

# Broads Authority riverbank stabilisation guidance





**The careful design of bank stabilisation and protection is crucial to maintain the special landscape character of the Broads.**

**The Broads Authority is keen to see the use of more subtle forms of bank protection in appropriate areas. This guide is intended to give landowners advice on the best method to use and provides important information on how to achieve the same high standard that the Authority sets for its own work.**

**The guide focuses on protecting an eroding riverbank from the natural effects of wave or other action and covers these topics:**

[Landscape and wildlife](#) • [Materials](#) • [Practical considerations](#) • [Types of mooring](#) • [Checklist](#)

*For information on mooring design please see the relevant guide in this series.*

## **Landscape and wildlife**

The Broads is a special area with status equivalent to a National Park. It is important to work with the landscape on any riverbank stabilisation work and consider the effect on wildlife and the environment.

The stabilisation method should reflect

and complement the character of the area, whether it is rural, urban, near a heritage site or part of a conservation area. Too many different solutions can also look visually confusing so you should take into account other nearby methods and how successful these have been.

You can get free advice from planning

officers at the Broads Authority to see if your chosen method is suitable for that location.

### **Piling**

Piling can cause issues for habitats and can create an urban feel to an otherwise rural area. It may also encourage unwanted mooring, can cause natural

bank erosion and can be expensive. If the area has been piled but this is coming to the end of its lifetime you may wish to consider whether there is a continuing need for it or whether one of the recommended options on pages 6, 7 and 8 and 9 would be more appropriate.

## Stabilisation through planting

**The restoration of a bank through the encouragement of appropriate vegetation is our main objective as it helps protect the unique Broads landscape and its biodiversity.**

Wetland plants that create a natural bank edge provide protection from erosion, a host of benefits for wildlife and the landscape and enhance the local character. Active planting of recommended species helps bind the bank edge soils together and naturally buffers wave action.

Native water voles rely on naturally

vegetated edges for feeding and protection from predators. Burrows in the banks are used for breeding, overwintering and protection.

Reeded margins provide important nesting areas for water birds including coot, moorhen and mallard. Sheltered bankside edges provide spawning and feeding areas for many types of fish in the Broads.

Recommended species include common reed (*Phragmites australis*), bur-reeds (*Sparganium emersum* or *Sparganium erectum*), pond sedges (*Carex riparia* or *Carex acutiformis*) Lesser reedmace (*Typha Angustifolia*) and purple loosestrife (*Lythrum salicaria*).

## Wildlife

**The Broads is an internationally important wetland and home to more than a quarter of the UK's rarest species.**

The Broads supports internationally important wildlife and habitats. Within the Broads are the Broads Special Area of Conservation (SAC), Broadland Special Protection Area (SPA) and Broads Ramsar site. These sites are underpinned at a national level by 28 Sites of Special Scientific Interest (SSSIs) covering 24% of the executive area. You will need written consent from Natural England for any proposed works that may impact a protected site. In some cases an appropriate assessment may be required under the Habitat Regulations to demonstrate that there will be no adverse impacts on the integrity of the protected site.

Protected species under the Wildlife and Countryside Act 1981 may occupy the proposed site. These include otter, water vole, breeding birds and reptiles. Professional surveys should be carried out before works if there is a likelihood

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of their presence, and if you find a protected species during works, you must stop work immediately and contact Natural England.

Where bank protection options can enhance or create increased space for wildlife they should be explored.

Any impacts to fish spawning areas will also need to be considered as part of the proposal.

You can contact the Broads Authority ecologist for advice.

## Trees

Trees are a complex issue. They can cause problems, shading and preventing the growth of natural vegetation such as reeds, which would otherwise help stabilise the bank. They could also be overhanging the bank or even falling into the water and they can block wind, affecting sailing on the Broads.

At the same time tree-lined waterways are part of the landscape character in some areas. Tree roots can also act as erosion protection and are valuable habitats in their own right. Some trees will also have protected status under a tree preservation order or be in a conservation area which protects them.

All these factors have to be considered and balanced in each case so it is best to contact our Tree Officer who can help with advice tailored to your situation.

## Heritage and Archaeology

Heritage is a finite resource so care should be taken throughout the design process to ensure that the physical and visual impact on built heritage and archaeology is minimised.

