**Broads Authority**
**Planning committee**
29 May 2015
Agenda Item No 10

# Riverbank Stabilisation and Mooring Guide Consultation Version

Report by Planning Policy Officer


**Summary:** The Broads Authority currently has published guidance on Riverbank Stabilisation and Moorings. This guidance was produced some time ago and has recently been updated as part of the Local Plan review. It is envisaged the revised guidance will form background evidence and steer the Implementation of policies in the reviewed Local Plan. Clearly the guides have an impact on several areas of the Authority's work and a cross directorate officer group has produced new drafts, which will need to be the subject of public consultation. The guides will also be presented to Navigation Committee on 4 June 2015 and will then be subject to a six week period of public consultation.


**Recommendations:**

(i) That Members' views on the draft guides are sought.

(ii) That, following any comments on the detail of the guides, the layout and form of the guides is improved and both guides are subject to six weeks consultation.

## 1 Introduction

1.1 The Authority has an existing guide for Riverbank Protection Works[1] which is over ten years old. As part of the Local Plan review process, Officers have reviewed the guide with the intention of making the content more up to date to reflect current practice and lessons learned.

1.2 Fundamentally, the guides are intended to give would- be designers/ developers of riverbank stabilisation and moorings high level information to help inform the way forward with their design and highlight some of the common issues which such development needs to consider.

## 2 Work Completed to Date

2.1 An Officer group comprising representatives from navigation, design, access, recreation, heritage, landscape, planning and ecology teams have worked

[1] http://www.broads-authority.gov.uk/__data/assets/pdf_file/0020/412832/Riverbank_Protection_Works.pdf

together to provide two draft guides: the riverbank stabilisation guide and the mooring guide.

2.2 The original guide has been split into two guides to provide clarity between the issue of riverbank stabilisation and mooring and also to enable more information to be provided for the different structures to reflect their purpose.

2.3 The draft guides are at Appendix A and B.

## 2 The Way Forward

2.1 The information presented to members is the draft content of the guide. It is intended that it be produced in a more user friendly format, including sketches and photos.

2.2 In order to give the guides more weight in determining planning applications and potentially at any subsequent appeals, it is recommended that the guides are subject to 6 weeks consultation with the public in a similar approach to that of the Local Plan. The guides will then be presented to a future Full Authority meeting for adoption.

## 3 Financial Implications

3.1 It is intended that the guides will be hosted on the Broads Authority website and produced in paper format only on request.

## 4 Conclusion

4.1 The draft guides update the existing riverbank protection guide.

4.2 To give the guides more weight in the planning system, it is recommended that they are consulted on and then adopted by Full Authority.

4.3 Having up to date guides will provide developers and landowners with useful guidance on the design of moorings or the protection of riverbanks.

Background papers: None

Author: Natalie Beal

Date of report: 5 May 2015

Appendices: Appendix A: Draft Riverbank Stabilisation Guide
Appendix B: Draft Mooring Guide

**APPENDIX A**

## Riverbank stabilisation guidance

### Introduction

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

Riverbanks have on occasion been protected using timber or steel piling driven into the riverbed at the bank edge. However, this damages habitats and can create a very urban feel to an otherwise rural area. It may also encourage boat mooring in inappropriate areas. It is also expensive.

More natural bank edges provide protection from erosion, as well as a host of benefits for wildlife and the landscape:

- 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.

The Broads Authority is keen to see the use of more subtle forms of bank protection in appropriate areas. The restoration of a natural bank through encouraging the re-establishment of appropriate vegetation is our main objective, to help protect the special Broads landscape and its biodiversity. This leaflet is intended to give landowners guidance on the most appropriate method to use. This is the standard that the Broads Authority uses for its own works and therefore is what we expect others to use as well.



### What is the purpose of your proposal?

With the wide range of methods available to stabilise river banks, and a wide variation in cost, it is important to decide why bank protection is required at all.

- If the purpose is to provide boat mooring please refer to leaflet <<hyperlink to mooring guidance>> on boat mooring facilities.
- If the purpose is to protect an eroding riverbank from the natural effects of wave or other action then please read on.

