

# Bellinger River Estuary Revegetation Guide

## What is this leaflet for?

The information in this leaflet will help landholders select the right plant species to use in river bank restoration works in estuarine areas of the Bellinger and Kalang river systems.

## Why restore estuarine river banks?

Native vegetation plays a vital role in river bank stabilisation. In estuaries, wind and waves constantly act on river-banks and plant roots act as physical reinforcement within river bank soils. Trees also shelter the water surface from extremes of wind which lessens wave action. Trees also help to remove water from river bank soils through transpiration which protects banks from slumping.

Whilst erosion and deposition of sediment are natural river processes, the accelerated rates of erosion seen today are the result of removal of native vegetation over time through land clearing, over-grazing and other development pressures. This in turn leads to the loss of productive land and valuable habitat and impacts on water quality and aquatic habitats downstream. The effects of accelerated erosion are especially significant during floods.

Disturbance or destruction of river bank vegetation and weed invasion has also severely limited the ability of river banks to repair themselves through natural regeneration of vegetation between flood events.

In their current state, river banks need active assistance and management to maintain and improve their stability and resistance to erosion. Planting river banks with local native species which are adapted to the pressures of this dynamic environment is a valuable way to ensure our river estuaries remain healthy.

The vegetation naturally occurring on estuarine river banks changes as the river water becomes less salty upstream. The Bellinger and Kalang estuaries have four vegetation zones characterised by particular groupings of plant species and their preferred location on the river bank. This leaflet summarises this information and will help landholders put the right plant in the right place to recreate healthy riparian vegetation to protect and enhance our estuarine water ways.

## How do I use the leaflet?

- Step 1.** Find out which zone your rehabilitation site is located using the map on the back cover.
- Step 2.** Use the plant species and bank location table on page 2 for your zone to determine the right species for your project and where to plant them on the river bank.
- Step 3.** Use information on page 3 to help plan and carry out your project.

**For further information and advice on river bank restoration contact  
Bellinger Landcare Inc**

1a Oak Street Bellinger NSW 2454 02 6655 0588 email [belland@midcoast.com.au](mailto:belland@midcoast.com.au)

