

BROADLAND FLOOD ALLEVIATION PROJECT

Review of Progress

Public Exhibition 7 April 2009

Introduction

The Broadland Flood Alleviation Project (BFAP) is a long-term scheme to provide flood defence improvements, maintenance and emergency response services within the tidal areas of the rivers Yare, Bure, Waveney and their tributaries. The 240km of floodbanks protect over 20,000ha of land, 1,700 properties and important transport routes such as the A47 Acle Straight and the Norwich to Yarmouth and Lowestoft railway lines. The land, predominantly grazing marshes, has high environmental value and is important to the local economy through its use for farming and tourism.

In May 2001 Broadland Environmental Services Limited (BESL) was awarded a 20-year contract by the Environment Agency (EA) to undertake the BFAP. The EA's approach to flood management in Broadland was adopted in the 1990's and is based on a strategy consisting mainly of bank strengthening and erosion protection in order to reduce the risk of banks breaching. BESL and the EA updated the strategy in 2003 and are now carrying out improvement works throughout 40 individual flood compartments in Broadland.

The Project is holding a Public Exhibition at Acle Recreation Centre on Tuesday 7th April. The exhibition provides an opportunity for people to come and meet Project staff; look at displays showing what work has been done; and view demonstrations of some of the computer packages that are used to help with design and data management.

The purpose of this review document is to provide a summary that outlines what the BFAP does; what the important considerations and issues are; and what has been achieved to date (notably since the last Exhibition in 2007).

A feedback sheet is provided at the end of this review and will also be available at the public exhibition.

Improvement works

The primary purpose of improvement works is to strengthen existing floodbanks and restore them to a height that existed in 1995, making allowance for sea level rise and natural ground settlement. It is important to note that the Project is not seeking to prevent all flooding; the relative heights of bank throughout the system will remain the same as they were at 1995 levels. The key objective is to minimise the risk of the banks breaching in the event of floodwater overtopping them (see *Flood Events* below). In some areas new banks are being constructed landward of the existing ones with a reeded area being created between the old and new. These 'setback' banks are the preferred solution where piling that currently provides erosion protection is coming to the end of its life. Re-piling is not a sustainable option and is only undertaken where there are over-riding reasons to do so, for example where there is a property immediately behind the bank.

The major improvement works are being undertaken during the first 12 years of the Project; thereafter the condition of the banks will be monitored and maintenance works undertaken as required.

To date, improvement works have been completed, or are substantially complete, in 23 of the compartments comprising:

- 89.1km Strengthening
- 29.5km Setback
- 3.7km Re-piling
- 15.2km Other erosion protection including asphalt matting and timber poles combined with reed
- 4.5km Piling removal associated with setback areas

Further details, including the likely timescale for the remaining compartments, are provided in table 1 overleaf. If you would like to know the exact location and extent of compartments then plans are available at www.bfap.org . Alternatively you can contact the Project office on 01603 226161.

The Project also provides first time defences to a number of previously 'undefended communities' i.e. properties, including some businesses such as boatyards, which have never previously had any formal defences. Works have been completed at Reedham, St Olaves, Brundall, Chedgrave and Surlingham.



Topsoiling a strengthened bank



Strengthened bank at Cantley 1 year after completion



Reedham floodwall in operation, November 2007



How Hill moorings, River Ant

Table 1. BFAP Flood Defence Improvement Programme (April 2009)