### Things to consider

When deciding which method of bank protection to use, the following factors need to be taken into account:

- Why is the bank vulnerable?

Sources of erosion including wind, boat wash, livestock and geese can all have an impact on river banks and vegetation. Design should therefore take account of the cause of erosion.

- Navigation

The design should also take account of the navigation use. Any development should not cause hazards to navigation and should be adequately marked. You may need a Works Licence (link) from the Broads Authority for the timing of installation and the size of any work vessels used.

- Each site is different

Sometimes the solutions have to be tailored to suit. Different methods should reflect the local character of different areas, such as rural areas, urban areas, near heritage assets or conservation sites. You may wish to seek professional advice to help you choose the most appropriate design and you should check with planning officers at the Broads Authority to see if the stabilisation method proposed is suitable for that location.

- Tidal range and strength of current

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 broadly shows the tidal range throughout the Broads.

*<<insert map, same as original >>*

- Existing piling

If the site has been piled in the recent past consider the end use and if there is a need for such a hard and vertical edge.

- Trees

Trees are a complex issue. On the one hand they can cause problems by 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. 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 (Tree Preservation Orders) 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 Landscape Officer and Tree Officer on 01603 610734 who can help with advice tailored to your situation.

- Do I need consents?
    - Planning: waterside development, including new and replacement works, usually requires planning permission. Please call the Broads Authority on 01603 610734.
    - Works: a Works Licence may be required for any work which affects a publicly navigable stretch of river. The Broads Authority is responsible for issuing this permission. Please call the navigation team on 01603 756066.
    - Environment Agency: prior written consent of the Environment Agency is required for any proposed work or structure on, over, under or near a main river, flood or seas defence. Please call the agency on 01473 706047 for advice.

- You should contact the landowner of the bed of the river that you are intending to moor over for permission.

- Wildlife
  - Protected species: protected species under Schedules 1 and 5 of the Wildlife and Countryside Act 1981 (amended) may occupy the proposed site. These species include otter, water vole, breeding birds and reptiles. If you find a protected species you must stop work immediately and contact Natural England on 0300 060 3789 or at Dragonfly House, 2 Gilders Way, Norwich, NR3 1UB.
  - Designated Sites: prior written consent from Natural England is required for any proposed works that are in designated sites or may impact on those nearby such as sites of special scientific interest (SSSIs).
  - Provisions for wildlife: where bank protection options can enhance or create increased space for wildlife, they should be explored. Provision of a bank edge with native wetland plant species is one of the best ways to encourage wildlife at the water's edge. If you would like advice contact the Broads Authority Ecologist on 01603 610734.

- Archaeology:

The entire Broads is a site of exceptional waterlogged archaeology. What this means is that there is potential for important discoveries during the course of works such as riverbank stabilisation. You should be aware that archaeology may be uncovered. If planning permission is required it may be subject to an archaeological condition. If you find anything that appears to be of interest, you should contact the Historic Environment Officer at the Broads Authority on 01603 610734.

- 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. Alder, which is available locally, has a natural resilience to rot in a wet environment.

**Riverbank stabilisation options**

The following methods of bank stabilisation are commonly used in the Broads. All drawings are intended for guidance only. Precise specifications will depend on site conditions and the agreement of the Environment Agency and the Broads Authority.

- Do the minimum

The erosion may be caused by livestock action on the bank, in which case simple fencing might solve the problem. Planting appropriate species (see later in the guide) is another simple way of stabilising the bank. Simple signage could deter the activity that could be causing the erosion. Providing a suitable alternative for a particular activity that is causing the erosion is another option.

- Re-profiling the riverbank

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 guard or replanting.
- Potential for trampling by livestock but could be combined with suitable fencing.
- Suitable for most locations in the Broads.
- 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.

- Using 'bundles' to protect the riverbank

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

- Faggots and coir 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 mesh can corrode quickly and only last a few years.
- 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 methods.

