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ENVIRONMENT AGENCY

Babtie Brown & Root

River Little Ouse (Brandon to Thetford) Prefeasibility Study

Stage 1 Report: Description of Investigations

Environment Agency Anglian Region
BBR Ref: 0006077/D5/135
EA Project Ref: LVN 17010

Babtie Brown & Root JV
8 The Square Martlesham Heath Ipswich Suffolk IP5 3SL
Tel 01473 624326 Fax 01473 623021

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Front Cover Photo

Abbey Heath Weir, River Little Ouse, Thetford.

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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 Forest Enterprises.

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

1.4 The costs for these proposals have been assessed. Work on an assessment of the benefits in continuing, and will be reported on in a stage 2 report.

INTRODUCTION

2.1 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. There is a history of previous navigation going a further 8kms upstream to Thetford but this has not been possible for many years.

2.2 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.

2.3 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.

2.4 The study has been prepared by Babtie Brown & Root under the NEECA framework agreement. This draft report identifies the key environmental issues and the scope of work, which would be required to reopen the navigation. The final report will provide further details of costs and benefits.

BACKGROUND

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

3.2 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.

3.3 There is a significant historical record of the development of this section of river and navigation used to go up as far as Thetford. This, however, has been disused 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 upstream of the A1065 road bridge at Brandon.

3.4 There are some limitations on the size of boats that can navigate to Brandon as follows:

- Limited headroom of approximately 2.1m at the cut-off channel near Hockwold Cum Wilton, although it is understood that this is currently being raised.
- There is limited width, length, depth and headroom at Brandon Lock (4m wide, 14m long, 1.2m deep and 2m headroom).

3.5 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.

3.6 The Thetford Forest Enterprises 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.

3.7 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.

3.8 Historical survey information has been used to look at the engineering requirements to allow water depths to be increased for navigation. 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.

TECHNICAL ASSESSMENT

Current Water Level Management Regime

4.1.1 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.

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

4.1.3 The Environment Agency carries out dredging of the river as required, and weed cutting twice a year (in June and September). Further details of the results of the current water level management are covered in Appendix A.

4.1.4 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.

4.1.5 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.

4.1.6 The Agency have advised that the current 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

4.2.1 The existing river bed level (and subsequent water level) rises by approximately 7.5 m along the 6 km between downstream of Brandon Sluice and Thetford town centre, which will necessitate the construction of locks to enable boats to reach Thetford.

4.2.2 There are essentially two different navigation standards that could be adopted; one which 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

4.2.3 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.

4.2.4 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.

4.2.5 New lock construction will need to be in accordance with the Environment Agency's Lock Standards Report, which stipulates the following minimum gauge and lock draft dimensions:

Length: 22 m Width: 4.3 m Draft: 1.7 m

The Brandon Lock has a width of 4 m, which is only marginally smaller than the EA 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 EA standard of 22 m or the Denver standard of 30 m.

Outline Proposals/Options

4.3.1 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**
All locks (including Brandon) to Denver standard	**Option 3A**	**Option 3B**

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

Item	**Options**					
	1A	**1B**	**2A**	**2B**	**3A**	**3B**
New Lock to EA Std	4	4	4	4		
New Lock to Denver Std					4	4
Brandon Lock gate structure raised		X				
Brandon Lock rebuilt to EA Std.			X	X		
Brandon Lock rebuilt to Denver Std.					X	X
New Weir/Sluice Structure	2	2	2	2	2	2
Footbridge to be raised	2	2	2	2	2	2
Road bridge to be raised	0	0	0	0	0	0

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

4.3.3 The existing lock and Brandon would need to be rebuilt to meet the EA and Denver standards.

4.3.4 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 Forest Enterprise 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.

4.3.5 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.

4.3.6 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.

4.3.7 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.

4.3.8 The existing footbridge at Two Mile Bottom (Chainage 29.98 km) is just 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.

4.3.9 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.

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

Current Standard of Flood Protection

4.4.1 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).

4.4.2 It is understood that there are no significant flood issues within the study area. However, the studies identified the property most at risk as being Spring House, Thetford, which lies 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.

4.4.3 The navigation proposals identified under Section 4.3 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

4.5.1 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 Forest Enterprise.

4.5.2 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.

Associated Interests

4.6.1 The following aspects are covered in the Section A.3 of the Environmental Report under 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

4.6.2 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.

4.6.3 There are also 3No 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 4.6.2 above are included under Appendix F.

4.6.4 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

Outline Benefits

4.7.1 The potential outline benefits of the aforementioned proposals are as follows:

- Navigation along the River Little Ouse from Brandon to Thetford town centre.
- Environmental enhancement along the river corridor.
- Potential for flood plain restoration between Santon Downham and Two Mile Bottom.
- Additional business and tourism generated by navigation up to Thetford and the effect on Thetford's structure plan.
- Possibility of EU Funding.

4.7.2 The extent of the above benefits is currently being investigated and the results of this will be presented in Stage 2 of this report.

CONCLUSIONS

5.1 The conclusions of this Stage 1 report are as follows:

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

5.1.2 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 m3)
- Raising of river banks (1600 m)
- Construction of boat turning area and moorings at Thetford

5.1.3 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.

5.1.4 The estimated cost for extending the navigation up to Thetford at this stage of the investigations is £4.95 million or £5.83 million if the Brandon Lock is rebuilt to meet the EA's lock standard. It is estimated that this cost would increase to £6.63 million if the required lock length increased from 22 m to 30 m to meet the Denver standard.

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Appendix A

Environmental Report

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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 by the Forestry Commission and managed by Forest Enterprise.

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
- Forest Enterprise
- 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 Forest Enterprise 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 Forest Enterprise on behalf of 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
- Country 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 Forest Enterprise 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. 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; these areas 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 Forest Enterprise.

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 Forest Enterprise 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. 85184

A.3.5.3 If the water level in the area was increased by inundation by the river water, 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 such as heath 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 main landowner in the study area is the Forestry Commission with Crown Estates owning the riverbed. The land is managed by Forest Enterprise on behalf of the Forestry Commission.

A.3.6.2 The majority of the area has been afforested and now the land is managed by Forest Enterprise, 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 Forest Enterprise ©.

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 Forest Enterprise. 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 which altering the water level could have on those habitats which need their current water level maintained, such as SSSI and heath land habitats; 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 Forest Enterprise 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 +
- Forest Enterprise +
- 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 (indicate ✔or ✗) (see key below)	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	The river Little Ouse flows	+++/XXX	Survey work should be carried out along the study area to include studies of, bats, otters, 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 (indicate ✔or ✗) (see key below)	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
	Navigable	through environmentally designated sites 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)		water voles. In addition, other protected species in 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

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 (indicate ✔or ✗) (see key below)	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
				the river.
	Using increased water level to inundate the deprived areas of wet land	If nutrient rich water is used to 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)	XXX	Further study into how the hydrology of the area 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:				

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 (indicate ✔or ✗) (see key below)	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
	Increasing water levels to inundate surrounding wetland areas / lock structures altering river flow	If water levels are increased, there 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	Survey is needed into how the lagoon functions and 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	XXX	Consultation with English Heritage to determine what monuments are included in the area Further consultation is required to obtain

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 (indicate ✔or ✗) (see key below)	Baseline data requirements, Comments & Recommendations (include available data, survey requirements, mitigation & enhancement measures and consultation required)
		negative impacts on archaeological artefacts, which are located in the study area. (C&E)		information on the built conservation area in 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 Forest Enterprise 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)*						

APPENDIX 3 – CITATIONS

Nature Conservancy Council
60 Bracondale Norwich NR1 2BE
Telephone Norwich 620558

The Conservator
Forestry Commission
[East (England) Conservancy]
Great Eastern House
Tenison Road
Cambridge CB1 2DU

Your reference

Our reference EA/N/96/14 WHM

Date 21st August 1985

Notification under Section 28 of the Wildlife and Countryside Act 1981

THETFORD GOLF COURSE AND MARSH

1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.

2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.

3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.

4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:

   a. the operation is carried out with the written consent of the NCC;

OR

   b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;

OR

   c. 3 months have expired since NCC received notice of your proposal to carry out the work.

Dr M George
Regional Officer
East Anglia

55/107

39/73

Operations requiring prior consultation with NCC

Site name: THETFORD GOLF COURSE & MARSH, NORFOLK

Ref No	Type of Operation
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	The introduction of, or changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of, or changes in stock feeding practice [including changes in the number of animals stocked].
4.	The introduction of, or changes in the mowing or cutting regime [including hay making to silage and cessation].
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
9.	The release into the site of any wild, feral or domestic animal*, plant or seed.
10.	The killing or removal of any wild animal*, including pest control.
11.	X The destruction, displacement, removal or cutting of any plant or plant remains, including herb, moss, lichen, fungus, and turf.
12.	The introduction of, or changes in tree and/or woodland management+.
13a.	Drainage [including the use of mole, tile, tunnel or other artificial drains].
13b.	Modification of the structure of watercourses [eg. rivers, springs, ditches, dykes, drains], including their banks and beds, as by re-alignment, re-grading and dredging.
13c.	Management of aquatic and bank vegetation for drainage purposes [see also 11].
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, dykes, drains, marshes or pits.
20.	Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26.	Use of vehicles or craft likely to damage or disturb features of interest.
27.	Recreational of other activities eg. motor-cycle scrambling likely to damage woodland or wetland vegetation.
(28.)	Introduction of, or changes in game and waterfowl management and hunting practice.

* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.

\+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species

56/101

File Ref: EA/N/96/14 WHM

COUNTY: Norfolk

SITE NAME: THETFORD GOLF COURSE & MARSH

DISTRICT: Breckland

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Breckland District Council

National Grid Reference: TL 845838 Area: 119.6 [ha] 295.5[ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TL 88 SE, SW

Date Notified [Under 1949 Act]: 1968 Date of Last Revision:

Date Notified [Under 1981 Act]: 1985 Date of Last Revision:

Other Information:

This site is listed in a "Nature Conservation Review".

