



**Horncastle and Tattershall/ Coningsby Canal  
Heritage (H.A.T.C.H)**

*Horncastle & Tattershall Canal*

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**Feasibility Study – Executive Summary**

**April 2005**

**Client Ref:**  
**Project Ref:**  
**Report No:**  
**Version:**

**104B058**  
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## EXECUTIVE SUMMARY

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### Purpose of Brief

Bullen Consultants was appointed by Horncastle and Tattershall Canal Heritage (HATCH) to investigate the technical requirements of restoring Horncastle and Tattershall Canal back to a fully operational canal. Several difficulties are faced with the restoration of the canal, as the canal has not been operational since the early 1900's.

The extent of the River Bain included in this study is from the Bain/ Waring confluence in Horncastle to the confluence of the River Witham and River Bain, south of Tattershall at Dogdyke. This study does not include the sections of canal into Horncastle up to the north and south basins.

This study has investigated these issues, which include water supply, flooding and environmental impacts, to determine if the restoration is technically feasible. A cost estimate of the restoration works was required to determine how much funding would be required to restore the canal.

### Public Consultation

As part of the feasibility study a preliminary consultation was undertaken with local residents/landowners as well as with relevant organisations, such as the Environment Agency. This consultation process was to gauge people's opinion of the scheme to determine whether they were in favour or against the restoration of the canal.

From the consultations undertaken the majority of responses were in favour for the restoration however, there were some reservations regarding the scheme and these are listed below.

- **Environmental Impacts** – Concerns were raised over the affect the restoration would have on the ecology of the area and the pollution from boats.
- **Flooding Issues** – The risk of flooding in the area of the River Bain should not be increased with the restoration of the canal.
- **Construction/ Maintenance of the Canal** – Disruption to the local residents during the restoration works and the affects it will have on land drainage.
- **Financial Concerns** – Comments were received regarding who will finance the scheme and would it be an on-going cost for the Local Authority.

The majority of these concerns have been addressed within the feasibility report with the exception of the financial comments, as this was not part of the brief.

## Water Resources

Water resources have been investigated in three main sections, these are the existing water requirements, predicted demand for water for navigation, and how to supply this water to the canal.

The existing water requirements include the abstractions from the canal and the recent Catchment Abstraction Management Strategy (CAMS) that had been undertaken by the Environment Agency for the Witham catchment. The compensation water required for the Old River Bain channel was also considered as part of the existing demand for water.

The water demand for navigation was determined by estimating the number of boat trips on the canal to calculate the number of lock operations and the leakage rate. The predicted number of boat trips was estimated by investigating the surrounding canal infrastructure and the number of boats that currently used the River Witham. Future improvements to the canal infrastructure, such as the extension of the Kyme Eau navigation and the new Fen Waterway Link; were taken into consideration. It was calculated that it would take approximately one day to travel from Dogdyke to Horncastle so the navigation would make a weekend trip. Future growth of the canal traffic has been taken into consideration and has been assumed to be in the region of 2% over the next ten years.

Taking all these factors into consideration, the estimated number of boat trips on Horncastle and Tattershall Canal is 2000 trips per annum. This figure is dependant on the Fenland Link being constructed, as this will open up Lincolnshire's waterways to a wider canal network.

It was assumed that one lock full of water would be used for each trip along the canal, irrespective of the length of the canal travelled. From this it was estimated that the number of lockages used per year would be 1429 and this equates to  $404,646\text{m}^3$ . The leakage of the canal was estimated by using the nationally accepted figure of  $1.75\text{MI}/\text{km}/\text{wk}$ . However the leakage figure was rationalised as it was thought that it was excessive for the parts of the canal that had been specifically constructed as a canal and lined with puddle clay. Therefore it was decided to use half the figure for leakage so the overall total required for leakage is  $644,000\text{m}^3$  per year. Hence the total water demand for navigation is just over 1 million  $\text{m}^3$  of water.

