

Invitation to Tender: Brushwood sediment fences and brushwood wave baffles.

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Introduction

The purpose of this scheme is to use natural materials to encourage the accretion of fine sediments on the great bank at Horsey Island on the Taw Torridge estuary. The principle has been adapted from the practice in the German and Dutch polder fencing used to trap sediment and warp up the polders.

The need in this case is to add resilience to the flood banks by encouraging sediment to deposit on the flank of the flood bank to infiltrate and fill interstices in the bank, thereby decreasing porosity and add mass to the bank. The newly warped up sediments should also readily colonise with appropriate saltmarsh vegetation.

The project is part of a Natural Flood Management Demonstration Project that is funded via the Environment Agency.

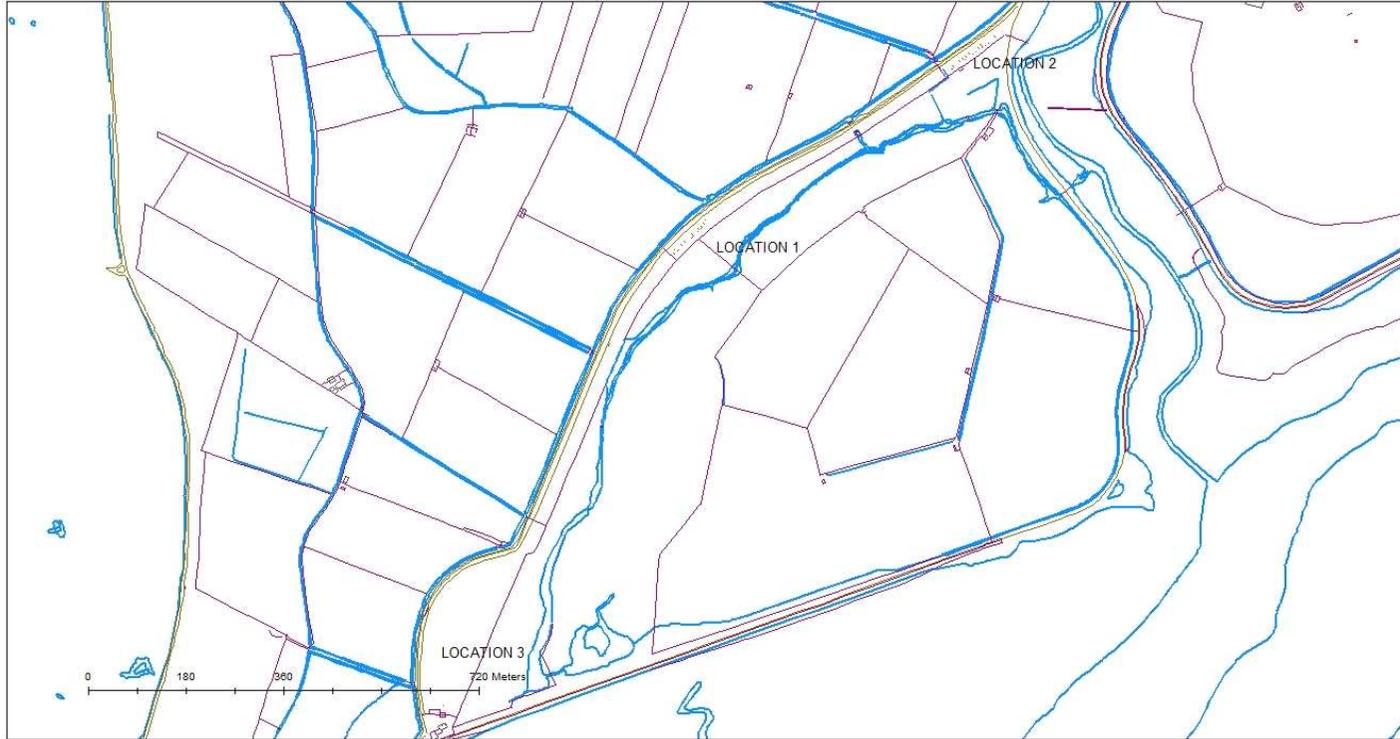
The sediment fencing uses brushwood pinned in place by fence post, and secured in place.