Reasons for Notification:

This site contains the only surviving area of a once extensive track of Breckland heath known as Thetford Warren. A wide range of heathland plant communities still occur in the occasionally mown "roughs" on the golf course and on other parts of the site. Dry grass heath on both acidic and calcareous glacial drifts covers much of the area but there are also good examples of open lichen heath and heather heath. The diverse flora includes two locally rare plants. Horse Meadows, an area of low-lying ground by the River Little Ouse forms a marked contrast to the dry heathland. The wet peaty soils support a range of fenland plant communities and a fine example of valley alder woodland.

Calcareous grassland occurs where there are chalk fragments in the overlying drift. Areas of "semi-rough" are lightly mown and the grass sward contains an abundance of Sheep's Fescue [Festuca ovina], Sweet Vernal Grass [Anthoxanthum odoratum] and Crested Hair-grass [Koeleria macrantha]. Associated herb species include Lady's Bedstraw [Galium verum], Kidney Vetch [Anthyllis vulneraria], Common Broomrape [Orobanche minor] and the nationally rare Spanish Catchfly [Silene otites]. Taller growing calcareous grassland is present on the unmown rough and is dominated by Cock'sfoot [Dactylis glomerata] and Oat-grass [Arrhenatherum elatius].

Acidic grassland, Bracken [Pteridium aquilinum] and dry heathland dominated by Heather [Calluna vulgaris] are present on free-draining sands and gravels. Common Bent [Agrostis capillaris], Wavy Hair-grass [Deschampsia flexuosa] and Sheep's Fescue dominate the areas of acidic grassland with Sheep's Sorrel [Rumex acetosella], Wood Sage [Teucrium scorodonia], Harebell [Campanula rotundifolia] and a small population of the uncommon Maiden Pink [Dianthus deltoides]. In places there are alternating stripes of Heather and acidic grassland which reflect differential sorting of the drift material by frost during a periglacial period. Lichen heath has developed on the lightest sands and gravels in an area of abandoned gravel workings. This is a rare habitat confined to Breckland and is dominated by low-growing lichens [Cladonia spp.] and mosses [mostly Polytrichum piliferum]. An uncommon fern, Moonwort [Botrychium lunaria] occurs in one pit.

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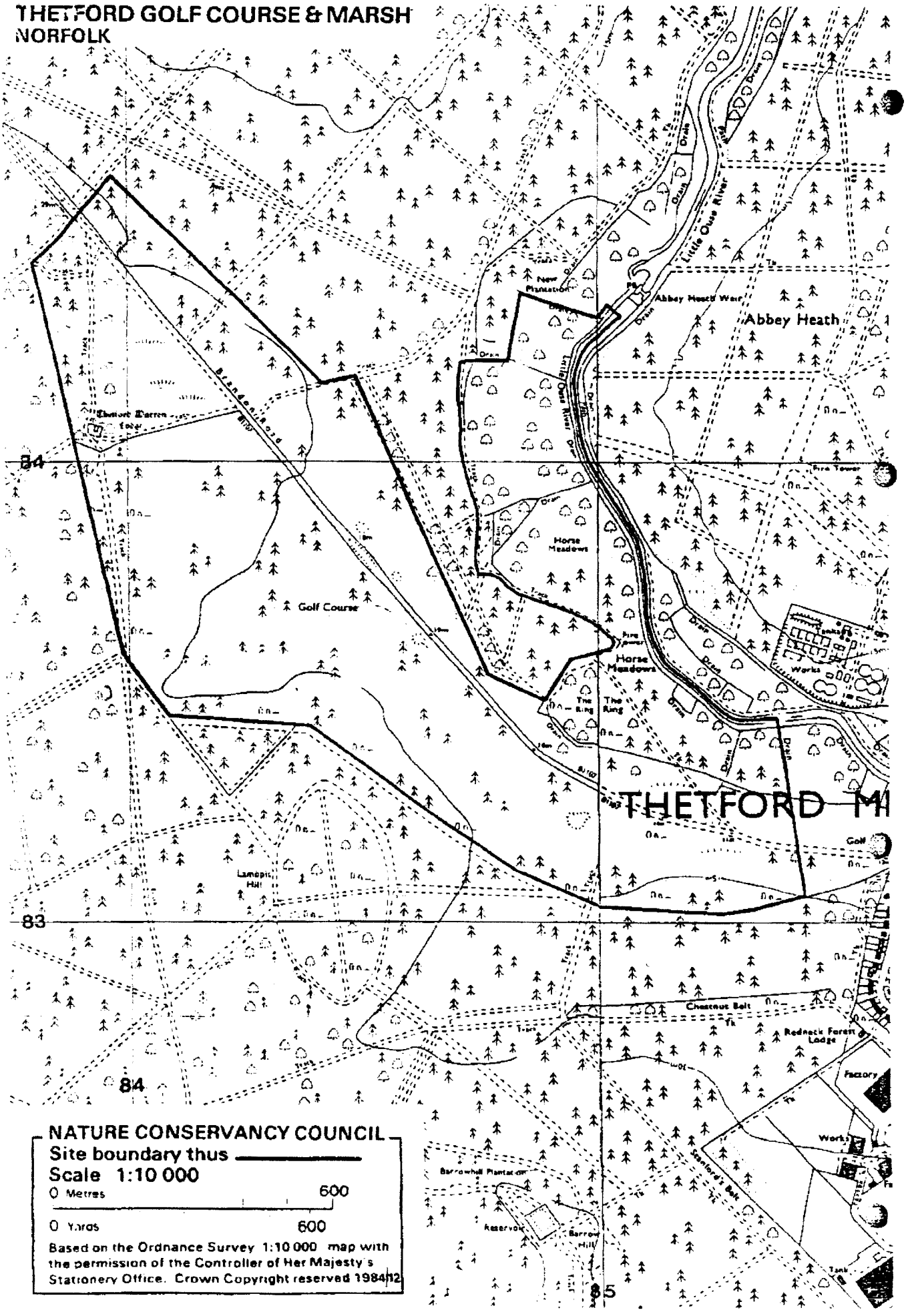
THETFORD GOLF COURSE & MARSH
NORFOLK



NATURE CONSERVANCY COUNCIL

Site boundary thus

Scale 1:10 000

0 Metres 600

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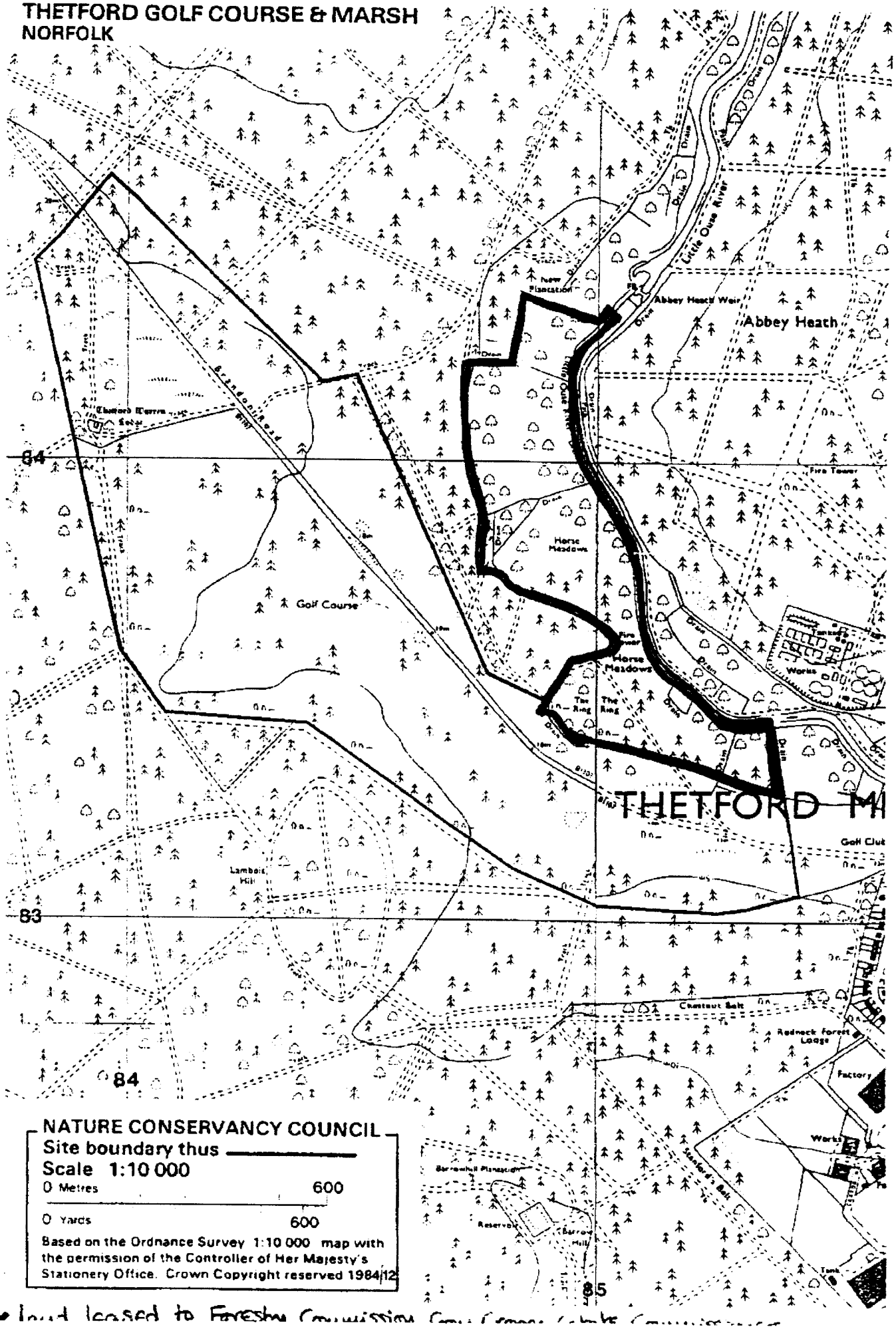
Horse Meadows support a series of fen and wet grassland communities under scattered plantings of Poplar. Reed Canary-grass [Phalaris arundinacea], Purple Small-reed [Calamagrostis canescens], Reed Sweet-grass [Glyceria maxima], Common Reed [Phragmites australis], Greater Pond Sedge [Carex riparia] and Tufted Sedge [C. elata]. provide the dominant or co-dominant species on the wet fen. Much of the variation in the vegetation is due to the differing degrees of wetness and depth of standing water on the site.