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 pocketed geotextile.

- 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.
- Landscape character impact will depend on height of the finish. The nearer it is to the water, the lower the impact.
- Medium cost as they do require skills and equipment but cost will depend on availability or proximity of site to suitable materials.

- Matting

Jute matting and asphaltic matting provide a protective surface to a fairly flat slope.

- Jute 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 repinning of matting is likely to be required.
- Failed fixings must be replaced promptly to prevent navigation hazards.
- Jute 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 overkill 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.

**Planting**

Encouraging wetland plants that create a natural edge to the waterway helps prevent erosion, provides a wildlife habitat and enhances the Broads landscape. Recommended species include Common Reed (Phragmites australis), Bur-reeds (Sparganium emersum or Sparganium erectum), Pond Sedges (Carex riparia or Carex acutiformis) and Purple Loosetrife (Lythrum salicaria). Active planting of such species helps bind the bank edge soils together and naturally buffer wave action.

*Pictures courtesy of Verdant Solutions.*

Common Reed

Bur-reeds (Sparganium emersum or Sparganium erectum)

Purple Loosetrife (Lythrum salicaria).

Pond Sedges (Carex riparia or Carex acutiformis)

**Checklist for design.** *(add page references to the detail)*

Please complete this checklist and submit with your planning application.

Why does the bank need stabilising?

What is causing the issue? How have you addressed this?

What is the location? What are the characteristics of the location (taking into account archaeology, heritage, wildlife, landscape, navigation, tidal range and water depth)?

What bank stabilisation is there already? Is this appropriate for the location?

How have you considered and addressed the landscape impact of the stabilisation method?

How have you considered providing for wildlife?

How have you considered long term maintenance?

Have you spoken to the Broads Authority for their advice?
Please call xxxxxx to speak to the Landscape Officer, Tree Officer, Rivers Engineer or planning officers.

**APPENDIX B**

**Broads Authority mooring design guide**

**Introduction**

Moorings are part of the everyday landscape in the Broads for residents, visitors and those who work on the river. As the interface between water and land, it is important that moorings are well considered and designed properly. The Broads Authority is keen to see the right type of safe mooring design in the right place. This guide provides important information on how to achieve this.

**Mooring provision or bank stabilisation?**

- If you wish to protect an eroding riverbank from the natural effects of wave or other action then please refer to leaflet <<hyperlink to mooring guidance>>
- If the purpose is to provide boat mooring please read on.

**Things to consider…**

- Each site is different

Sometimes the solutions have to be tailored to suit. You should check with planning officers at the Broads Authority who can give you free advice on whether any mooring is acceptable in principle. You may wish to seek professional advice to help you choose the appropriate design.

- How much mooring do you need?

Does the whole length or frontage need to be designed for moorings? Could part of the frontage be left natural with some other form of bank stabilisation? Natural frontage can save you money as well as benefiting the local landscape and wildlife in your area. It would also enable boat users to appreciate the scenery of the Broads. Retaining the natural bank edge helps to protect local wildlife such as water voles, nesting birds and fish.

Of course this approach is not going to be suitable for every project so please contact us for advice about whether natural frontage is appropriate as part of your mooring.

- Consider the impact beyond your project

Introducing hard piled bank edges could lead to the erosion of natural edges in some areas. Any length of piled mooring will need to be returned to the bank , meaning the ends are slanted inwards to the bank to stop water getting behind the piling and causing pockets of erosion..

- Other existing uses

An early consideration in any mooring project of any scale is that of the existing uses. Some examples include:

  - Angling – The Broads is popular for anglers. Do they use the proposed site? Can you take angling into account in your project design, for example by providing a location for anglers?
  - Existing rights of access – such as public rights of way and public staithe rights
  - Existing drainage pipes and water outfalls - check permissions, easements and other issues

- Canoes and row boats – if the site is intended for the launching of canoes consider low freeboard pontoons. Launching platforms that may submerge should be adequately signed or marked to avoid boat collisions.
- Protected species such as water vole and nesting birds should be considered, as should fish spawning areas.