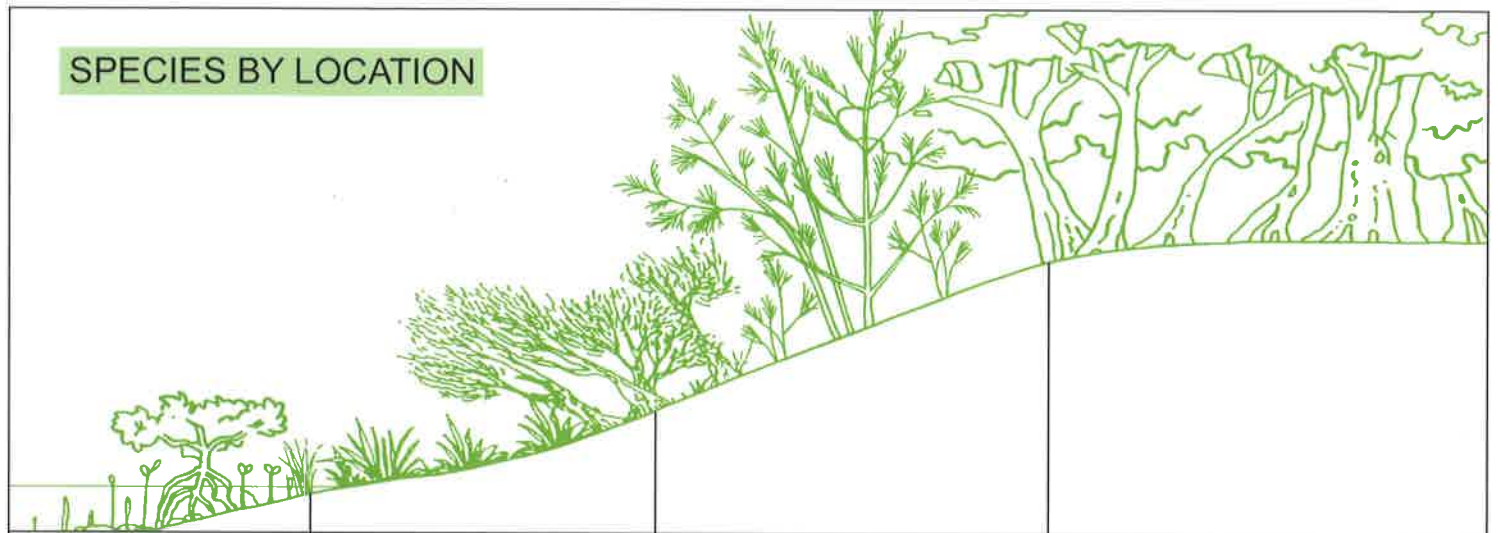


## Acknowledgements

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# SPECIES BY LOCATION



	MID to HIGH TIDE	TOE	MIDDLE	UPPER
ZONE A	<p>Grey Mangrove <i>Avicennia marina</i></p>	<p>Grey Mangrove <i>Avicennia marina</i></p> <p>Swamp She Oak <i>Casuarina glauca</i></p> <p>Swamp Rush <i>Juncus sp.</i></p>	<p>Grey Mangrove <i>Avicennia marina</i></p> <p>Swamp She Oak <i>Casuarina glauca</i></p> <p>Swamp Rush <i>Juncus sp.</i></p>	<p>Swamp She Oak <i>Casuarina glauca</i></p> <p>Broad leaved Paperbark <i>Melaleuca quinquenervia</i></p> <p>Tuckeroo <i>Cupaniopsis anacardioides</i></p> <p>Guoia <i>Guoia semiglauca</i></p> <p>Hard Quandong <i>Elaeocarpus obovatus</i></p> <p>Yellow Pear Fruit <i>Mischocarpus pyriformis</i></p> <p>Red Ash <i>Alphitonia excelsa</i></p> <p>Rusty leaved fig <i>Ficus rubiginosa</i></p>
ZONE B	<p>Grey Mangrove <i>Avicennia marina</i></p> <p>River Mangrove <i>Aegiceras comiculatum</i></p> <p>River Lily <i>Crinum pedunculatum</i></p>	<p>Species listed for tidal area plus: Swamp She Oak <i>Casuarina glauca</i></p>	<p>Broad-leaved Paperbark <i>Melaleuca quinquenervia</i></p> <p>Swamp Oak <i>Casuarina glauca</i></p> <p>Tuckeroo <i>Cupaniopsis anacardioides</i></p> <p>Guoia <i>Guoia semiglauca</i></p> <p>White Bottlebrush <i>Callistemon salignus</i></p> <p>Cheese Tree <i>Glochidion ferdinandi</i></p> <p>Hard Quandong <i>Elaeocarpus obovatus</i></p>	<p>Species listed for middle-bank plus: Red Ash <i>Alphitonia excelsa</i></p> <p>Foambark <i>Jagera pseudorhus</i></p> <p>Rusty leaved Fig <i>Ficus rubiginosa</i></p> <p>Deciduous fig <i>Ficus superba</i></p> <p>Blackwood <i>Acacia melanoxylon</i></p>
ZONE C	<p>River Mangrove <i>Aegiceras comiculatum</i></p> <p>River Lily <i>Crinum pedunculatum</i></p> <p>Swamp She Oak <i>Casuarina glauca</i></p>	<p>Tidal: River Mangrove <i>Aegiceras comiculatum</i></p> <p>River Lily <i>Crinum pedunculatum</i></p> <p>Swamp She Oak <i>Casuarina glauca</i></p> <p>Above tidal: River Oak <i>Casuarina cunninghamiana</i></p> <p>Thin-fruited Tea-Tree <i>Leptospermum brachyandrum</i></p> <p>Water Gum <i>Tristaniopsis laurina</i></p> <p>Mat Rush <i>Lomandra hystrix</i></p>	<p>Species listed for above tidal plus: Tuckeroo <i>Cupaniopsis anacardioides</i></p> <p>River Oak <i>Casuarina cunninghamiana</i></p> <p>Foambark <i>Jagera pseudorhus</i></p> <p>Lily Pilly <i>Syzygium australe</i></p> <p>Red Ash <i>Alphitonia excelsa</i></p> <p>Sandpaper Fig <i>Ficus coronata</i></p> <p>Guoia <i>Guoia semiglauca</i></p> <p>Hard Quandong <i>Elaeocarpus obovatus</i></p> <p>Cheese Tree <i>Glochidion ferdinandi</i></p> <p>White Bottlebrush <i>Callistemon salignus</i></p>	<p>Species listed for middle bank plus: Weeping Cherry <i>Waterhousea floribunda</i></p> <p>White Cedar <i>Melia azedarach</i></p> <p>Rusty Fig <i>Ficus rubiginosa</i></p> <p>Deciduous Fig <i>Ficus superba</i></p> <p>Blackwood <i>Acacia melanoxylon</i></p> <p>Pepperberry <i>Cryptocarya obovata</i></p> <p>Jackwood <i>Cryptocarya glaucescens</i></p> <p>Native Daphne <i>Pittosporum undulatum</i></p>
ZONE D		<p>Mat Rush <i>Lomandra longifolia</i></p> <p>Thin-fruited Tea-Tree <i>Leptospermum brachyandrum</i></p> <p>Water Gum <i>Tristaniopsis laurina</i></p>	<p>Toe species plus: Tuckeroo <i>Cupaniopsis anacardioides</i></p> <p>River She Oak <i>Casuarina cunninghamiana</i></p> <p>Foambark <i>Jagera pseudorhus</i></p> <p>Lily Pilly <i>Syzygium australe</i></p> <p>Red Ash <i>Alphitonia excelsa</i></p> <p>Sandpaper Fig <i>Ficus coronata</i></p> <p>Guoia <i>Guoia semiglauca</i></p> <p>Hard Quandong <i>Elaeocarpus obovatus</i></p> <p>Cheese Tree <i>Glochidion ferdinandi</i></p> <p>White Bottlebrush <i>Callistemon salignus</i></p> <p>Weeping Lilly Pilly <i>Waterhousea floribunda</i></p>	<p>Middle bank species plus: White Cedar <i>Melia azedarach</i></p> <p>Rusty Fig <i>Ficus rubiginosa</i></p> <p>Deciduous Fig <i>Ficus superba</i></p> <p>Blackwood <i>Acacia melanoxylon</i></p> <p>Pepperberry <i>Cryptocarya obovata</i></p> <p>Jackwood <i>Cryptocarya glaucescens</i></p> <p>Native Daphne <i>Pittosporum undulatum</i></p> <p>Ribbonwood <i>Euroschinus falcata</i></p> <p>plus other lowland rainforest species as available</p>



