



# Broadland Flood Alleviation Project

## Protecting



Broadland

## Chedgrave Common and Hardley Marshes (Compartment 21) Consultation Document - January 2004

### Introduction

In May 2001 Broadland Environmental Services Limited (BESL) was awarded a long-term contract by the Environment Agency to improve and maintain flood defences in Broadland. The Agency's approach to flood alleviation in Broadland was adopted in the 1990's and is based on a strategy consisting mainly of bank strengthening and erosion protection and reducing the risk of banks breaching. BESL has recently updated this strategy and it now sets the scene for how this and future improvement schemes are designed, programmed and carried out.

Recent detailed surveys and monitoring confirm that improvements are needed to flood defences for the left bank of the River Chet (Chedgrave Common and Hardley Marshes), the right bank of the River Yare (Hardley Marshes) and Hardley Dyke. All of this area is referred to as Compartment 21. BESL have taken a comprehensive approach in developing the proposal for work in this compartment, linking it to flood alleviation work in the whole Chet valley and work on the opposite bank of the river in particular (Compartment 22).



River Chet

Broadland Environmental  
Services Limited



### Consultation

This leaflet has been prepared as part of an ongoing process of consultation to inform you about BESL's proposals and to seek your views on them. Preparation of this document has been preceded by a series of meetings with the River Chet Liaison Group between December 2002 and October 2003. Potential issues raised during these discussions and previous consultation on the south bank of the River Chet have been incorporated into this document and have been considered in BESL's proposal (see page 6).

The purpose of this consultation document is to:

- ▶ Explain the range of flood defence options that BESL can consider;
- ▶ Outline our preferred flood defence proposals and explain why this is BESL's preferred option in each case;
- ▶ Invite your views on these proposals;
- ▶ Make sure, from the responses we receive, that we are aware of any specific local issues that ought to be considered as we go on to develop the proposals in greater detail.

BESL will carefully consider any comments it receives, seeking clarification and incorporating changes before finalising its plans. The results of this consultation will play an important part in BESL's proposals. General feedback on this consultation will be contained in planning application documents.

A questionnaire is provided with this leaflet. If you have not received one, or if you would like an electronic copy of the questionnaire by e-mail, please contact Tanja Hofmann at the address given at the end.

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## The need to improve existing flood defences

The existing flood defences along the left bank of the River Chet, the right bank of the Yare and Hardley dyke in Compartment 21 are continuous clay floodbanks with a mixture of reed ronds of varying width, and harder defences such as sheet metal and timber piling.

The overall standard of flood defence within the compartment has progressively reduced over time due to bank settlement, age and the combined effects of erosion, corrosion and sea level rise. In some areas the original floodbanks are too narrow and too steep, making them vulnerable to breaching during very high tides when floodwater overtops them. Sea level rise and tidal surges add to this vulnerability.

BESL has taken every effort to ensure that the solutions presented here are technically feasible, cost-effective, environmentally sound and acceptable to communities. It is the combination of these principles for a 'sustainable' project that underpin BESL's specific detailed proposals here and across Broadland.



Timber piling - River Chet

## What solutions are BESL considering for improvement works in this compartment?

The range of flood alleviation solutions BESL are proposing for these works follows the Environment Agency's and BESL's overall strategy for flood alleviation in Broadland. These are always the solutions BESL will examine first, before looking at alternatives. BESL's choice of technique needs to follow the strategy options for sustainable flood defences. Specific solutions are based on up-to-date survey data (assessing the condition of the existing floodbank and erosion protection), an evaluation of the level of flood defence provided, local environment issues and legal designations.

The solutions considered are listed below and illustrated on page 3. A brief outline of some of the decision criteria leading to a particular option as the preferred solution is also given:

### ► Floodbank strengthening

This involves strengthening the existing clay embankment in its present location by placing material on the front and/or back slope of the bank (Fig.1). Raising the crest may also be necessary. Typically the strengthened banks will have a 2m crest width and a back slope of between 1 in 2 and 1 in 3. Bank crests must be wide enough to allow maintenance access and further topping up if necessary.

*Feasible solution when the rond in front of the existing floodbank is sufficiently wide (generally >10m) and or piling/other erosion protection has a remaining lifespan of 20 years or more.*

### ► Floodbank setback

This option consists of constructing a new clay embankment, 20m to 30m behind the existing floodbank (Fig.2). The actual distance of setback depends on local erosion rates, river depth and the quality of land behind the existing floodbank. Once the new bank has been constructed the existing floodbank will be removed and the material levelled and profiled to promote the development of a new stable rond. A new folding and soke dyke will also be provided.