The valley carr woodland is dominated by large coppiced stools of Alder [Alnus glutinosa] with occasional Ash [Fraxinus excelsior], Birch [Betula pubescens] and Common Sallow [Salix cinerea]. The ground flora is typically diverse and includes Yellow Flag [Iris pseudacorus], Greater Tussock Sedge [Carex paniculata], Wood Small-reed [Calamagrostis epigejos], Gipsywort [Lycopus europaeus] and Water Mint [Mentha aquatica].

THETFORD GOLF COURSE & MARSH
NORFOLK



NATURE CONSERVANCY COUNCIL

Site boundary thus ——

Scale 1:10 000

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~ land leased to Forestry Commission [illegible]

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EC Directive 79/409 on the Conservation of Wild Birds
Potential Special Protection Area (pSPA)

Name: Breckland

Unitary Authority/County: Norfolk, Suffolk.

Consultation proposal: All or parts of the following 28 Sites of Special Scientific Interest (SSSIs) have been recommended as a potential Special Protection Area (pSPA) because together they support breeding bird populations of European importance: Barnham Heath SSSI; Barnhamcross Common SSSI; Berner's Heath, Icklingham SSSI; Breckland Farmland SSSI; Breckland Forest SSSI; Bridgham & Brettenham Heaths SSSI (includes Brettenham Heath NNR); Cavenham-Icklingham Heaths SSSI (includes Cavenham Heath NNR); Cranberry Rough, Hockham SSSI; Cranwich Camp SSSI; Deadman's Grave, Icklingham SSSI; East Wretham Heath SSSI; Eriswell Low Warren SSSI; Field Barn Heaths, Hilborough SSSI; Foxhole Heath, Eriswell SSSI; Gooderstone Warren SSSI; Grimes Graves SSSI; How Hill Track SSSI; Lakenheath Warren SSSI; Little Heath, Barnham SSSI; Old Bodney Camp SSSI; Rex Graham Reserve SSSI; Stanford Training Area SSSI; Thetford Golf Course & Marsh SSSI; Thetford Heaths SSSI (NNR); Wangford Warren & Carr SSSI; Weather & Horn Heaths, Eriswell SSSI; Weeting Heath SSSI (NNR); and West Stow Heath SSSI. See map for detail of the pSPA boundary.

Site description: The Breckland of Norfolk and Suffolk lies in the heart of East Anglia on largely sandy soils of glacial origin. In the nineteenth century the area was termed a sandy waste, with small patches of arable cultivation that were soon abandoned. The continental climate, with low rainfall and free-draining soils, has led to the development of dry heath and grassland communities. Much of Breckland has been planted with conifers throughout the twentieth century, and elsewhere arable farming is the predominant land use.

The remnants of dry heath and grassland which have survived these recent changes support heathland breeding birds, where grazing by rabbits and sheep is sufficiently intensive to create short turf and open ground. These species have also adapted to live in forestry and arable habitats. Woodlark *Lullula arborea* and nightjar *Caprimulgus europaeus* breed in clear-fell and open heath areas, whilst stone curlews *Burhinus oedicnemus* establish nests on open ground provided by arable cultivation in the spring.

Size of pSPA: The pSPA covers an area of 39,987.60 ha.

Qualifying species: The site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed in Annex 1, in any season:

Annex 1 species	Count and season	Period	% GB pop.
Stone Curlew *Burhinus oedicnemus*	115 pairs - breeding	Count as at 1996	60.1% GB
Nightjar *Caprimulgus europaeus*	415 males - breeding	Count as at 1992	12.2% GB
Woodlark *Lullula arborea*	430 pairs - breeding	Count as at 1997	28.7% GB

Sources of bird count data:

Hayman, P., Riley, G., Austin, M., & Rondel, G. 1996. *RSPB/English Nature Breckland stone curlew protection report - 1996.* RSPB unpublished report.

Morris, A., Burges, D., Fuller, R.J., Evans, A.D., & Smith, K.W. 1994. The status and distribution of nightjars *Caprimulgus europaeus* in Britain in 1992. A report to the BTO. *Bird Study* 41: 181-191.

Wotton, S.R. & Gillings, S. 2000. The status of breeding woodlarks *Lullula arborea* in Britain in 1997. *Bird Study* 47(2): 212-224.

Non-qualifying species of interest: The pSPA regularly supports small numbers (less than 1% of the GB population) of wintering Hen Harrier *Circus cyaneus* and breeding Goshawk *Accipiter gentilis*, both of which are listed in Annex 1 of the Birds Directive.

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Citation

County: Norfolk and Suffolk **Site name: Breckland Forest SSSI**

District: Forest Heath, St Edmundsbury, Breckland, Kings Lynn and West Norfolk

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended)

Local Planning Authority: Suffolk County Council, Norfolk County Council, Forest Heath District Council, St Edmundsbury Borough Council, Breckland District Council, Kings Lynn and West Norfolk Borough Council

National Grid Reference: TL819839 **Area:** 18,188.91 (ha)

Ordnance Survey Sheet 1: 50 000: 143, 144, 155

Ordnance Survey Sheet 1: 10 000: TF71SE, TF70NE, TF70SE, TF80NW, TF80SW, TL79NE, TL79SE, TL79SW, TL78NE, TL78SE, TL78NW, TL77NW, TL77NE, TL77SW, TL77SE, TL89NW, TL89SW, TL89SE, TL88NW, TL88NE, TL88SW, TL88SE, TL87NW, TL87NE, TL87SW, TL87SE, TL99SW, TL98NW, TL98NE, TL98SW, TL98SE

Date Notified (Under 1949 Act): Not applicable

Date Notified (Under 1981 Act): 15 November 2000

Reasons for Notification:

The clear fell areas and young plantations within Breckland Forest SSSI provide suitable breeding habitat for woodlark *Lullula arborea* and nightjar *Caprimulgus europaeus*, which occur in internationally important numbers.

Breckland Forest supports five vascular plants listed on Schedule 8 of the Wildlife and Countryside Act: perennial knawel *Scleranthus perennis* subsp. *prostratus* (an English endemic restricted to the East Anglian Breckland), red-tipped cudweed *Filago lutescens*, maiden pink *Dianthus armeria*, Breckland mugwort *Artemisia campestris* and spiked speedwell *Veronica spicata* subsp. *spicata*, the last of which was introduced at this site but within the UK is restricted to Breckland. The forest also supports an important assemblage of Nationally Rare and nationally scarce vascular plant species , a number of which are largely restricted to East Anglia and occupy habitats characteristic of Breckland.

Breckland Forest SSSI also supports an exceptionally rich invertebrate fauna with Red Data Book and nationally scarce species across most taxonomic groups that have been studied.

A mammal species associated with the conifer plantations is the red squirrel *Sciurus vulgaris*. Although the population is small it is the only one extant in East Anglia.

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Within Breckland Forest SSSI are three important geological areas, formerly notified as separate SSSIs. Warren Hill, High Lodge and Beeches Pit all provide evidence for interpreting and understanding the links between the geography, climate, environment and human history of East Anglia during the Middle Pleistocene.

General Description

Breckland Forest SSSI lies between Bury St Edmunds in Suffolk and Swaffham in Norfolk. The majority of the site is within Thetford Forest Park, the largest commercial forest in lowland England. Breckland is characterised by its climate and its soils. Its climate is described as semi-continental, being the driest region of the British Isles and subject to great extremes of temperature. The soils are complex, but are typically very sandy free-draining mixes of chalk, sand, silt, clay and flints.

Planting of the site with conifers began in 1922. Prior to this the land was mainly Breckland heath, unstable sand dunes and marginal agriculture. Corsican pine *Pinus nigra* subsp. *laricio* is the dominant species comprising over 70% of all plantings. Scots pine *P. sylvestris*, Douglas fir *Pseudotsuga menziesii* and larch *Larix* spp. also feature in the forest and ten percent of the trees are broadleaves. The majority of the initial plantings reached the end of their first rotation in the mid 1970s. Since then the harvesting of these and subsequent plantings has created a continuous supply of clear-felled areas and young plantations which are suitable as breeding territories for woodlark and nightjar, which occur in internationally important numbers.

The SSSI regularly supports small numbers (less than 1% of the GB population) of goshawk *Accipiter gentilis*.

In addition to the important assemblage of Schedule 8 species the SSSI supports a further five Nationally Rare (Red Data Book) and eleven nationally scarce vascular plant species. A number of these are largely restricted to East Anglia and occupy habitats which are characteristic of Breckland. In the forest many of them are confined to field edges and tracksides, on grassy banks and along open rides where remnants of characteristic Breckland grass-heath habitats survive. An example is Breckland thyme *Thymus serpyllum* which occurs in short Breckland grass-heath swards, usually rabbit or sheep grazed. However a few species such as tower mustard *Arabis glabra*, and dense silky-bent *Apera interrupta* colonize open ground within the main plantation blocks following clear-felling or other disturbances. Species such as smooth rupturewort *Herniaria glabra*, mossy stonecrop *Crassula tillaea* and purple-stemmed cat's tail *Phleum phleoides* also favour open, disturbed areas on drought prone sandy or stony soils.