The water demand for the navigation equates to 50 litres per second (l/s) and the recorded flow from gauging stations at Horncastle, Fulsby and Coningsby were analysed to determine periods of low flow. It was decided to keep the canal operational until a 20 year low event occurred when the canal would have to be closed. From the gauged data it was determined that the flow had fallen below 50l/s for 8 weeks during 20 years of record. This gave the length of time water had to be supplied from storage.

There are two options available for keeping the canal operational up to a 20 year low flow, these are storage of the whole volume required for an 8 week period or store a smaller amount and back pump the flow back to the top of the system.

## Flood Control

Major flood events that have affected Horncastle and the surrounding villages on the River Bain have occurred in 1920, 1960 and 1981. Horncastle currently floods at less than a 1 in 10 year return period event (10% annual probability) and Kirkby-on-Bain and Haltham flood at about the 1 in 10 year return period. Coningsby and Tattershall are more at risk from the River Witham flooding than the River Bain and it is estimated that these villages could be affected by flooding between a 1 in 25 years and 1 in 50 year return period event (between a 4% and 2% annual probability).

A flood alleviation scheme has been proposed for Horncastle to alleviate flooding up to the 1 in 100 year return period event (1% annual probability). This involves the construction of flood storage reservoirs upstream of Horncastle on both the River Bain and the River Waring. At present there are no known plans to implement a scheme for the villages of Kirkby-on-Bain and Haltham.

If the canal is restored then the risk of flooding to the surrounding properties and land should not be increased. The flood flows should be able to flow down the canal in a similar way as they do in the existing situation. Three main options have been identified that would allow the conveyance of flood flows down the canal. A bywash channel around the lock structure was identified as the most appropriate solution as it would allow the canal to be operational all year round and take into account the possibility of summer flooding. There should not be an increase in the risk to safety to boaters with a bywash during a flood event unlike the overtopping of the lock gates option. This risk to safety could be minimised by using flood warning devices, offline moorings for boats, or fenders in front of the by-wash weirs to stop boats being washed over the weirs.

## Restoration

The canal was spilt into four sections and these are:

- Confluence with the River Witham to Coningsby Lock
- Coningsby Lock to Kirkby-on-Bain
- Kirkby-on-Bain to Haltham Lock
- Haltham Lock to Horncastle

The confluence with the River Witham to Coningsby Lock section is the area with the most difficulties. It has been identified that one of the original routes of the canal, called Gibson's Cut, could not be restored due to developments since the canal's closure. These include a culvert underneath the A153 (Sleaford Road), which would need to be replaced with a bridge and the A153 road would need to be realigned.

The route from Dogdyke is currently the main channel of the River Bain from Coningsby to the confluence. However there are some issues with this route with regard to navigation and three options have been identified. The main difficulties with this section are the reduction in headroom at Butts Bridge and Tattershall Gauging Station. Three options have been identified but only two resolve all the difficulties associated with this section. The two main options are:

- Option A - Deepening the channel and underpinning the bridges,
- Option B - Raising Butts Bridge with dredging of the channel bed.

The third option is the same as the second option (of raising Butts Bridge) but does not include for the bridge raising and accepts a lower headroom requirement. All the options have major implications on the local residents and the ecology of the canal.

Between Coningsby Lock and Kirkby-on-Bain the restoration of the canal generally consists of refurbishment of the locks and remedial works to the banks and channel bed. There are two locks within this section that require refurbishment; these are Tumbly Lock and Fulsby Lock both of which need various amounts of restoration. Dredging is required throughout the length of this section to remove the build up of silt that has accumulated since the canal's closure. Linings of the canal may also be required but the extent is unknown without further investigations.