*Preferred solution when the bank might become unstable due to failed piling or the reed rond failing, subject to adjacent land use, suitable ground conditions and availability of sufficient material for construction of a new floodbank.*

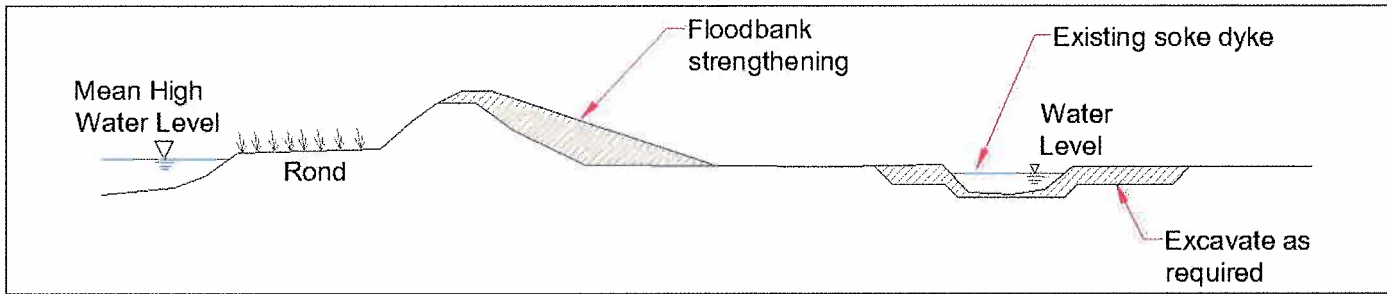
### ► Floodbank rollback

This option is similar to setback, however, the distance the floodbank is moved inland is considerably less (dependent on position of existing soke dyke, ground conditions and width of folding) (Fig. 3).

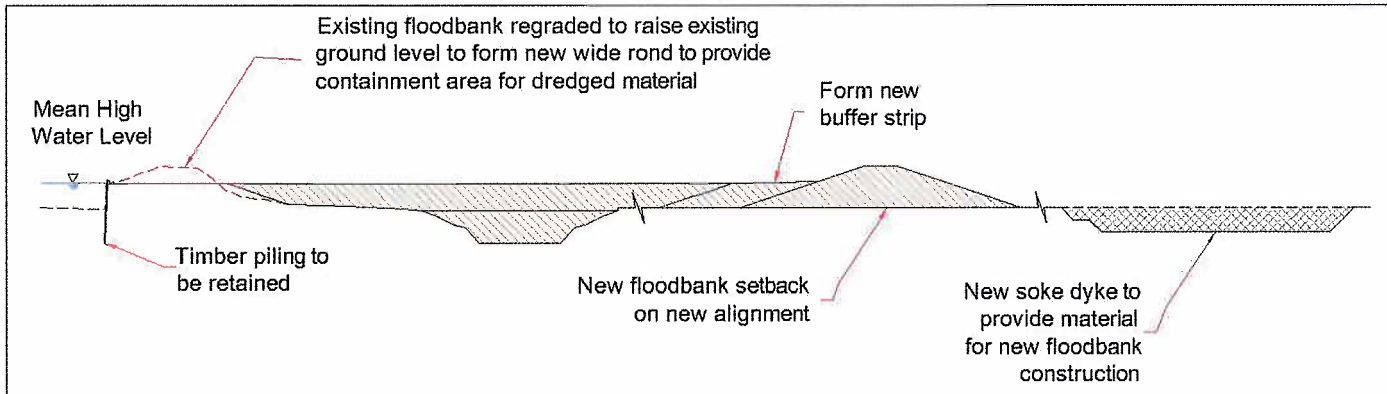
*Preferred solution when rond/erosion protection is insufficient to allow for just bank strengthening and where ground conditions do not permit full setback. Requires less material and land compared to setback and utilises the total lifespan of existing piling.*