Breckland Forest supports an exceptionally rich invertebrate fauna with Red Data Book and Nationally scarce species across most taxonomic groups that have been studied. At least 37 Red Data Book species and 129 nationally scarce species have been recorded from various parts of the forest. They mainly occupy remnants of habitats which have survived afforestation such as dry grassland, wetlands and temporary pools

A mammal species associated with the conifer plantations is the red squirrel *Sciurus vulgaris*. Although the population is small it is the only one extant in East Anglia.

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Within Breckland Forest SSSI are three important geological areas, formerly notified as separate SSSIs. Warren Hill, High Lodge and Beeches Pit all provide evidence for interpreting and understanding the links between the geography, climate, environment and human history of East Anglia during the Middle Pleistocene. Between them the three sites provide evidence of conditions prior to and after the Anglian glaciation in this area and contribute to an overall understanding of this period of time in Britain. These sites will continue to be of importance in future research on the Pleistocene of East Anglia.

The sequence at Warren Hill is divided into two units; the Warren Hill Sands and Gravels (of variable thickness) and the Warren Hill sands and silts (over 4.6m thick). Clast lithological analysis is important in the interpretation of the gravels at this site. Early workers interpreted the deposits as being glacial in origin, but the absence of characteristic Anglian lithologies such as *Rhaxella* chert, indicates that the deposits were not laid down under glacial conditions. The presence of quartzite, quartz and Carboniferous chert indicates that the deposits may be the product of the river system that deposited the Ingham sand and gravels to the east. This, coupled with the bedding structures and coarse gravels, lends support to the idea of a larger river flowing from the Midlands, across the present Fen Basin and East Anglia into the North Sea. This was the Bytham, or Ingham River.

High Lodge is a small clearing in Mildenhall Woods about 3km east of Mildenhall. This classic site has been the subject of a number of investigations and is of great importance both for its relevance to the interpretation of the Pleistocene succession of the area and evidence for the presence of man in Britain prior to the Anglian Glaciation. Chronologically, the succession starts with clays containing organic material of lacustrine origin (High Lodge Clayey Silts and High Lodge Sands). These have been deformed by glacial processes. Physically underlying the lacustrine sequence is a lodgement till belonging to the Anglian Glaciation. The lacustrine clays are overlain by sands and gravels of a fluvio-glacial origin (Mildenhall Sands and Gravels) and a till which is lithologically identical to the lodgement till. The lacustrine clays have provided a pollen assemblage indicative of cool-temperate conditions. Evidence from fossil insect faunas complement the pollen evidence. Fossil vertebrate remains from the clays include *Dicerorhynus* and *Palaeotoxodon*. Artifacts recovered from the clay provide evidence for the presence of pre-Anglian humans in Britain. The deformation of the these deposits during the Anglian Glaciation, makes their interpretation controversial, and this remains a key site with much further research potential.

Beeches Pit is a small, disused brick pit situated in a plantation close to the village of West Stow, about 8km northwest of Bury St Edmunds.

Beeches Pit has been the subject of several excavations. Several metres of sediments are present, and these include tufa, calcareous silts, organic clays and sands. The relationships between these sediments are complicated by rapid lateral changes and the interdigitation of different units, but they rest on a chalky till. A fossil molluscan fauna occurs in the tufa and other sediments. The faunal composition suggests that the tufa formed in a temperate forest with deep water nearby. This fauna is exceptional in being composed of taxa which are either extinct, or whose modern ranges do not overlap today. Fossil vertebrates including fish, amphibians and mammals are present. This fauna is compatible with the environmental interpretation deduced from the molluscs, and the presence of the water vole (*Arvicola cantiana*), the pine vole (*Pytymys subterraneus*) and the auroch (*Bos primigenius*) indicate that the sediments were deposited during the Hoxnian interglacial. A number of artifacts have also been found which date to the Hoxnian interglacial. An uranium- series date indicates that the tufa is over 300,000 years old, and which is consistent with the age indicated by the vertebrates.

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Other information

Woodlark and goshawk are specially protected by being listed on Schedule 1 of the Wildlife and Countryside Act 1981(as amended).

Nightjar, woodlark and goshawk are included on Annex 1 of the European Communities Directive 79/409/EEC on the Conservation of Wild Birds.

Perennial knawel, Breckland mugwort, maiden pink, red-tipped cudweed and spiked speedwell are specially protected by being listed on Schedule 8 of the Wildlife and Countryside Act 1981(as amended).

Perennial knawel, maiden pink, red-tipped cudweed, tower mustard, red squirrel, nightjar and woodlark are priority species of the UK Biodiversity Action Plan.

Warren Hill, High Lodge Mildenhall and Beeches Pit are sites which have been selected by the Geological Conservation Review (GCR).

Beeches Pit SSSI previously notified (under 1981 Act): 1988
High Lodge, Mildenhall SSSI previously notified (under 1949 Act): 1971
(under 1981 Act): 1986
Warren Hill SSSI previously notified (under 1981 Act): 1997

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Operations likely to damage the features of special interest

Site name: **Breckland Forest**
County: **Norfolk and Suffolk**

This is a list of all operations which could possibly damage the interest features in this site of special scientific interest. The list covers the whole site although some of the operations may be damaging only on parts of the site or at particular times of year or if carried out in particular ways.

The list of operations is not a list of prohibited activities. However, the law requires you to give written notice to English Nature before any of these operations is undertaken on your land. This allows us to discuss the proposals with you and consider their effects on the features of interest. In some cases the proposals will be damaging and in other circumstances they will be beneficial.

Enclosed is a form for you to use if you need to tell us about any operations which are proposed on your land and for which you would like consent. Further advice can be found in the enclosed booklet.

Standard Ref No	Type of Operation
1.	Cultivation, including ploughing, rotovating, harrowing and re-seeding.
2.	The introduction of grazing and alterations to the grazing regime (including type of stock, intensity or seasonal pattern of grazing).
3.	The introduction of stock feeding and alterations to stock feeding practice.
4.	Mowing or cutting vegetation, the introduction of mowing and alterations to the mowing or cutting regime.
5.	Application of manure, slurry, silage liquor, fertilisers and lime.
6.	Application of pesticides, including herbicides (weedkillers) whether terrestrial or aquatic, and veterinary products.
7.	Dumping, spreading or discharge of any materials.
8.	Burning and alterations to the pattern or frequency of burning.
9.	Release into the site of any wild, feral, captive-bred or domestic animal*, plant, seed or micro-organism (including genetically modified organisms).
10.	Killing, injuring, taking or removal of any wild animal*, (including dead animals or parts thereof), or their eggs and nests, including pest control and disturbing them in their places of shelter.
11.	Destruction, displacement, removal or cutting of any plant or plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould, turf and peat.

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12. Tree and/or woodland management and alterations to tree and/or woodland management (including planting, felling, pruning and tree surgery, thinning, coppicing, changes in species composition, removal of fallen timber).

13a. Drainage (including moor-gripping, the use of mole, tile, tunnel or other artificial drains).

13b. Modification of the structure of watercourses (rivers, streams, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, regrading, damming or dredging.

14. Alterations to water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes). Also the modification of current drainage operations.

15. Infilling or digging of ditches, dykes, drains, marshes and ponds.

20. Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, and spoil.

21. Destruction, construction, removal, rerouting, or regrading of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, including soil and soft rock exposures or the laying, maintenance or removal of pipelines and cables, above or below ground.

22. Storage of materials.

23. Erection of permanent or temporary structures or the undertaking of engineering works, including drilling.

24a. Modification of natural or man-made features and clearance of boulders, large stones, loose rock or scree.

24b. Battering, buttressing or grading of geological exposures.

26. Use of vehicles.

27. Recreational activities.

28 Game management and hunting practices and alterations to game management and hunting practice.

* "animal" includes any mammal, reptile, amphibian, bird, fish or invertebrate (including honey bees)

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Appendix B

Photographs

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Photo 1: Brandon Lock (Ch. 21.82 km)

Photo 2: A1065 Road Bridge, Brandon (Ch. 22.42 km)

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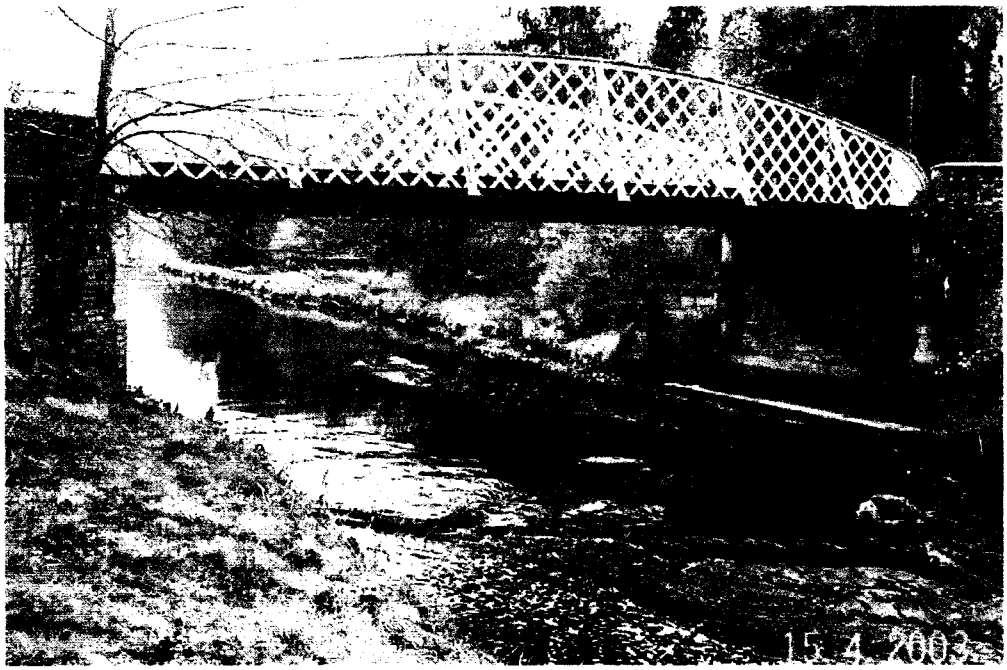

