



Hunter River Estuary Riparian Revegetation Guide

Information in this leaflet will help landholders select the right plant species to use in river bank (or riparian) restoration in the Hunter River estuary – the part of the river influenced by the tides.

WHY RESTORE RIVER BANKS IN THE ESTUARY?

Native vegetation plays a vital role in river bank stabilisation. The estuary's river banks are impacted by tides, floods, wind, waves, as well as human and animal activities. In their current state, river banks need active assistance and management to maintain and improve their stability and resistance to erosion. Local native trees, shrubs and groundcovers are best suited to protect and restore river banks:

- tree roots help river banks resist erosion by holding soil in place
- over-hanging foliage regulates water temperature and provides shade for fish
- fallen trees provide additional river bank protection and native fish habitat.

Erosion and deposition of sediment are natural river processes. However, rates of erosion in the Hunter estuary have been accelerated with the removal of native vegetation, over-grazing and other pressures of development, leading to:

- loss of productive land
- loss of habitat
- reduced water quality
- degraded aquatic habitat for fish.

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

HOW TO RESTORE RIVER BANKS IN THE ESTUARY?

A healthy river and estuary relies on good riparian land management throughout the river valley or catchment.

Recommended management practices include:

- removing stock access to waterways
- providing off-stream water and shade for stock
- restoring riverbanks with native vegetation.

This leaflet provides a landholders a guide for putting the right plant in the right place to restore healthy riparian vegetation which will protect and enhance our estuarine waterways.

Steps to successful planting

Step 1

Find out in 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 Hunter Local Land Services.