Comp.	River	Site(s)
1	Bure	Upton Marshes
2	Bure	South Walsham Marshes
3	Ant	Horning Marshes
4	Ant	Clayrack Marshes (How Hill)
5	Ant, Bure & Thurne	How Hill - Ludham - St Benet's - Womack Water
6	Thurne	Ludham - Potter Heigham Marshes + Upper Thurne
6A	Thurne	Hickling-Horsey-Somerton
7	Thurne	Thurne - West Somerton
8	Thurne	Thurne Mouth
9	Bure	Stokesby-Thurne Mouth
10	Bure	Stokesby-N.Denes
11	Yare	Reedham & Halvergate Marshes
11	Bure	Acle to Yarmouth
12	Yare	Limpenhoe Marshes
13	Yare	Cantley Beet Factory
14	Yare	Cantley Marshes
15	Yare	Buckenham Marshes
16	Yare	Strumpshaw
17 OA	Yare	Postwick Marshes
18	Yare	Rockland & Claxton Marshes
19 OA	Yare	Claxton Marshes
20 OA	Yare	Langley Marshes
21	Yare & N. Chet	Hardley Marshes - Chedgrave Common
22	Waveney, Yare, Chet & Cut	Wheatacre-Burgh St Peter-Haddiscoe, Norton Marshes, Chet mouth – Nogdam End
22 OA	Chet	Loddon – Nogdam End
23	Waveney	Short Dam Level
24	Waveney	Long Dam Level
25	Waveney	Gillingham Marshes
25A	Waveney	Dockeney Wall
25A	Waveney	Geldeston Marshes
25B	Waveney	Barsham Marshes
26	Waveney	Beccles Marshes
27	Waveney	Barnby Broad & Marshes
28 I	Waveney	Share & Carlton Marshes
28 II	Waveney	Peto's Marsh
29	Waveney	Oulton Marshes
30	Waveney	Blundeston Marshes
31	Waveney	Somerleyton Marshes
32	Waveney	Herringfleet Marshes
33	Waveney	Fritton Marshes
34	Waveney	Belton Marshes
35	Yare, Waveney & Cut	Haddiscoe Island
36	Yare (Breydon)	Burgh Castle & Fisher's Marshes
37	Bure	Fishley Marshes

	Completed
	On site and scheduled for completion 2009-2010
	Planning permission required; scheduled to start on site 2009-2010
	Planning permission required; scheduled to start 2011-2012
OA	Timing subject to outcome of Options Appraisal

Maintenance and ancillary works

Maintenance schemes are undertaken where it is necessary to provide repairs to floodbanks and erosion protection in advance of the improvement works. Annual condition surveys of the floodbanks (in winter) and erosion protection (from a boat in summer) identify where maintenance schemes are required.

Typical maintenance works involve plugging leaks, filling erosion pockets, repairing top boards on piling and minor crest raising. Since 2001 over 200 schemes have been implemented that have required engineering design and environmental input; in addition several hundred leak repairs have been completed. The majority of maintenance schemes do not require planning permission but other consents are sometimes needed e.g. work within a designated wildlife site.

Ancillary works include:

- grass cutting along floodbank crests and slopes
- maintenance of structures such as sluices
- cut and clear during the winter months along other watercourses that are the responsibility of the Environment Agency

The Project also provides a 24-hour duty roster and emergency response team in the event of major flooding occurring.

Flood Events

Following exceptionally high river levels and flooding in November 2006 an even larger flood event occurred on the 9th November 2007. This produced the highest recorded water levels in the Broadland river system since the devastating east coast floods in 1953. The flood defences throughout Broadland performed extremely well given the large volumes of water that spilled over many sections of bank, with only two small breaches (bank collapse). Overtopping allows floodwater to spill onto the marshes but then be returned (via IDB and other pumps) to the river once levels reduce.

November 2007 flooding



Overtopping, Haddiscoe Cut



Flooding in the lower Yare (photo: Mike Page)

Project delivery considerations

This section summarises some of the main issues that have to be taken account of during the planning and implementation of the BFAP. This includes opportunities to provide enhancements, either within the scope and budget of the flood defence works or through partnership working and use of external funding.

Wildlife

All of the sites that the Project works within have some wildlife interest, including the potential for protected species such as water vole, otter and marsh harrier to be present.

Species

A considerable amount of time and effort is spent in ensuring that populations of important plants and animals are either protected during the works or, where this is not possible, that habitat re-instatement allows them to recolonise afterwards.