Photo 3: Santon Downham Road Bridge (Ch. 26.69 km)

Photo 4: Footbridge at Two Mile Bottom (Ch. 29.98 km)

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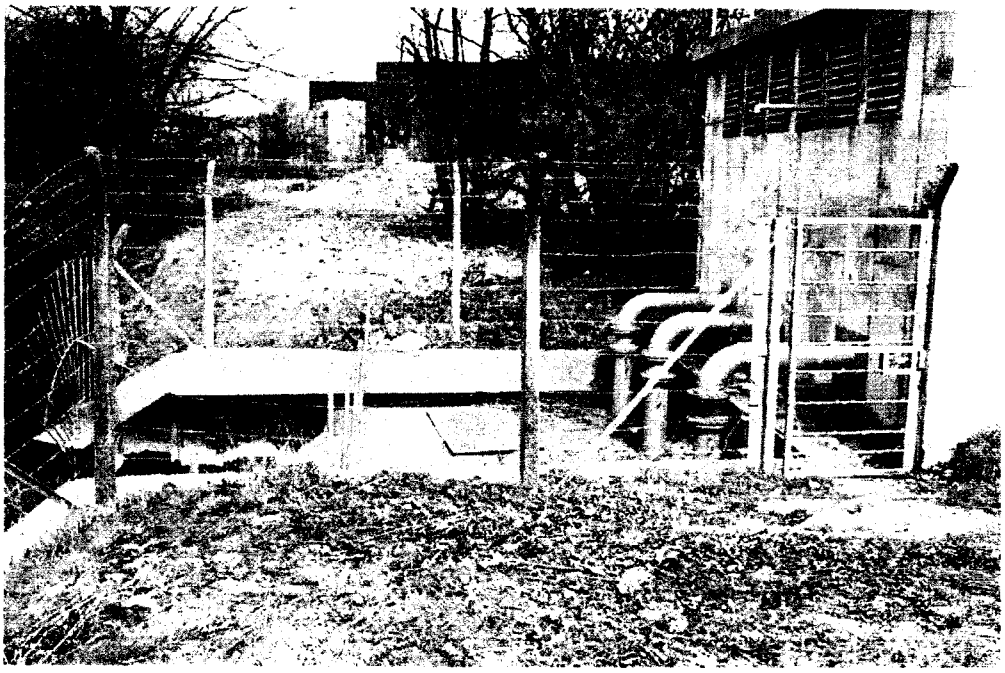

Photo 5: Breckland Growers Irrigation Pumping Station (Approx Ch. 30.8 km)

Photo 6: Abbey Heath Weir (Ch. 33.17 km)

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Photo 7: A11 Road Bridge, Thetford (Ch. 34.28 km)

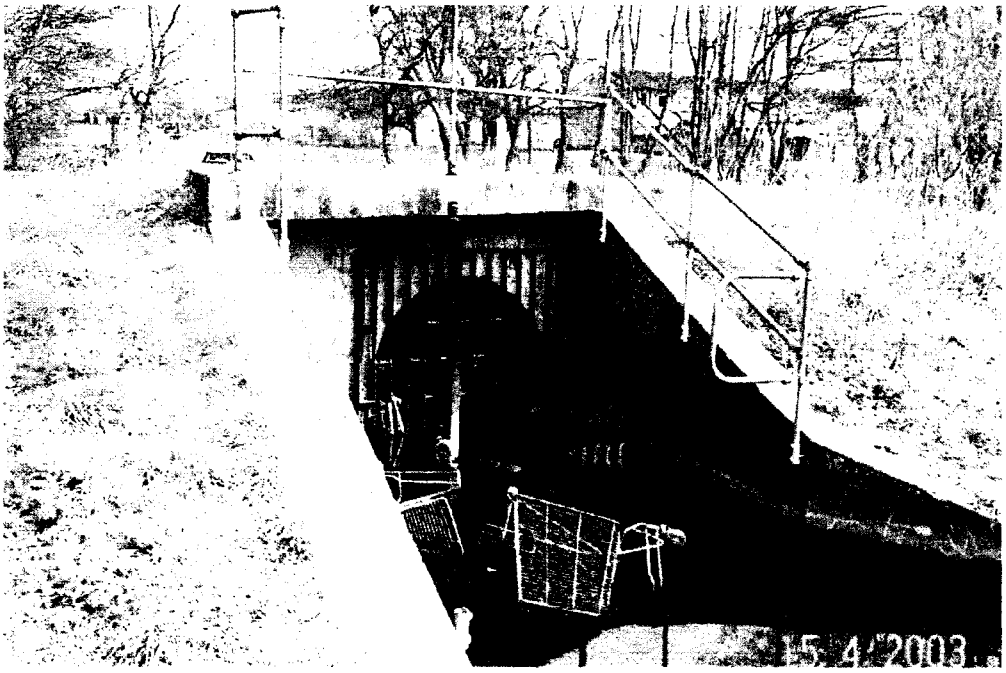

Photo 8: Surface Water Outfall (Ch 34.84 km)

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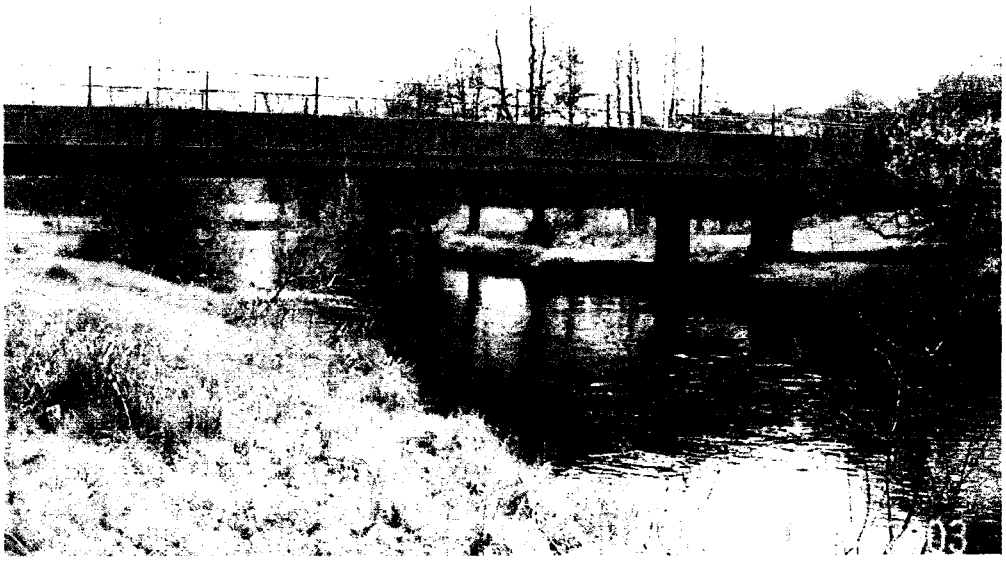

Photo 9: Canterbury Way Road Bridge, Thetford (Ch. 34.99 km)

Photo 10: Thetford No.1 Sluice (Ch.35.08 km)

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Photo 11: Footbrdge, Thetford (Ch. 35.35 km)

Photo 12: Old A11 Road Bridge, Thetford (Ch. 35.74 km)

Photo 13: Little Ouse River, Thetford looking upstream from Ch.35.80 km

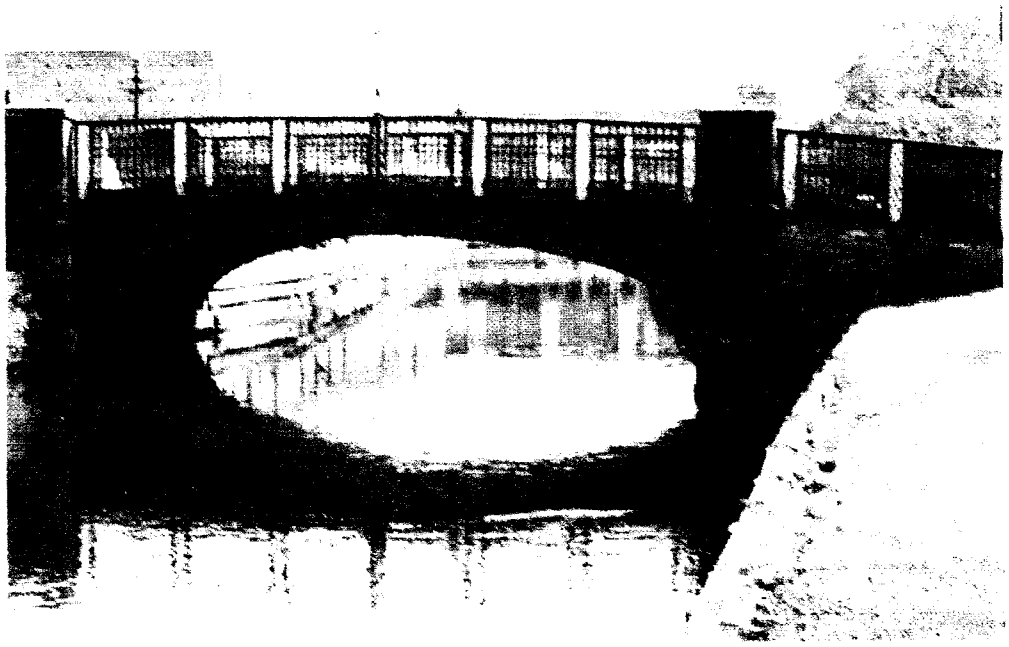

Photo 14: Bridge Street, Thetford (Ch. 35.95 km) – Proposed Limit of Navigation

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Appendix C

Works Required for Navigation

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Required Works to facilitate Navigation

Criteria: Minimum Depth of Water = 1.35m
Minimum Headroom = 2.70m
Lock Length: Existing lock at Brandon = 14m, Denver Standard = 30m.