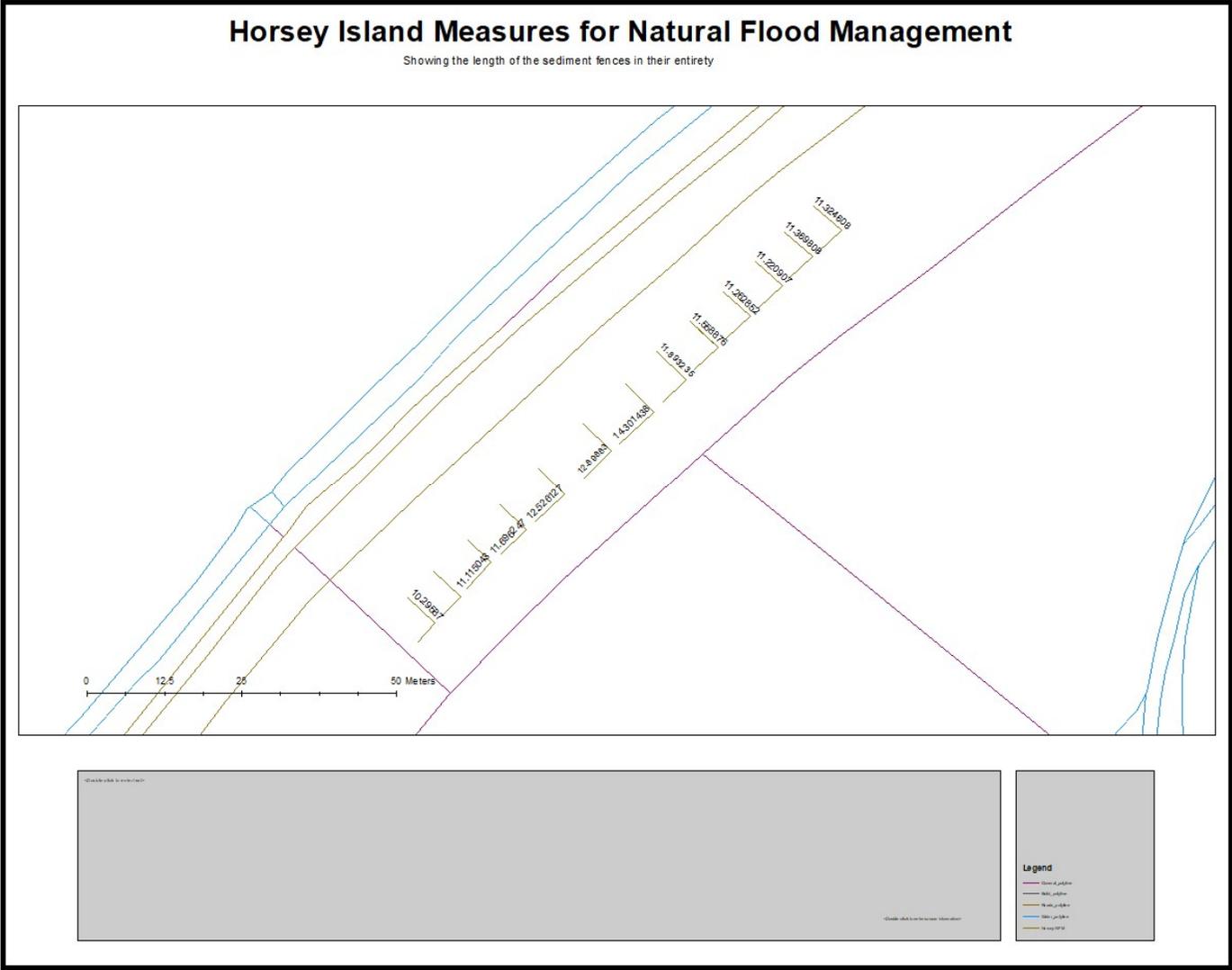
The fencing will be placed perpendicular to dominating flows and wave action at a number of sites and accretion will be monitored.

