Babtie Brown & Root

River Little Ouse
(Brandon to Thetford Navigation)
Pre-Feasibility Study

Stage 2 Report

Environment Agency Anglian Region
BBR Ref: 0006077/D4/135
EA Project Ref: LVN 17010

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Draft	26/6/03	Draft for Discussion
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Front Cover Photo

Abbey Heath Weir, River Little Ouse, Thetford.

RIVER LITTLE OUSE

(BRANDON to THETFORD NAVIGATION)

Notes

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29: Title page only – Appendix A, Environmental Report.
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53: Title page only – Citations (Appendix 3 – sic)
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55 - 67: Thetford Golf Course And Marsh, Sites of Special Scientific Interest, Conservation of Wild Birds. **See Pages 35 to 47 in original report.**
68: Blank
69: Title page only – Appendix B, Photographs
70 - 76: 14 photographs. **See pages 50 to 56 of original report.**
77: Title page only – Appendix C, Works Required for Navigation
78 - 79: Schedule of new works – **See pages 58 & 59 of original report**
80: Blank
81: Title page only – Appendix D, Costs Estimates
85: Title page only – Appendix E, Economic Assessment
91: Title page only – Working Group Consultation
92: Blank
93 - 94: Working Group. **See pages 67 & 68 of original report**
98: Blank
99: Title page only – Abstraction Licence Summaries
100: Blank
103-106: River Flow Records
107: Drawings

Table of Contents

Appendices

Drawings

SUMMARY

1.1 This report presents the initial environmental and technical assessments for providing enhancements to the environment, and navigation on the Little Ouse between Brandon and Thetford.

1.2 The areas of potential environmental enhancement have been identified based on information provided from a core list of consultees, particularly the Forestry Commission.

1.3 The key engineering works required for the navigation to be reopened between Brandon and Thetford have been identified.

1.4 Budget costs and benefits for these proposals have been determined; the costs are in the region of £6.5 to £7.5 million.

1.5 An assessment of the economic benefits has been carried out for a range of scenarios. The medium (intermediate) case scenarios suggest that the navigation proposals would yield a positive NPV after approximately 20 to 25 years.

1.6 There is scope to restore the flood plain in the vicinity of Two Mile Bottom and to a lesser extent Santon Downham. However, the affect of increased levels on the flood defence aspects has not been fully examined at this stage.

1.7 Investigations would be needed to determine the potential affects of navigation on river flows due to increased water levels, and confirm the technical feasibility of the proposals.

1.8 Further environmental studies are required to identify the presence of protected species along the river corridor and consider the effects of extending the navigation to Thetford. In addition, consideration should be given to the effects of navigation on river bank stability from wave action. These issues would need to be addressed under the environmental mitigation proposals for the scheme.

INTRODUCTION

Background

2.1.1 The river Little Ouse is a gently sloping river draining the low-lying land of the Brecks in Norfolk, and meanders from Thetford, past Santon Downham, Brandon and Hockwold-Cum-Wilton until it flows into the river Great Ouse at Brandon Creek.

2.1.2 The river between Brandon and Thetford flows through the Thetford Forest, part of which is part of the Breckland Forest SSSI and part of in the Thetford golf course and Marsh SSSI.

2.1.3 The river Little Ouse is at present navigable by small boats up from its confluence with the river Great Ouse up to Brandon on the Norfolk/Suffolk border. Limitations on the size of boats that can navigate to Brandon are as follows:

- Limited headroom of approximately 2.7m at the railway bridge downstream of Brandon lock.
- There is limited width, length, depth and headroom at Brandon Lock (4m wide, 14m long, 1.2m deep and 2m headroom).

2.1.4 Boats currently have access from the river Little Ouse to the river Great Ouse, where they can navigate north to the Denver Sluice complex or south towards Ely. Access to this waterway system will enable boats using the river Little Ouse to gain access to the proposed Fens Waterway Link and Nar Ouse Navigation (to King's Lynn).

2.1.5 The section of the river Little Ouse upstream of Brandon is not navigable due to insufficient water depth in places and restrictions caused by existing structures such as bridges and gauging weirs.

2.1.6 There is considerable existing amenity value along the length of river between Brandon and Thetford, and there are several environmental designations covering this area (see Appendix A). Use is made of the watercourse for canoeing and there are other recreational uses of the area.

2.1.7 The Forestry Commission have extensive responsibilities for the management of land adjacent to the river, and are keen to improve the water level management so as to improve some of the existing land uses.

Project Aims

2.2.1 The purpose of this scheme is to enhance the amenities provided from the river Little Ouse and the adjacent area of the Thetford Forest Nature Reserve. The Forestry Commission is continually working to enhance the local area through the reinstatement of natural habitats associated with the flood plain. The boating community is keen to increase the current navigation on the river Little Ouse to Thetford.

2.2.2 The project group's aims are to enhance and improve the provision of navigable waterway whilst maintaining/improving the standard of flood protection currently offered to the respective area. The key members of the project group are:

- Environment Agency
- Keystone Community Partnership
- Forestry Commission
- East Anglian Waterways Association
- Great Ouse Boating Association
- Inland Waterways Association
- Brecks Countryside Project
- English Nature
- Forest Heath District Council
- Breckland District Council

2.2.3 The purpose of this prefeasibility study is to examine the issues associated with reopening the length of watercourse between Brandon and Thetford to navigation, and to identify any potential enhancements to the amenities in the area.

2.2.4 This study has been prepared by Babtie Brown & Root commissioned under the Environment Agency's NEECA framework agreement. This report identifies the key environmental issues and the scope of work, which would be required to reopen the navigation.

Tasks

2.3.1 The purpose of this prefeasibility study is to identify:

- The current water level management regime and standards of flood protection offered to the study area.
- The water level management requirements necessary to enable the re-opening of the river Little Ouse to navigation, between Brandon and Thetford, and the restrictions imposed on its users (i.e minimum draft, widths and headroom etc).
- Any potential for flood plain restoration within the area of the Nature Reserve.
- The scope/extent of future works required to implement the scheme.
- Outline options and associated costs.
- Outline benefits.
- Associated interests; nature conservation, landscape, fisheries, recreation, amenities, local communities, land use, archaeology, planning issues, water resources and water quality.

Study Area

2.4.1 The extent of the study area is shown in drawing 0006077/01/01.

2.4.2 A description of the location is given in Section 2.2 of the Environment Report under Appendix A. Photographs of the site are shown under Appendix B.

Navigation History

2.5.1 Navigation along the river Little Ouse used to extend as far as Thetford. The section of river between Brandon and Thetford, however, has been disused in this respect for many years, although the opening of a lock at Brandon in 1995 has allowed small boats to pass upstream of Brandon sluice to a point immediately upstream of the A1065 road bridge at Brandon.

2.5.2 There is a long history of navigation on the river Little Ouse, with records from the 13th Century of barges travelling to Thetford. An Act of Parliament passed in 1670 allowed for improvements to the navigation and included the construction of five stanches to retain water at appropriate levels for navigation. The river Little Ouse up to Thetford continued to be navigated by commercial traffic for the next two centuries, however by 1900 trade had dropped to a bare minimum, and by 1914 – with the staunches falling into disrepair – commercial traffic ceased altogether. In 1925 the upstream section of navigation from Thetford to Two Mile Bottom was abandoned, followed 5 years later by the remaining section between Two Mile Bottom and Brandon. With the construction of the Denver Sluice, water levels began to fall and navigation eventually became impossible.

2.5.3 Today, only remnants of the stanches remain, and no structures exist that can retain water levels sufficient to enable navigation to Thetford.

2.5.4 There will have been a change in the types of boats using these inland waterways. Historically, the boats using the river Little Ouse would have been mainly shallow draft boats or barges. In recent years, there has been a growing trend for more cruising boats, which have greater depth and air space requirements.

Methodology

2.6.1 This study was undertaken by reviewing the available literature, referring to Ordnance Survey maps, obtaining relevant survey drawings and data from the Environment Agency and inspecting the river corridor. Relevant information was also received from other members of the project group, particularly the Forestry Commission who provided local information on environmental and water level issues.

2.6.2 Historical survey information has been used to look at the engineering requirements to allow water depths to be increased for navigation. This included the development of existing and proposed river long sections (between Brandon and Thetford) from the existing Little Ouse cross-section survey drawings. These changes in water depth would need to be achieved with a combination of raising water levels and excavation/dredging of the existing bed. Details of these works are given in the following sections.

2.6.3 Consultations with the seven members of the working group have been undertaken during the period of this study. These are reported on in Appendix F.

2.6.4 Consultations have been undertaken as part of an environmental report and these are detailed in Appendix A.

2.6.5 Discussions have been held with the Planning Officers from two District Councils (Forest Heath and Breckland) who are responsible for the sections of the river Little Ouse covered in this study. These discussions have sought to identify possible synergies with other planning initiatives in the area, and potential sources of local, national and European funding.

TECHNICAL ASSESSMENT

Current Water Level Management Regime

3.1.1 A Water Level Management Plan exists for the Thetford Golf Course and Marsh SSSI. This SSSI contains the only surviving track of Breckland Heath known as Thetford Warren.

3.1.2 Much of the river corridor also comprises wetland habitat, although no specific water level management plan has been identified for these other areas.

3.1.3 The Environment Agency carries out dredging of the river as required, and weed cutting twice a year (in June and September) in order to maintain channel size and condition for flood discharge purposes. Further details of the results of the current water level management are covered in Appendix A.

3.1.4 The location of the five historical staunches which used to exist on the river between Brandon and Thetford are shown on drawing 0006077/D2/08. These staunches were used to impound water above them to allow sufficient depth for navigation. While there may be traces of the staunches remaining, they have no practical affect on the current water levels.

3.1.5 The drawing (0006077/D2/08) also shows the location of the weirs/sluices along this stretch of river, which have been built to replace these historic staunches. In addition to controlling water levels, it is understood that these structures also act as gauging stations to measure flows.

3.1.6 The Agency has advised that the current normal retention Levels are:

- Brandon Sluice > upstream water level = 3.4 mAOD
- Abbey Heath Weir > upstream water level approx = 7.4 mAOD
- Thetford No1 Sluice > upstream water level = 8.6 mAOD

Requirements for Navigation

3.2.1 The existing river bed level (and subsequent water level) rises by approximately 7.5 m along the 16 km between downstream of Brandon Sluice and Thetford town centre, which will necessitate the construction of locks to enable boats to reach Thetford.

3.2.2 There are essentially two different navigation standards that could be adopted; one that would limit the size of the boats to the navigation standard of the current Brandon Lock; and another that would allow larger vessels to reach Thetford, but this would necessitate the enlargement/reconstruction of the Brandon Lock. These two standards are tabulated below:

Navigation Standard	Minimum Depth of Water	Minimum Headroom
Existing Standard	1.35 m	2.0 m
Higher Standard**	2.0 m	3.0 m

** *Equivalent to navigation standard of Denver Relief Channel Lock*

Following discussions with the EA, it was agreed that the above higher standard would be too onerous, since 90% of the boats using this stretch of river only had a draft of 1.2m or less. It was also accepted that the minimum headroom figure of 3.0 m could be reduced to 2.7m to avoid raising/reconstructing the A1065 Brandon (Arch) Road Bridge. Therefore, the two navigation standards considered by this study are as follows:

Navigation Standard	Minimum Depth of Water	Minimum Headroom
Existing Standard	1.35 m	2.0 m
Improved Standard	1.35 m	2.7 m

3.2.3 The width of the River Little Ouse within the study area generally varies between 12 and 15 m for much of its length, with local widening to approximately 20 m at Brandon, and reduced widths of 9 and 10 m at Thetford town centre and Two Mile Bottom respectively. These widths would appear to be sufficient for navigation up to Thetford.

