# Fitzroy Basin Association Revegetation Advice

**Plant species, planting location and methodology, Bindaree**

**Notes:** This advice is limited to matters relating to planting of tubestock at the Fitzroy River Bindaree site and maintenance of these plants until well established. Species recommended are based on a site inspection on 5 March 2024.

# Planting areas

Planting areas are as defined by FBA email of 27 February 2024.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Zone** | **Grade** | **Area (m2)** | **Width (m)** | **Length (m)** |
| **Bench (bottom of bank/water level)** | No slope/flat | 2333 | 13 | 190 |
| **Lower bank** | 1v:3h | 5238 | 20 | 260 |
| **Upper bank** | 1v:3h | 7204 | 25 | 300 |
| **Overbank** | Natural ground level | 4873 | 15 | 330 |

# Tubestock planting density (trees and matrush (lomandra))

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Bench\* 0.233ha (13mx190m)** | | **Lower Bank 0.524ha (20mx260m)** | | **Upper Bank 0.720ha (25mx300m)** | | **Overbank 0.487ha (15mx330m)** | |
|  | **No./ha (spacing)** | **Tubes** | **No./ha (spacing)** | **Tubes** | **No./ha (spacing)** | **Tubes** | **No./ha (spacing)** | **Tubes** |
| **Tree** | 2,000 (2m) | 0 | 1,000 (3m) | 850 | 750 (3.5m) | 540 | 750 (3.5m) | 365 |
| **Matrush** | 3,000 (1.8m) | 0 | 2,000 (2m) | 1310 | 0 | 0 | 0 | 0 |

**\*Note**: The bench will extend into the existing wetted area of the river close to the current main channel.

# Bench species 0.233ha (13m x 190m)

|  |  |  |
| --- | --- | --- |
| **Tree Species (2,000 Stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total tree tubestock** | **0** | **2** |
| Casuarina cunninghamiana | 0 |  |
| Melaleuca fluviatilus | 0 |  |
| Melaleuca trichostachya | 0 |  |
| Melaleuca viminalis | 0 |  |
|  |  |  |
| **Sedge/grass Species (3,000 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total Sedge/grass tubestock** | **0** | **1.8** |
| Lomandra longifolia/L. spicata\* | 0 |  |

\* Optionally use 50:50 *Chrysopogon filipes* and *Lomandra longifolia*

# Lower Bank 0.524ha (20mx260m)

|  |  |  |
| --- | --- | --- |
| **Tree Species (1,500 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total tree tubestock** | **850** | **2.5** |
| Casuarina cunninghamiana | 144 |  |
| Corymbia tesselaris | 50 |  |
| Eucalyptus raveretiana | 50 |  |
| Eucalyptus tereticornis | 50 |  |
| Ficus opposita | 50 |  |
| Melaleuca fluviatilus | 240 |  |
| Melaleuca trichostachya | 166 |  |
| Melaleuca viminalis | 100 |  |
|  |  |  |
| **Sedge/grass Species (2,500 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total Sedge/grass tubestock** | **1310** | **2** |
| Lomandra longifolia/L. spicata\* | 1310 |  |

\* Optionally use 50:50 *Chrysopogon filipes* and *Lomandra longifolia*

1. **Upper Bank 0.720ha (25mx300m)**

|  |  |  |
| --- | --- | --- |
| **Tree Species (750 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total tree tubestock** | **540** | 3.5 |
| Casuarina cunninghamiana | 50 |  |
| Cordia dichotoma | 40 |  |
| Corymbia tesselaris | 100 |  |
| Eucalyptus coolabah | 50 |  |
| Eucalyptus raveretiana | 50 |  |
| Eucalyptus tereticornis | 100 |  |
| Ficus opposita | 50 |  |
| Ficus rubiginosa | 50 |  |
| Planchonia careya | 50 |  |
|  |  |  |
| **Sedge/grass Species (0 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total sedge/grass tubestock** | **0** |  |
| Lomandra longifolia/L. spicata | 0 |  |