Some examples of recent work contributing to the protection of species and increasing knowledge about their distribution are summarised below:

- Survey and mitigation methods have been further developed to protect **water vole** populations. This has included the funding of a student research project to investigate the fate of displaced voles and the effectiveness of the mitigation methods used. The results of this and associated work have been published in the Norfolk Bird and Mammal Report 2007 and a paper delivered at a national conference of ecologists.
- **Common lizards, grass snakes, adders** and **slow worms** are present in some of the work areas. Surveys have been undertaken to determine the presence and distribution of reptiles so that mitigation can be targeted at particular locations. A major capture and translocation exercise for common lizards is underway on the River Bure between Acle and Great Yarmouth and along the south bank of the River Thurne. Next year we will be undertaking mitigation work for adders in the upper Thurne and the lower Waveney. In preparation for this we are currently catching and marking animals in order to identify how large the populations are and where they are likely to be hibernating.
- There are a large number of plants in the Project area that have some conservation value. We are continuing to monitor populations of **grass-wrack pondweed** following mitigation work at South Walsham in 2006 and a paper was published in 2008 describing the methods used. Surveys of two nationally important species, **floating water plantain** and **sharp-leaved pondweed**, were completed in 2008. Although neither species are directly threatened by the works they do occur in nearby marsh dykes so the opportunity was taken to gather information on their distribution.
- The large number of surveys being undertaken has generated thousands of **biological records**. As well as maintaining these on a BFAP database the Project is also providing them to various national and local recording schemes, including the Norfolk Biodiversity Information Service and the Suffolk Biological Records Centre.

Habitat

The flood defence works are providing benefit to a wide range of freshwater plants and animals that are dependant upon good water quality within the grazing marshes. Frequent flooding by river water high in nutrients and/or saline in nature would

damage these communities. However, the Project has to source material for the bank works from the grazing marsh, some of which is recognised as a Biodiversity Action Plan (BAP) habitat. To counter this, the Project undertakes to replace the area of habitat lost from within designated sites (SSSIs) by creating new grazing marsh from arable fields. Additionally, existing poor quality (in BAP terms) grazing marsh can be improved as is being done in partnership with Suffolk Wildlife Trust at Oulton. The Environment Agency is taking responsibility for the replacement of other grazing marsh as part of its Regional Habitat Creation Project.

Designated sites

Direct protection is being provided to large areas of land that are of national and international importance for their wildlife. We have recently completed works at Cantley Marshes, an RSPB reserve in the Yare valley. As part of this scheme an additional perimeter dyke was excavated, which will allow the RSPB and IDB to transfer the main drain from the centre of the reserve, thereby improving water level management across the whole site. Improvement works are just starting at Shallam Dyke Marshes SSSI (compartment 7), a site that is currently in unfavourable condition partly as a result of inputs of river water coming through the bank.

In the Yare valley proposed works at Postwick Marshes (compartment 17) have had to be put on hold due to concerns about high water levels affecting the nearby designated fen sites at Surlingham and Wheatfen. These sites aren't protected by floodbanks so further studies are required to investigate whether flood management solutions in this part of the valley can deliver the water level reductions that are required for the designated site.

Wetland opportunities

Although the majority of the drained marshes will continue to be protected by improved floodbanks there may be opportunities to create wetlands in some areas. The Project has worked closely with the Broads Authority, Natural England, Norfolk Wildlife Trust and the RSPB to identify potential sites that would achieve the greatest biodiversity benefits. We are hoping to be able to deliver at least one wetland scheme around Hickling and two schemes in the Waveney valley in the next few years.

Further information relating to wildlife issues, including links to published papers and reports, can be found on the Project's website www.bfap.org.