3.2.4 To facilitate navigation up to Thetford will require a combination of raising water levels and bed excavation/dredging. Raised water levels will be required along the section of river between Santon Downham and Abbey Heath Weir – where the current water depths are limited. There will also be a requirement to raise some of the existing bridges over the river to accommodate the minimum headroom requirement.

3.2.5 New lock construction will need to be in accordance with the Environment Agency's Anglian Region Lock Standard of:

Length: 26 m, Width: 4.3 m, Draft: 1.2 m

The Brandon Lock has a width of 4 m, which is only marginally smaller than the Agency's standard of 4.3 m. Its lock length of 14 m, however, is much more restrictive and there is an option to increase this up to the Agency's standard of 26 m.

Outline Prposals/Options

3.3.1 The outline options included in this study are as follows:

Option Matrix	Minimum 2.0 m Headroom	Minimum 2.7 m Headroom
Existing Brandon Lock navigation standard retained. New locks to EA standard	**Option 1A**	**Option 1B**
All locks (including Brandon) to EA standard	**Option 2A**	**Option 2B**

3.3.2 The key works necessary to implement the navigation options are tabulated below:

Item	Options			
	1A	1B	2A	2B
New Lock to EA Std	4	4	4	4
New Lock to Denver Std				
Brandon Lock gate structure raised		X		
Brandon Lock rebuilt to EA Std.			X	X
Brandon Lock rebuilt to Denver Std.				
New Weir/Sluice Structure	2	2	2	2
Footbridge to be raised	2	2	2	2
Road bridge to be raised	0	0	0	0

Item	All Options
Length of river to be dredged	4900 m
Length of bank to be raised	1600 m

3.3.3 The existing lock at Brandon would need to be rebuilt or extended to meet the Agency's standard.

3.3.4 The new locks would be located at Santon Downham, Two Mile Bottom, Abbey Heath and at Thetford No.1 Sluice. It has been noted that the Forestry Commission expressed a preference for the lock at Two Mile Bottom to be located approximately 800 m downstream of the footbridge at this location (i.e. at chainage 29.2 km). However, to achieve this would require the footbridge to be raised to permit navigation.

3.3.5 Where new locks are to be constructed, the proposal would be to excavate a new channel parallel to the existing river and adjacent to an existing or new weir/sluice structure, as appropriate, similar to the arrangement at Brandon.

3.3.6 New hydraulic structures (weir/sluice) would be required at the lock locations at Santon Downham and Two Mile Bottom to retain the upstream water levels for navigation, whilst still allowing the passage of river flows. No investigations have been undertaken as to what form these should take or whether gauging stations should be included at these

locations. However, it is envisaged that the new hydraulic structures would be similar to the arrangement at Brandon.

3.3.7 The proposed limit of navigation for all options is immediately downstream of the existing road bridge at Thetford town centre (Bridge Street) at chainage 35.9 km. However, should the 2.0 m minimum headroom option be adopted, navigation could be extended a further 200 to 300 m upstream to the confluence with the River Thet without needing to raise the road bridge.

3.3.8 The existing footbridge at Two Mile Bottom (Chainage 29.98 km) is high enough to accommodate the 2.7 m minimum headroom requirement within the centre third of the river, which equates to a navigable width of approximately 5.5 m. The headroom, however, falls below the 2.7 m requirement nearer the banks. The bridge will need to be raised or renewed should the navigable width be considered insufficient. The existing footbridges at Santon Country Park (Chainage 27.7 km) and Thetford (Chainage 35.35 km) will need to be raised to facilitate navigation irrespective of whether the 2.0 m or 2.7 m headroom option is adopted. It is, therefore, apparent that the 2.0 m headroom options (1A, 2A & 3A) have no significant financial advantage over those for 2.7 m.

3.3.9 The existing A1065 road bridge at Brandon, which is made up of three consecutive brick arches, has sufficient headroom beneath the centre arch to accommodate the 2.7 m headroom requirement for navigation. However, with the current (and proposed) water level, the minimum headroom requirement can only be achieved over a 4.5 m width before the arch profile begins to limit the headroom.

3.3.10 The navigation proposals are detailed under Appendix C and on Drg 0006077/D2/09. Associated costs for the outline proposals are presented in Section 7 and Appendix D (Costs are provided for the 2.7 m headroom options – 1B, 2B & 3B – only).

Current Standard of Flood Protection

3.4.1 Flood studies were undertaken for Thetford and Brandon by Posford Duvivier in 1999/2000. The final reports were issued in January 2000 (Thetford) and March 2000 (Brandon).

3.4.2 It is understood that there are no significant flood issues within the study area. However, the studies identified one property at risk in Thetford, near the confluence of the river Little Ouse and river Thet. It is understood that the cellar of this property was last flooded in 2002.

3.4.3 The navigation proposals identified under Section 3.3 above and on Drg 0006077/D2/09 show that the current water levels upstream of Thetford No.1 Sluice and the current level of flood protection at Spring House would be maintained.

Flood Plain Restoration

3.5.1 The proposals to raise the water level along some lengths of the river, in order to achieve navigation, will be desirable at some locations as part of a water level management strategy favoured by the Forestry Commission.

3.5.2 On examining the proposed water levels and existing bank levels, there appears to be scope to restore the flood plain in the vicinity of Two Mile Bottom and to a lesser extent Santon Downham. However, the affect of increased levels on the flood defence aspects has not been fully examined at this stage. The potential for causing flooding of properties would need to be checked before proceeding with such work.

Hydrology

3.6.1 Records for river flows in the Little Ouse have been taken from the National River Flow archive (at). This has provided information on river flow rates throughout the year and the frequency of low flows. Records from the Abbey Heath weir (gauging station reference 33034) between 1968 and 2003 are presented under Appendix G, and suggest that even during the months of June to September, there are flows in excess of 0.7 m^3/s for 99% of the time. This flow rate is sufficient to fill a standard EA lock (26m x 4.3m x 2m drop) within 6 minutes, which is expected to be adequate.

3.6.2 While existing river flow records show that there is sufficient water flows for navigation, this relies upon there being no change in the water level regime and potential losses from the river to the aquifer. It is envisaged that water levels would need to rise between Santon Downham and Abbey Heath by approximately 0.6 to 1.9 metres depending on the location/lock positions. An investigation would be needed to determine the potential affects on river flows due to increased water levels, and confirm the technical feasibility of the proposals.

SWOT ANALYSIS

Strength, Weakness, Opportunities & Threats

4.1 A SWOT analysis has been carried out for all option, including Do-Nothing.

Do-Nothing

4.2.1 Strengths

- Existing environment, wildlife habitat and water levels retained
- Lowest capital expenditure

4.2.2 Weaknesses

- Navigation to Thetford not achieved
- Reduced scope for environmental enhancement along river

4.2.3 Opportunities

- None identified

4.2.4 Threats

- Reduced potential for additional business and tourism

Option 1A – 2.0m Headroom, New Locks to EA Standard, Existing Brandon Lock Retained

4.3.1 Strengths

- Navigation extended to Thetford
- No modifications required to existing Brandon Lock
- 2.0m headroom standard affords greater tolerance beneath bridges
- Additional business and tourism generated by navigation up to Thetford

4.3.2 Weaknesses

- Retention of existing Brandon Lock limits size of boats upstream of Brandon
- Potential health and safety issues concerning restricted headroom
- Potential for increased risk of bank erosion due to wave action from boats
- Risk of excessive disturbance to wildlife/habitat from unregulated use of river, mooring/access points, dredging and weed cutting

4.3.3 Opportunities

- Navigation could extend to confluence with River Thet without the need to raise town centre road bridge
- Potential for environmental enhancement along river corridor
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom

4.3.4 Threats

- Potential risk of insufficient river flow in summer months to support navigation

- Risk of adverse impact on local area, environment and ecology due to increased tourism/visitor numbers
- Scheme costs and environmental impact outweigh benefits

Option 1B – 2.7m Headroom, New Locks to EA Standard, Existing Brandon Lock Retained

4.4.1 Strengths

- Navigation extended to Thetford
- Increased headroom
- Additional business and tourism generated by navigation up to Thetford

4.4.2 Weaknesses

- Retention of existing Brandon Lock limits size of boats upstream of Brandon
- Existing head structure on Brandon Lock will need to be raised to accommodate 2.7m minimum headroom
- Periodic small increases in water levels due to rainfall/surface water runoff could infringe on headroom tolerance beneath some bridges
- Increased risk of bank erosion due to wave action from boats
- Risk of excessive disturbance to wildlife/habitat from unregulated use of river, mooring/access points, dredging and weed cutting

4.4.3 Opportunities

- Potential for environmental enhancement along river corridor
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom
- New locks could be built to 'Denver' standard (Option 3B)

4.4.4 Threats

- Potential risk of insufficient river flow in summer months to support navigation
- Risk of adverse impact on local area, environment and ecology due to increased tourism/visitor numbers
- Scheme costs and environmental impact outweigh benefits

Option 2B – 2.0m Headroom, All Locks to EA Standard

4.5.1 Strengths

- Navigation extended to Thetford
- 2.0m headroom standard affords greater tolerance beneath bridges
- Additional business and tourism generated by navigation up to Thetford

4.5.2 Weaknesses

- Substantial construction work required in river to renew/upgrade Brandon Lock
- Potential health and safety issues concerning restricted headroom
- Increased risk of bank erosion due to wave action from boats
- Risk of excessive disturbance to wildlife/habitat from unregulated use of river, mooring/access points, dredging and weed cutting

4.5.3 Opportunities

- Navigation could extend to confluence with River Thet without the need to raise town centre road bridge
- Potential for environmental enhancement along river corridor
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom

4.5.4 Threats

- Potential risk of insufficient river flow in summer months to support navigation
- Risk of adverse impact on local area, environment and ecology due to increased tourism/visitor numbers
- Scheme costs and environmental impact outweigh benefits

Option 2B – 2.7m Headroom, All Locks to EA Standard

4.6.1 Strengths

- Navigation extended to Thetford
- Increased headroom
- Additional business and tourism generated by navigation up to Thetford

4.6.2 Weaknesses

- Substantial construction work required in river to renew/upgrade Brandon Lock
- Periodic small increases in water levels due to rainfall/surface water runoff could infringe on headroom tolerance beneath some bridges
- Increased risk of bank erosion due to wave action from boats
- Risk of excessive disturbance to wildlife/habitat from unregulated use of river, mooring/access points, dredging and weed cutting

4.6.3 Opportunities

- Potential for environmental enhancement along river corridor
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom
- New locks and replacement Brandon Lock could be built to 'Denver' standard

4.6.4 Threats

- Potential risk of insufficient river flow in summer months to support navigation
- Risk of adverse impact on local area, environment and ecology due to increased tourism/visitor numbers
- Scheme costs and environmental impact outweigh benefits

PLANNING ISSUES

Forest Heath District Council

5.1.1 The Local Plan for the area is out of date and is being revised in conjunction with the new planning legislation. It is anticipated that the public deposit will be Summer 2004. The most up to date Structure Plan for Suffolk is for 2001 (which can be viewed on the County Council website).