Ph: (02) 4930 1030

Email: admin.hunter@lls.nsw.gov.au



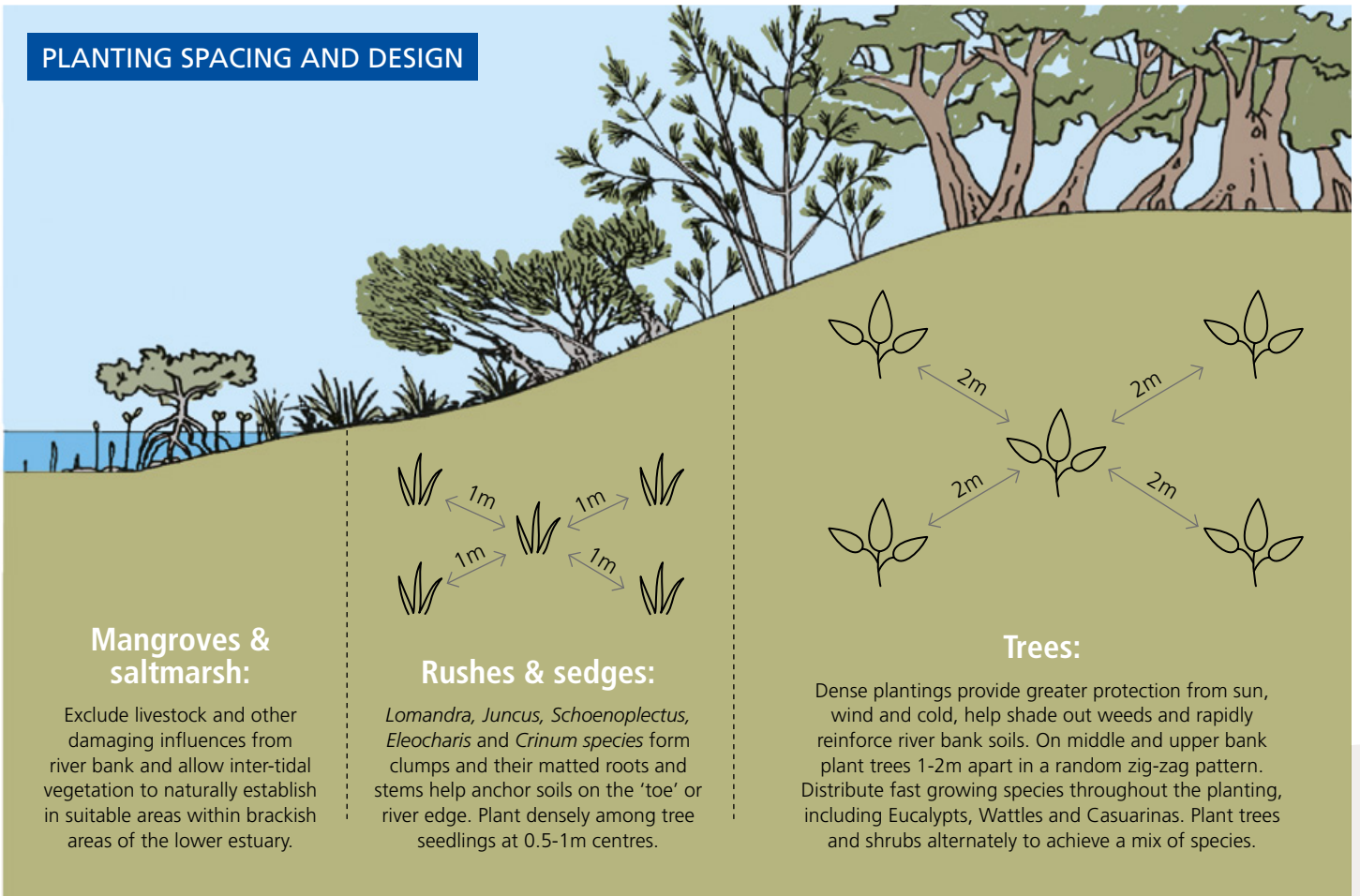
ACKNOWLEDGEMENTS

Concept for this fact sheet was based on the *Bellinger River Estuary Revegetation Guide* initiated by Bellinger Landcare Inc. Local botanical expert advice was provided by Noel Jupp and Dr Stephen Bell.

HOW TO PLANT YOUR SITE

1. Use your chosen species from the table on page 2, including a mixture of ground covers, shrub and tree canopy species.
2. Design the site and work out plant numbers and spacing as outlined below.
3. Place your order with local nurseries in spring/summer for autumn and winter planting.
4. Arrange to collect or have plants delivered as close as possible to your planting day(s). Store nursery plants in a protected area and water twice daily.
5. Remove livestock from planting site and fence if required, allowing access for maintenance.
6. Prepare the site by slashing, weeding, applying herbicide (contact LLS staff for advice – allow two weeks after herbicide treatment before planting) and/or mulching.
7. Plant, water in and protect from herbivores, wind, and extreme elements using tree guards and stakes. See planting methods below.
8. Maintain planting: water weekly for the first month then as needed, depending on weather; reduce competition by regular weeding and/or mulching, checking every month.
9. Retrieve all plastic tree guards when plants are waist high.

PLANTING SPACING AND DESIGN



Mangroves & saltmarsh:

Exclude livestock and other damaging influences from river bank and allow inter-tidal vegetation to naturally establish in suitable areas within brackish areas of the lower estuary.

Rushes & sedges:

Lomandra, Juncus, Schoenoplectus, Eleocharis and *Crinum* species form clumps and their matted roots and stems help anchor soils on the 'toe' or river edge. Plant densely among tree seedlings at 0.5-1m centres.

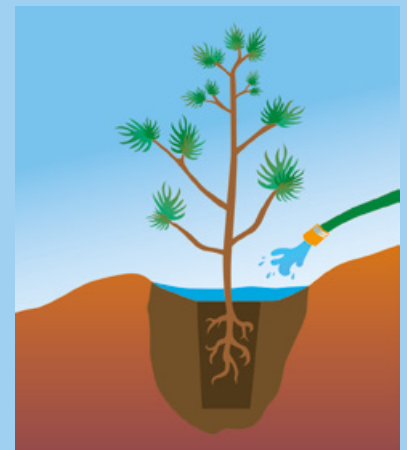
Trees:

Dense plantings provide greater protection from sun, wind and cold, help shade out weeds and rapidly reinforce river bank soils. On middle and upper bank plant trees 1-2m apart in a random zig-zag pattern. Distribute fast growing species throughout the planting, including Eucalypts, Wattles and Casuarinas. Plant trees and shrubs alternately to achieve a mix of species.