Fencing to protect a population of lizards whilst working on an adjoining length of bank



Common lizard

Archaeology and cultural heritage

In 2006 a significant find was made on Beccles Marshes in the Waveney valley. The excavation of a new soke dyke revealed a number of vertical timbers, which an archaeological evaluation concluded were part of an ancient causeway. Some of the remains date from the Bronze Age but with more evidence of use during the Iron Age and by the Romans through to the 4th century AD. In 2007, whilst undertaking works upstream of Beccles at Barsham a similar discovery of timbers was made. The posts were not as well preserved as the ones at Beccles due to relatively low groundwater levels having caused desiccation. The site was subject to an archaeological excavation and analysis suggests that the structure dates from the Roman period.

Other interesting finds during excavation works over the last two years include:

- The remains of a possible fish trap dating from the Saxon period;
- A brick kiln at Limpenhoe Marshes; and
- The base of a former mill at Caister

The Project employs locally based archaeologists to do the site monitoring work. It also works closely with Norfolk and Suffolk County Council's Archaeological Services plus Norfolk Windmills Trust and the Broads Authority in order to identify any potential risks and design requirements during the planning of individual schemes.



Brick works and kiln remains, Limpenhoe



Retention of dyke pattern, Boardman's Mill

Navigation

The Broadland rivers are used extensively for sailing and cruising, particularly between Easter and October when there are large numbers of hire boats in addition to the growing number of private craft. The majority of BFAP activities do not directly impact on river users but there are a number of aspects that are relevant and have been raised as concerns:

- the need to temporarily close moorings and/or restrict bank access whilst works are undertaken on piling, quay heading or adjacent sections of floodbank;
- piling removal in setback areas leading to loss of visible edge; potential for erosion and sedimentation; loss of vertical edge for mooring; temporary channel markers;
- the fact that not all of the piling in the Project area is being maintained or replaced so will eventually be lost for mooring (where that is currently possible); and
- ensuring the specification used for replacement piling is appropriate.

The Project has worked closely with the Broads Authority to address these issues:

- where possible, re-piling works are scheduled for the winter period, or at least to avoid the peak season from Easter to October. In some cases, where sufficient width means there are no health and safety issues, it has been possible to keep moorings open for use whilst bank works proceed nearby;
- temporary marker posts are installed wherever there is a change to the profile at the river's edge as a result of BFAP works (see *piling removal* below);
- the Project needs to deliver sustainable flood defence solutions that move away from the reliance on sheet piling that is costly to install and maintain. Piling is being maintained by the Project where it continues to serve a flood defence purpose (e.g. protecting property) and is being retained where it has a residual life and there is the opportunity for others to manage it. We have contributed to the BA's Mooring Strategy and are using the information from the audit to identify informal mooring areas that need to be retained where possible;
- A Best Practice Procedure for Mooring Areas has been produced, which incorporates specifications for piling, wailing, safety chains etc.

In 2008 there were problems with two planning applications because the Broads Authority was not satisfied with the proposed solutions for mooring areas. At Potter Heigham (compartment 7) the bank is owned by the Environment Agency but the Broads Authority has a long-term lease on the two areas of 24-hour moorings. The proposed solutions were to rollback the bank but no longer maintain the piling as part of the erosion protection. The planning application was refused on the grounds that the proposals would lead to the loss of short-term visitor moorings and therefore have a negative impact on navigation, recreation and businesses at Potter Heigham. The issue was resolved by BESL agreeing to maintain the piling for the duration of the Project. On the Bure at Acle Bridge (compartment 37) the planning application was deferred due to concerns that the piling managed by Horizon Craft for boat moorings was no longer going to be maintained. This was resolved by BESL agreeing to maintain top boards and fendering and the Environment Agency agreeing to work with the Broads Authority to develop options for alternative mooring provision once the piles reach the end of their life.

