliser and seed is to be kept in a homogenously mixed state throughout the mulching operation.
6. During preparation of the hydromulch, a liquid form pesticide may be added to the storage tank, to facilitate surface application. Application rate should be in accordance with the manufacturer's recommendation.
7. Additional protective treatments (eg. fibre matting, anionic bitumen emulsion etc) shall be as specified on the approved Project Drawings.
8. Hydromulch shall not be applied under the following weather conditions at the site:
  - a. when temperature is higher than 35°C
  - b. when winds exceed 15 km/hr;
  - c. where the surface is too wet or
  - d. during rain periods or when rain appears imminent.
9. The rate at which the mulch is applied is dependent on slope shall be in accordance with Table S8.02.

**Table S8.02 Hydromulching Material and Application Rates (per 1000m<sup>2</sup>)**

Slope	< 5%	5% - 12%	12% - 20%	20% to 50%	> 50%
Pulped Paper	200kg	120kg	120kg	140kg	200kg
Bagasse (Wet weight)	200kg	400kg	500kg	700kg	800kg
Cane Fibre (Alternative to Bagasse)	200kg	200kg	300kg	400kg	500kg
Fertiliser	50kg	50kg	50kg	50kg	50kg
Seed	5kg	5kg	5kg	5kg	5kg
Water	8000 litres	8000 litres	10,000 litres	12,000 litres	18,000 litres
Binder Curasol Enviro-tack	5 litres 3kg	5 litres 2kg	7.5 litres 3kg	15 litres 4kg	30 litres 5kg
Mulch Thickness	1-2mm	2-3mm	2-4mm	2-4mm	4-6mm

11. Watering is the application of 10mm of water to the total area in not less than one hour and shall include any natural rainfall. The frequency of watering shall comply with the following minimum requirements:-

<b>Periods after grassing</b>	<b>Watering(s)</b>
Immediately	Once
Week 1	Twice / day during hot dry windy periods Once / day during cool / overcast periods
Weeks 2	Once / day
Weeks 3 & 4	Once every second day
Week 5 until necessary	Twice a week or as necessary to ensure 80% minimum strike rate.

12. A follow up fertiliser treatment is to be applied to 4 – 6 weeks after germination has occurred. Fertilisation should be with a product that provides for the following elements: Nitrogen (N) 13%, Phosphorus (P) 4% and Potassium (K) 12%.
13. Acceptance shall be subject to the achievement of a minimum vegetative cover of 80% of both the annual and perennial grass cover over the whole area. Hydromulched areas shall exhibit signs of healthy growth and shall be free of weeds, stones, sticks and other deleterious material.

#### **S8.14 PLANTING**

- Planting shall be carried out as soon after delivery to the site as possible. All containers, unless fully biodegradable, shall be removed at the latest point before planting.
- All plants shall be obtained from a nursery located in an area having a similar climate to the site of the Works.
- Shrub and ground cover planting to verges and traffic islands etc. shall be as detailed on the approved Project Drawings and unless otherwise specified the planting beds shall be in accordance with Standard Drawing S4210.
- Prior to planting all weeds shall be killed by spraying a suitable non-residual aquatic friendly based herbicide. Sprayed areas shall remain undisturbed for two weeks.
- Street trees shall be planted at the locations as shown on the approved Project Drawings.
- During backfilling around the plants the soil shall be lightly firmed to ensure intimate contact with the roots, but with large material successive layers of soil will need to be lightly firmed as backfilling proceeds.
- Ensure the plants are held securely by the soil but not so that moisture penetration of the soil is restricted. After planting, damaged, dead, diseased or crossing branches shall be removed by pruning.
- Plants should be watered directly after planting prior to spreading of mulch. The mulch shall be left just clear of the plant stem.
- To ensure establishment all trees shall be appropriately staked with hardwood or recycled plastic stake, extending into the ground to a depth of 500mm. Do not allow the stake to penetrate the root ball. Tree to be loosely supported from each stake by hessian tree tie. Refer Standard Drawing S4210 for details.

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10. Mulch shall be aged forest and hardwood woodchip, stockpiled for a minimum of 6 weeks, free from rocks, non-biodegradable and toxic material. In paved footpath planters it shall be installed to a depth of 75mm, in tree guards, traffic islands and mulched, mass planted garden beds within parkland and reserves to a depth of 150mm depth.
11. Natural Forest mulch to be used in "natural" planting areas only, such as buffer planting or parkland planting. It should be installed to a minimum 150mm compacted depth, free from rocks, nut grass, and any other invasive weed.
12. Tea-tree mulch is prone to combustion and shall not be used unless permission is obtained from Council. .
13. All plants shall be watered, immediately upon planting, and as required by soil moisture conditions for the first thirteen weeks. The use of slow release drip irrigation watering is recommended i.
14. Weed and grass growth in mulched areas shall be killed by treatment with herbicide in accordance with the manufacturer's instructions at monthly intervals during the construction period and contract maintenance period. Contact of the herbicide with the new plants shall be avoided and any damage repaired or damaged plant material replaced.
15. Acceptance shall be subject to achieving the following criteria. Plants, which do not meet the acceptance criteria, shall be replaced. Replacement plants shall be of similar size and quality and of identical species and variety to the plant being replaced.
  - a. Plants shall exhibiting signs of healthy growth,
  - b. Plants shall be well formed,
  - c. Plants shall be free from disease or insect pests,
  - d. Plants shall be free of physiological disease symptoms (yellowing, wilting etc)
  - e. Mulch shall be free from weeds, sticks, rubbish and other deleterious material,

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**IRRIGATION<sup>CRC</sup>****S8.15 GENERAL<sup>CRC</sup>**

1. Application shall be made to Council for connection of irrigation systems to the water main for all landscaping of Council assets that require irrigation. The Contractor shall arrange with the Council for the timing of the work. All works shall be carried out by the relevant Local Authority at the applicants cost.
2. The Applicant will be responsible for the payment of all water used during construction, testing, establishment and maintenance of the irrigation system and landscape works.