1. **Over- Bank 0.487ha (15mx330m)**

|  |  |  |
| --- | --- | --- |
| **Tree Species (750 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total tree tubestock** | **365** | 3.5 |
| Corymbia tesselaris | 100 |  |
| Eucalyptus coolabah | 25 |  |
| Eucalyptus raveretiana | 40 |  |
| Eucalyptus tereticornis | 100 |  |
| Ficus opposita | 40 |  |
| Ficus rubiginosa | 30 |  |
| Planchonia careya | 30 |  |
|  |  |  |
| **Sedge/grass Species (0 stems/ha)** | **No. Tubes** | **Approx. Spacing (m)** |
| **Total sedge/grass tubestock** | **0** |  |
| Lomandra longifolia/L. spicata | 0 |  |

1. **Species Totals**

|  |  |
| --- | --- |
| **Tree Species** | |
| Casuarina cunninghamiana | 194 |
| Cordia dichotoma | 40 |
| Corymbia tesselaris | 250 |
| Eucalyptus coolabah | 75 |
| Eucalyptus raveretiana | 140 |
| Eucalyptus tereticornis | 250 |
| Ficus opposita | 140 |
| Ficus rubiginosa | 80 |
| Melaleuca fluviatilus | 350 |
| Melaleuca trichostachya | 196 |
| Melaleuca viminalis | 100 |
| Planchonia careya | 80 |

|  |  |
| --- | --- |
| **Sedge/grass Species** | |
| Lomandra longifolia/L. spicata | 1748 |

1. **Planting and watering**
   1. **General planting advice**

**N.B. The planting and watering methodology** should be reviewed by the contractor and any variations agreed between the contractor and the project manager. The planting and watering methods used should be subject to monitoring during and after planting. Watering rate and frequency may need to be adjusted based on visual assessment of plant stress.

**Correct distribution/location of plant species** at the time of planting is important and requires that the contractor/site supervisor is able to recognise each species and follow the planned location and density of planting. The specified requirements should be discussed with the project manager prior to commencement.

**Maintaining adequate moisture in the root zone is critical** to ensuring survival and growth of trees. Planning must provide for adequate watering of tubestock from time of collection at the nursery to time of planting on site. Potting mix may dry out within an hour on a hot day and once the mix is dry it becomes water repellent. Plants may die while in the tube or soon after planting.

**Effective dispersal of soil into the potting mix at the time of planting is critical** to ensure that the potting mix will not subsequently become water-repellent on drying, and that the plant roots are able to grow out without encountering significant dry airspaces. In heavy clay soils, this may require more than one watering after planting.

**Sufficient water must be available at a sufficient rate of supply** to deliver at least 20L of water to each tree within 1hr of planting. This is usually not able to be achieved by using an irrigation system.

The volume of water per plant can be reduced to 5 – 10L for the Lomandra. Where limited water supply is available, the number of tubestock planted per hour or day must be reduced as required.

**Mulch.** Application of a layer of chip (from the trees removed prior to earthworks), or other clean mulch, over the 1:3 slopes prior to ripping on the contour may assist water retention, cool surface soil, and enhance survival and growth of tubestock. Care is needed to not have too much chip as it may reduce grass and legume establishment and may reduce available nitrogen. Alternatively, mulch can be placed around each tree after planting and first watering, ensuring that mulch is kept away from the stem of the plant.

# Planting depth and hole design

Deep ripping is generally not recommended as this will increase the rate of dispersion of water away from the planting hole. Shallow ripping is needed to capture the seed mix and the irrigation water needed to germinate seeds.

In order to ensure that the plant roots receive adequate water at the time of planting, and following planting, it is necessary to use a hole design, planting depth, and backfill method (see 8.4) that will enable water to be retained around the plant (the 20L on watering and any rainfall runoff). Where this is not possible (e.g. lomandra, grasses), it is essential to use a watering regime sufficient to ensure establishment of the plant (see 8.4).

For tree tubestock, the hole should be approx. 400mm deep and a diameter about the same as a post-hole shovel for ease of clean out before planting and to ensure an adequate well to hold water. For sedges, grasses and rushes (Lomandra) the hole should be approx. 200 - 300mm deep.