Somerleyton 24-hour mooring extension



Eroded road with new piling



Completed mooring extension

Navigation benefits

There have been a considerable number of navigation benefits and enhancements delivered as part of the Project:

- Replacement slipways installed at Stokesby and Upton Dyke;
- Re-piling 24-hour moorings/public staithes at How Hill, Herringfleet and Ludham
- Re-piling locations for potential new 24-hour or other moorings including; Short Dyke, Hardley Cross, Seven Mile House, Somerton Dyke;
- Extension of the 24-hour moorings at Somerleyton (with BA) following collapse of a section of bank;
- Provision of hydrographic survey data and staff time towards the development of the BA's Sediment Management Strategy;
- Providing opportunities for sustainable dredging disposal sites in areas where the banks have been setback (sites already being used at Black Mill, St Benet's, River Ant and River Yare below Reedham);
- Tree clearance removing hazards overhanging the channel; and
- Undertaking top board repairs to improve the safety of piling used for informal mooring

Replacement piling

Since 2007 replacement piling has been installed at a number of locations:

- Compartment 14 Cantley Marshes – 41m at the Reedcutter pub and upgrading part of the 24-hour moorings (BA funded);
- Compartment 10 lower Bure – 324m;
- Compartment 11 lower Bure – 893m including Stracey Arms

In addition to the replacement piling there is over 900m in the lower Bure that will be maintained and replaced if necessary during the BFAP contract. Approximately 1.3km of piling associated with setback at these locations will eventually be removed.

Piling removal

Following the initial piling removal in the lower Yare at Halvergate and Haddiscoe Island (2005-2006), further removal has taken place in the River Chet (compartments 21 and 22) and River Ant (compartment 5). Next winter piling removal will take place on the River Chet; downstream of St Benet's on the River Bure (compartment 5); and on the opposite bank between South Walsham pump and Tall Mill (compartment 1).

Piling removal is creating a softer, natural edge that will provide long term erosion protection to the new setback banks. A low 'cadge' bank has been formed on the front edge in order to encourage reed growth, which will provide a visible edge to the channel. In addition temporary large metal marker posts are being installed along the line of where the piles were removed; this identifies the point at which the channel profile starts to slope up towards the cadge bank. The need for and specification of the posts is a requirement of the planning permission. Concern has been raised by some sailors that the posts represent a navigation hazard, particularly on the River Ant. They are currently being replaced by buoys on the River Ant by a consortium of interest groups including boatyards. BESL and the Broads Authority have contributed financially to this.

Piling removal



Piling removal, River Ant



Channel markers and developing reed, River Chet

Landuse and local community

Most of the floodbanks are remote from any residential areas. However, in 2008 the Project worked directly next to properties at Dockeney where the floodbank runs along the bottom of people's gardens. A major programme of works is just about to begin in the Thurne valley, which will involve working next to the Thurne bungalows as well as the communities at Potter Heigham, Repps, Somerton and Thurne.

As well as disturbance to residents and holiday makers, the construction works have the potential to disrupt farming activities and affect local businesses

A number of measures are taken to avoid or minimise these impacts, for example:

- early dialogue with landowners to discuss constraints, agree access routes and location of site compound;
- discussion with local businesses to minimise disruption through programming works outside of the main holiday season;
- consultation with user groups and Parish Councils to identify any other local issues;
- consultation with the Highways Authority on the suitability of proposed routes;
- delivery of materials and plant on low loaders and HGVs to be done at times to avoid busy traffic periods; and
- erection of signs to direct visitors and workforce and warn road users of site entrances.

BAM Nuttall, the contractor that undertakes the BFAP works, has recently entered the compound at Acle for the *Considerate Constructors Scheme*. This national scheme assesses the quality of the compound in terms of health and safety; environmental credentials (including provision for recycling); and how it operates in relation to neighbours and the local community. An audit of the site resulted in a score of 36 out of 40, which reflects the fact that the site is achieving a standard beyond that of the statutory requirements and accepted best practice.

Health and Safety

BAM Nuttall, Halcrow and the Environment Agency take the health and safety of their staff, sub-contractors and the public very seriously. The Project has an excellent health and safety record, indeed last September it passed 1 million man hours without a 'reportable' accident. To celebrate such a milestone, rarely achieved in the construction industry, a cheque was presented to the Nancy Oldfield Trust, a local charity that helps disabled and socially disadvantaged people enjoy days out on the rivers and broads.