**S8.16 EXCAVATION<sup>CRC</sup>**

1. Do not excavate by machine within 500mm of existing underground services.
2. The standard width of trench for pipes shall be 150mm.
3. Unless noted otherwise on the approved Project Drawings or directed by Council all pipe work is to be installed with a minimum cover of 350mm.

**S8.17 LAYING OF PIPES<sup>CRC</sup>**

1. All pipe work to be bedded in clean fill sand with a minimum cover of 50mm all round.
2. Special precautions are to be taken to exclude dirt, sand, grit or gravel from entering pipelines.
3. The open ends of pipes shall be plugged at the end of the day's work to prevent entry of water or mud.

**S8.18 PRESSURE TESTING**

1. All work shall satisfy a test pressure of the nominated working pressure for a period of two (2) hours. The test shall be carried out during the coolest part of the day. The point at which the test pressure is measured shall be at the lowest point in the profile of that section of main under test.
2. All tests shall be carried out under the supervision and in the presence of the Council Inspector.
3. Any defects that arise during the tests shall be repaired in an approved manner. Any leak however small will be classed as a defect. All such repair work shall be similarly tested and approved before acceptance.
4. The Contractor shall give 48 hours notice to Council so that arrangements can be made for supervision of the testing.
5. The Contractor shall accept all risks and expenses incurred during testing and shall provide all labour together with all pumps, engines, pipes, temporary valve plugs, flanges and all other equipment as may be necessary to undertake testing.

**S8.19 FLUSHING**

1. After pressure testing has been carried out the new pipework shall be flushed as thoroughly as possible with the available water pressure.

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### **S8.20 CONTROLLERS**

1. All Council landscaped areas, which require irrigation systems shall be controlled by electrically, operated solid state controller.

### **S8.21 AUTOMATIC CONTROL**

CRC only:

1. The automatic control shall be capable of operating as a stand-alone controller with integral 240 VAC power source, multi start times, multi independent programs, "Cycle and Soak" capability, and have provision for sensor input/ override. Installation is to be strictly to manufacturer's instructions, in a location as directed by the council. Internal automatic control will provide unattended operation of the irrigation system.
2. Internal installation is to include connection to the 240VAC outlet GPO. All wiring to access via PVC conduit sweep bends. Connect 24 AC control wire from controller to 24 AC solenoid valves, access from external points to be via conduit through sleeves and or penetrations.

### **S8.22 SPRINKLER UNITS**

See CRC Local Government Specific

### **S8.23 FILTRATION**

1. All irrigation systems shall be fitted with an approved flow strainer installed in a secure enclosure.

### **S8.24 VALVES<sup>CRC</sup>**

1. Electrically actuated solenoid valves shall have flow control, manual bleed screw, 24 VAC solenoid, Buna N diaphragm, and be constructed of PVC and stainless steel. They shall be suitable for direct burial and have 150 psi maximum working pressure. They shall be pressure regulating solenoid valves.
2. Isolation valves shall be of bronze construction and of the BSP screwed gate type as approved by the engineer. They shall be installed on the supply side at every solenoid valve to enable isolating.
3. Protective valve boxes are to be provided for each solenoid valve. They shall be constructed of green high density polyethylene, be 450 x 300 x 300mm in dimension, and have a lockable lid with the word "Irrigation" clearly marked on it.
4. The wiring from the solenoid to the controller shall be laid in conduit and shall be of 250 volt grade and shall be installed to approved standards. The wiring shall be located with all pipework.
5. All solenoid valves shall be connected to controller by 1.5 mm<sup>2</sup> solid core wire or decoder wire and to have seven insulated cores within a common plastic protective shield. It shall be similar in all respects to RIS multi-core electrical control wire and shall be continuous between valve and controller, and valve to valve. An additional one metre length of cable shall be provided at each wire termination. Cable shall be sized for voltage drop not exceeding four (4) volts over total route length.
6. Solenoid valves are required to be fitted with a ball valve upstream of each valve, as approved by council.
7. Where required Installation of the air valve is to be off the top of pipe positioned with a 30-degree angle off from the horizontal.



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**S8.25 BACKFLOW PREVENTION DEVICES<sup>CRC</sup>**

1. All Council landscaped areas, which require irrigation systems, shall have a backflow prevention device installed. This device should comprise of a stand constructed fully from hard drawn copper pipe (Type D) and should have an inline strainer both before and after the backflow preventer. This should comply with AS 2845.

**S8.26 PERFORMACE TEST**

1. On completion of the installation the system shall be tested in the presence of a Council Inspector.
2. The system shall be operated to demonstrate that all components function as required by the design.
3. The Contractor is responsible for making all necessary alterations to the system so that the performance is in accordance with the design specifications.

**S8.27 BACKFILLING OF TRENCHES**

1. Trenches shall be backfilled with the excavated material. If the excavated material is considered unsuitable for backfilling by the Council Inspector, it shall be removed from the site and replaced with clean approved backfill material.
2. All trenches so backfilled shall be compacted and lightly raked to ensure that surface levels marry with adjacent surface levels, are free draining and free from mounds or depressions. All rocks or evidence of excavated subgrade shall be raked up and removed.