** Minimum works required to achieve navigation in **bold**, Comments in *italic*.

New Strucures & Modifications to Existing Structures

Location	Proposed Works/Comments **
Brandon Sluice	**Existing head structure to be raised to accommodate minimum headroom** *Existing lock would need to be reconstructed to meet EA or Denver standard*
A1065 Road Bridge. Brandon	*Headroom OK over center 4.5m width. Arch springing levels below min headroom level*
Santon Downham Road Bridge	*Headroom OK – No modifications required*
Santon Downham	**New Lock and weir/sluice structure to be constructed**
Santon Park Footbridge	**Bridge to be raised**
Two Mile Bottom Footbridge	*Headroom OK at center of river but becomes restrictive near the banks due to the bridge profile.*
Two Mile Bottom	**New Lock and weir/sluice structure to be constructed**
Irrigation Pumping Station (LH bank)	*Not considered to be a problem – increased water level may remove current restrictions on abstraction.*
Abbey Heath Weir	**New Lock to be constructed**
A11 Road Bridge	*Headroom OK – No modifications required*
Thetford STW Outfall	*Consideration to be given to providing additional energy dissipation at outfall structure*
Abbey Heath Estate SW Outfall	*Consideration to be given to providing additional energy dissipation at outfall structure*
Canterbury Way Road Bridge	*Headroom OK – No modifications required*
Thetford No.1 Sluice	**New Lock to be constructed**
Footbridge upstream of Thetford No.1 Sluice	**Bridge to be raised**
Old A11 Road Bridge, Thetford	*Headroom OK – No modifications required*
Bridge Street, Thetford	**Boat turning area and moorings to be provided** *Proposed Limit of Navigation*

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Dredging Requirements

Location	Required Dredging	Estimated Volume (m3)
Brandon	Minimal Dredging Required	100
Santon Downham	Dredging required for approx 2.2 km downstream of Santon Downham Road Bridge, average depth 0.5m.	6600
Two Mile Bottom	Dredging required for approx 350m downstream of Two Mile Bottom Footbridge, average depth 0.3m.	600
Abbey Heath Weir	Dredging required for approx 1.0 km downstream of Abbey Heath Weir, average depth 0.4m.	2400
Thetford No.1 Sluice	Dredging required for approx 600m downstream of Thetford No.1 Sluice, average depth 0.5m.	1800
Thetford Town Centre	Minimal Dredging Required	100
Total Estimated Volume:		**11600**

Note: Estimated volumes based on 6m wide channel.

Raising of River Banks

Location	Sections of Bank to be Raised	Approx Length (m)
Brandon to Santon Downham	No works required	0
Santon Downham to Two Mile Bottom	LH bank immediately upstream of Santon Downham Road Bridge and proposed lock location, and RH bank near Little Lodge Farm	700
Two Mile Bottom to Abbey Heath Weir	LH bank immediately upstream of Two Mile Bottom Footbridge and LH bank downstream of Abbey Heath Weir	900
Abbey Heath Weir to Thetford Town Centre	No works required	0
Total Length of Bank works:		**1600**

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Appendix D

Cost Estimates

Cost Estimates for Navigation Proposals (Base Option – 1B)

Item	Description	Estimate (£)
1	Existing head gate structure at Brandon Lock to be raised	20000
2	1500 m3 Excavation for Santon Downham Lock & Weir structure	45000
3	Construction of 22m L x 4.3m W x 3m D Lock at Santon Downham	800000
4	Construction of 10m wide Weir/Sluice structure at Santon Downham, incorporating separate weir and sluice gate.	150000
5	Raising of existing Santon Country Park Footbridge	40000
6	1500 m3 Excavation for Two Mile Bottom Lock & Weir structure	45000
7	Construction of 22m L x 4.3m W x 3m D Lock at Two Mile Bottom	800000
8	Construction of 10m wide Weir/Sluice structure at Two Mile Bottom, incorporating separate weir and sluice gate.	150000
9	Excavation and construction of new 80m L x 6m W x 1.5m D navigation bypass channel around Abbey Heath Weir	50000
10	Construction of 22m L x 4.3m W x 3m D Lock at Abbey Heath	800000
11	Modify existing SW outfall headwall to incorporate energy dissipation	10000
12	Excavation and construction of new 80m L x 6m W x 1.5m D navigation bypass channel around Thetford No.1 Sluice	50000
13	Construction of 22m L x 4.3m W x 3m D Lock at Thetford	800000
14	Raising of existing Footbridge at Thetford	40000
15	Dredging of Little Ouse river (11600 m3)	350000
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	700000
	Total (Option 1B):	**4950000**

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	1100000
20	Additional cost to provide 30m long Locks at Santon Downham, Two Mile Bottom, Abbey Heath and Thetford.	600000
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

82/10) Revises these figures slightly

Summary Totals:

Option	Calculation	Estimate (£)
Option 1B	(as calculated above)	4950000
Option 2B	As Option 1B (-20000 + 900000)	5830000
Option 3B	As Option 1B (-20000 + 1100000 + 600000)	6630000

83/107 Revises these figures

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Appendix E

Working Group Consultation

Notes of meeting from Working Group
24/4/03 and 2/7/03

91/107

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92/107

Notes of Meeting

Babtie Brown & Root

Babtie Brown & Root JV
8 The Square
Martlesham Heath
Ipswich
Suffolk
IP5 3SL
Tel: 01473 624326
Fax: 01473 623021

Client:	Environment Agency
Job title:	Brandon to Thetford Navigation
Purpose of meeting:	Project Group Meeting
Date of meeting:	2 July 2003
Place of meeting:	Thetford
Ref:	0006077/1/3038
Date of Distribution:	18 July 2003

Present		**Copies**
Andy Bennison (AB)	Envionment Agency (EA)	Yes
Nick Gibbons (NG)	Forest Enterprises (FE)	Yes
Alan Faulkner (AF)	East Anglian Waterways Association (EAWA)	Yes
Bob Wells (BW)	Great Ouse Boating Association (GOBA)	Yes
Derek Bradley (DB)	Inland Waterways Association (IWA)	Yes
Tony Jones (TJ)	Keystone Community Partnership (KCP)	Yes
Richard Beck (RDLB)	Babtie Brown & Root (BBR)	
Kay Siddall (KS)	Babtie Brown & Root (BBR)	Yes
		File
		Vicky Stone, Brecks Countryside Project
		Sarah Antony, English Nature

Item	**Minute**	**Action by**
1.0	The main points from the draft report on the feasibility of reopening the navigation on the Little Ouse between Brandon and Thetford were presented. The updates since the last meeting of 24 April 2003 were:	
1.1	Area designated as SAC has been corrected to reflect new citations.	
1.2	Area of potential environmental enhancement has been identified with Forest Enterprise; these show area (particularly of Alder Carr, Fen grazing or popular) which are likely to be improved by raised water levels.	
1.3	Engineering proposals for navigation have been examined two standards. The lower standard would only extend the existing standard at Brandon Lock (1.2m depth and 2m headroom) while a second higher standard would require Brandon Lock itself to be enlarged. The lower standard would probably need four locks, the higher standard, 5. Bridges to be raised included one at Stanton and a footbridge in Thetford.	

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95 Bothwell Street
Glasgow
G2 7HX

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Registered Office
Hill Park Court
Springfield Drive
Leatherhead
Surrey KT22 7NL

93/107

6/73

Item	Minute	Action by
2.0	**Discussion on Draft Proposals**	
2.1	The headroom at the cut off channel was being raised (from the existing 2.1m to 3m). This would mean that the height restriction below Brandon would now be the railway bridge (2.7m). This height would be adequate for a full standard in the future. General standard of 1.2m – 1.35m depth with 2.7m headroom was seen as acceptable.	
2.2	Concern about Brandon Lock was its length (currently about 14 metres). Many boats are longer than 33 – 37 feet, and 50 or more is not uncommon. Andy Bennison to send BBR results of recent survey on boat lengths, depths and heights, and details of EA's standard lock design.	**EA (AB)**
2.3	Discussion on planning gain opportunities would be arranged with Roger Vallentine by AB in week commencing 22 July 2003.	**EA (AB)**
3.0	Draft report on current proposals, without economic appraisal would be issued to EA in two weeks.	