## How to plant out your site:

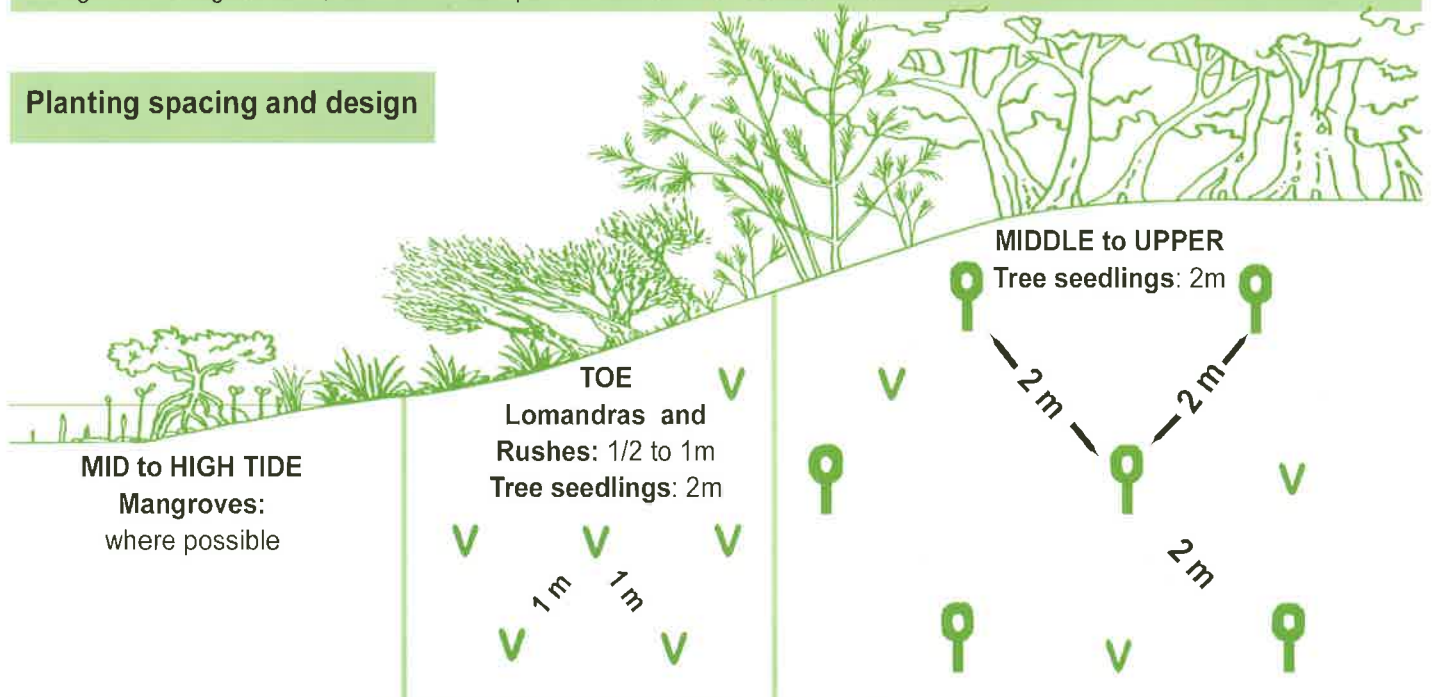
1. Use your chosen species from the table on page 2.
2. Design the site and work out plant numbers as outlined below.
3. Place your order with nurseries by October and plan for a February/March planting.
4. Prepare the site in time for planting. Things to consider are: (a) minimising competition from other plants (especially grasses) by weeding, spraying or mulching (b) allowing time for any herbicide treatment to act - usually 2 weeks (c) fencing out stock before planting (d) allowing access for maintenance (e) general weed control on site prior to planting.
5. Plant and protect from wallabies, hares and frosts using guards and stakes.
6. Maintain planting, water weekly for the first month if possible, reduce competition by regular weeding and/or mulching.