5.1.2 Key organisations that could potentially input into the proposals are:

- Brecks Countryside Project
- Keystone Partnership
- Breckland DC
- Brandon Community Project
- Suffolk European Funding

5.1.3 It is not anticipated that there would be any significant land use issues associated with the navigation proposals, although the proposals would need a specific reference in the Local Plan. Any marina development proposal would also need to be identified in the Local Plan. The general development areas and areas of housing growth in Brandon are not adjacent to the river, and there is sufficient land within the development boundary for housing growth up to 2021.

5.1.4 The District Council does not anticipate any development next to the river, as the existing amenity value is water meadows. It is also unlikely that developer contributions would be available for the navigation proposals as there is little opportunity for a mixed riverside development.

5.1.5 The Forestry Commission is investigating the re-opening of Santon Downham camp site.

5.1.6 There are also proposals for a new marina at Brandon, which would be controlled by Forest Heath DC.

Breckland District Council

5.2.1 There are no objections in principal with the navigation proposals, although there is nothing specific in the Local Plan.

5.2.2 Breckland DC is keen to maintain the visual appearance of the river corridor.

5.2.3 Funding sources for these proposals could include:

- Keystone Partnership (who are funded by Breckland DC)
- European Cultural Package
- Community Development Funds

- Rural Development Agenda.

Legislation

5.3.1 If the Brandon to Thetford navigation proposals were to proceed, the following items, inter alia, would be required:

- Town and Country Planning submissions
- Preparation of an Environmental Statement
- Permission under the Water Resources Act 1991
- Permission under the Land Drainage Act 1991

5.3.2 Permissions will be required under the Town and Country Planning Legislation for new structures (e.g. locks) and possibly for altered structures (e.g. bridges).

ENVIRONMENTAL ISSUES

6.1 The environmental issues affecting this scheme are covered in the Environmental Report under Appendix A. The Environmental Report contains the following sections:

- Summary
- Introduction
- Existing Environment
- Alternative Options
- Consultation
- Potential Impacts, Mitigation Measures & Enhancement Opportunities
- Next Steps in the EIA Procedure
- Further Information
- Appendices – EIA Scoping Matrix, Communication Plan and Citations

6.2 The following aspects relating to environmental issues and associated interests are covered in Section A.3 of the Environmental Report (Appendix A):

- Social Context (Local Communities, Recreation & Amenities)
- Nature Conservation and Ecology
- Air Quality and Climate
- Landscape and Visual Amenity
- Water Quality
- Land Use
- Cultural Heritage, Archaeology and Material Assets
- Traffic and Transport
- Soil, Geology and Hydrography

6.3 Virtually the entire study area covered by this report is part of the Breckland Forest SSSI. There are also other classified environmental areas adjacent to the river.

6.4 The Environmental Report (Appendix A) identifies the need for further studies to determine whether specific species are present in the river corridor (bats, otters and watervoles), and the effect of increased visitor numbers on these species and other fauna and flora.

6.5 There are also concerns, which will have to be addressed, over changing the flow characteristics of the river with regards to wildlife habitat. In particular the reduction of areas of shallow, fast flowing water.

6.6 Opportunities have been identified for increasing areas of wetland habitat, and this is strongly supported by the Forestry Commission. The formal views of English Nature have yet to be confirmed.

6.7 The re-introduction of navigation between Brandon and Thetford could be detrimental to wildlife (disturbance) and to river bank stability (erosion from wave action), particularly if the frequency of boat movements is unregulated. These issues would need to be addressed under the environmental mitigation proposals for the scheme.

Other Associated Interests

6.8 In addition to the above, there is an existing irrigation pumping station on the right hand river bank between Two Mile Bottom and Abbey Heath at approximate chainage 30.8 km (see Appendix B – Photographs). It is understood that the pumping station, which is owned by Breckland Growers Ltd, abstracts water directly from the Little Ouse during the winter months and pumps it (via a pumping main) to storage lagoons near Attleborough for the purpose of irrigation. The pumping station, main and storage lagoons were designed by Plandescil Ltd of Attleborough, and were constructed in the mid-1990s. It is understood that these works were commissioned to mitigate the abstraction of water from the aquifer (borehole) at Attleborough. It is not considered that the navigation proposals and associated increase in river water level will be detrimental to this pumping regime.

6.9 There are also 3 No groundwater boreholes and a pumping station located approximately 80 m from the right hand bank of the river at approximate chainage 31 km, which are owned by Anglian Water for water supply. Copies of the abstraction licence summaries for this and the aforementioned irrigation pumping station in 6.3 above are included under Appendix G.

6.10 There are various discharges into the river from outfall pipes between Brandon and Thetford. The most notable of these are:

- Final Effluent Outfall from Brandon STW – Ch. 21.55 km
- Surface Water/Highway Drainage Outfalls at A11 Road Bridge – Ch. 34.25 km
- Final Effluent/Storm Outfalls from Thetford STW – Ch. 34.45 km
- Surface Water Outfalls near Thetford at Ch. 34.77 & 34.84 km
- Surface Water Outfall at Canterbury Way at Ch. 35.03 km
- Surface Water/Highway Drainage Outfalls at Old A11 Bridge – Ch. 35.80 km

SCHEME COSTS

7.1 The estimated costs for Options 1B, 2B are tabulated below:

Option Ref	Option Description	Cost Estimate (CAPEX)
Option 1B	2.7m Headroom New locks to EA standard Existing. Brandon lock retained	**£6.4 million**
Option 2B	2.7m Headroom All locks to EA standard	**£7.6 million**

7.2 The breakdown of the above costs is presented in Appendix D. The costs are approximate estimates for the cost of the construction works to provide navigation up to Thetford, and include an allowance for professional fees, surveys, site investigation, and environmental mitigation/enhancement (these allowances were omitted from previous editions of this report). The estimated costs, however, exclude any other items that might be required to service tourism or commercial interests, e.g. facilities such as moorings, public toilets and car parking areas. To cover these items and the general uncertainties of the detail at this stage a 20% contingency has been included in the above cost estimates.

7.3 For the reasons given in paragraph 3.3.8, the cost differences between the 'A' options (2.0m headroom) and 'B' options (2.7m headroom) above are negligible.

7.4 The cost of extending the proposed navigation from Bridge Street, Thetford to the confluence with the river Thet (paragraph 3.3.7) would be approximately £100,000.

OUTLINE BENEFITS

8.1 The outline benefits of extending the navigation along the river Little Ouse from the current limit at Brandon to Thetford, as described in the previous sections, are as follows:

- Thetford will have direct access to navigable waterway.
- Proposed navigation will extend into Thetford town centre.
- Access to river Great Ouse and Denver Sluice complex enabling navigation to existing Fenland rivers/canals and proposed Fens Waterway Link and Nar Ouse Navigation (King's Lynn).
- Potential for environmental enhancement along the river corridor by increasing areas of wetland habitat.
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom as part of the change in water level management regime necessary to facilitate navigation.
- Additional business and tourism generated by navigation to Thetford, and positive effect on Thetford's structure plan.
- Potential to open up river corridor to recreation activities such as walking, cycling and horse riding etc.
- Possibility of EU Funding.

8.2 In addition to the above, the extension of navigation from Brandon to Thetford, along the river Little Ouse is potentially seen as a significant benefit to the proposed Fenland Waterways Link, especially if the proposed marina at Brandon (Ref paragraph 5.1.6) was incorporated, as this would provide additional mooring places to accommodate increased boat traffic.

8.3 The position of Breckland District Council with regards to financial contributions towards the navigation proposals is that, in order to attract European funding, the project would need to demonstrate high levels of economic benefit to the locality. The costs involved in extending the navigation up to Thetford are high and the economic benefits derived directly from this are unlikely to be on an equivalent scale. Breckland DC has advised that a potential source of funding could be the European Life Fund, but applications to this would need to demonstrate overwhelming environmental benefits in order to be successful.

ECONOMIC BENEFITS

9.1 Economic benefits have been estimated for the proposed re-opening of the Little Ouse to navigation between Brandon and Thetford. The benefits have been derived from the base data and assumptions set out in the Fens Waterways Link – Economic Analysis Report (Atkins, Sept 2003).

9.2 The calculations for the economic benefits are presented in Appendix E. These include an assessment of probability by presenting figures for a low, medium and high case. The low case is essentially a pessimistic forecast, whereas the high case is an optimistic forecast. The medium case is an intermediate assessment.

9.3 The following aspects/activities have been considered:

Hire Boats

9.3.1 The British Waterways national average for the number of hire boats that could be expected along a stretch of river/canal is one boat for every 2 km of navigation. Currently, however, there are just 21 boats for hire on the 190 km of existing Gt Ouse system. This equates to only one boat per 9 km.

9.3.2 The Fens Waterways Link report concluded that if the full Fens Waterways Link scheme was implemented, a ratio of around half the British Waterways national average for hire boats might be achieved, i.e. one boat per 4 to 5 km. This assumption has also been used in the medium case for the proposed Brandon to Thetford navigation.

9.3.3 As a result of the relatively short length of proposed navigation, it is reasonable to expect that the number of hire boats (3 to 4) based on the above ratio may not be sufficient to support a local hire boat facility. Therefore, hire boats have been excluded from the low case.

9.3.4 An allowance has been included for economic benefits arising from the daily expenditure of holidaymakers using the hire boats. The bulk of this expenditure would be on food and drink from shops, public houses and restaurants in Brandon and Thetford. The same rates as those used in the Fens Waterways Link Report have been used. These were originally derived from the East Midlands Boating Survey 1991, and it has been assumed that these were increased in-line with inflation at the time of preparing the aforementioned report.

Private Canal Boats

9.3.5 The British Waterways national average is approximately 5 boats per km of navigation. Based on this and extending the navigation 14 km from Brandon to Thetford, the estimated number of new private boats based in the area would be around 70. This figure has been adopted for the medium case and adjusted for the low and high cases accordingly.

9.3.6 Allowances have been made for economic benefits arising from the daily expenditure of boat owners. The comments under 9.3.4 above also apply here. The economic assessment has been carried out on the basis of there being no marina (long term storage and maintenance) facilities between Brandon and Thetford. It has, therefore, been assumed that boating facilities would be limited to EA and/or GOBA (Gt Ouse Boating Association) riverside moorings. The EA moorings are normally free to all river users up to a 48 hour limit. GOBA moorings are free to members and hirers of boats operated by the Gt Ouse Boatbuilders & Operators Association, and carry a 48 hour limit.

9.3.7 It is estimated that should the projected marina at Brandon come to fruition, then an additional annual benefit of around £150,000 could be realised from long term mooring fees, and maintenance/repair facilities.

Trip Boats, Restaurant Boats and Day Boats

9.3.8 It is considered that the proposed navigation scheme would be unlikely to support the operation of Trip, Restaurant and Day boats due to the relatively small scale of the navigation and the low ratios for these boats intimated in the Fens Waterways Link Report.

9.3.9 Restaurant boats have therefore been excluded from both the low and medium cases, while Trip and Day boats have been excluded from the low case only.

Towpath/Riverside Path Users

9.3.10 This includes walking, cycling, horse-riding and sightseeing etc. The level of attraction will depend, not only on the re-opening of navigation up to Thetford, but also on the level of improvements to the existing riverside path network.