Holes are best prepared prior to commencement of planting in each section in accordance with the specified spacing for the zone. Holes for sedges, grasses and rushes are normally prepared immediately prior to planting.

# Plant species distribution and planting layout

Planting in rows is desirable where possible for easier maintenance and monitoring. This may be essential if drip irrigation is used.

The plant species for each defined location must be selected and distributed consistent with the planned density and species ratios specified for the area. See sections 2 - 6 above.

Tree species in each area should be fairly randomly distributed i.e. plants of each species should not be clustered together.

# Planting methodology and follow up maintenance

Potting mix must be fully wetted at the time of planting by submerging tubestock in a container of water with a small amount of seaweed extract until no further air is released. This can be achieved by placing a number of tubestock of mixed species (correct species for the location) in the container and picking from these to plant.

The plants must be removed from the tubes using good technique (do not pull out by the stem) such that the roots are not disturbed except for any necessary trimming of extending roots to allow removal from the tube. If the plant will not come out of the tube easily, it may be necessary to cut the side of the tube.

**Tree tubestock** should be planted 400mm deep and (partly) **backfilled with topsoil** to leave a substantial depression around the tree to capture initial and follow up waterings and any rainfall

runoff. Surplus soil should be left downslope to form a dam to assist retention of any runoff. Backfilling of soil should extend up the stem of the plant but the extent will vary according to the height of the plant. Care must be taken to ensure that the plant will not be buried on watering or heavy rainfall. **See FBA Deep Planting Guide.**

**Lomandra and grass tubestock** should be planted 200-300mm deep and backfilled to level with the top of the roots. The well around the plant must be shallow to prevent burial on watering. Watering rate may need to be reduced to ensure that penetration of an adequate volume of water around the roots is achieved. An additional watering may be needed to ensure soil is dispersed into the potting mix.

If required by the contract, fertiliser should be added to the hole before planting or within the backfill to enhance growth rate.

Trees must be watered with at least 20L of water within 1 hour of planting, ensuring that all water is retained in the planting hole (this requires correct hole preparation, planting depth, and backfilling to leave a significant depression around each plant).

Lomandra and grass tubestock are not planted with a large well but the watering must still be adequate to merge the soil with the potting mix. This may require multiple waterings.

Sprinkler systems, drippers and rainfall are not effective in supplying adequate water at the time of planting or in initial follow up watering and must not be used as the primary method of applying water. Sprinkler irrigation is needed for the initial grass and legume seed germination and establishment.

Drippers can be effective for trees after initial establishment but water should be applied in pulses

e.g. 20L once per week or month, rather than continuous.

In heavy clay soils it may be necessary to apply follow up water 1 or 2 days after planting to ensure that the clay is effectively dispersed around and into the potting mix leaving no significant voids.

Plants must be monitored regularly and **rewatered with at least 20L of water when signs of moisture stress are apparent**. In general it is beneficial to apply follow up water 2 – 7 days after planting to ensure roots are not damaged by drying out, unless there is good soil moisture profile and/or good rainfall.

The rate of watering must be sufficiently slow to ensure that all water goes into the soil around the roots of the plant. If there is an adequate well, application of 20L can be fast. If not, or if the soil will not absorb water quickly, a slower watering rate or multiple lower volume watering may be needed. This is not an issue if drip irrigation is used.

Once the plant roots are properly established, rainfall may be adequate but monitoring is needed to check for plant stress. Water only when some plants look stressed to ensure plant roots go deep.

# Optional measures

It is usually desirable to clearly mark the location of each tree with a paint-marked durable stake approx. 1.5m high to assist locating during maintenance (may need 3 stakes if installing animal or frost protection). However, this would add significantly to costs.

Grazing animal (rabbits, wallabies, hares) protection may be required but again would add significantly to costs.

Prevent stock access until the trees are of a height that can withstand likely impacts (could be 2 – 3m high for eucalypts).

Implement measures to protect the planted areas from fire until trees are sufficiently advanced to withstand fire. This could be 10 years or longer.