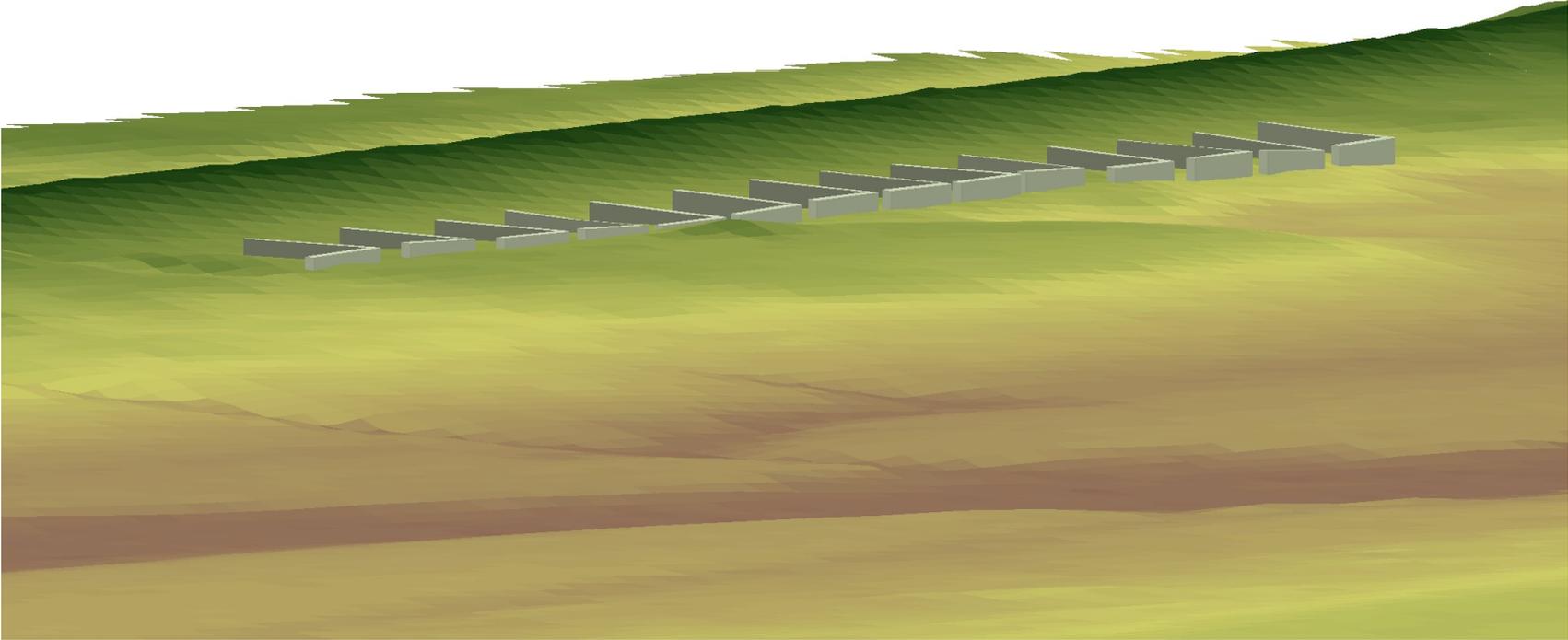
Horsesey Island Measures for Natural Flood Management