9.3.11 The Fens Waterways Link (Economic Analysis) Report assumed a conservative figure of 10000 visits per mile of navigation and an average daily expenditure of £5.00 per visitor based on the British Waterways Survey of the Kennet & Avon Canal in 1991. These same figures have been used for the economic assessment of the Brandon to Thetford navigation.

Economic Benefit Summary

9.4 The economic benefits calculated in Appendix E are tabulated below:

	Low Case	Medium Case	High Case
Annual Benefit	**£466,088**	**£586,213**	**£741,512**
No. of FTE jobs supported, based on one third of revenue spent on salaries and average FTE salary of £15000 **.	**10**	**13**	**16**

** Note: Same assumption as Fens Waterways Link (Economic Analysis) Report.

9.5 Net present values are presented in Appendix E and have been calculated on the basis of the 3.5% discount rate used by the Environment Agency in its Flood Defence Schemes,

which is derived from the HM Treasury "Green Book" 2003 (Appraisal & Evaluation in Central Government).

9.6 The NPV calculations include sums for the maintenance of the new locks (4No.) at Santon Downham, Two Mile Bottom, Abbey Heath and Thetford, the new sluice/weir structures (2No.) at Santon Downham and Two Mile Bottom, and general maintenance of the river (weed cutting and dredging). Maintenance costs for Brandon lock/sluice and the weirs at Abbey Heath and Thetford have been excluded, as these are already included in the EA's annual maintenance budget.

9.7 Based on the estimated CAPEX, maintenance costs and annual benefits, the options considered would yield a positive NPV in the years indicated in the table below:

	Low Case	Medium Case	High Case
Option 1B	26th year	18th year	13th year
Option 2B	30th year	20th year	14th year

CONCLUSIONS

10.1 It is feasible to extend the navigation from Brandon to Thetford.

10.2 The minimum engineering works necessary to facilitate navigation to Thetford would involve the following:

- Construction of 4No. new locks
- Construction of 2No. new weir/sluice structures
- Raising of 2No. footbridges
- Dredging of some sections of the River Little Ouse (approx 11600 m^3)
- Raising of river banks (approx 1600 m)
- Construction of boat turning area and moorings at Thetford

10.3 The viable limit of navigation is currently considered to be up to Bridge Street, Thetford. The navigation could be extended if Bridge Street Road Bridge is raised or the headroom requirement beyond this point is limited to 2.0 m.

10.4 The estimated cost for extending the navigation up to Thetford at this stage of the investigations is £6.4 million, or £7.6 million if the Brandon Lock is rebuilt to meet the EA's lock standard.

10.5 The local councils, the Keystone Partnership and the European Union are potentially the major funding source for this scheme. However, there would need to be a favourable cost benefit rate for EU funding to be approved.

10.6 The economic benefits have been identified based upon similar work undertaken for the Fens Waterways Link proposals. The results are heavily dependent upon the increase in visitor numbers for land-based recreation. The benefits from navigation (water-based recreation) contribute less to the overall benefit figure, particularly for the low case scenarios.

10.7 On the basis of the assumptions made in this report, the re-opening of the navigation to Thetford would yield a positive NPV after approximately 20 to 25 years based on a medium case scenario.

10.8 There is scope to restore the flood plain in the vicinity of Two Mile Bottom and to a lesser extent Santon Downham. However, the affect of increased levels on the flood defence aspects has not been fully examined at this stage.

10.9 Investigations would be needed to determine the potential affects of navigation on river flows due to increased water levels, and confirm the technical feasibility of the proposals.

10.10 Further environmental studies are required to identify the presence of protected species along the river corridor and consider the effects of extending the navigation to Thetford. In

addition, consideration should be given to the effects of navigation on river bank stability from wave action. These issues would need to be addressed under the environmental mitigation proposals for the scheme.

RECOMMENDATIONS

11.1 This pre-feasibility study has suggested that a full detailed study and outline design of the re-opening of the navigation along the river Little Ouse between Brandon and Thetford could be justified.

11.2 Options have been included in this report for lengthening the existing Brandon lock to the EA lock standard to accommodate larger boats, and these options should continue to be assessed.

11.3 Clarification is required on the legal procedures that will need to be taken for re-opening the navigation, as the section between Brandon and Thetford had been abandoned by 1930.

11.4 While there is already support from a number of local groups and organisation for these proposals, wider stakeholder consultation is required in order to obtain the active support from others including English Nature and the local Councils/Planning Authorities.

11.5 Funding sources need to be identified.

Appendix A – Table of Contents

Section A.1- Summary

A.1.1 This appendix is part of a pre-feasibility report undertaken for the Little Ouse navigation link between Brandon and Thetford. The objective of the pre-feasibility stage of the project is to ensure that any key environmental constraints and opportunities are raised at an early stage in the process so they may influence the choice of options and the business case.

A.1.2 The current extent of navigation along the Little Ouse stops at Brandon, historically however navigation was possible to Thetford, however the stanches, which were used for this purpose, fell into disrepair and resulted in a lowering of the water levels on this stretch of river, so it is now no longer suitable for navigation. To enable navigation along the river, lock structures need to be installed alongside existing weirs with the possibility of more locks and new weirs being required.

A.1.3 The stretch of river between Brandon and Thetford is approximately 8 miles and flows through Breckland Forest and Thetford Golf Course and Marsh, Sites of Special Scientific Interest, the area is also designated as Breckland potential Special Protection Area and the heath areas are designated as a candidate Special Area of Conservation. Despite these designations some of the areas of interest have suffered due to the change and reduction in water levels, one of the aims of this project is to attempt to tie in the need for increased water levels for navigation and the benefits, which could be afforded for conservation from increased water levels. The majority of the land is owned and managed by the Forestry Commission.

A.1.4 Consultation was undertaken with the working group, which is headed by Keystone Community Partnerships and the Environment Agency. The working group consists of,

- The Breck's Countryside Project
- East Anglian Waterways Association
- English Nature
- Forestry Commission
- Forest Heath District Council
- Great Ouse Boating Association
- Keystone Community Partnership

A.1.5 The outcomes from consultation indicate that the boating community feel there is a need and benefit from enabling navigation on the River Little Ouse from Brandon to Thetford, with the Forestry Commission utilising the requirements from boating i.e. increased water levels, to improve the condition of key habitats along the river.

A.1.6 Further survey and consultation with English Nature is required to identify what impacts there will be on areas of nature conservation importance, and national and internationally designated areas. The main issues are with regard to how changes in hydrology may affect these areas and what impacts the boating activities will have.

A.1.7 The baseline information requirements for this study include,

- Analysis of the potential boat use of the river including, type, frequency and number of boats
- Landscape impact assessment and visual impact assessment
- Data on County Wildlife sites in Suffolk
- Water quality data for the river
- Survey of the hydrological requirements of the fen system to determine what impact the change in water levels will have on this and other designated areas.
- Flood risk assessment
- Flora and fauna survey of ditch systems
- Further consultation with a wider group of consultees such as English Heritage and the Crown Estates

A.1.8 The main impact from this project is envisaged to be on the various national and internationally designated sites through which the river flows. This is with regard to the hydrological system of the river and its surrounding area and through disturbance to these areas from increased visitor numbers. To counter this the main area of mitigation will be the improvement of habitat in the river corridor, which could be achieved by increasing the water level. Other enhancement opportunities involve increasing access to the river paths from Brandon and Thetford and the connection of these paths to a greater network of long distance paths in the area. These issues will be broadened as the EIA process progresses and options are identified.

A.1.9 The next steps in the EIA process are to develop further the baseline information for the study area in a scoping report which will be used to aid options appraisal, outline design, detailed design and project implementation.

Section A.2. Introduction

A.2.1 Purpose of the Document

A.2.1.1 This document is part of a pre-feasibility study undertaken into the potential options associated with the Brandon to Thetford navigation link.

A.2.1.2 Babtie Brown and Root have been appointed to undertake this pre-feasibility study, and this document was prepared through desktop study and consultation was undertaken with specialists at the Environment Agency, relevant authorities and the working group for this project.

A.2.1.3 The issues identified at this stage will be addressed during the subsequent feasibility, options appraisal, design and implementation of the scheme. Relevant interested parties (including environmental specialists) will be consulted as the project progresses.

A.2.1.4 This environmental appendix has been prepared to identify areas of potential impact from initial options and possible mitigation and enhancement measures, which can be carried out to

counter these impacts and to enhance the area. It also highlights the areas in which further information needs to be gathered and recommendations made for further study etc.
This report has been based on the Environmental Impact Assessment guidelines (2002)

A.2.2 Location and Site Description

A.2.2.1 The River Little Ouse is a tributary in the Great Ouse catchment and together with the River Waveney forms the boundary of Norfolk and Suffolk for much of their length.

A.2.2.2 The Brandon to Thetford navigation link will utilise the River Little Ouse, a gently sloping river that joins the river Great Ouse at Brandon Creek. The river drains the low-lying land of the Brecks and meanders through Hockwold cum Wilton, Brandon, Santon Downham, and Thetford Forest, continuing beyond Thetford, as shown on Drg 0006077/01/01 Study Area.

A.2.2.3 The study area is defined as the river Little Ouse and its approximate floodplain between the towns of Brandon and Thetford. The Western extent of the study area is taken to be Brandon lock as this is the point where navigation currently extends, (NGR TL 869 783). The eastern extent is taken to be Thetford town centre at the point where the river splits into the River Little Ouse and the River Thet (NGR TL 829 878). This stretch is approximately 10 miles in length.

A.2.3 Background to the Project

A.2.3.1 There is a long history of navigation on the river Little Ouse, with an Act of parliament being passed in 1670 for improvements to its navigation. There are records from the 13th Century of barges travelling to Thetford, however after the construction of the Denver Sluice, water levels began to fall and navigation eventually became impossible.

A.2.3.2 As a result of the 1670 Act, five stanches were built to hold water at an appropriate level for navigation, but there were long delays whilst water levels built up sufficiently.

A.2.3.3 Nowadays, only a remnant of these stanches remains, and so no structures exist that can hold the water level sufficiently for navigation to be undertaken on the river. This change in water regime has left the watercourse above Brandon un-navigable due to insufficient depths.

A.2.3.4 A modern sluice, which is controlled by the Environment Agency, is installed at Thetford and this controls the water level through the town.

A.2.3.5 There is also a sluice installed at Abbey Heath, which also controls water levels immediately downstream of Thetford.

A.2.3.6 The proposal is to enable navigation to take place once more along the river Little Ouse from Brandon to Thetford; this requires increasing the depth of water in the river, either by raising levels or by lowering the bed in some locations.

A.2.3.7 The majority of the river valley is managed by the Forestry Commission. The valley contains nationally and internationally important wetland habitats. However, due to the decrease in water level, many of the habitats are in a less than favourable condition.

A.2.3.8 A second element of this project is to integrate the need to change water depths in the river for navigation, with the beneficial effect that increasing the water level could have on many of the habitats in the river corridor.