Education

The Project has developed links with a number of local schools and universities, which has enabled it to provide a range of learning opportunities: interactive workshops and presentations; offering short-term work experience; providing 12-month industrial placements to undergraduates; and facilitating postgraduate research projects.

Access

Many of the improvement works require the temporary closure of public rights of way and other access routes. Where appropriate, and with the agreement of landowners, diversions are provided to maintain circular walks and links with important routes such as long distance paths.

In terms of the completed works the improved floodbanks are providing a much better surface, particularly in those areas where the crest has become narrow and uneven. In some locations the Project has provided earth ramps and steps on the rear floodbank face to help walkers and anglers access the crest from car parks or rights of way that come across the marshes. Similarly, ramps have been provided on the front face for reedcutters wanting to access the ronds.

Improved access is also a focus for partnership projects, especially with Broads Authority and County Councils, for example the grass protection mesh and turf that was installed at Chedgrave. Later in 2009 the Project, in partnership with the Broads Authority and Suffolk County Council, intend to construct an easy access path and create a new circular route between Oulton Broad and Carlton Marshes Nature Reserve.

Angling

The Project continues to work closely with colleagues from the Environment Agency's Fisheries Team, Broads Authority and the Broads Angling Strategy Group to identify and deliver enhancements as part of the flood defence works.

Several schemes are due to be completed shortly including upgrading the car park area that services Coldharbour Farm on the River Thurne and the replacement of angling platforms on the Thurne. At Shipmeadow, Barsham the Project and the Broads Authority, with funding from Suffolk County Council, have planning consent to install fishing platforms as part of the provision of disabled access moorings.

The Project is also working with Norwich and District Anglers Association to ensure that safe access remains available to lengths of river where the floodbanks have been setback on the Bure and the Thurne. Similarly we are in dialogue with George Prior Engineering AC about maintaining access along Oulton Dyke.

Consultation

Consultation with local people and organisations is a key aspect of the BFAP. We endeavour to contact all interested parties so that they have an opportunity to comment on schemes before they are submitted for planning permission. Whilst we cannot satisfy all requests or agree with everyone's viewpoint on individual schemes, it is often helpful to have had the opportunity to discuss issues and be able to explain the objectives of the Project and what constraints it works under.

Broads Authority

The Broads Authority has a unique and important role to play in both the scrutiny and delivery of BFAP. It has a statutory duty to manage the Broads executive area for the purposes of:

- Conserving and enhancing the natural beauty of the Broads;
- Promoting the enjoyment of the Broads by the public; and
- Protecting the interests of navigation.

Because of the BA's key role there are a number of measures in place to promote good lines of communication and exchange of information:

- A full-time BFAP Co-ordinator post (currently Adrian Clarke) to act as a link between the Project and BA, including responsibility for organising meetings and developing partnership projects;
- Monthly officer meetings to discuss programme, issues, partnership working;
- Site meetings to discuss solutions during preliminary scheme development; and
- BFAP briefings and presentations to BA committees as requested.

Both the Project and BA have benefited from the ability to combine resources and skills to achieve multiple objectives, for example setback areas providing opportunities for dredging disposal and habitat creation. Such projects can only be delivered effectively if there is good communication and a willingness to work together.

Contact list

The Project maintains an extensive list of stakeholders and endeavours to contact the relevant organisations and individuals when a consultation is being undertaken. However, we are reliant on people keeping us informed of any amendments or additions. If you want to check your entry on the database or would like adding to the consultation list for particular schemes please contact Angela Rowe on 01603 226161 or e-mail Halcrow@bamnuttall.co.uk

BFAP FEEDBACK FORM 2009

A separate feedback form will be available for those attending the Public Exhibition. If you are unable to attend but would like to submit comments or questions then please complete this sheet and return to:

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Comments and/or queries

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