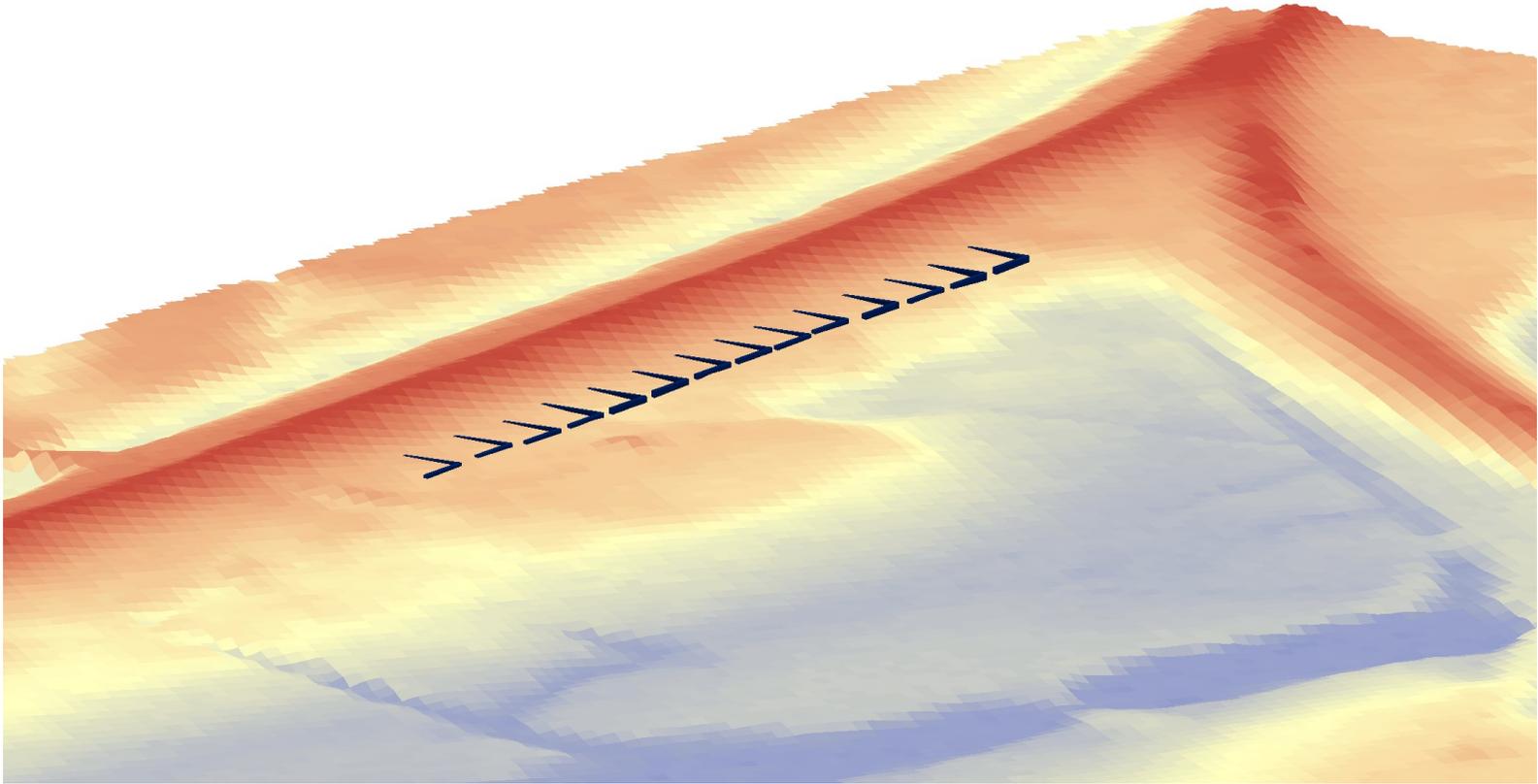
Showing the length of the sediment