The entire Broads is a site of exceptional waterlogged archaeology. This means there is potential for important discoveries during the course of carrying

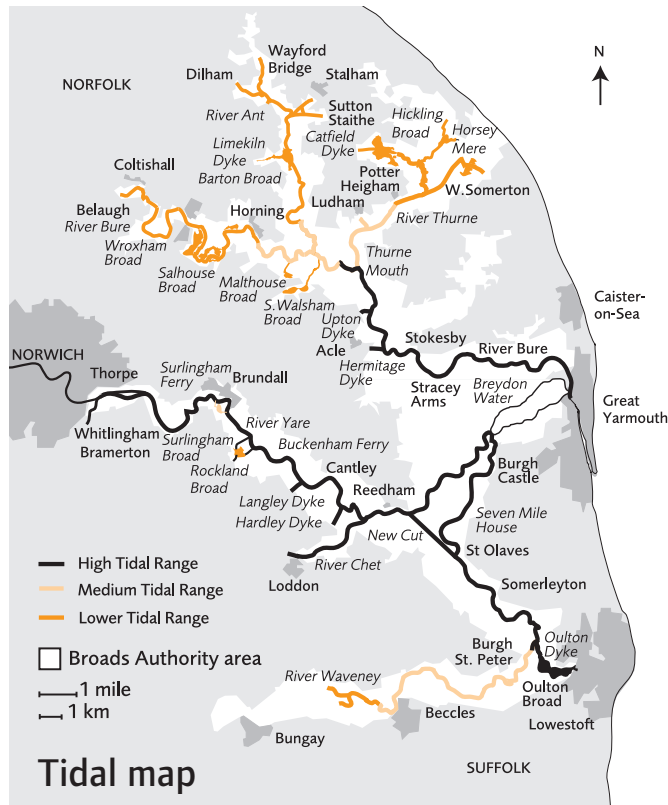
out work and you should be aware that archaeology may be uncovered. If planning permission is required it may be subject to an archaeological condition.

Early advice should be sought from the Authority. Consulting the relevant Historic Environment record early in the process will indicate any known heritage assets and help assess the likelihood of potential archaeology.

[www.heritage.norfolk.gov.uk](http://www.heritage.norfolk.gov.uk)

[www.heritage.suffolk.gov.uk](http://www.heritage.suffolk.gov.uk)

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## Practical considerations

Each site will have different considerations such as tidal range, water depth, channel width and proximity to flood defences which may influence your choice. You may wish to seek

professional advice to help you choose the most appropriate design.

Sources of erosion including wind, boat wash, livestock and geese can all have an impact on river banks and vegetation and your solution should take account of the reasons why the bank is vulnerable.

## Tides and currents

If the site has a high tidal range or is exposed to strong wave action or current, such as on the lower reaches of the main rivers, then the range of bank protection options becomes more limited.

However, more sheltered areas and dykes running off the main channel will be subject to lower wave action and a broader range of green engineering methods may be used. The map on page 5 broadly shows the tidal range throughout the Broads.

## Navigation

The design should also take account of the navigation use. Any development should not cause hazards to navigation and should be adequately marked.

## Climate Change

The easterly, low-lying and coastal nature of the Broads makes it vulnerable to the effects of climate change and sea level rise. The Broads Authority has produced a Climate Change Adaptation Plan which may be of relevance when considering your scheme.

## Existing uses

You need to consider at an early stage how the location is already used and make any allowances so that existing uses can be continued.

The Broads is popular for angling, boating and sailing as well as walking and cycling. Consider such activities when

you are planning your scheme.

## Use of timber

Timber should be from a sustainable source. For example any treated timber should have FSC certification. If sawn softwood is to be used, it should be pressure treated to provide a reasonable life in wet conditions. Alder, which is available locally, has a natural resilience to rot in a wet environment.

## Permissions and notices

It is your responsibility to ensure you have the right permissions and consents before beginning work to make changes to or install riverbank stabilisation but advice on what you require is easily available. Some typical consents required are listed below, but this list is not exhaustive.

### Planning

Waterside development, including new and replacement works, usually requires planning permission. The Broads Authority is the local planning authority for the Broads. You can find out more on the Broads Authority's website or you can contact us for free advice.