PLANTING METHODS

Most native tree seedlings are sold in trays of 40 tubes or hikos. These small pots are designed to be an optimal size for field planting considering weight, price, speed of plant growth and development of roots. Using a mattock, spade or auger, dig a hole just big enough to comfortably fit the root ball of the plant. Gently remove the plant from the plastic tube and place the plant in the hole. Make sure that all of the roots are beneath the surface of the ground. Back fill the hole with topsoil and press down firmly around the plant. Build a water basin around the outside of the planted tree, especially if planting on a slope or in fast draining soils. Give the tree plenty of water.

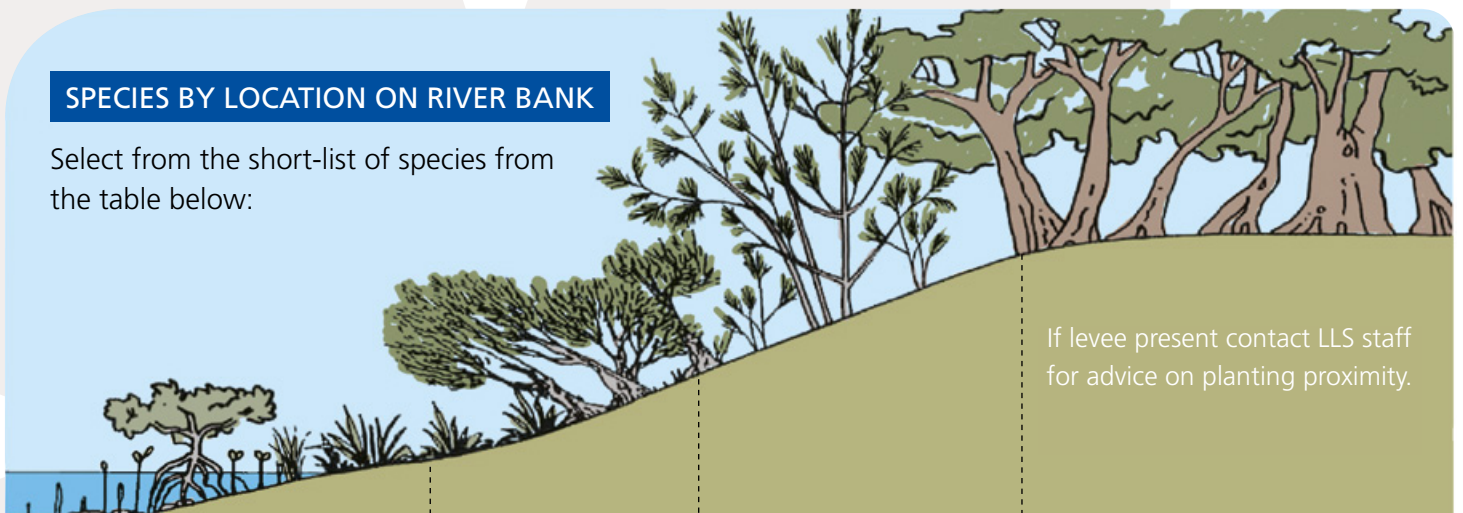
Tree guards used on the upper river bank protect from wind, sun, frost, and browsing herbivores (hares, wallabies, kangaroos), and can be biodegradable cardboard (better near creeks and rivers) or reusable plastic 'sleeves'. All guards must be staked straight and tight to prevent them from collapsing, leaning on tree seedlings or blowing away. **Mulch** from an approved supplier may be applied (across whole site or in rings around plants) to reduce grass growth and preserve soil moisture but must not be heaped against the stem of the seedling as this can rot the bark. Retrieve plastic guards when plant is about waist high.



Form a water basin around plants to catch and retain water.