fences in their entirety



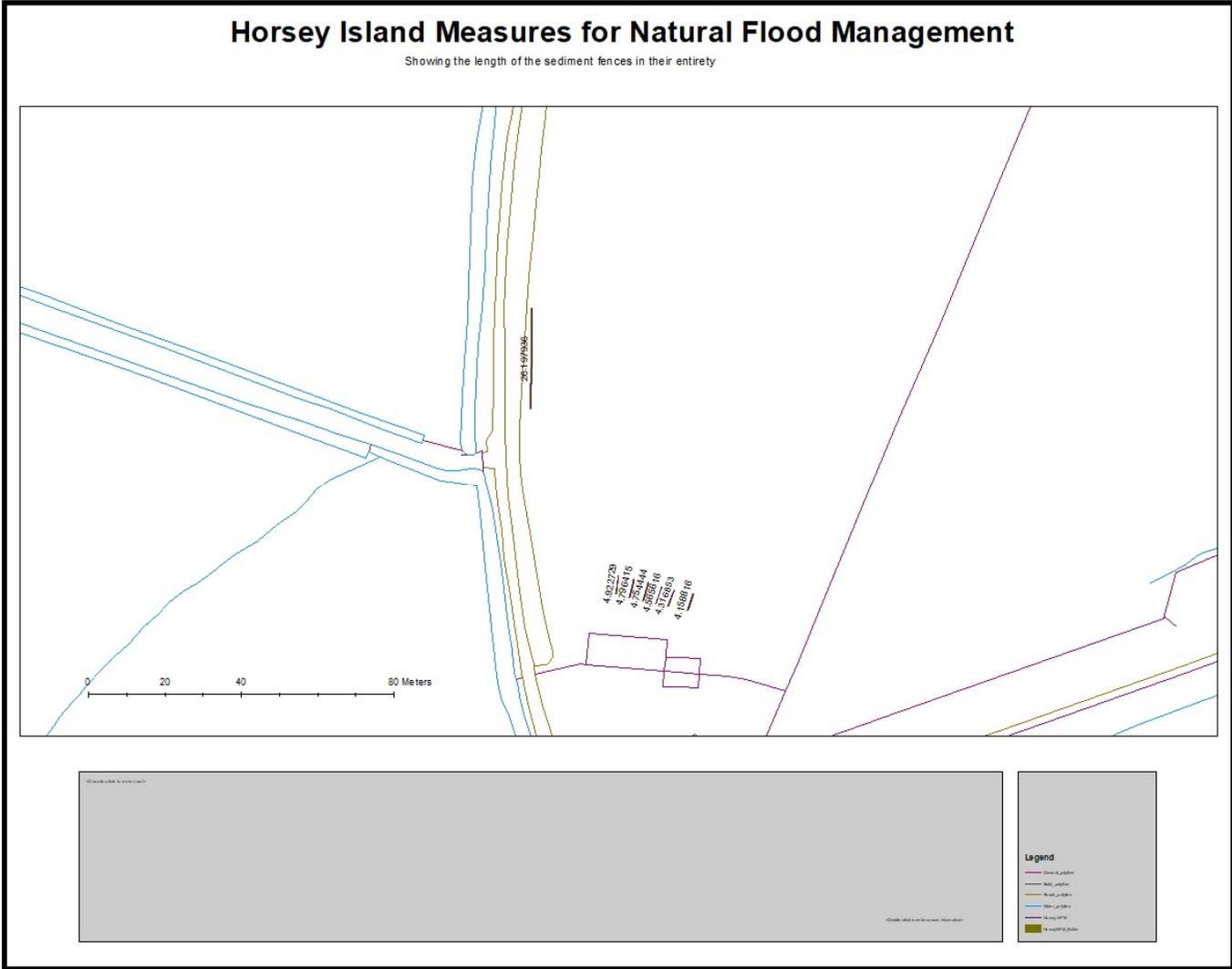
Location 1.