The next section of the canal consists of the area between Kirkby-on-Bain and Haltham Lock. At Kirkby-on-Bain the original alignment of the canal has been long since filled in so the route that the river takes at present is down an old mill race. It is not feasible to reinstate the original canal cut as a house has been recently constructed near the original alignment. For this section it is proposed to construct a new canal cut with a new lock to take the canal slightly further away from the village but within walking distance. The exact position of the new cut has not been decided as further investigations are required, especially into the ground conditions and landowner agreements. Haltham Lock has been highly modified and there are very few original features that still remain. The lock structure requires refurbishment and the concrete footbridge needs to be raised, as it does not have the required headroom.

Within the section between Haltham and Horncastle there are five locks that require refurbishment works, each with varying degrees of remaining traditional features. As well as the lock refurbishment, the canal's bed will require dredging and there is the possibility that it may require lining to reduce seepage.

A storage area has been proposed to the south of Horncastle to keep the canal operational during an exceptionally dry summer. The water would be stored over the winter months and used during the summer if required.

Winding holes and mooring site have been considered within the restoration works. The winding holes have been placed so that visitors have various options on the length of their voyage up or down the canal. Overnight mooring should be provided near the villages or places of interest. Off line mooring is preferred, as this would give the boats some protection if a flood event occurred on the canal.

The existing access to the canal has been investigated and there are several areas where improvements can be made. These include extending the tow path to cover the whole length of the canal and providing the possibility of circular walks to nearby villages, such as Woodhall Spa. The Disability Discrimination Act (DDA) should be taken into account when looking to improve the existing access as well as when providing new footpaths/ cycleways.

It is suggested that the construction and restoration works of the canal are phased to minimise the disruption to local residents. Before the canal is opened several safety issues also need to be considered, such as the safety of boaters during a flood event.

### **Environmental Issues**

Restoring the canal and subsequent recreational activities associated with the canal will have an impact on the existing natural and human environment. Restoration will result in impacts both during restoration and operation of the canal. Hence an Environmental Impact Assessment (EIA) is required to determine the impacts of the restoration and propose mitigation measures. A Scoping Report has been produced as the first stage of an EIA and provided information on key features and outlined the proposals for the canal. This document facilitated the consultation process with relevant organisations and individuals.

General mitigation measures for the ecology of the area are given in broad terms as survey work is required to determine the exact extents of the species present and then specific mitigation measures can be formulated. For example if water voles are located along the foreshore banks then these would be trapped and translocated and substantial habitat restoration and improvements could be made to encourage the establishment of the water voles.

As well as ecology the EIA would include the existing landscape, public use and human access, water resources and archaeology and cultural history. If there were any negative impacts caused due to the restoration of the canal then these would be highlighted for mitigation during construction and operational use of the canal.

### **Cost**

The cost of the proposed options for restoration was calculated using the geometry information gathered about the canal and the rates were generally obtained from the Civil Engineering Standard Method of Measurement 3 (CESMM3) Price Database 1999/2000. These rates were then adjusted to January 2005 prices by using the Retail Price Index (RPI). Rates not taken from CESMM3 were taken from relevant manufacturers or from similar project and have been adjusted for RPI where applicable. Below is a summary of the cost calculated for the restoration of Horncastle and Tattershall Canal

Location	Cost (£)
<b><i>Dogdyke to Coningsby</i></b>	
Deepening of channel	3,611,000
Raising bridges	3,846,000
Reduced headroom	2,676,000
<b><i>Coningsby to Horncastle</i></b>	
Refurbishment of eight locks	5,034,000
Kirkby-on-Bain canal cut	1,371,000
Dredging	1,565,000
<b><i>Water Supply Options</i></b>	
Storage area only	2,193,000
Pumping station and storage area	1,936,000
<b><i>Others</i></b>	
Land acquisition	104,000
<b>Total: raising bridges option and excluding lining)</b>	<b>14.6 million</b>
<b>Total: raising bridges option plus 50% of lining costs</b>	<b>20.1 million</b>
<b>Total: raising bridges option plus 100% of lining costs</b>	<b>25.6 million</b>