SPECIES BY LOCATION ON RIVER BANK

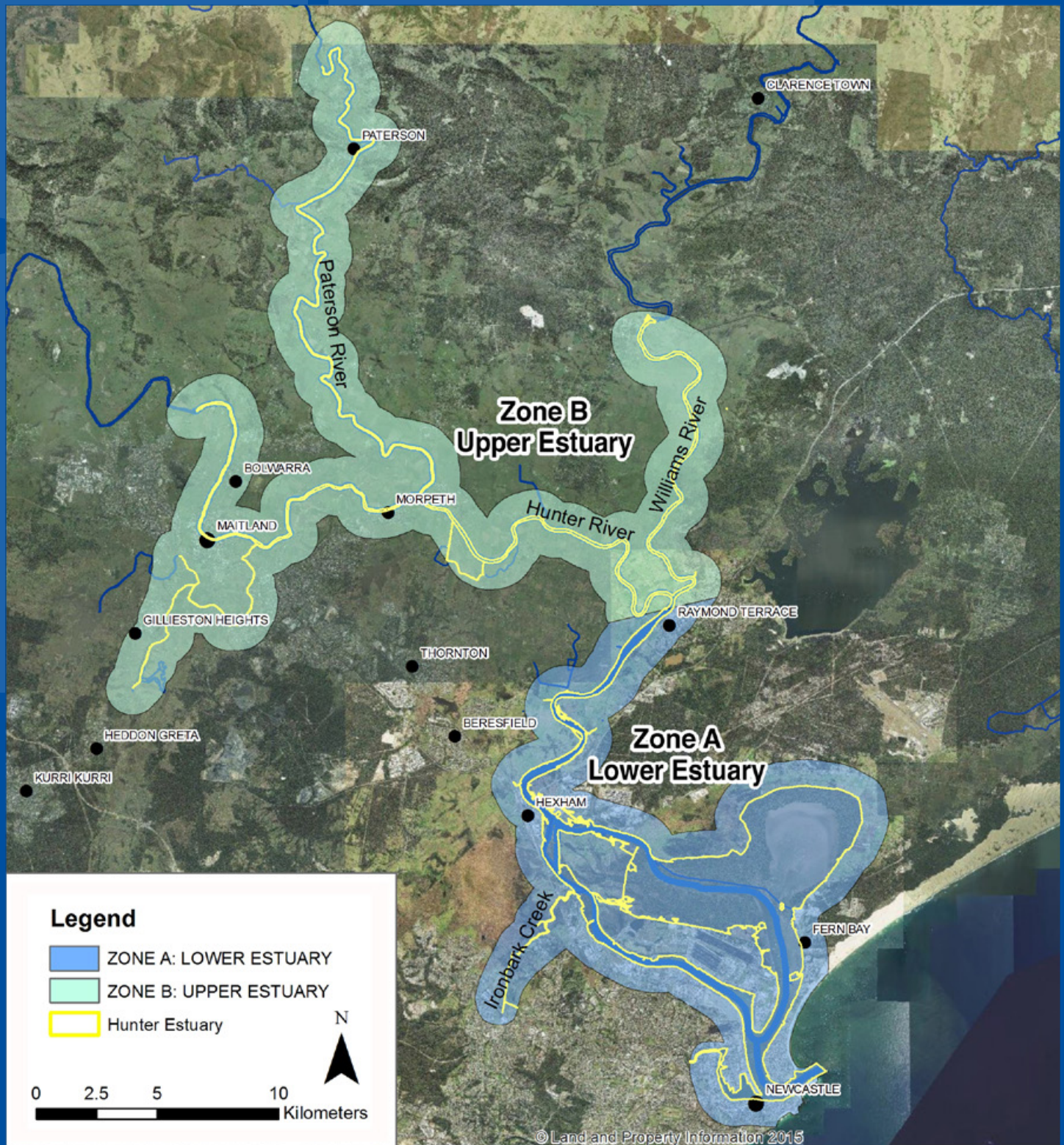
Select from the short-list of species from the table below:



	ESTUARY	MID to HIGH TIDE	TOE	MIDDLE	UPPER
ZONE A Brackish reaches: Hunter River (from Newcastle to Raymond Terrace)		<p>No need to plant the species listed below - these will naturally establish in inter-tidal zones of the lower estuary, given suitable conditions</p> <ul style="list-style-type: none"> Grey mangrove <i>Avicennia marina</i> River mangrove <i>Aegiceras corniculatum</i> Streaked arrow grass <i>Triglochin striatum</i> Glasswort <i>Sarcocornia quinqueflora</i> Seablite <i>Suaeda australis</i> Sea rush <i>Juncus kraussii</i> 	<ul style="list-style-type: none"> Swamp rush <i>Juncus kraussii</i> Spiny-headed mat rush <i>Lomandra longifolia</i> River lily <i>Crinum pedunculatum</i> Tall spike rush <i>Eleocharis sphacelata</i> Club rush <i>Schoenoplectus subulatus</i> 	<ul style="list-style-type: none"> *Spiny-headed mat rush <i>Lomandra longifolia</i> River lily *<i>Crinum pedunculatum</i> Swamp oak <i>Casuarina glauca</i> Broad-leaved paperbark <i>Melaleuca quinquenervia</i> *Prickly-leaved paperbark <i>Melaleuca styphelioides</i> *Narrow-leaved paperbark <i>Melaleuca linariifolia</i> Swamp paperbark <i>Melaleuca ericifolia</i> *Pink tip bottlebrush <i>Callistemon salignus</i> Swamp mahogany <i>Eucalyptus robusta</i> 	<p>If levee present contact LLS staff for advice on planting proximity.</p> <ul style="list-style-type: none"> Sydney golden wattle <i>Acacia longifolia</i> Bleeding heart <i>Omalanthus nutans</i> Whalebone tree <i>Streblus brunonianus</i> Tuckeroo <i>Cupaniopsis anarcardioides</i> Coffee bush <i>Breynia oblongifolia</i> Forest red gum <i>Eucalyptus tereticornis</i> Wild quince <i>Alectryon subcinereus</i> Rosewood <i>Dysoxylum fraserianum</i> Hard quandong <i>Elaeocarpus obovatus</i> Muttonwood <i>Myrsine variabilis</i> Rusty-leaved fig <i>Ficus rubignosa</i> Yellow pittosporum <i>Pittosporum revolutum</i> Lilly pilly <i>Syzygium smithii</i>
	ZONE B Fresher reaches: Williams River, Paterson River and Hunter River upstream from Raymond Terrace	<p>ALL SPECIES ABOVE PLUS:</p> <ul style="list-style-type: none"> Common reed <i>Phragmites australis</i> Common rush <i>Juncus usitatus</i> Tall sedge <i>Carex appressa</i> Tall spike rush <i>Eleocharis sphacelata</i> 	<p>ALL SPECIES ABOVE PLUS:</p> <ul style="list-style-type: none"> Common rush <i>Juncus usitatus</i> Jointed twig rush <i>Baumea articulata</i> Club rush <i>Schoenoplectus validus</i> Δ Snake vine <i>Hibbertia scandens</i> 	<p>*SPECIES ABOVE PLUS:</p> <ul style="list-style-type: none"> Brush kurrajong <i>Commersonia fraseri</i> Wild quince <i>Alectryon subcinereus</i> Rough-barked apple <i>Angophora floribunda</i> Kurrajong <i>Brachycton populneus</i> Native rosella <i>Hibiscus heterophyllus</i> Δ Red seed saw sedge <i>Gahnia sieberiana</i> 	<p>ALL SPECIES ABOVE PLUS:</p> <ul style="list-style-type: none"> River oak <i>Casuarina cunninghamii</i> Cabbage gum <i>Eucalyptus amplifolia</i> River red gum <i>Eucalyptus camaldulensis</i> Flooded gum <i>Eucalyptus grandis</i> Cheese tree <i>Glochidion ferdinandii</i> Black wattle <i>Acacia melanoxylon</i> Creek sandpaper fig <i>Ficus coronata</i> Native peach <i>Trema tomentosa</i> Δ Wallaby grass <i>Austrodanthonia fulva</i> Δ Paroo lily <i>Dianella caerulea</i> Δ Tall saw sedge <i>Gahnia clarkei</i>

Δ Ground cover / grass may not be suitable in dense vegetation, can be added later

Map of Hunter River Estuary



References for further details

<https://kooragangwetlands.com/library/>

Peake, T (2003) Hunter bushland resource kit: a guide to managing vegetation on private land in the Hunter catchment. Hunter Catchment Management Trust, Tocal NSW.

Schneider, G (2007) Where land meets water resource kit: a guide to riparian management in the Hunter Valley. Hunter-Central Rivers Catchment Management Authority, Tocal NSW.



**Local Land
Services
Hunter**

State of New South Wales through Local Land Services 2017. The information contained in this publication is based on knowledge and understanding at the time of writing June 2017. However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of Local Land Services or the user's independent adviser. For updates go to www.lls.nsw.gov.au

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