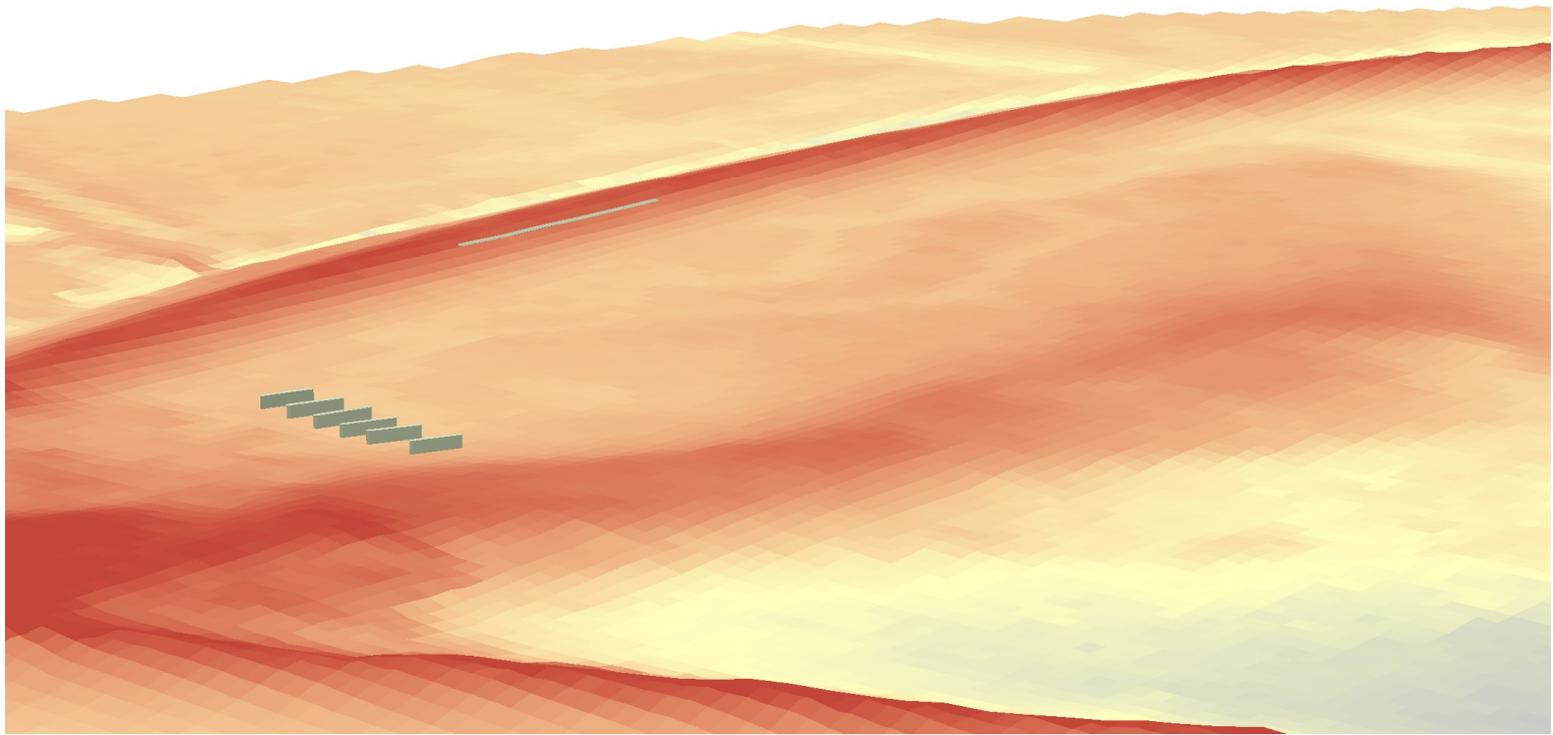




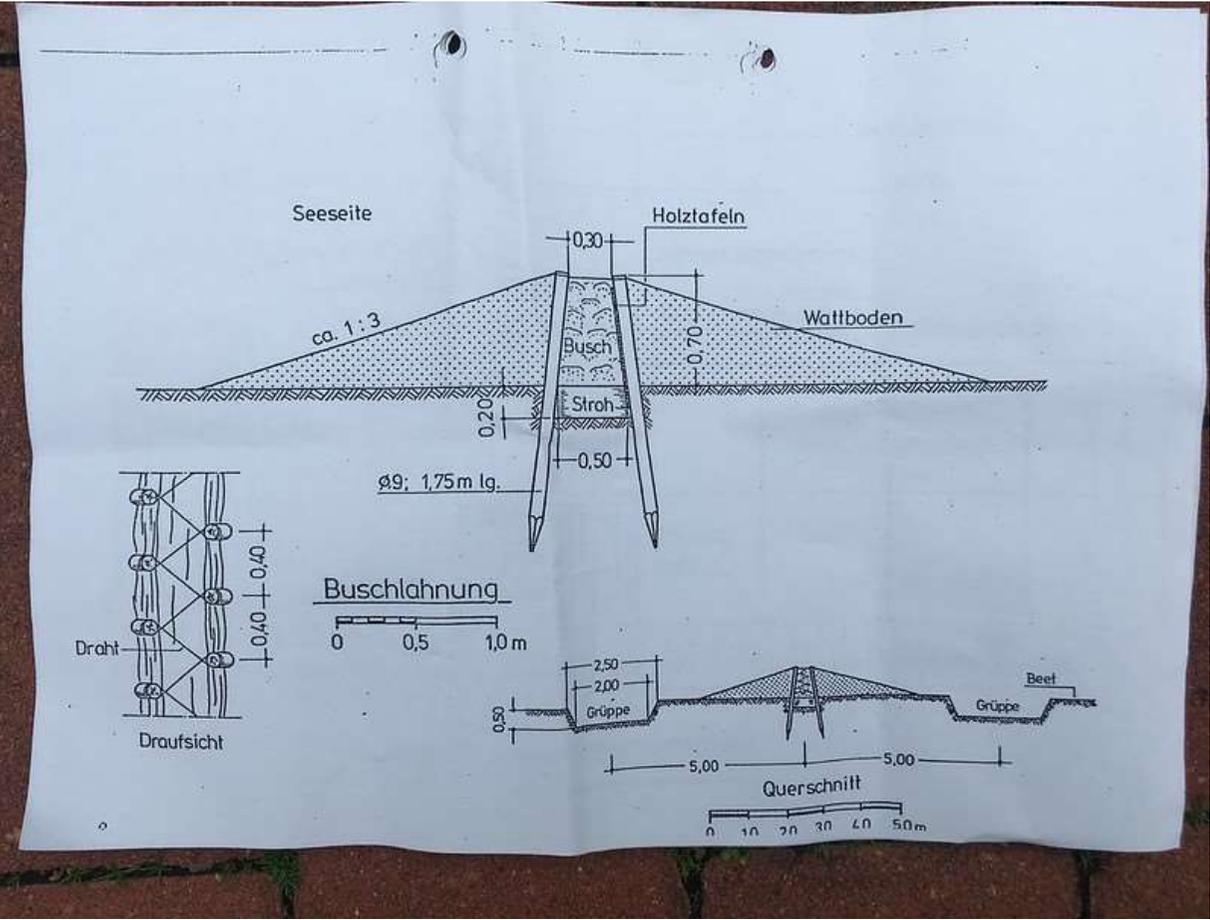


Location 3 (Whitehouse new bank area)





Design detail.
Sediment Fencing



Each L shaped groyne is 6m+ 6m. Therefore requires 60 posts.