### **The Way Forward**

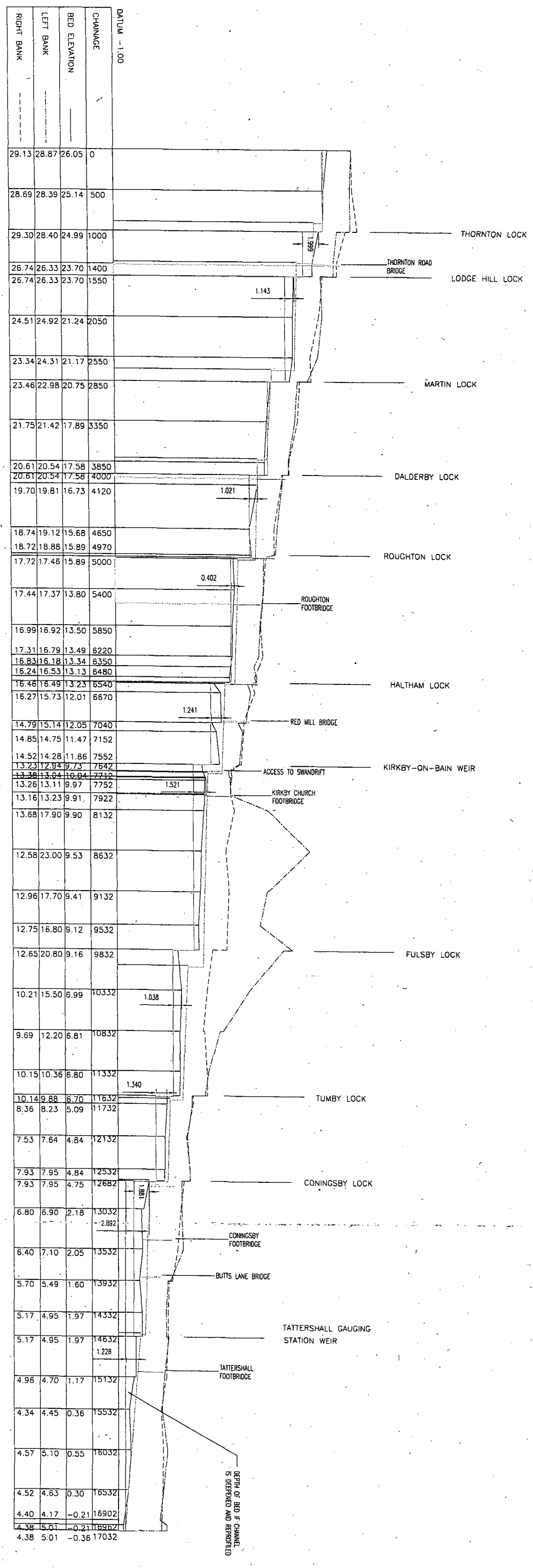
From this feasibility study it has been determined that the restoration of Horncastle and Tattershall Canal is practically feasible in terms of engineering works however it will cost between £20.1 million and £25.6 million. The next stage is to consider the legal and financial aspects of the scheme, such as who would maintain the navigation once it has been restored and to allow a comprehensive funding package to be negotiated. Once these issues have been resolved then detailed design can commence along with several detailed surveys of the site, including ground investigations and structural surveys of lock structures.

As mentioned previously the construction of the canal should be phased to reduce the impact on local residents and the environment. It is proposed that the restoration should start from Dogdyke to Coningsby and then work up to Horncastle in stages.

NOTES  
1. 1:50 VERTICAL SCALE THIS DRAWING.  
2. DIMENSIONS SHOWN ARE DEPTHS OF DRAINING IN EACH POINT.