## Design Principles:

Planting densely will result in early shading of the ground layer which helps reduce grass and weed growth and ensures 'control' of the site at an early stage. This means less maintenance is needed overall and the effect of the planting is achieved within the first few seasons. The trees will also give each other some protection from sun, wind and cold.

Dense planting results in growth under competitive conditions which favours faster growing species and produces taller trees in a shorter time. These conditions will not necessarily produce the type of tree form that would emerge with wider plant spacings or through natural regeneration, but will ensure rapid reinforcement of river bank soils.

## Planting spacing and design



**MID to HIGH TIDE**  
**Mangroves:**  
where possible

**TOE**  
**Lomandras and**  
**Rushes:** 1/2 to 1m  
**Tree seedlings:** 2m

**MIDDLE to UPPER**  
**Tree seedlings:** 2m

### Mangroves:

Are not commercially available. Collect seeds and push them into the mud, just below the surface. Choose areas protected from strong water flows. Grey Mangrove seeds can be found floating in the river in December and should be planted immediately. Space the seeds as close as numbers collected allow.

### Lomandras, River Lily and Rushes:

Plant at 0.5 to 1 m centres. *Lomandra hystrix* and *Lomandra longifolia* are readily available from nurseries, while other species may be more difficult to obtain. Division of clumps near your site may be an option. The clumps will quickly expand and form dense mats.

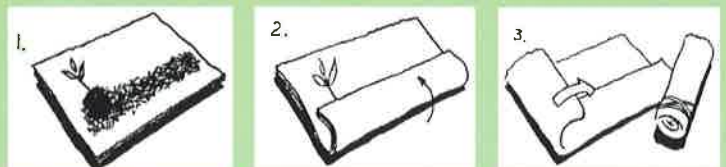
### Trees:

On all areas of the bank spacing should be at 2m centres along and between rows in a zig-zag pattern. Twenty percent of the total number should be selected for fast growth, in order to protect and provide early shade. These should be spread evenly throughout the planting. Lomandras can be interplanted at 1 metre centres. Fast growing species include: Blackwood (*Acacia melanoxylon*), River Oak (*Casuarina cunninghamiana*), Red Ash (*Alphitonia excelsa*), White Cedar (*Melia azederach*).