Minutes by Richard Beck

Appendix F

Abstraction Licence Summaries

99/107

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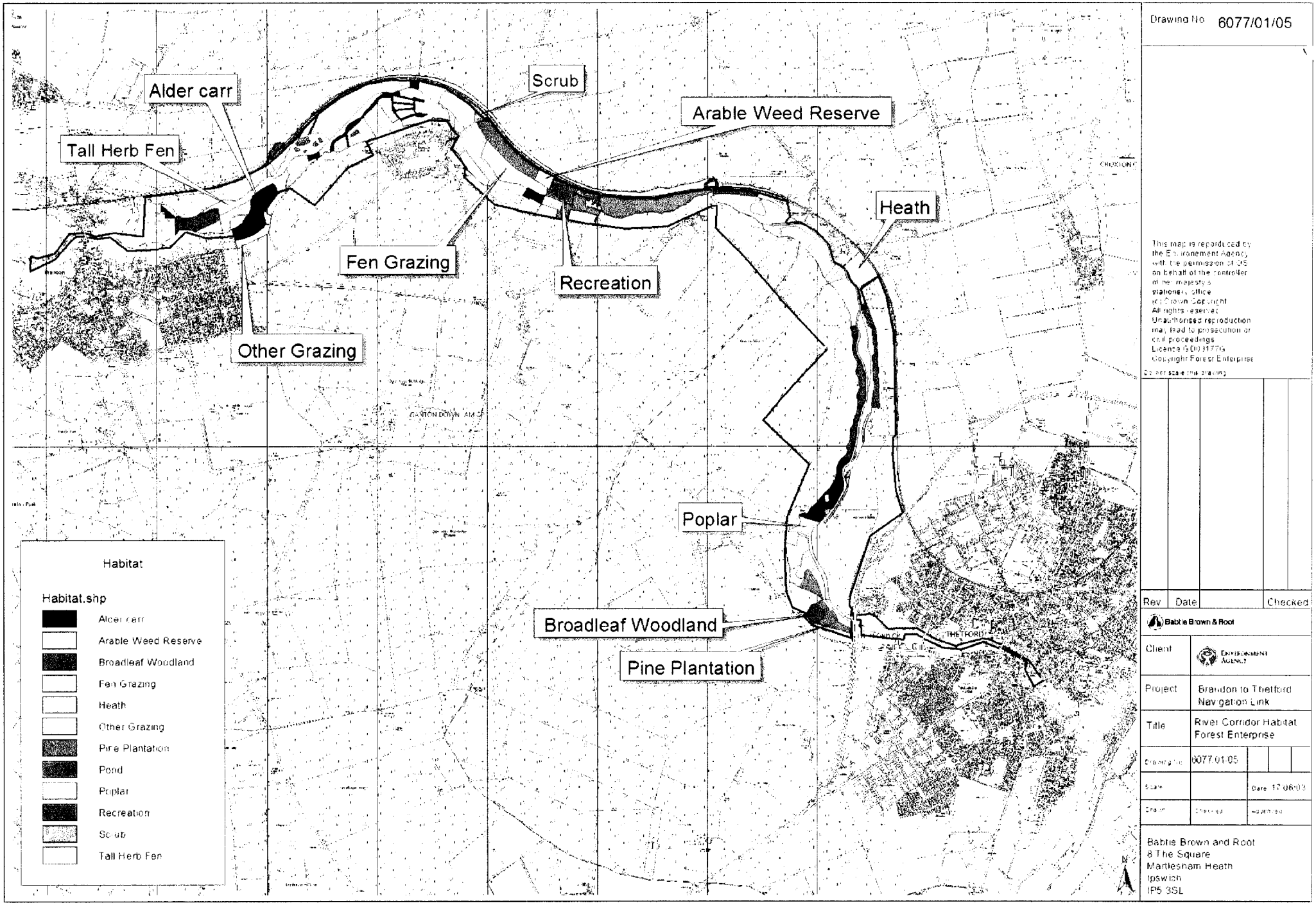
Drawings

0006077/01/01	-	Study Area
0006077/01/02	-	SSSI's
0006077/01/03	-	SAC's
0006077/01/04	-	Current Structures and Preferred Lock Locations, Forest Enterprise
0006077/01/05	-	River Corridor Habitat, Forest Enterprise
0006077/01/06	-	Potential Enhancement Areas, Forest Enterprise
0006077/01/07	-	Scheduled Ancient Monuments
0006077/D2/08	-	Historic Staunches and Existing Weirs
0006077/D2/09	-	Navigation Proposals – Plan & Longsection



Drawing No 6077/01/05

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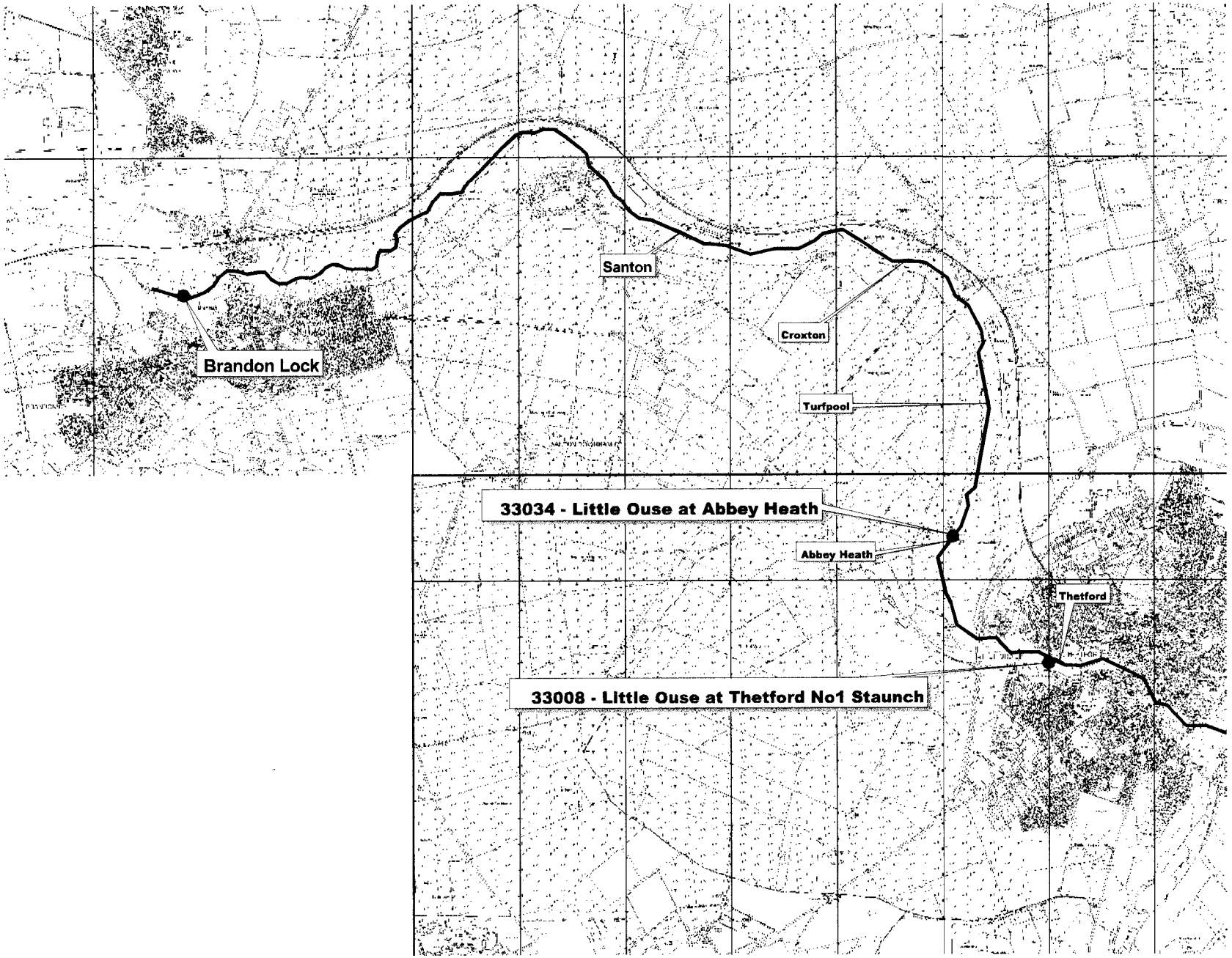
Rev	Date		Checked

Babtie Brown & Root

Client	Environment Agency
Project	Brandon to Thetford Navigation Link
Title	River Corridor Habitat Forest Enterprise
Drawing No	6077/01/05
Scale	Date 17/06/03
Drawn	Checked Approved

Babtie Brown and Root
8 The Square
Martlesham Heath
Ipswich
IP5 3SL



Drawing No.
006077/D2/08

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Rev	Date	Checked

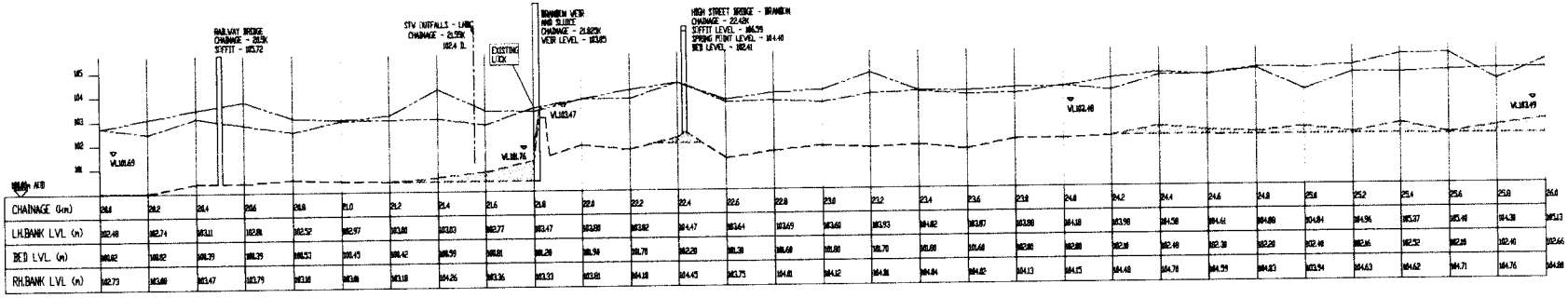
Babtie Brown & Root

Client	Environment Agency
Project	Brandon Thetford Navigation
Title	Historical Staunches and Current Weirs
Drawing No.	006077/D2/08
Scale	1:50000 at A4
Date:	17/7/03
Drawn by:	rb
Checked:	jre
Approved:	rdlb