KEY:  
1834 SURVEY  
1950 SURVEY  
MODEL SURVEY

MODEL SURVEY



REV	AMENDMENT	DWN	CHKD	APPR	DATE

**CLIENT**  
 HORNCASTLE AND TATTERSHALL  
 CANAL HERITAGE TRUST

**PROJECT**  
 HORNCASTLE AND TATTERSHALL  
 CANAL FEASIBILITY STUDY

**TITLE**  
 LONGITUDINAL SECTION

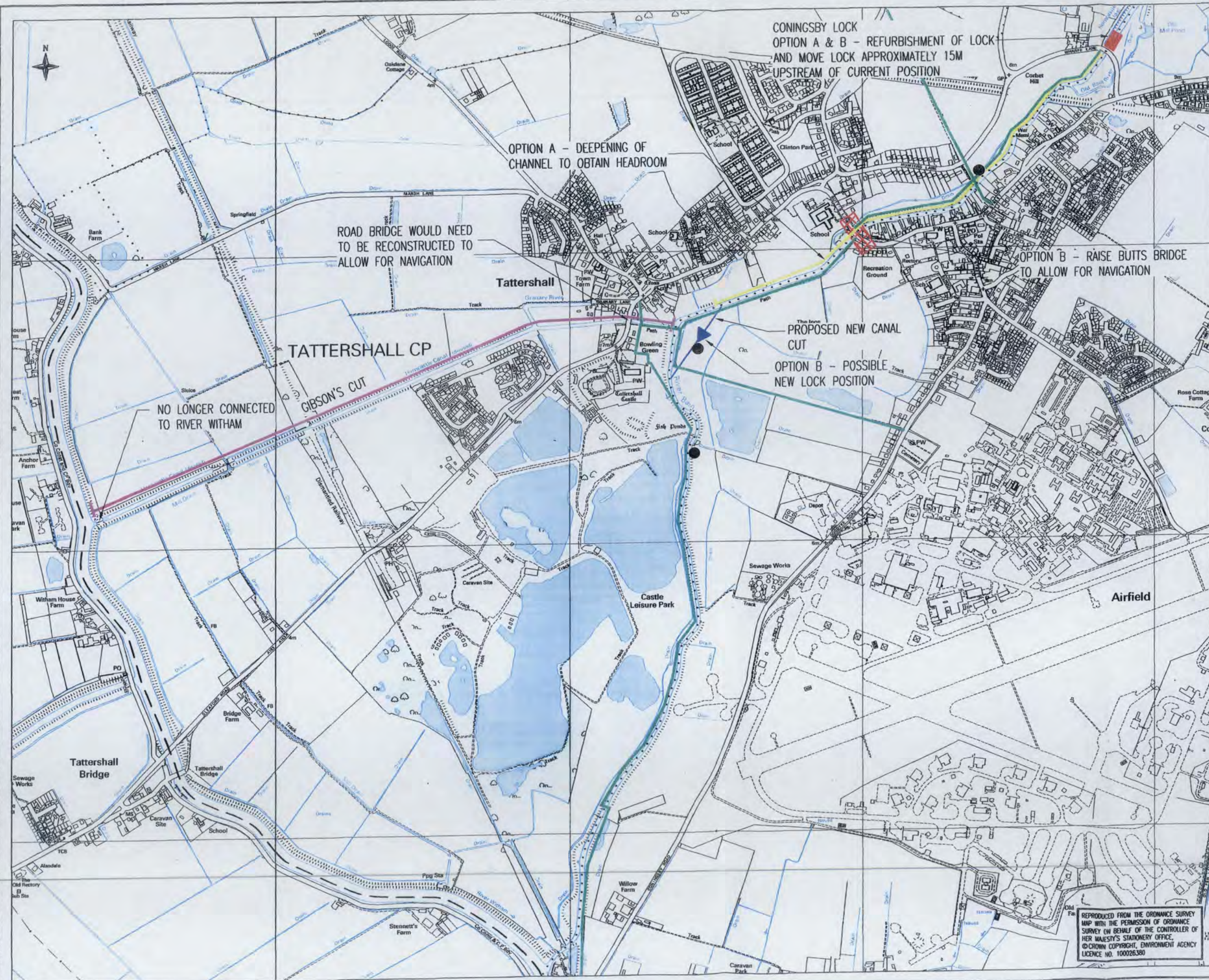
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DRAWN BY	SCALE	DAT