The variation from the above drawing is that the height above ground is expected to 0.45m and the depth penetrated into the bank 0.45. Allowing for 2 stakes to be made from a single 1.8m fence stake.

Materials

Stakes need not be treated. C 75mm diameter and 900mm long.

Brush will come from local hedging sources, forestry brash or from scrub clearances in the area. The source must be from an authorised and legal operation. Invasive species that can reproduce vegetatively should not be used (e.g. Rhododendron, Sea buckthorn)

The brush faggots will be bound into the stake fencing with nylon rope (6mm diameter and fencing staples holding the rope to the stake.

No sediment will be imported or placed against the fence. It will test for accretion naturally.

These will be in 2 locations; each with 14 "groynes" with a length of 12m in each groyne.

The third location are simple sediment fences, 6 No, 5 m long.

Total of 366m of groynes.

Comprising 1830 stakes 0.9mx75mm

92 m3 of brushwood

For the wave baffles,

These are short brushwood fences parallel with the crest of the bank located near the crest. These will be 2 lengths in locations to be agreed with the owners, where the wave exposure at the highest tides may compromise the crest. They will be 2m away from the crest, and sit to crest height, (c 500mm above the ground) and constructed in the same manner as the sediment fencing, though less densely packed.

Provision is made for 2 stretches of 30 metres.

Total of 60m of wave baffle.

300 stakes 0.9mx 75mm

15 m3 of brushwood

Design Mitigation measures to consider:

Risk	Mitigation
Timber spikes may be too wide and compromise the flood defence. Causing failure of the flood bank	Consider using metal spikes or lamp irons and monitor regularly
Ensure the groynes do not become traps for fish.	Make the horizontal arm of the fence point slightly down hill (1% gradient)

Generic Risk Assessment

Receptors:

- Horsey Island CWS, new saltmarsh and mudflats
- Great Bank (historic flood defence)
- Great Sluice (Scheduled Ancient Monument)
- Braunton Marsh (land and property)
- Taw Torridge SSSI

Creation of Brushwood sediment fencing:			Creation of sediment fencing in a tidal environment					
Location:			On Braunton Marsh/Horsey Island					
Location of environmentally sensitive sites (km / m):			See below					
Risk assessment carried out by:			North Devon Biosphere					
Date:			10-Mar-21					
			The scope of the standard permit is defined by the following risk criteria:					
	Parameter 1	Installation of a structure made from natural materials occupying up to 100m of a main river, on or near a flood risk management structure or works and more than 50 metres from another man made structure in under or over the watercourse.						
	Parameter 2	The activity shall be limited to a maximum of 4 weeks.						
	Parameter 3	No part of the structure shall be above the level of 25% of the height of the bank above river bed level.						

	Parameter 4	The structure shall be securely fastened to the bed of the watercourse, the bank or both.							
	Parameter 5	The structure shall be made from naturally occurring woody material, varying in size from small twigs and branches.							
	Parameter 6	Measures must be taken to address the flood, drainage and environmental risks described.							
	Parameter 7	The structure must not be installed within 100m of SSSI.							
Data and information				Judgement			Action (by permitting)		
Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	What is the agent or process with potential to cause harm?	What are the harmful consequences if things go wrong?	How might the receptor come into contact with the source?	How likely is this contact?	How severe will the consequences be if this occurs?	What is the overall magnitude of the risk?	On what did I base my judgement?	How can I best manage the risk to reduce the magnitude?	What is the magnitude of the risk after management? (This residual risk will be controlled by Compliance Assessment).