- Impact on channel width

Any refurbishment must maintain the existing piling line. Encroachment beyond this is unlikely to be acceptable as it will narrow the width of the channel. Any new mooring will need to ensure there is no impact on the navigation channel. Please remember that it is not necessarily about the mooring itself, but the impact on channel width by the vessel that is to be moored.

- Do you need to access the bank from the water?

Some mooring types discussed in this guide may require the use of a dinghy to access land. Others, such as staging, enable people to get onto land directly from the vessel. Others may need a ramp and in this case there will be a need for some bank work to provide a secure point on a plinth or piling.

- Signage

You may wish to put up signage to deter others using your mooring. But signage, if it is required, should always be in keeping with its location and local character. You should always seek advice on signage from the Broads Authority.

If you need signage:

- Lettering should be 50mm in height
- Text should be white on a black background.

- Maintenance

If you travel around the Broads there are areas of old, rotten, abandoned moorings which detract from the special qualities of the area. Anyone installing a new structure must also make provision for the maintenance of the structure during its life and replacement in the future. This could include cleaning, replacing timber work and also dredging to maintain adequate mooring depth.

- Aesthetics
  - Different methods should reflect the local character of different areas such as rural areas, urban areas, near heritage assets or conservation. You can get free advice from the Broads Authority.
  - A typical materials choice is softwood timber, which should be pressure treated in accordance with BS8417 for Use Class 4 for suitable durability. Timber is a natural and renewable product and is in keeping with the Broads.
  - Of the alternative materials available, plastic products are often proposed as a substitute to timber. There are many different products on the market and their appearance varies widely so you will need to consider the impact of plastic on the local character. The use of plastic for moorings is a relatively new technology in the Broads, so you should ensure that the material is durable for the life time of your project and there

are no ecological impacts. For example, will the plastic decay and what will the impact of this be on the wildlife and water quality of the Broads?
    - If materials other than timber are used for piling a double whaling board could be used. This is a timber board to disguise the less natural material.
    - Surfacing behind moorings should be kept as natural as possible. A grass surface with a reinforcement mesh is ideal. If a different surface is required, a local product such as gravel, hoggin or bark is also acceptable.

- General design considerations
    - Location: The conditions of the site such as tidal range, water depth, channel width and proximity to flood defences may influence choice of design, materials and layout. If the mooring is near livestock, you may wish to consider appropriate fencing to prevent the animals from accessing or damaging the moorings and equipment.
    - Moorings need to be designed for the purpose in mind, whether it is public, private or commercial. For most Broads moorings, light steel or timber piling is adequate where a piled mooring is required. However, in some circumstances loading on piling may be more significant due to vehicle access, tidal conditions or banked material. A piling contractor or engineer will be able to advise you.
    - Access to moorings: If the mooring is intended for commercial or public use consideration should be given to access by disabled people or wheelchair users under the requirements of the Equalities Act 2010.
    - Lighting and electric hook ups: While these amenities are often welcomed by users the Broads Authority is keen to minimise light pollution. Please talk to planning officers about the design of lighting at moorings. You should also seek professional advice as there will be health and safety concerns regarding electricity being so close to water.
    - Tie rods can impact the root system of trees which could lead to trees dying. You should contact us for advice if you intend to provide moorings near trees.

- Health and Safety

For any commercial or public mooring we recommend you provided a means of getting out of the water like a safety ladder no more than 50m apart, spread out along the length of the mooring. Between this there should be a chain, rail or similar structure that can be reached and held by someone in the water at any state of tide. There should also be lifebuoys or unlocked throw lines no more than 50m apart spread out along the length of the mooring.

If land access is not required or is provided at specific points only, the mooring will need to be designed to discourage people from jumping onto the bank from their vessel, which can cause injury.

If the proposal is a private mooring, we strongly recommend that you consider these standards. There is a Health and Safety Executive approved code of practice (link to www.hse.gov.uk/pubns/books/l148.htm) relating to docks and moorings. There is also a guide (link to www.tyha.co.uk/codepractice.asp) published by the British Marine Federation's Yacht Harbour Association which you can buy that sets out best practice guidance for marinas and yacht harbours.