### Works Licence

A licence will be necessary for the design and timing of installation of work which affects areas that are publicly navigable. The Broads Authority is responsible for issuing the Works Licence. Full details can be found on the Authority's website [www.broads-authority.gov.uk/planning/Planning-permission/works-licences](http://www.broads-authority.gov.uk/planning/Planning-permission/works-licences)

### Environment Agency

Prior written consent of the Environment Agency is required for any proposed works or structures in, under, over or within nine metres of a main river or a

flood/sea defence. Depending on the length and type of works proposed a water framework assessment may be needed. Full details and how to contact the agency can be found on the relevant section of the Government website. [www.gov.uk/government/organisations/environment-agency](http://www.gov.uk/government/organisations/environment-agency)

### Notice to Mariners

If any machinery work or the scheme itself significantly affects navigation, the Broads Authority may need to let boat users know. This involves a public notice placed in a local newspaper at least 35 days in advance of work. This will be at your cost but is administered by us. You can find full details on our website. <http://www.broads-authority.gov.uk/boating/navigating-the-broads/notices-to-mariners>

## Stabilisation options

We have outlined below the recommended methods commonly used in the Broads.

All drawings are intended for guidance only and precise specifications will depend on site conditions and the agreement of the Broads Authority and other consenting bodies.

### Do the minimum

Many methods impact on the environment and involve a cost so natural stabilisation (see page 2) should be considered first.

It is also important to look at the cause of erosion to see whether this can be deterred without any need for stabilisation work. For example if livestock on the bank are contributing to erosion, simple fencing might solve the problem.

Signage could also deter the activity causing the erosion. Providing a different location or suitable alternative for a particular activity is another option.

### Re-profiling

This involves reshaping the bank to provide a more stable slope which will be less prone to erosion. Natural vegetation can establish or the bank can be planted.

- Requires the use of an excavator to profile the bank and subsequent planting.
- Need to ensure planting establishes. May require goose fencing or replanting.
- Potential for trampling by livestock but could be combined with suitable fencing.
- Appropriate for most locations in the Broads with medium and low tidal ranges.

- Beneficial to wildlife once vegetation is established.
- Can help enhance the local landscape character.
- Low material cost, but moderate on site costs from machinery hire and operator time.



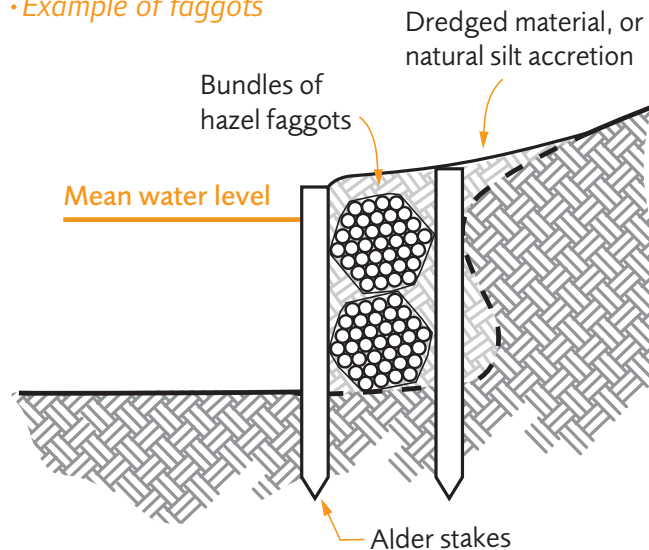
## Bank toe protection

A protective toe to the bank allows natural vegetation to establish behind. There are four types considered in this guide: faggots, coir rolls, rock rolls and stone filled gabions.

Faggots and coir (coconut fibre) rolls can be installed manually. Rock rolls and gabions are likely to require machinery. All tend to require staking to secure in place.

- It is important to ensure planting establishes behind.
- Faggots and coir roll have a shorter life than rock rolls and gabions.
- The life of rock rolls and gabions depends on the quality of the mesh.
- Rock rolls and gabions are not suitable in brackish waters as the wire mesh can corrode quickly and only last a few years. You could consider plastic or

### • Example of faggots



plastic coated meshing instead of steel wire.