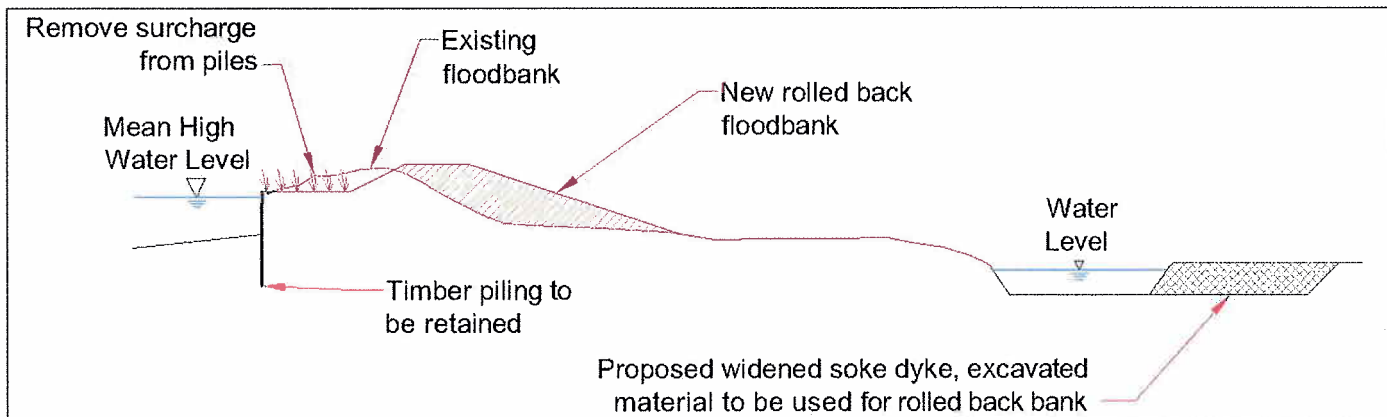
Boats on River Chet



1) Floodbank Strengthening



2) Floodbank Setback



3) Floodbank Rollback

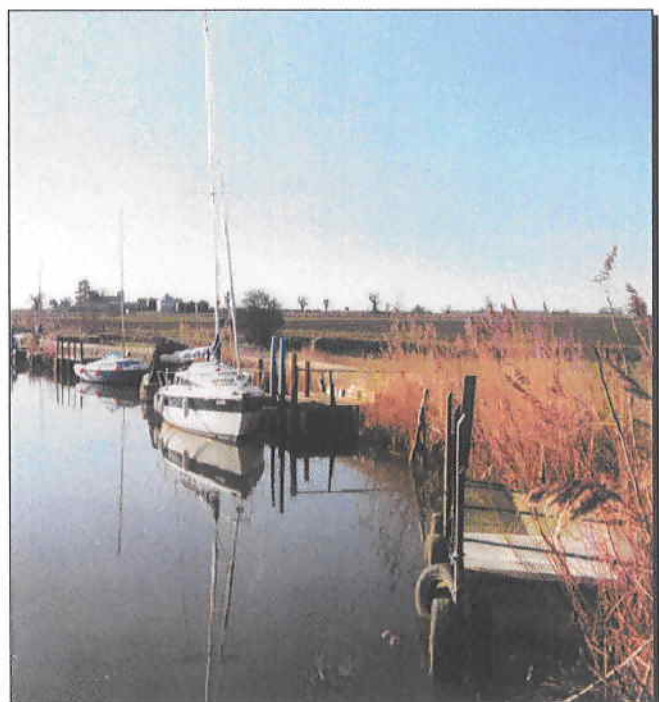
► Erosion protection

This stabilises the riverbank and the edge of the rond and is used where erosion may threaten the floodbank. There are several types of erosion protection and most types are soft engineering such as asphalt matting, coir and reed rolls and alder poles. In a small number of locations, BESL installs replacement steel sheet piling but this hard engineering is used very sparingly due to its high cost and limited sustainability. Erosion protection is used in conjunction with the above options where needed.

*The type of erosion protection that is chosen depends mainly on existing erosion protection and its lifespan, adjacent land use and long-term sustainability.*

► Material sourcing

BESL prefer to use local material where possible, by widening the existing soke dykes and internal drains. Along the River Chet, dredgings will also be used where agreed with the Broads Authority. BESL use a sequential approach to material sourcing and only if there are no other reasonable alternatives, will it be necessary to create local borrow pits.



Hardley Dyke

## What are BESL's specific proposals for the left bank of the River Chet, the right bank of the River Yare and Hardley Dyke?

BESL will need to obtain approval from statutory bodies including planning permission from the Broads Authority for works other than maintenance or replacement of existing defences.

The drawings on page 5 show what solutions BESL are proposing for different lengths of floodbank in Compartment 21. These are based on the current best available information. While ground investigation has been carried out, factors such as localised ground conditions may affect the final solution.