While this is not specifically for private moorings and the guidance is costly, it may be relevant and you may wish to consider it.

- How will vessels be moored?

In some locations double mooring or mooring stern on  are more efficient ways of using space as long as there is adequate channel width.  Regardless of how the mooring is configured adequate mooring posts or cleats should be installed.

- Navigation Byelaws…

There are some Byelaws in the Broads that relate to moorings. Go to page 26 of this document for more information: http://www.broads-authority.gov.uk/__data/assets/pdf_file/0008/399230/Navigation_Byelaws_1995-1.pdf

- Do I need consents?
    - Planning: waterside development, including new and replacement works, usually requires planning permission. The Broads Authority is the local planning authority for the Broads. We have policies specifically relating to moorings which can be found on the Broads Authority's website or you can call a planning officer for advice on 01603 610734.
    - Works: a Works Licence may be required for any works, which affect a publicly navigable stretch of river. The Broads Authority is responsible for issuing this permission.. Please call the navigation team on 01603 756 066.
    - Environment Agency: prior written consent of the Environment Agency is required for any proposed work or structure on, over, under or near a main river, flood or seas defence. Please call the agency on 01473 706047 for advice.
    - You should contact the landowner of the bed of the river that you are intending to moor over for permission.
    - Marine Management Organisation (MMO): you may need a marine licence from the MMO for constructing, altering or improving any works in relation to your mooring dredging or depositing. There are certain exempted activities and more information on types of activities and on how to apply for a license can be found at https://www.gov.uk/do-i-need-a-marine-licence.

- Insurance

You may need insurance for your mooring. Your insurance provider may have some requirements related to the mooring design.

- Ancillary

Parking, lockers and other associated infrastructure should be sensitively located to take account of the local character of the site.

- Wildlife
    - Protected species: protected species under Schedules 1 and 5 of the Wildlife and Countryside Act 1981 (amended) may occupy the proposed site. These species include otter, water vole, breeding birds and reptiles. If you find a protected species, you must

stop work immediately and contact the Natural England on 0300 060 3789 or at Dragonfly House, 2 Gilders Way, Norwich, NR3 1UB.

- Designated sites: prior written consent of Natural England is required for any proposed works that may impact nearby designated sites.
- Where bank protection options can enhance or create increased space for wildlife, they should be explored. Provision of a bank edge with native wetland plant species is one of the best ways to encourage wildlife at the water's edge. If you would like advice contact the Broads Authority ecologist on 01603 610734.
- Any impacts to fish spawning areas will also need to be considered as part of the proposal. Contact the Broads Authority ecologist for advice.

- Archaeology:

The entire Broads is a site of exceptional waterlogged archaeology. What this means is that there is potential for important discoveries during the course of work like riverbank stabilisation. You should be aware that archaeology may be uncovered. If planning permission is required it may be subject to an archaeological condition. If you find anything that appears to be of interest, you should contact the Historic Environment Officer at the Broads Authority on 01603 610734.

- 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. Alder, which is available locally, has a natural resilience to rot in a wet environment.

**Mooring design**

When reading the information about the designs of the various types of moorings, please note:

- The cost will depend on the size or quantity of moorings. Low, medium or high gives an indication relative to the different designs in this guide.
- Maintenance requirements will reflect the quality of the initial work.

Timber staging

- This type of mooring consists of piling and decking. Piling would need to be undertaken by a contractor.
- It still allows wildlife such as water voles to access the bank and, provided there are spaces left in the decking for light to penetrate, bankside vegetation will continue to grow.
- It is suitable for a river or broad where there is not a large tidal range.
- Staging should be kept as narrow as possible and preferably use timber. Consider that timber can become slippery when wet.
- The decking will need regular cleaning and it is likely that the piling will need to be replaced every 10 years, so maintenance is high.
- The impact on landscape character does depend on how the staging is integrated and depends on the size and its context.
- Compared to other mooring designs in this guide, the cost is medium.