- Faggots and coir rolls are suitable for areas of low tidal range.
- Faggots and coir rolls are beneficial to wildlife once vegetation is established.
- Gabions and rock rolls are more of an engineering solution but do allow vegetation to establish behind them.

- The landscape character impact of bundles is minimal if vegetation establishes well. But gabions could have a high impact as the metal mesh and rocks can be seen.
- Faggots and coir rolls are biodegradable and designed to degrade leaving established vegetation to protect the bank. Stakes may need removal in future.
- In terms of cost, faggots are low, coir rolls are medium and rock rolls and gabions are high.

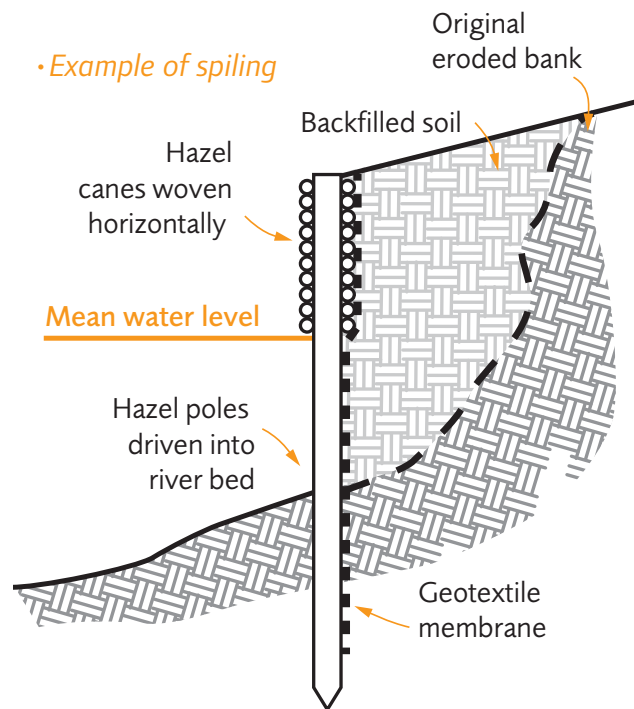


## Vertical stabilisation

These methods provide a vertical edge to the bank and retain soil behind them while enabling vegetation to establish. There are three types considered in this guide: alder pole piling, dead willow or hazel spiling and geotextile, which can be pocketed.

All types require back filling and therefore may require heavy posts and ties. All may require work from within the water.

- Fairly low maintenance if installed well.
- Suitable for low or medium tidal range only.
- Will result in a modified bank. Likely to be beneficial to wildlife once vegetation is established especially if finished close to average water levels.
- The impact on landscape character will depend on height of the finish.



The nearer it is to the water, the lower the impact. However the potential for navigational hazard has to be considered.

- Medium cost as they do require skills and equipment but cost will depend on availability or proximity of site to suitable materials.

- Geotextile membranes should be installed at or below waterline to allow burrowing animals to access the bank.

## Matting

Matting may be appropriate for some stabilisation projects but needs to be used in the right way and with care to ensure it does not get caught up in the stern gear of a boat and cause damage.

Natural fibre matting (jute, coir or hemp) and asphaltic matting provide a protective surface to a shallow slope.

- Natural fibre matting can be installed by hand but asphaltic matting will require machinery due to its weight. Any matting requires robust pinning to secure in place.
- It is important to ensure planting establishes through the material. Matting is low maintenance if planting establishes. If planting does not establish then relaying and re-pinning of matting is likely to be required.

- Matting will need monitoring and failed fixings must be replaced promptly to prevent navigation hazards.
- Natural fibre matting is suitable for low to medium tidal ranges. Asphaltic is suitable for most locations although as it is the most robust type of matting, it may be excessive in low tidal range but more appropriate in areas of wave action.
- Vegetation grows through the matting which is beneficial to wildlife once it is established.
- There is minimal landscape character impact if vegetation establishes well and it could help improve the character of the area.
- Jute matting is biodegradable and designed to degrade leaving established vegetation to protect the bank. Stakes may need removal in future.

- Cost will depend on scale although jute is a medium cost and asphaltic is a high cost.

## Contact us:

For more information and advice please contact the Broads Authority on 01603 610734 or visit our website [www.broads-authority.gov.uk/contact-us](http://www.broads-authority.gov.uk/contact-us)