A.2.4 Objectives of the Project

A.2.4.1 The main aims of the project are to: -

1) Extend the navigation from Brandon to Thetford by increasing water level in the river for the benefit of the boating community and the associated recreational opportunities;

2) Taking advantage of the increased water level required for navigation to improve the habitat in the river corridor. This can be achieved by increasing water level and enhancing the wetland habitats which have suffered as a consequence of the water level in the area falling;

3) Enhancing the overall amenity value of the area and consolidating the attraction and amenity value of the area which already exists, such as Thetford Forest Nature Reserve, Brandon Riverside Park and other attractions in the surrounding area.

4) A further aim of the project at this pre-feasibility stage is to identify a list of consultees, which can be used for consultation as the project progresses.

A.2.4.2 The overall environmental objectives are to identify any possible impacts and mitigation measures, which arise from the works on the river to enable navigation. Also to investigate the possibility of harnessing the increased water level required for navigation and use it to bring into favourable condition areas of wetland habitat that have suffered due to water levels falling.

Section A.3. Existing Environment

A.3.1 Social Context

A.3.1.1 The River Little Ouse is a popular location for walkers and cyclists who use the riverside path for recreation. The wider area of the Brecks is also a popular attraction for different types of outdoor activities and visitor attractions. The river Great Ouse, and its connecting navigable waterways, are used for recreational sailing and fishing.

A.3.1.2 The re-introduction of navigation on the river Little Ouse would further enhance the recreational facilities in the area. These include the forest village of Santon Downham, Grimes Graves, which are located to the north of the site, Weeting Castle, Brandon Country Park, and Thetford Forest. There is also the benefit to the boating community, to enjoy this stretch of river.

A.3.1.3 By enabling navigation on the river, there is the benefit of bringing visitors to the area as there would be the added attraction of being able to navigate on up the river passed Brandon to Thetford and visiting both of these towns.

A.3.1.4 By increasing visitor numbers to Brandon and Thetford, these areas could benefit from a boost in income into the town; this could also help them develop as tourist destinations. The local authority at Thetford has already invested in developing the riverside area as an attraction for visitors.

A.3.1.5 However, by increasing the number of visitors to an area, which could already suffer from over-use i.e. erosion of footpaths, trampling of plants etc. Further survey is required to identify what negative impacts increasing visitor numbers to the river could have. Further consultation is required to identify what affect a change in use of the river could have in terms of changing the character of the area and its use for quiet recreational pursuits.

A.3.2 Nature Conservation and Ecology

A.3.2.1 The section of river included in this study flows through various nature conservation designations these include: -

- Breckland Forest Special Site of Scientific Interest,
- Thetford Golf Course and Marsh SSSI,
- Breckland candidate Special Area of Conservation,
- Breckland potential Special Protection Area
- County Wildlife Sites

A.3.2.2 Drg 0006077/01/02 shows Sites of Special Scientific Interest (SSSI) in the study area, Drg 0006077/01/03 shows the candidate Special Area of Conservation (cSAC) and the potential Special Protection Area (pSPA), combines both the SSSI and the cSAC. Citations are included in Appendix 4.

A.3.2.3 Thetford Golf Course and Marsh SSSI was notified in 1968 and contains the only surviving track of Breckland heath known as Thetford Warren, within the SSSI there are also good examples of lichen heath and heather heath along with fenland plant communities and valley alder woodland on the wet peaty soils in the low lying ground by the river.

A.3.2.4 A Water Level Management Plan exists for the Thetford Marsh SSSI, an area also known as Horse Meadow. This plan will be used along with further consultation, to determine the possible impact of increased water level in this area. A management agreement exists between the Forestry Commission and English Nature as to the management regime undertaken in this area. Thetford Marsh covers 119.6 hectares and extends for approximately 1 km along the western bank of the Little Ouse.

A.3.2.5 Breckland Forest SSSI was notified in 2000, and is known to support Woodlark, and Nightjar, the area supports 5 vascular plants listed in Schedule 8 of the Wildlife and Countryside Act. The area is also known to support Red Squirrel.

A.3.2.6 Breckland potential Special Protection Area is made up of 28 SSSI's including Breckland Farm SSSI, Breckland Forest SSSI and Thetford golf course and Marsh SSSI. The pSPA covers an area of 39,987.60 ha and is proposed as it supports breeding bird populations of European importance. These species include Woodlark, Nightjar and Stone Curlews.

A.3.2.7 As the river forms the division of Norfolk and Suffolk for much of its length there are county wildlife site designations from both Norfolk and Suffolk in the study area. The designations from Norfolk are available in this report however those designations from Suffolk need to be obtained.

A.3.2.8 Much of the river corridor in the study area comprises of wetland habitat including fen, alder and carr woodland etc. The proposals for increasing water levels could have significant beneficial effects in these areas, particularly in the wetland habitats/marshes, which are known to be in an unfavourable condition. However, other sections of the study area are made up of habitats in which a change of water level could have quite significant negative impacts. These habitats include the SSSI designation on Thetford Heath, which require their existing conditions to be maintained in order for them to remain in a favourable condition.

A.3.2.9 To enhance areas which have a less than favourable status in the river corridor it is the aim of this project to utilise the increase in water levels needed for navigation, this could be achieved by selecting lock locations with this in mind, and Drg 0006077/01/04 shows the preferred lock locations of the Forestry Commission.

A.3.2.10 It is not know whether any of the ditches in the study area contain notable flora or fauna, if so, these requirements will need to be considered, and managed accordingly. If increased water levels look likely to effect the drainage ditches on site, these areas should be incorporated into further flora and fauna surveys of the area.

A.3.2.11 The river has a moderate fishery, however there is the potential to improve this as the habitat improves. Fish populations between Brandon and Thetford have shown encouraging signs of improvement since 1996 due to habitat rehabilitation work and re-stocking. Further consultation with Environment Agency staff is required.

A.3.2.12 The Environment Agency carries out dredging of the river as and when required, and weed cutting is carried out twice per year in June and September.

A.3.3 Air Quality & Climate

A.3.3.1 The issue of air quality is addressed by local authorities, as the river forms the boundary of Norfolk and Suffolk, the area will be covered by their air quality management plans. Further consultation is required with these authorities within a review of planning documentation to determine the current baseline conditions.

A.3.4 Landscape & Visual Amenity

A.3.4.1 The area is predominantly rural with the small towns of Brandon and Thetford at either end of the study area, and the small village and the Forestry Commission Headquarters located at Santon Downham. A landscape assessment and a visual impact assessment are required to identify possible constraints and mitigation measures required.

A.3.5 Water Quality

A.3.5.1 The River Little Ouse is designated as a statutory main river, and is approximately 15-20 meters wide and 1-2 meters deep and runs over sand, silt and pebble substrate.

A.3.5.2 The river quality is affected by discharge from the Thetford sewage treatment works, and there is a sampling point situated at Thetford No 2 Staunch at NGR TL 8500 8400. Data from this sampling point can be collected in later consultation exercises as required. The river was classified as 1b or unpolluted in December 1991; this classification will require confirmation from the Environment Agency.

A.3.5.3 If the water level in the Fen area is increased by the navigation works, there could be issues relating to the high nutrients level of the river water. Consultation would need to be carried out to determine the effects on the low nutrient areas and the impact on wetland species.

A.3.5.4 There is the potential for seepage of pollutants from a pollution lagoon, which adjoins the A11 road which passes over the River Little Ouse near Thetford, if water levels were to be raised the first water body at risk would be a nearby pond. Further surveys would need to be undertaken to determine at what level there would be a risk of contamination.

A.3.5.5 Consultation has indicated that if the channel is deepened to allow navigation it may lead to a disassociation of the river and its floodplain, this has implications for the existing wetland areas and the water balance of the area.

A.3.5.6 Little is known about the hydrology of the fen area and the functions of the drains on the site. Therefore further consultation and possible survey work is required to identify the current hydrology.

A.3.5.7 There are no flood defence improvement works determined for the river, however a study is to be undertaken by the Agency on the river Little Ouse and Thet at Thetford to determine whether any flood defence improvements are justified.

A.3.5.8 Any works affecting the flow of a watercourse requires the prior written consent of the Agency under the Land Drainage Act 1991.

A.3.6 Land Use

A.3.6.1 The Crown Estate owns the land between Thetford and Two Mile Bottom, and the Forestry Commission leases this from the Crown Estate.

A.3.6.2 The majority of the area has been afforested and now the land is managed by the Forestry Commission, in agreement with English Nature, to enhance the conservation value it holds. Most of the historic forestry planting took place on higher, drier ground. Poplar plantation took place in the wetter areas of the study area and this is now being managed for conservation objectives. Drg 0006077/01/05 shows the types of vegetation within the river corridor. Data collected by the Forestry Commission ©.

A.3.6.3 Apart from the towns of Brandon and Thetford, there is the village of Santon Downham, in the study area, which is the headquarters of the Forestry Commission. Various public footpaths run through the study area, these include Harling Drove which is a long distance footpath which runs to the north of the railway line boundary of the study area, and the Little Ouse path which runs next to the river within the study area and that runs from Brandon to Thetford. In the local area there is also the St Edmunds Way and the Hereward Way.

A.3.6.4 There are various land uses in the area, there is a sewage treatment works at Santon Downham (NGR 818 875) and one on the outskirts of Thetford (NGR 835855). A golf course comprises part of the Thetford Golf course and Marsh SSSI (NGR 836 844). The area to the south of Brandon is Brandon Country Park, which provided visitor facilities; there are also various parking and picnic points along the Little Ouse path.

A.3.7 Cultural Heritage, Archaeology & Material Assets

A.3.7.1 Since prehistoric times, the Little Ouse has been used as a route from the Fens into the area known as the Brecks. The local topography comprising of also small sandy ridges and peaty flood meadows indicates that it has high archaeological potential. Occupation throughout all periods of history is known in the area.

A.3.7.2 Drg 0006077/01/07 shows details of Scheduled Ancient Monuments located near the study area, however consultation is required with English Heritage and local archaeological groups to identify further areas which maybe subject to archaeological finds etc. the current SAM's in the area are:

- Roman Buildings East of Fen gate Farm
- Pepper Hill Bowl Barrow
- Santon moated site and associates medieval settlement
- St Helen's Church, earthworks and Holy Well
- Blood Hill
- Thetford Warren Lodge
- Thetford Cluniac Priory
- Red Castle medieval ringworks, church and Saxon settlement
- Site of a Saxon town near Thetford
- Black friars in Thetford.

A.3.8 Traffic & Transport

A.3.8.1 The river Little Ouse is crossed by the A1065 at Brandon (GDR 869 784) and the A11 at Thetford (GRD 834 856). The river is also crossed by a narrow road at Santon Downham (GDR 878 818) this is used as access to Field Barn (GDR 889 825). The southern limits of the study area in places in the B1107 Brandon road, which links Brandon to Thetford.

A.3.8.2 The northern limits of the study area are defined by the railway line, which runs from Brandon to Thetford, and links the area to Cambridge and Norwich. There are various cycle-ways, which cross the area however none follow the line of the Little Ouse.

A.3.9 Soil, Geology & Hydrogeology

A.3.9.1 The River Little Ouse is incorporated into the Ely Ouse catchment, which is a combination of 17 sub-catchments that cover 2,510 km^2. The principle aquifer is chalk and in areas of higher ground, Bolder Clay and Sands cover the chalk. Additional sand and gravel deposits occur within the upland river valleys and form small isolated aquifers. Water flows from these aquifers from springs, and this is the source of the river Little Ouse.