Quay heading and piling

- This would result in a continuous line of piles. As this is a more complicated mooring structure, there is a need for a more robust anchoring system of the piles.
- Steel is the most expensive material, followed by plastic then timber.

- Timber has a typical life of up to 10 years. Plastic and steel have a typical lifetime of around 40 years or more.
- The design is suitable for most tidal ranges.
- It creates a less natural modified vertical edge to the river bank.
- Any piling has a high impact at low tide. Capping and whaling of steel or plastic piles can help the mooring to be more in keeping with the Broads.
- Surfacing and capping must be topped up and level.
- 
- Cost of installation is high as contractors will be on site for longer.

Pontoons

- Relatively quick to install. Will need secure anchorage or piling. You will need to consider access to the bank.
- Not a solution for narrow channels as can impede navigation
- Will require regular deck cleaning. Could have a life time of up to 30 years.
- Suitable for wider navigations or broads and areas of low tidal range.
- Provides protection to the natural bank behind
- Pontoons can provide a safe refuge for fish
- Likely to have a high landscape impact due to the bulk of the structure.
- Medium cost.

Swing or trot

- This is a buoy which is permanently fixed to the bed to provide stationary mooring. One buoy is called a swing mooring and the vessel will move with the wind or current.
- A row of buoys, linked as shown in the diagram, is a trot mooring and enables vessels to be secured so they do not drift with the wind or current.
- Requires a means to get ashore, such as a dinghy.
- Maintenance is generally low, but regular inspections of the chain and replacements will be required.
- Swing would not be suitable for rivers but ideal for broads in areas where there are not strong currents.
- Trot could be suitable for rivers, if buoys are securely positioned.
- At the time of writing, trot moorings are a new concept to the Broads, so please contact us for advice on 01603 610734.
- Low impact on wildlife and minimal landscape character impact.
- Relatively easy to install and low cost.

Dolphin

- Can be attached or detached from the bank.
- Will require piling which would need to be undertaken by a contractor.
- As the timber piling is likely to be bulky, the lifetime will be around 20 years.
- Suitable for rivers and broads in most tidal ranges.
- Low wildlife and landscape character impact.
- Medium cost.

King post

- This can comprise one post or, if the vessel is to be moored fore and aft, two.
- If there is one post, the boat will move with the wind or current.
- Will require piling which would need to be undertaken by a contractor.
- As the timber piling is likely to be bulky, the lifetime will be around 20 years.

- Suitable for rivers if the vessel will be moored fore and aft using two posts
- A single post is not suitable for rivers but ideal for broads in areas where there are not strong currents.
- Low wildlife and landscape character impact.
- Medium cost.

**Checklist for moorings.** *(add page references to the detail)*

Please complete this checklist and submit with your planning application.

- Have you checked with the Broads Authority if moorings are acceptable in principle in the proposed location?
- Do you need moorings for an entire length, or can you have a smaller area of mooring?
- In your design, have you returned the mooring to the bank so that the ends are slanted inwardsto address erosion further along?
- Have you considered and addressed other users and uses in the area in your design? For example anglers, water pipes, existing rights of way and canoes or row boats?
- What effect will your proposal have on the width of the publicly navigable channel?
- Do you need to have access to the river bank? If so, how are you going to do this?
- Have you considered and can you commit to and afford continuing costs of maintenance, cleaning, insurance and dredging?
- Does you proposal reflect the local character? Is your mooring going to be out of place?
- Does the design take into account the local tide, depth and channel width?
- Have you considered the type of vessel to be moored and does the detailed design, such as fixings, reflect the weight of the vessel?
- Is there likely to be an impact on protected species or fish spawning areas as part of the proposed works?
- What safety features have you included and why?
- Have you considered different types of mooring configurations? Why is the chosen format most appropriate?
- Are you aware of the byelaws in the area?
- Have you investigated and do you have the required consents?
- Have you met the policy requirements in your proposal?