PROJECT NO	FIGURE NO	APR '05	REVISION





CONINGSBY LOCK  
 OPTION A & B - REFURBISHMENT OF LOCK  
 AND MOVE LOCK APPROXIMATELY 15M  
 UPSTREAM OF CURRENT POSITION

OPTION A - DEEPENING OF  
 CHANNEL TO OBTAIN HEADROOM

ROAD BRIDGE WOULD NEED  
 TO BE RECONSTRUCTED TO  
 ALLOW FOR NAVIGATION

OPTION B - RAISE BUTTS BRIDGE  
 TO ALLOW FOR NAVIGATION

PROPOSED NEW CANAL  
 CUT  
 OPTION B - POSSIBLE  
 NEW LOCK POSITION

NO LONGER CONNECTED  
 TO RIVER WITHAM

TATTERSHALL CP

GIBSON'S CUT

Airfield

Castle Leisure Park

Tattershall Bridge

REPRODUCED FROM THE ORDNANCE SURVEY  
 MAP WITH THE PERMISSION OF ORDNANCE  
 SURVEY ON BEHALF OF THE CONTROLLER OF  
 HER MAJESTY'S STATIONERY OFFICE.  
 ©CROWN COPYRIGHT, ENVIRONMENT AGENCY  
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NOTES:

1. DO NOT SCALE THIS DRAWING.
2. ALL PROPOSED NEW CANAL WORKS SHOWN ARE INDICATIVE ONLY.
3. THE CANAL IN ITS CURRENT STATE WILL REQUIRE VARIOUS AMOUNTS OF DREDGING.

KEY:

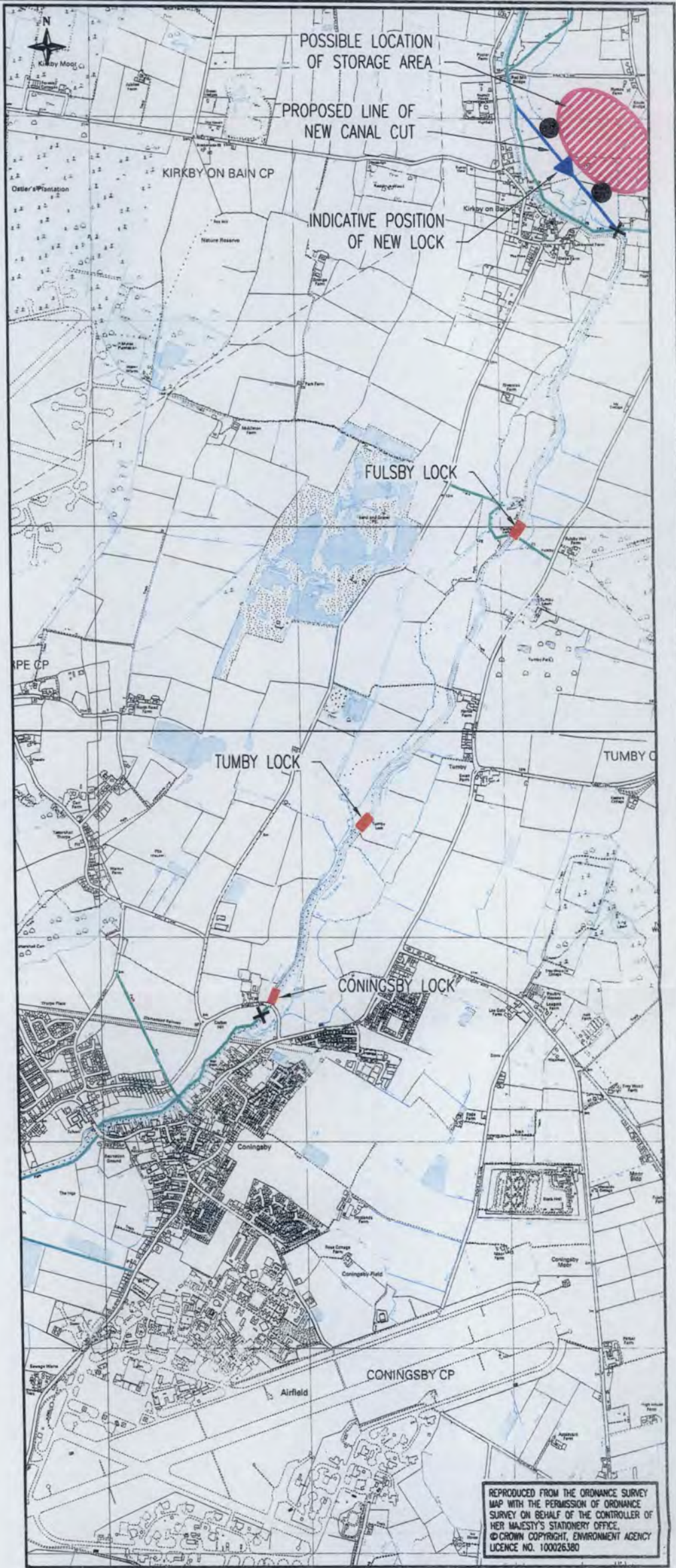
- OFF-LINE MOORING
- EXISTING FOOTPATHS/ BRIDLEWAYS

REV	AMENDMENT	DWN	CHKD	APPR	DATE
<b>CLIENT</b> HORNCASTLE AND TATTERSHALL CANAL HERITAGE TRUST					
<b>PROJECT</b> HORNCASTLE AND TATTERSHALL CANAL FEASIBILITY STUDY					
<b>TITLE</b> LOCATION OF PROPOSED ENGINEERING WORKS CONINGSBY TO THE RIVER WITHAM					
11/12 Eldon Place, Bradford, BD1 3AZ. Tel. 01274 370410 Fax. 01274 734447 Email: bradford@bullen.co.uk					
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DAC		1:12,500		APR '05	
PROJECT NO.		FIGURE NO.		REV	
104B058		10.1			





PLAN OF ENGINEERING WORKS - HORNCASTLE TO KIRKBY ON BAIN



PLAN OF ENGINEERING WORKS - KIRKBY ON BAIN TO CONINGSBY

NOTES:

1. DO NOT SCALE THIS DRAWING.
2. ALL PROPOSED NEW CANAL WORKS ARE INDICATIVE ONLY.

KEY:

- REFURBISHMENT OF LOCK
- WINDING HOLES
- OFF-LINE MOORING
- NEW CANAL CUT
- STORAGE AREA/ MARINA
- EXISTING FOOTPATHS/ BRIDLEWAYS
- NEW LOCK