Local population and Braunton Marsh	Increased flood risk	Impact on local population and businesses, damage to property	diverted flow	Low	High	Medium	Working inappropriately on the structure may cause damage or increase flood risk.	Include a condition that spikes do not penetrate the flood bank more than 0.5m	Low
Local population	Increased flood risk	Impact on local population and businesses, damage to property	Out of channel flow	Low	High	Medium	To prevent the structure moving and causing flood risk in other locations	The structure shall be securely fastened to the bank.	Low
Historic environment	Physical damage to designated sites (eg Great Sluice)	Damage to designated sites	During construction works	Medium	Medium	Medium	construction works that dig into the ground can cause damage to Scheduled Monuments	Include a condition to prohibit works within Scheduled Monuments.	low
Habitat and species	Siltation and erosion	Loss of or damage to habitat or species	In-channel flow and sediment movement, especially during high flow events	Medium	Medium	Medium	Working in the channel can cause increased sedimentation and other damage, which may be large enough to adversely affect a conservation site or species.	No digging for the works, only placing of stakes and fill of brushwood on top of existing soil. Machinery transiting in dry conditions only	Low

Habitat and species	Change if flows/trapping species of importance	Impact to Taw Torridge SSSI features	Movement of species between Horsey Island and the SSSI	Medium	Medium	Medium	fences might provide alternative sites for SSSI spp	Works must not be carried out during the relevant fish breeding season. The groynes must slightly slope downhill to ensure no ponding or trapping of fish spp	Low
Habitat and species	Spread of non native invasive species and plant and animal diseases	Loss of or damage to habitat or species	Spread of species in the catchment caused by non-native species being disturbed and spread downstream or transported by machinery and equipment to another site	Medium	Medium	Medium	Use of biosecurity measures and good site management will reduce the spread of non-native invasive species	The operating techniques/management system should include a plan of biosecurity and site management measures to prevent the spread of invasive non-native species and plant and animal diseases.	Low
Habitat and species	Siltation and erosion	Loss of or damage to habitat or species	Introduction to the habitat	Medium	Medium	Medium	To ensure that the materials are suitable for use in habitat creation.	Include a condition that the structure shall be made from naturally occurring woody material, varying in size from small twigs to whole trees.	Low

Fish	Direct damage, siltation and erosion	Loss of or damage to species and breeding grounds	Changes in: quantity and dynamics of water flow; structure and substrate of river bed; and structure of riparian zone.	Low	High	Medium	Prohibiting works during breeding periods will greatly reduce the risk to spawning grounds.	Works must not be carried out during the relevant fish breeding season. The groyne must slightly slope downhill to ensure no ponding or trapping of fish spp	Low
Water quality	Increased siltation caused by working in the river, direct disturbance whilst undertaking construction works or footprint of the finished works.	Increase in sediment load.	Direct runoff from site, or in-channel flow from works within bank.	Medium	Medium	Medium	Will reduce risk due to limited mobilisation of sediment or pollutants.	risks to water quality and sediment control will be minimised through minimal machine working	Low

Management System

Site Infrastructure

None will be needed. A portable toilet will be provided by the contractor to be removed each day.

All activities will be done at the place of construction.

The seaward side of the bank is prone to flooding from the estuary.

Materials (brushwood and spikes may be stored in barns on the marsh by private arrangement or off site)

Method of work:

Delivery of materials

Material will come on vehicles not greater than 7.5 tonnes.

The material will be off loaded by the inland foot of the bank and carried over by hand to the installation area.

If a mechanical post driver is used, the access must be agreed with the land-owner. The machine must be removed from the wet side of the bank 2 hours before high tide. Low pressure tyres must be used.

Building the fences:

To ensure the max depth is not exceeded, the spikes will all be marked for the depth of 0.45m from the tip.

Brushwood will be packed into the fence manually and tied down using nylon rope.

Machines

Machines will not be left on the wet side of the bank.

The refuelling of any machine must be done in a location where spilt fuel can be easily contained and recovered.

Tidal Working: Do not work 2 hours before or after high tide. Ensure all machines and equipment are removed from the wet side of the site.

Contingency Planning

In the event of flood warnings for the site, all plant and equipment must be removed from the flood zone.

Contacts:

Owners: Braunton Marsh Inspectors: Bob Haynes, 07831122868

Contract Client: Andrew Bell 07967134149 andrew.bell@devon.gov.uk

Date: 08/03/21

How to apply

Reply to the tender quoting

- quote the value of the work,
- your method and approach including
- the source of the brushwood.
- Evidence of your experience in sensitive environments
- When you can do the work

Send the reply to Andrew.Bell@devon.gov.uk

By March 25th 2021.