A.3.9.2 In the Little Ouse catchment, there is an unconfined Chalk aquifer exposed in the river valley, with southern areas being comprised of fluvial gravel's and northern part comprising of alluvium deposits. Middle chalk lies further up the valley sides and this is covered by a variety of drift materials. Consultation is required at the next stage of this project to identify soil type and the geology of the area, and to identify any hydro-geological features, which may affect the proposed project.

A.3.9.3 Sedge swamp in the area suggests that groundwater is responsible for water-logging of the root zone, with the water supplied by the chalk aquifer, this suggests that seepage of the river into these areas has limited effect on the hydrology.

A.3.10 Main Constraints and Opportunities

A.3.10.1 At this early pre-feasibility stage of the project, the main environmental constraints appear to be as follows,

- The various nature designations that are found throughout the study area;
- The impact on the river and surrounding area by the boating activities, this requires further investigation and analysis;
- The possible negative impact of altering the water level on those habitats which need their current water level maintained, such as SSSI and heath land; and,
- The areas high archaeological potential is a possible constraint to the project as there is the possibility that finds of archaeological importance could be affected or uncovered by works undertaken for the project.

A.3.10.2 The main opportunities that will be gained from this project are:

- The ability for navigation along the river Little Ouse up to the town of Thetford;
- By generating this navigable link there is the possibility of creating significant environmental enhancement along the river corridor. There is possible enhancement opportunity by raising the water level in wetland areas, which are not in a favourable condition due to a decrease in water levels. Drg 0006077/01/06 shows the areas suggested by the Forestry Commission as those, which would receive the most benefit from enhancement; this map also shows their preferred lock locations to enable this enhancement.

A.3.10.3 Other potential enhancements that could be made in the area include,

- Improving the access from Brandon and Thetford town centres to the river Little Ouse;
- Promotion of 'access for all' along the river, which would require changes to the hard covering of the paths;
- Linking the Little Ouse path to the larger network of long distance paths in the area and encouraging visitors to the towns of Brandon and Thetford; and.
- There are issues of illegal access to the forest via the A11 road bridge at Thetford and the dumping of cars etc. Possible enhancement works could enable measures to be put in place to prevent access to the river from this site.

Section A.4. Alternative Options

A.4.1 Options for providing a solution including:

Do nothing (abandonment);
Maintenance (current levels);
Improvement;
Other.

A.4.2 For this project the options of do nothing and maintenance would not enable the objective of allowing navigation to Brandon on the river Little Ouse. This would only be possible if the option of Improvement were carried out.

A.4.3 The proposed works to improve the river to enable navigation would entail the use of locks on the river to ensure water levels were sufficient to allow navigation. The proposed locations of the locks would be at the existing weir locations on the river with the possible requirement of locks at other locations.

A.4.4 At this pre-feasibility stage the exact locations of the locks are unknown as is the size, material and likely design. Due to the shallow nature of some parts of the river it is envisaged that dredging will be required to enable navigation. It cannot be determined the exact locations which require dredging until the location of lock structures.

Section A.5. Consultation

A.5.1 A preliminary Communication Plan outlining important requirements for consultation during the project is included in the EIA Communication Plan (Appendix 2). The Plan will be revised appropriately as the project progresses.

A.5.2 Consultation was carried out internally within the Environment Agency via the customer service team. The following environmental specialists within the Environment agency were also contacted with initial details of the proposals:

- David Smith

A.5.3 Consultation was carried out with the following external stakeholders who form the working party for this project:

- Brandon Community Partnership *
- Brecks Countryside Project +
- East Anglian Waterways Association +
- English Nature +
- Forestry Commission +
- Forest Heath District Council *
- Great Ouse Boating Association +
- Inland Waterways Association +
- Keystone Community Partnership
- Norfolk County Council *
- Royal Yachting Association *
- Suffolk County Council +

* indicates no response
\+ indicates request to be consulted during project design;
x indicates request to approve the Environmental Report/Statement;
# indicates request to sign-off final design.

A.5.4 As this project progresses further consultation will be carried out to include all statutory consultees, consultees required for FEPA licensing, and other interested parties, which were identified from this initial round of consultation.

Section A.6. Potential impacts, baseline information, mitigation measures and enhancement opportunities

A.6.1 Following Scoping consultations with stakeholders, as listed above, the key environmental effects raised focused upon the issues identified in the Scoping Impacts Table (Appendix 1). Opportunities for enhancement have also been identified. The Scoping Impacts Table provides a list of potential environmental effects, along with what baseline information is available and what additional surveys are required and what will be undertaken. However due to the pre-feasibility stage of this report further survey is required to determine the exact level of impacts, extend baseline information and consider mitigation measures and enhancement opportunities in greater detail.

Section A.7. Next Steps in the EIA Procedures

A.7.1 Appropriate consultation in relation to the issues identified will continue through feasibility, design and construction. As the feasibility study progresses, the need for and scope of baseline environmental surveys can be refined.

A.7.2 To meet statutory requirements, external consultation will be maintained as the scheme progresses, including liaison with the following organisations:

- Brecklands District Council
- Norfolk County Council
- Suffolk County Council
- English Nature
- English Heritage
- Countryside Agency (as part of SI 99/1783)

A.7.3 The Environmental Impact Assessment Officer will arrange this consultation on behalf of the project manager if required. The Project Manager, in consultation with the EIA Officer and Agency's legal department, will need to confirm with the Local Planning Authority if planning permission is needed.

Section A.8. Further Information

This Scoping Report has been prepared on behalf of the Project Manager. Further information can be obtained from the Project Manager at the address below:

Andy Bennison
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Telephone: 01733 371811

Appendix 1: EIA Scoping Impact Matrix Project Title: Brandon to Thetford Navigation Link

Receptors & Environmental Resources Affected	Cause of impact (describe what activities, processes etc. give rise to the impact)	Description of effect: Construction (C) or End-state (E)	Potential Significance of impacts: **Key:** positive/negative Minor + X Moderate ++ XX **Major +++ XXX**	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
Human Beings:				
	Making the River Little Ouse Navigable	Allowing the boating community to use the river up to Thetford (E)	**+++**	Survey is required to identify the type and number of craft likely to use the river
	Making the River Little Ouse Navigable	Increasing tourists to the towns of Brandon and Thetford (E)	**+++**	Further information needs to be gained on activities on the river and amenities in Brandon and Thetford that could accommodate boats and tourists.
	Making the River Little Ouse Navigable	Change in use of the area from one of quiet recreation to allow boating (E)	**XX**	Identify any possible negative impacts from altering the use of the river from walking and cycling to allowing boating on the river. Identify what impact visitors have on the areas currently and how this may change if boating is possible on the river.
	Create a 'towpath' along the river Little Ouse from Brandon to Thetford	Connecting the Little Ouse path to a wider public footpath network and promoting 'access for all' (E)	**+++**	The creation of a footpath/towpath along the river which is suitable for all would be an enhancement of the area, and require further consultation with the local authorities and the Brecks Countryside Project
Flora and Fauna:				
	Making the River Little Ouse Navigable	The river Little Ouse flows through environmentally designated sites	**+++/XXX**	Survey work should be carried out along the study area to include studies of, bats, otters, and water voles. In addition, other protected species in

Receptors & Environmental Resources Affected	Cause of impact (describe what activities, processes etc. give rise to the impact)	Description of effect: Construction (C) or End-state (E)	Potential Significance of impacts: Key: positive/negative Minor + X Moderate ++ XX **Major +++ XXX**	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
		for the protection of its flora and fauna. By altering, the water level there could be benefits to some types of habitat such as degraded wetlands and negative impacts on others such as heath land and SSSI designations, which need to retain their current water level. (E)		accordance with the level of construction works proposed, if the information is not already available. Further consultation with the Environment Agency, English Nature, Forestry Enterprise and other interested parties is required to gain a better understanding of the reasons why these areas hold designations, and on the impacts/mitigation, which arise from, proposed works. Any works undertaken to the river navigable need to take into account its use for fishing.
	Making the River Little Ouse Navigable	Increasing the number and frequency of visitors to the area could result in increased pressure of flora and fauna i.e. trampling erosion of footpaths. (E)	**XXX**	Further consultation is required to determine the current level of impact visitors have on the area and what possible impact increasing these numbers may have on the surrounding flora and fauna.
	Making the River Little Ouse Navigable	Dredging the river and installing lock structures to allow navigation will change to flow characteristics in the river(E)	**XX**	Further hydrological study is required into the flow of the river and how it will alter when dredging and lock structures are in place. Consultation is required with English Nature to determine the potential impact from dredging on the river.
	Using increased water level to	If nutrient rich water is used to	**XXX**	Further study into how the hydrology of the area

Receptors & Environmental Resources Affected	**Cause of impact** (describe what activities, processes etc. give rise to the impact)	**Description of effect: Construction (C) or End-state (E)**	**Potential Significance of impacts:** **Key:** positive/negative Minor + X Moderate ++ XX **Major +++ XXX**	**Baseline data requirements, Comments & Recommendations** (include available data, survey requirements, mitigation & enhancement measures and consultation required)
	inundate the deprived areas of wet land	inundate the wetland area, there could be changes to the nutrients levels in the soil. Because of this, there could be a change in the species found in the designated areas. (E)		operates. Collection of water quality data and further consultation with English Nature and the Environment Agency.
Air & Climate:				
	Construction of structures to retain water	During construction there could be dust and exhaust fumes generated from vehicle movement on site (C)	**X**	Identification of methods of working on site and ensure an Environmental Action Plan is draw up to meet all requirements on noise and methods of working.
Landscape & Visual Amenity:				
	Allowing navigation on the river	Vessels would be visible from the banks of the river and would change the appearance of the area	**X**	Landscape assessment and visual impact assessment are required
Water:				
	Increasing water levels to	If water levels are increased, there		Survey is needed into how the lagoon functions and

Receptors & Environmental Resources Affected	Cause of impact (describe what activities, processes etc. give rise to the impact)	Description of effect: Construction (C) or End-state (E)	Potential Significance of impacts: Key: positive/negative Minor + X Moderate ++ XX **Major +++ XXX**	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
	inundate surrounding wetland areas / lock structures altering river flow	could be an impact on the pollution lagoon constructed for run-off from the A11. (E) There is also an issue of using nutrient rich water to inundate areas of low nutrient level; this could lead to changes in the vegetation structure. (E)	**XX** **XXX**	how it will be affected by increased water levels. Further information is required on any abstraction licences held for the river Little Ouse Further survey is required to identify the hydrological function of the fen area and the drains which cross the site
Land use:				
	Enhancing the area to promote wet land habitats (E)	To use the increase in water level which will be required for navigation to enhance the wet land habitat in the river corridor	**+++**	Further consultation is needs to determine what areas in the study area are suitable to change to wet land habitat and which areas of wetland are in a less favourable condition and require enhancement.
Cultural Heritage, Archaeology & Material Assets:				
	Construction and excavation to enable navigation on the river.	Undertaking excavation, construction works and increasing the water level, there could be negative impacts on	**XXX**	Consultation with English Heritage to determine what monuments are included in the area Further consultation is required to obtain information on the built conservation area in

Receptors & Environmental Resources Affected	**Cause of impact** (describe what activities, processes etc. give rise to the impact)	**Description of effect: Construction (C) or End-state (E)**	**Potential Significance of impacts:** **Key:** positive/negative Minor + X Moderate ++ XX **Major +++ XXX**	**Baseline data requirements, Comments & Recommendations** (include available data, survey requirements, mitigation & enhancement measures and consultation required)
		archaeological artefacts, which are located in the study area. (C&E)		Brandon.
Traffic & Transport:				
	Encouraging increased visitor numbers to the area, by increasing the attraction value of the area through navigation	Increased visitor numbers to the area, and pressure on the road system (E)	**X**	Consultation is required with the county council regarding increased traffic volume on the A11 and A1065, which service Brandon and Thetford.
Soil, Geology & Hydro-geology:				
	Alterations to the water level	A change in water level is required to enable navigation, this may alter the hydro-geology of the area (E)	**XX**	Consultation and further survey work is required to determine the exact hydrology of the area and to determine how the river interacts with the SSSI and wetlands.