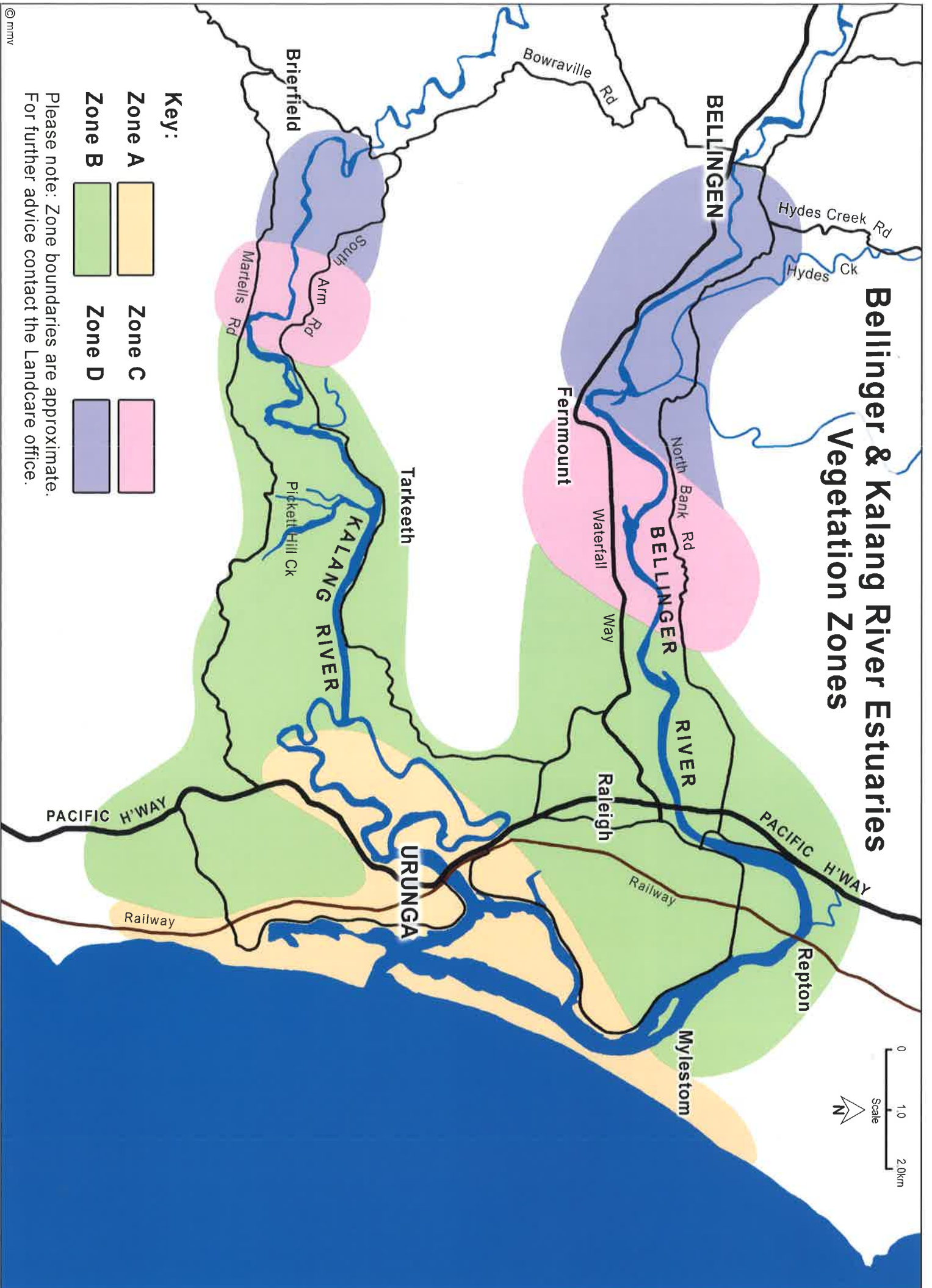
## Planting methods:

Most tree seedlings are sold in a "tube" or a "hiko". These small pot sizes promote the best leaf/root system ratio, considering weight, speed of growth and price. The planting hole should be just big enough to comfortably fit the rootball. The rootball should be placed into the hole with its top surface level with the ground. **Guards** can be milk cartons, protecting from hares and herbicide spray drift. Plastic guards at 900mm height will protect from wallaby browsing. All guards must be straightened to prevent them from leaning on tree seedlings. **Mulch** will reduce grass growth and preserve soil moisture. Mulch must not be heaped against the stem of the seedling, as this will rot the bark.

In **sandy coastal soils** the "bundling" technique can help prevent drying of seedlings. The rootball is placed on three sheets of newspaper with potting mix, water holding crystals and slow-release fertilizer. The paper is rolled up and soaked prior to planting and gives the young plant a protective sleeve.



# Bellinger & Kalang River Estuaries Vegetation Zones



Key:

- Zone A
- Zone B
- Zone C
- Zone D

Please note: Zone boundaries are approximate.  
For further advice contact the Landcare office.