N

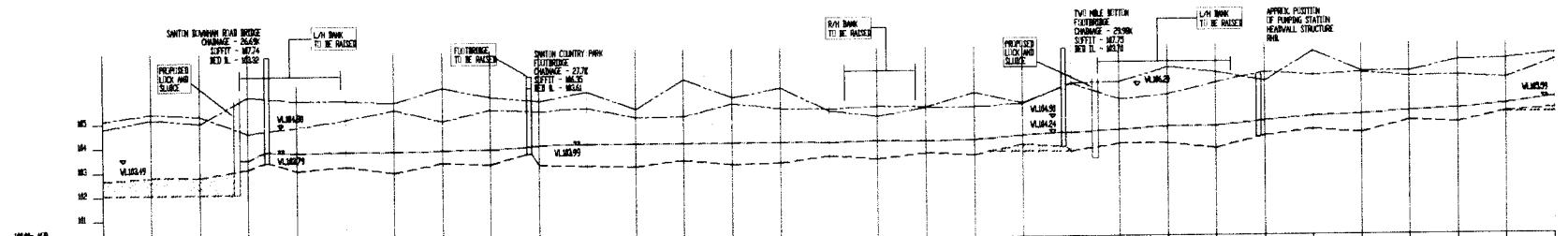
Babtie Brown and Root
8 The Square
martlesham Heath
Ipswich IP5 3 SL

j:\projects\xxxxxx\xxxxxx\xxxxxx\xxxxxx.apr



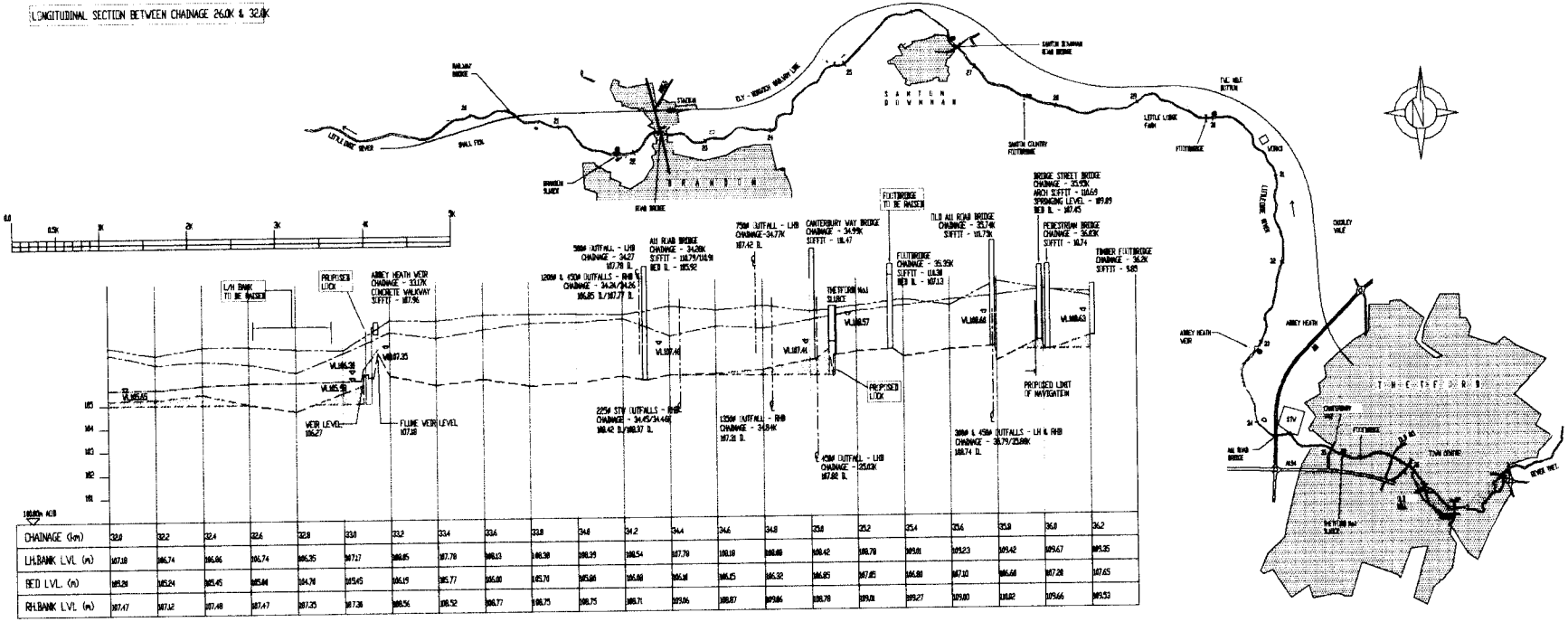
100.00m AOD																												
CHAINAGE (km)	20.0	20.2	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.4	22.6	22.8	23.0	23.2	23.4	23.6	23.8	24.0	24.2	24.4	24.6	24.8	25.0	25.2	25.4	25.6	25.8	26.0
LH.BANK LVL (m)	102.48	102.74	103.11	102.84	102.52	102.97	103.00	103.03	102.77	103.47	103.80	103.82	104.47	103.64	103.69	103.68	103.93	104.02	103.87	103.98	104.18	103.98	104.58	104.44	104.88	104.84	104.96	105.37	105.46	104.28	105.13
BED LVL (m)	100.62	100.82	100.39	100.29	100.53	100.45	100.42	100.59	100.81	100.28	100.34	100.78	100.28	100.38	100.68	101.00	101.78	101.00	101.48	102.00	102.00	102.16	102.48	102.38	102.26	102.48	102.46	102.52	102.28	102.48	102.66
RH.BANK LVL (m)	102.73	103.00	103.47	103.79	103.16	103.08	103.18	104.26	103.36	103.33	103.81	104.18	104.45	103.75	104.01	104.12	104.31	104.84	104.82	104.13	104.15	104.48	104.78	104.59	104.83	103.54	104.63	104.62	104.71	104.76	104.88

LONGITUDINAL SECTION BETWEEN CHAINAGE 20.0K & 26.0K



100.00m AOD																												
CHAINAGE (km)	26.0	26.2	26.4	26.6	26.8	27.0	27.2	27.4	27.6	27.8	28.0	28.2	28.4	28.6	28.8	29.0	29.2	29.4	29.6	29.8	30.0	30.2	30.4	30.6	30.8	31.0	31.2	31.4	31.6	31.8	32.0
LH.BANK LVL (m)	105.13	105.42	105.38	104.57	104.88	105.18	105.38	105.06	105.48	105.38	105.01	105.88	105.11	105.62	105.29	105.36	105.43	105.41	105.97	105.52	106.38	105.64	105.84	106.32	106.75	106.98	106.70	106.52	106.56	106.44	107.18
BED LVL (m)	102.66	102.86	102.78	103.18	103.48	103.18	103.28	103.29	103.15	103.10	103.45	103.38	103.15	103.42	103.27	103.58	103.48	103.84	103.58	103.88	103.82	103.68	104.18	104.35	104.28	104.78	104.68	105.65	105.28	105.47	
RH.BANK LVL (m)	104.88	105.18	105.68	106.18	105.89	105.88	106.28	105.99	105.86	106.18	105.42	106.65	105.87	106.25	105.27	105.84	105.37	105.29	105.51	106.33	106.37	106.96	106.75	106.37	107.59	106.74	106.74	107.28	107.23	107.47	

LONGITUDINAL SECTION BETWEEN CHAINAGE 26.0K & 32.0K



100.00m AOD																												
CHAINAGE (km)	32.0	32.2	32.4	32.6	32.8	33.0	33.2	33.4	33.6	33.8	34.0	34.2	34.4	34.6	34.8	35.0	35.2	35.4	35.6	35.8	36.0	36.2						
LH.BANK LVL (m)	107.18	106.74	106.96	106.74	106.35	107.17	106.85	107.78	108.13	108.38	108.39	108.54	107.78	108.18	108.48	108.42	108.78	108.81	109.23	109.42	109.67	109.35						
BED LVL (m)	105.28	105.24	105.45	105.68	104.78	105.45	106.19	105.77	106.00	105.78	105.86	106.08	106.38	106.25	106.32	106.95	107.05	106.80	107.10	106.66	107.28	107.65						
RH.BANK LVL (m)	107.47	107.62	107.48	107.47	107.25	107.28	106.56	106.52	106.77	106.75	106.71	105.06	106.87	105.86	106.78	105.81	105.27	105.80	105.80	106.82	105.66	105.53						

LONGITUDINAL SECTION BETWEEN CHAINAGE 32.0K & 36.2K

Drawing Number

0006077/D2/09

LEGEND (FOR SECTION)

- RH.BANK
- LH.BANK
- BED
- EXISTING WATER LEVEL WAS SURVEYED WHERE DIFFERENT TO PROPOSED
- PROPOSED WATER LEVEL
- PROPOSED DREDGING

LEGEND (FOR PLAN)

- BUILT-UP AREAS
- POSITION OF LOCK

NOTES

1. ALL LEVELS RELATE TO SOUTH LEVEL DATUM ie. 100m.S.L.D = 0m AOD.
2. EXISTING LEVELS FROM NRA/BANDALL CROSS-SECTION SURVEY DRAWINGS
   ER/09/82/107 - 125 INC. DATED JAN 1991
   ER/09/83/101 - 109 INC. DATED DEC 1990.
3. PROPOSALS BASED ON A NAVIGATION STANDARD OF NRA 1.35m DRAFT AND NRA 2.7m HEADROOM.

Do not scale this drawing

Rev	Date		Drn

Babtie Brown & Root

Client	(ENVIRONMENT) AGENCY)
Project	LITTLE OUSE NAVIGATION (BRANDON - THETFORD)
Title	NAVIGATION PROPOSALS PLAN AND LONGSECTION
Drawing No.	0006077/D2/09
Scale As Noted	1:10,000 Horiz. / 1:100 Vert.
Date	18/07/03
Drawn	RAC
Checked	JRE
Approved	A.R.

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