Appendix 2: Communication Plan

1. Introduction

This EIA Communication Plan sets out the arrangements for internal and external consultation with respect to the Brandon to Thetford Navigation Link. The EIA Communication Plan aims to:

- Clarify the roles and responsibilities of the project team for specific aspects of internal and external communication (using a single named contact as far as possible);
- Identify key consultees with a likely interest in the scheme; and
- Establish a consultation programme to provide a detailed list of future consultation rounds.

This is version **1** of the EIA Communication Plan and has been reviewed and updated as the scheme has progressed in line with adjustments to the project timetable and evolution of issues and ideas. The EIA Communication Plan will again be amended as necessary after significant phases of the project. The Environmental Impact Assessment Officer is responsible for updating the EIA Communication Plan on behalf of the Project Manager.

2. Project Team Member Roles and Responsibilities

Project Executive John Adams – Environment Agency
Project Manager Andy Bennison – Environment Agency
Project Manager Richard Beck – Babtie Brown and Root

3. External Consultees

External consultation has been undertaken to those parties who form the working party with the aim of improving the navigation on the Little Ouse, enhancing the habitats the river corridor and enhancing the existing amenities found in the area.
One stated aim from this initial round of consultation was to identify other interested parties that should be consulted as the project progresses.

4. Consultation Programme

Table 1 shows a proposed programme for internal and external consultation. Members of the project team are nominated responsibility for preparing material and undertaking each round of consultation. This is based on the current programme for the scheme. A named contact is also given in each case. As far as possible a single point of contact within the Environment Agency (i.e. the Project Manager) should be established for the scheme for all public consultation to avoid unnecessary confusion.

The project is currently at the pre-feasibility stage, and will progress through further stages of the EIA process. As the scheme progresses further consultation requirements may be identified and the consultee list may be expanded.

EIA COMMUNICATION PLAN

Scheme Name:	Brandon to Thetford Navigation link	**Client Manager:**	Andy Bennison	**EIA Officer:**	Unknown
Scheme No:		**Project Manager:**	Richard Beck	**Consultant:**	
Start Date:	14/02/03	**Consultant:**	Babtie Brown and Root		

Stage **EIA and** ***Engineering***	**Aim of Communication**	**Stakeholders** (Please list contact details on separate database)	**Method of Consultation** (Letter/press release, meeting, etc.)	**Dates:** (Start/ finish)	**Responsibility for undertaking and preparing consultation**	**Expected outcome or action** (with any relevant details, deadlines, etc.)
a) Consultees will normally include internal consultees and informal contacts with other stakeholders or organisations as appropriate (NB: it is not mandatory to complete the EIA Communication Plan prior to Form A SoD approval. However, a record of consultation must be maintained.)						
Screening/Scoping (Pre-feasibility)(or prior to feasibility)	**To determine key issues identified from members of the working party** **To Draw up a list of organisations for consultation at further stages of the project**	Brandon Community Partnership Brecks Countryside Project East Anglian Waterways Association English Nature Forestry Commission Forest Heath District Council Great Ouse Boating Association Inland Waterways Association Keystone Community Partnership Norfolk County Council Royal Yachting Association Suffolk County Council	**Letter / Phone calls**	14th March 2003 – 04 April 2003	**RB/KS**	**Key constraints and Opportunities identified** **List of further consultees**

Stage **EIA and *Engineering***	**Aim of Communication**	**Stakeholders** (Please list contact details on separate database)	**Method of Consultation** (Letter/press release, meeting, etc.)	**Dates:** (Start/ finish)	**Responsibility for undertaking and preparing consultation**	**Expected outcome or action** (with any relevant details, deadlines, etc.)
During Scoping and the Feasibility Study, consultees will normally include statutory consultees, stakeholders, e.g. all affected landowners, and internal Agency functions. All entries will be revisited as the project develops.						
Screening/Scoping *(Feasibility)*		Suffolk Wildlife Trust Norfolk Wildlife Trust Bury St Edmunds Angling association Thetford and Breckland Angling Association Breckland District council Thetford Town Council NCC Countryside Access Officer English Heritage Rambler Association Crown Estates				
Options Appraisal (Feasibility)						
At the beginning of the Assessment & Evaluation stage, the EIA communication plan should be re-visited. The Plan should be developed for communication/consultation up to ER/ES publication and target audiences and objectives listed according to chosen communication media. Outputs in the form of exhibitions, leaflets, etc should list and cost estimated. Provision should be made for all communication relating to mitigation and enhancement works with landowners/stakeholders to reach the agreement of detailed plans (as far as possible).						

Stage **EIA and** ***Engineering***	**Aim of Communication**	**Stakeholders** (Please list contact details on separate database)	**Method of Consultation** (Letter/press release, meeting, etc.)	**Dates:** (Start/ finish)	**Responsibility for undertaking and preparing consultation**	**Expected outcome or action** (with any relevant details, deadlines, etc.)
Assessment and Evaluation ***(Outline design)***						
During the Detailed Design, communication will focus on developing and agreeing the detailed design of the works, including temporary works, mitigation and compensation measures and environmental enhancements.						
Implementation ***(Detailed Design)***						
During Construction, communication will focus on site bulletins, press releases, community initiatives, and special meetings with stakeholders/landowners relating to construction issues. The plan must achieve effective communication of the varied contacts experienced at site level and members of the project team who need to be aware of issues arising.						
Implementation ***(Construction)***						
Following completion of the works, continue communication as implementation for the completion of post works mitigation (eg landscape/habitat creation… works). Evaluate the effectiveness of communication from the project performance record, the occurrence of incident, comments on the scheme from others, the communication record, and plan communication to feedback the outcomes from the project team to the contractor and others as required.						
Implementation: Post works mitigation establishment, and monitoring. ***(Operational, PPA and Audit)***						

Budget Cost Estimates for Navigation Proposals

(Base Costs for Construction only, based on Option 1B)

Item	Description	Estimate (£)
1	Existing head gate structure at Brandon Lock to be raised	30000
3	Construction of 22m L x 4.3m W x 3m D Lock at Santon Downham	700000
4	Construction of 10m wide Weir/Sluice structure at Santon Downham, incorporating separate weir and sluice gate.	200000
5	Raising of existing Santon Country Park Footbridge	40000
7	Construction of 22m L x 4.3m W x 3m D Lock at Two Mile Bottom	700000
8	Construction of 10m wide Weir/Sluice structure at Two Mile Bottom, incorporating separate weir and sluice gate.	200000
9	Excavation and construction of new 80m L x 8m W x 1.5m D navigation bypass channel around Abbey Heath Weir	150000
10	Construction of 22m L x 4.3m W x 3m D Lock at Abbey Heath	700000
11	Modify existing SW outfall headwall to incorporate energy dissipation	10000
12	Excavation and construction of new 80m L x 8m W x 1.5m D navigation bypass channel around Thetford No.1 Sluice	150000
13	Construction of 22m L x 4.3m W x 3m D Lock at Thetford	700000
14	Raising of existing Footbridge at Thetford	40000
15	Dredging of Little Ouse river (11600 m3)	200000
16	Raising of river banks (1600 m) by approx 0.5 – 1.0 m	100000
17	Construction of boat turning and mooring facility at Thetford	600000
	Total (Option 1B):	**4520000**

Additional/Optional Works:

Item	Description	Estimate (£)
18	Additional cost to rebuild Brandon Lock to EA standard	900000
19	Additional cost to rebuild Brandon Lock to Denver standard	1000000
20	Additional cost to provide 30m long Locks at Santon Downham, Two Mile Bottom, Abbey Heath and Thetford.	400000
21	Additional cost of raising/renewing footbridge at Two Mile Bottom	40000
22	Additional dredging costs of extending navigation to confluence with River Thet (900 m3).	30000
23	Additional cost of raising timber footbridge in Thetford town centre to facilitate navigation to confluence with River Thet.	50000

Summary Totals:

Option	Calculation	Estimate (£)
Option 1B 2.7m Headroom New locks to EA standard Existing Brandon lock retained	(as calculated above)	4520000
Option 2B 2.7m Headroom All locks to EA standard	As Option 1B (-30000 + 900000)	5390000

Notes:

1. The main cost difference between the 'A' options (2.0m headroom) and the 'B' options (2.7m headroom) is the raising of the head structure at the existing Brandon lock to accommodate the increased headroom standard (£30000).
2. The cost of Option 1A (2.0m Headroom, New locks to EA standard and existing Brandon lock retained – but without modifications to head structure) would be £4520000 - £30000 = £4490000.
3. The costs for Options 2A and 3A (2.0m headroom) would be the same as Options 2B and 3B respectively – as all these options would necessitate the reconstruction of Brandon lock irrespective of headroom.

Calculation of CAPEX

	Option 1B	Option 2B
Estimated Construction Cost (£)	4520000	5390000
Surveys / GI (£)	50000	60000
Design, Supervision, CDM @ 15% of construction cost (£)	678000	808000
EIA/Environmental Mitigation (£)	80000	80000
Contingency (approx 20%) (£)	1065000	1267000
Total CAPEX (£)	**6393000**	**7605000**

Maintenance/OPEX Costs

Description	Annual Cost (£)
Annual maintenance of 4No. locks. Based on EA annual budget of £120k for 23 locks	20000
Annual maintenance of 2No. additional sluices/weirs (estimate)	10000
Annual maintenance for 14km of river – weed cutting and dredging	30000
Total	**60000**

Little Ouse (Brandon to Thetford) Navigation

Economic Assessment

	Low Case	Medium Case	High Case	Comments
HIRE BOATS				
Number of boats = *Based on 14 km of navigation*	0	3	7	*British Waterways National Average = 1 boat / 2km. Gt Ouse system well below this @ 1 boat / 9km. Fens Waterways Link report adopted a ratio of 1 boat / 4km. This ratio adopted for medium case. BW Avg adopted for high case. Low case - no boats.*
Average annual usage (weeks) =	25	25	25	As per Fens Waterways Link Report
Typical weekly hire rate (£) =	700	700	700	As per Fens Waterways Link Report
CALCULATED BENEFIT FROM BOAT HIRE		6250	122500	*per annum*
Daily expenditure per boat (£) =	48.92	48.92	48.92	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on East Midlands Boating Survey 1991*
Days usage per week (days) =	6	6	6	As per Fens Waterways Link Report
CALCULATED EXPENDITURE FROM BOAT HIRE		2201.4	51366	*per annum*