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**PROJECT**

HORNCASTLE AND TATTERSHALL  
CANAL FEASIBILITY STUDY

**TITLE**

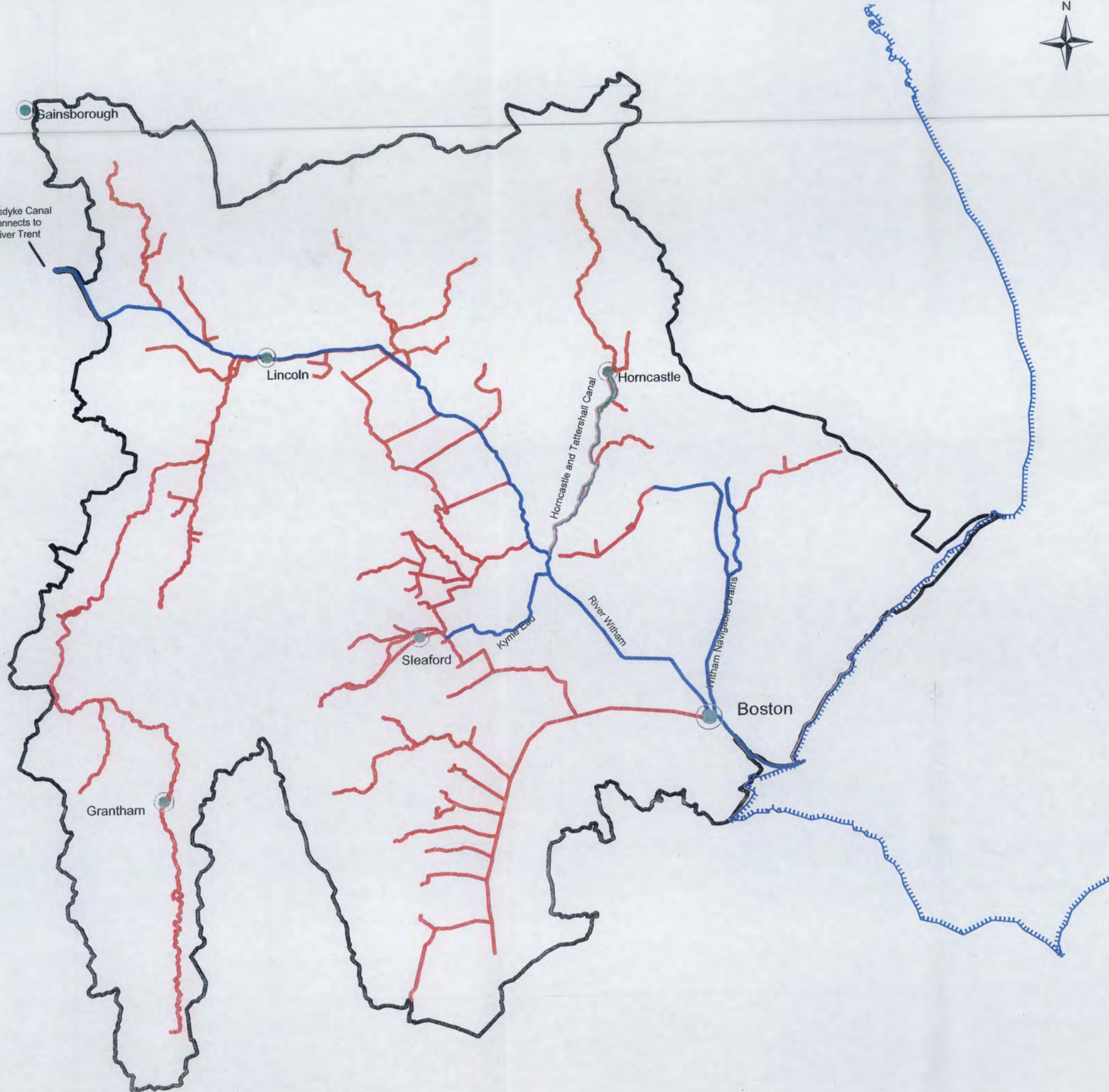
LOCATION OF PROPOSED ENGINEERING  
WORKS HORNCASTLE TO CONINGSBY

**CLIENT**





HORNCASTLE AND TATTERSHALL  
CANAL HERITAGE TRUST

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**LEGEND**

-  Cities / Towns
-  Main River
-  Existing Navigable Watercourses
-  Proposed Canal Restoration
-  Witham Catchment Boundary
-  UK Outline

REV	AMENDMENT	DWN	CHKD	APPR	DATE

**CLIENT**  
 HORNCASTLE & TATTERSHALL CANAL HERITAGE TRUST

**PROJECT**  
 HORNCASTLE & TATTERSHALL CANAL FEASIBILITY STUDY

**TITLE**  
 PLAN OF WATERCOURSES IN WITHAM CATCHMENT



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