A summary of these works is as follows:

### **Compartment 21 (Chedgrave Common and Hardley Marshes):**

(Please refer to drawing on the opposite page)

#### **River Chet (Chedgrave Common)**

- ▶ Strengthen 390m of bank, strengthen and retain piles along 150m, strengthen and install erosion protection along 100m (red line);
- ▶ Maintain and retain piles along 50m of bank (yellow line);
- ▶ Maintain, remove piles and install erosion protection along 90m (orange line).
- ▶ 520m of bank along Chedgrave boatyards, which are currently undefended, will be considered as part of a separate proposal, the solution of which will integrate into the works carried out in Compartment 21. There are no plans for redundant flood defences along 1670m of bank at Hardley Flood, which is a designated SPA and Ramsar site.

#### **River Chet (Hardley Marshes)**

- ▶ Strengthen 830m of bank, strengthen and maintain piles along 40m (red line);
- ▶ Rollback 950m of bank and retain piles, rollback 350m of bank and install erosion protection (blue line);
- ▶ Setback and retain piles along 550m of bank (green line). Remove piles along 70m of bank at a later stage (see section below on timing of work).

#### **River Yare (Hardley Marshes)**

- ▶ Strengthen 520m of bank (red line);
- ▶ Maintain 880m of bank (yellow line);
- ▶ Rollback and retain piles along 250m of bank (blue line).

#### **Hardley Dyke**

- ▶ Maintain 190m of floodbank (yellow line).
- ▶ Strengthening and erosion protection work along Hardley Dyke are planned for a later stage (see section below on timing of work).

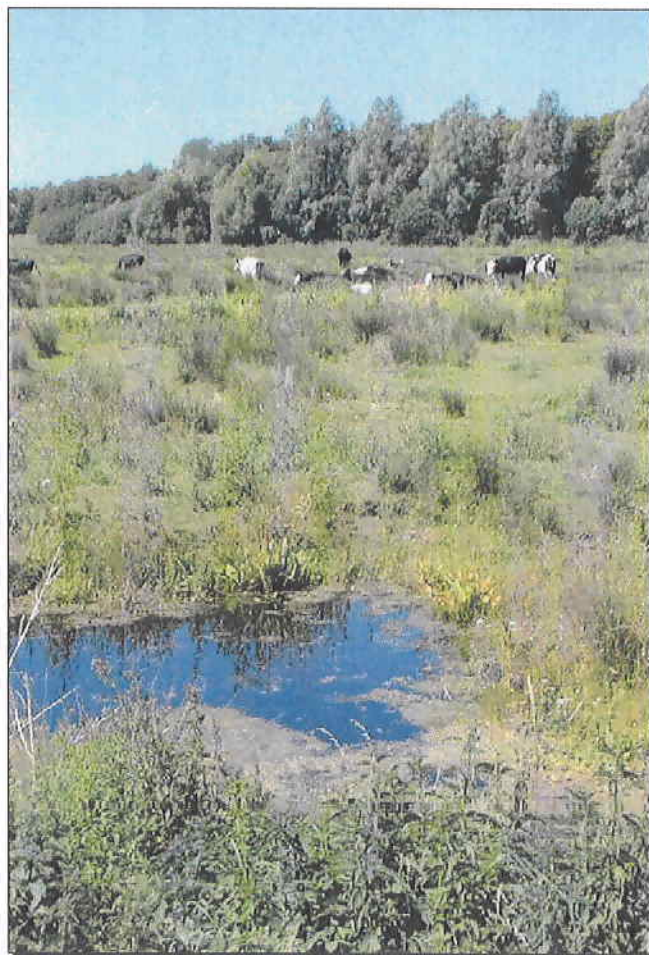
BESL's proposals to improve the floodbanks in the works area comprise a mixture of maintenance, strengthening, rollback and setback. The proposed solutions are chosen using the decision criteria outlined on page 2.

For erosion protection BESL proposes to maximise the lifespan of the existing piling system. This has the advantage of limiting effects on navigation and is consistent with BESL's proposal for the opposite bank of the Chet to retain piles as long as they remain cost-effective, provide an effective flood defence function and do not represent a safety hazard. Piling will therefore be initially retained and removal programmed dependent on their condition.

## What is the proposed phasing and timing of this work?

Flood alleviation works in Compartment 21 are proposed to start in August 2004. The improvement works will be progressed in two phases. Phase 1 will concentrate on the works along the River Chet at Chedgrave Common, the setback and rollback works along the lower Chet and the strengthening of existing floodbanks along the River Yare. Piling removal and subsequent replacement with an erosion protection system and strengthening work along Hardley Dyke will be carried out during the second phase.

Sections of floodbank that are to be maintained will have their condition reassessed each year as part of BESL's ongoing maintenance programme.



Grazing marsh - Chedgrave Common