Little Ouse (Brandon to Thetford) Navigation

Economic Assessment

	Low Case	Medium Case	High Case	Comments
PRIVATE CANAL BOATS				
Number of boats = *Based on 14 km of navigation*	50	70	90	*British Waterways National Average = 5 boats / km, which equates to 70 boats for 14km - adopt this for medium case. Adopt 50 and 90 boats for low and high cases respectively.*
Annual mooring charge per boat (£) =	0	0	0	*Economic assessment has assumed no marina facilities and that riverside moorings will be free (ie EA and GOBA moorings)*
CALCULATED BENEFIT FROM MOORING FEES	NIL			*per annum*
Daily expenditure per boat (£) =	38.86	38.86	38.86	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on East Midlands Boating Survey 1991*
Average annual usage (days) =	16	16	16	As per Fens Waterways Link Report
CALCULATED EXPENDITURE FROM BOAT OWNERS WHILST CRUISING	31088	43523	56968	*per annum*

Little Ouse (Brandon to Thetford) Navigation

Economic Assessment

	Low Case	Medium Case	High Case	Comments
Daily expenditure per boat visit (£) =	5.45	5.45	5.45	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on East Midlands Boating Survey 1991*
Average number of visits (days) =	0	0	0	*Not applicable - as assessment based on no marina facilities.*
CALCULATED EXPENDITURE FROM BOAT OWNERS WHILST MOORED		NIL		*per annum*

TRIP BOATS

Number of boats =	0	1	1	*Not considered to be realistic for low case*
Trip boat fare (£) =	3.50	3.50	3.50	*Ref. Atkins Fens Waterway Link Economic Analysis Report (Sept 2003)*
Number of passengers per year =	3200	3200	3200	*Ref. Atkins Fens Waterway Link Economic Analysis Report (Sept 2003)*
Other expenditure per visitor (£) =	4.52	4.52	4.52	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on Kennet & Avon Canal Survey 1991*
CALCULATED REVENUE FROM BOAT RIDES	NIL	25664	25664	*per annum*

Little Ouse (Brandon to Thetford) Navigation

Economic Assessment

	Low Case	Medium Case	High Case	Comments
RESTAURANT BOATS				
Number of boats =	0	0	1	*Not considered to be realistic. Consider 1 boat for high case only.*
Charge per head (£) =	20.00	20.00	20.00	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on Kennet & Avon Canal Survey 1991*
Number of passengers per year =	1800	1800	1800	*Ref. Atkins Fens Waterway Link Economic Analysis Report (Sept 2003)*
Cancelled Revenue from Restaurant Boats	NIL	NIL	36000	*per annum*
DAY BOATS				
Number of boats =	0	2	4	*Consider 2 boats for medium case and 4 boats for high case only.*
Typical usage per annum (days) =	60	60	60	*Ref. Atkins Fens Waterways Link Economic Analysis Report assumed 60 days hire per year based on 10 boats on 120 km of waterway.*

Little Ouse (Brandon to Thetford) Navigation

Economic Assessment

	Low Case	Medium Case	High Case	Comments
Typical daily hire rate (£) =	40.00	40.00	40.00	
Average number of people per boat =	5	5	5	*Ref. Atkins Fens Waterway Link Economic Analysis Report (Sept 2003)*
Other daily expenditure per person (£) =	4.52	4.52	4.52	*Ref. Costs from Atkins Fens Waterway Link Economic Analysis Report (Sept 2003) based on Kennet & Avon Canal Survey 1991*
CALCULATED REVENUE FROM DAY BOATS.	NIL	7512	16024	*per annum*
TOWPATH / RIVERSIDE PATH USERS				
Estimated number of visitors =	87000	87000	87000	*Ref. Atkins Fens Waterways Link Economic Analysis Report assumed a conservative figure of 10000 visitors per mile of navigation.*
Average expenditure par visitor (£) =	5.00	5.00	5.00	*Ref. Atkins Fens Waterways Link Economic Analysis Report assumed an average expenditure of £5 per visitor based on Kennet & Avon Canal Survey undertaken by British Waterways in 1991.*
CALCULATED BENEFIT FROM LAND BASED RECREATION (RIVERSIDE USES)	435000	435000	435000	*per annum*
TOTAL ECONOMIC BENEFIT (ANNUAL)	466088	586213	741512	

Notes of Meeting

Babtie

Client	EA/Working Group
Job title	Brandon to Thetford navigation link
Purpose of meeting	review of stage one report
Date of meeting	08 September 2003
Place of meeting	Thetford
Ref	006077/1/2/3432
Date of distribution	15/9/03

Babtie Group
technical and
management
consultants

15 Sturton Street
Cambridge
CB1 2SN
Tel 01223 365731/
01223 355890
Fax 01223 361332/
01223 355058

Present

Tony Jones	Keystone Project
Vicky Stone	Breck's Countryside Project
Nick Gibbons	Forest Enterprise
Richard Radcliff	Forest Heath District Council
Derek Bradley	Inland Waterways Association
Bob Wells	GOBA
Roger Valentine	EA
Miriam Byron	EA
Richard Beck	BBR
Kay Siddall	BBR

Copies

All present plus
Andy Bennison (EA)
file

Action

Apologies for absence from Andy Bennison

1 Since the last meeting the draft stage 1 report had been issued to all team members. This included the main engineering proposals but does not include the full assessment of benefits, which were still being worked on.

2 A presentation was made which identified the affect of the current proposals on the species in the Biodiversity / Habitat Action plan. Reference was also made to the current local plan for Thetford, which at the moment did not give any specific scope to the reopening of the navigation.

3 NG would like to see further increase in water level rather than dredging of material to gain sufficient depth. This would have a beneficial effect on the wetland in the study area, and remove the need to find a location for the dredged material.
This may have a small affect on the bridge soffit levels, and a potentially

RB to look at engineering aspects

greater affect on the water flow requirements **of this**

NG also commented that in the stage one report, no account has been taken of the cost of the environmental enhancement/ mitigation measures to be implemented as part of the project. This could be substantial if soil stripping etc was carried out. **KS/RB**

4 English Nature have not to date commented on the stage one report and did not attend the meeting (08/09/03. More detail needs to be obtained regarding their opinions on the project and any reservations they may hold. **KS to contact NG to discuss. NG to contact Sarah Anthony of EN to discuss**

The working group was keen for English Nature to be drawn more closely into the project group and encouraged to have more input into the design process

5 RV commented that more detail needs to be sought to make the navigation a stronger business case by,

a) Review of other projects such as Sleaford Navigation Trust

b) Present the project in terms of the ongoing Fens Waterways link, (20 year programme) a national trunk route for navigation from the Wash to the Bedford-Milton Keynes canal. British Waterways Association (James Clifton) has main input to this scheme. The Little Ouse could be seen as an added bonus to this scheme, especially if the marina at Brandon was incorporated, as this would provide an increased number of mooring places to accommodate increased boat traffic.

c) Consider Kings Lynn Link

d) Brandon Marina. Plans were discussed regarding a proposed marina in Brandon, which would be controlled by Forest Heath DC. It was proposed that if this was brought into the scheme and a water front improvement project was incorporated in Thetford then a link for navigation could be developed at a later stage.

e) In the future the scope of the working group will need to be increases to include all local authorities, English Nature and other partners i.e. Keystones vision statement.

f) Is the existing water level sufficient to facilitate the navigational needs on the river and the environmental requirements of the wetland areas?. While the modelling of the aquifer is not part of the current brief, this information will need to be in place to confirm the feasibility of the project. If sufficient information is not available then the need for a research and monitoring project (possibly carried out with English Nature and others) needs to be identified in the report. Such a study could of benefit to several parties, and could help address the concern of EN regarding the SSSI (Thetford Golf Course and Marsh) and the effect on the water level from this aquifer fed site, if water levels on the river were raised.

6	Planning A meeting needs to be set up with the forward planners fromForest Heath DC (John Smerdon 01638 719000) and Breckland DC (Andrea Bolton) to identify any potential opportunities, or how the local plan can incorporate the proposed project; any proposals to be included in the stage 2 report.	**RB**
7	RV suggested a review of figures for costs as he though the estimates were very light	**RB**
8	RV required the report to include more detail of environmental benefits i.e. extent of wetland which would be created. RV considered that environmental benefits could be considered as secondary benefits if the project could be shown to generate sufficient employment and economic gain.	**KS further discussion with NG/SA**
9	Date of next meeting to be fixed after discussion with Andy Bennison. RB to coordinate. Meeting room is available subject to booking. Monday is preferred day.	**RB**

Licence No: 6/33/45/*G/0016 Orig Application:

Expiry Date:
Revoked Date:
Lapsed Date:

Issue No	Incr No	Status	Effective Start	Effective End	Returns Req?	Chargeable?
100	0	CURR	01/08/1994		Y	Y

Licence Holder
4537 ANGLIAN WATER SERVICES LTD
11773 ENDURANCE HOUSE
CHIVERS WAY
HISTON
CAMBRIDGE
CB4 9ZR

Licence Type: Licence of Right

Source: GROUND WATER SOURCE OF SUPPLY
Multiple Lh?: N

Purpose: Water Supply - Public Water Supply
Potable Water Supply - Direct
Abs Period Start: 1/1 Abs Period End: 31/12 Time Ltd Start: Time Ltd End:

Annual Qty:	1659000 m3	Usability:	Legal
Daily Qty:	6800 m3	Usability:	Legal
Hourly Qty:	284 m3	Usability:	Legal
Inst Qty:	78.9 l/s	Usability:	Legal

Conditions Exist: Yes
Agreements Exist: No

Local Name		Primary Type	Secondary Type	Category
BORE "3", TWO MILE BOTTOM		Groundwater	Borehole	Single Point
NGR1: TL 8544 8638 0.3km	NGR2:	NGR3:	NGR4:	
BORE "2", TWO MILE BOTTOM		Groundwater	Borehole	Single Point
NGR1: TL 8537 8641 0.2km	NGR2:	NGR3:	NGR4:	
BORES "1", TWO MILE BOTTOM		Groundwater	Borehole	Single Point
NGR1: TL 8538 8641 0.2km	NGR2:	NGR3:	NGR4:	

101/107

Licence No: 6/33/45/*S/0064 Orig Application:

Expiry Date: 31/03/2027
Revoked Date:
Lapsed Date:

Issue No	Incr No	Status	Effective Start	Effective End	Returns Req?	Chargeable?
1	1	CURR	31/05/2001		Y	Y

Licence Holder
39964
68074
BRECKLAND GROWERS LTD
C/O CUNNINGHAM JOHN & CO
FAIRSTEAD HOUSE
7 BURY ROAD
THETFORD
NORFOLK
IP24 3PL

Licence Type: Ordinary Licence

Source: SURFACE WATER SOURCE OF SUPPLY
Multiple Lh?:

Purpose: Agriculture - General Agriculture
Spray Irrigation - Storage
Abs Period Start:1/11 Abs Period End: 31/3 Time Ltd Start: Time Ltd End:

Annual Qty:	1363800 m3	Usability:	Legal
Daily Qty:	13639 m3	Usability:	Legal
Hourly Qty:	568.3 m3	Usability:	Legal
Inst Qty:	157.8 l/s	Usability:	Legal

Conditions Exist: Yes
Agreements Exist: Yes

Local Name
LITTLE OUSE RIVER AT CROXTON
NGR1:TL 8527 8653 0.1km NGR2: NGR3: NGR4:

Primary Type	Secondary Type	Category
Surfacewater	Unknown	Single Point

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* END OF REPORT *
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102/107