



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

The Restoration of Horncastle Canal

Feasibility Study

Environmental Scoping Report

December 2004

Project Ref: Report No: Version: 1048058 RE02 A



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Non Technical Summary

1.0 Introduction & Background

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Bullen Consultants was commissioned by Horncastle and Tattershall/Coningsby Canal Heritage Trust (H.A.T.C.H) to undertake a feasibility study into the restoration of Horncastle Canal, Lincolnshire. This scheme has been developed by Lincolnshire County Council (LCC), British Waterways and the Environment Agency with the support of a wide range of local authorities and organisations, with viewpoint to once more create a navigable canal, to form links with the wider water network and to raise the tourism profile of the area.

- 1.2 The length of canal in question passes through residential, amenity and agricultural land of various parishes including Roughton, Haltham and Kirkby on Bain, Tumby, Confiingsby and Dogdyke in a southward direction from Horncastle to Tattershall. The complete stretch for restoration is approximately 11 miles long.
 - Restoring the canal and the subsequent recreational activities associated with the canal will have an impact on the natural and human environment. Therefore prior to any canal restoration works and increased use of the canal it is necessary to assess these impacts. It has been determined by LCC that an Environmental Impact Assessment (EIA) is required to assess these impacts and an environmental scoping report has been produced as the first stage of the EIA. The scoping report aims to provide information on, identify the key features of, outline the proposals for the restoration of Horncastle Canal and facilitate consultation with interested organisations and individuals.

2.0 **Proposed Restoration**

In order to restore the canal into a navigable stretch of water once more, various proposed works are suggested. The proposals will be confirmed during the EIA, but they include;

- Re-installation of the locks along the original alignment of the canal.
- Construction of a new marina and canal storage reservoir and / or pumping.
- The cutting of a new section of canal, including a new lock structure.
- Possible installation of a new canal lining.
- Necessity to either raise existing bridges or deepen the canal channel.
 - Possible actions to maintain or improve the current flooding regime.
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These proposals may lead to potential impacts, including an increase to the leakage rate of the canal, and disruption to the canal bed, but mitigation measures can be devised as part of the EIA and further investigations carried out.

3.0 Landuse

3.1 The majority of the land area surrounding the canal is agricultural with scattered settlements along the route and occasional wooded and leisure areas.

3.2 The main impact will be to selected agricultural land, which will be permanently lost to the canal restoration project, and some shall undergo considerable change. The proposed schemes potential effect upon local land drainage will also have to be addressed and local planning authorities, Defra (Department for Environment, Food and Rural Affairs) and landowners will need to be consulted. The majority of the

impacts identified to date are associated with construction works and many can be mitigated to reduce the extent of the impacts.

4.0 Landscape

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- 4.1 The existing canal has formed an integral part of the landscape since 1802. The landscape is simple and open, the underlying feature being broad low-lying arable vale, rich in ridge and furrow and other medieval remains. There is variable wooded cover and a series of enclosed hedgerows.
- 4.2 The majority of the impacts to the landscape shall occur via the construction works associated with the restoration including temporary loss of vegetation, channel widening and loss of and/or damage to surrounding land. There may even be an improvement to the scenic value as a result of the restoration. As part of the suggested mitigation, a Landscape and Visual Impact Assessment Survey of the Study Area is suggested, this can be carried out in the EIA.

5.0 **Recreation, Amenity & Tourism**

- Tourism is an important component of the Lincolnshire economy. Horncastle and surrounding towns attract tourists by means of various attractions, but an opportunity such as this canal restoration scheme provides the chance to diversify the facilities currently available to tourists.
- 5.2 Adverse impacts associated with tourism and recreation shall predominantly arise during the restoration works i.e. construction impacts, such as possible temporary loss of public right of way and increase in traffic levels. Once the works are completed, it is hoped that the increase in tourism the restored canal shall bring further economy and amenity to the area. Mitigation can be formulated during the EIA and put in place to reduce the adverse impacts during the restoration of the canal.

6.0 Archaeology & Cultural Heritage

- 6.1 Within 250 metres of the canal there are 118 archaeological sites, six of these being Scheduled Ancient Monuments, of which three are Listed. There are also 23 Listed Buildings within the Study Area, three of which are Grade I listed, two of which are Grade II*, and the remaining Grade II Listed.
- 6.2 Several known sites of prehistoric date are present within the Study Area; the earliest site around the canal dates to the Mesolithic period, with Neolithic sites, Neolithic to early Bronze Age, and Roman date sites also present. There is an abundance of material from the mediaeval and later periods and a number of medieval structures still survive.
- 6.3 The proposed improvements will have a number of impacts on known archaeological sites and Listed Buildings. The main impact upon archaeological sites will be caused by the proposed storage areas and it is likely that these areas, as well as the proposed new canal cutting, may contain previously unrecorded archaeological sites. Dredging of the canal may also impact upon previously unrecorded sites. Restoration of the locks along the canal will provide a beneficial impact to the canal as a whole, and to these historic structures.



6.4 To avoid potential adverse impacts to significant archaeological areas during the construction works, a full desk-based archaeological assessment and walkover-survey-of the affected areas, such as the proposed storage area, would need to be undertaken as part of the EIA to further determine the impact of the proposals upon the cultural heritage of the area.

7.0 Ecology

Horncastle Canal and surrounding area provide suitable habitat for numerous protected species which are likely to be adversely affected by the proposed scheme including;

- Water vole and Otter.
- Badger and Brown Hare.
- Bats.
- Great crested newt.
- White-clawed crayfish and Spined loach.
- Compressed river mussel and Witham orb mussel.
- Schedule 1 listed breeding birds.

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Eight Sites of Special Scientific Interest lie within 2km of the stretch of canal under consideration. There are also twenty-one recorded Sites of Nature Conservation within 1km of the canal. The nationally protected Lincolnshire Wolds Area of Outstanding Natural Beauty lies to the north of the Study Area.

Potential adverse impacts to all of the above listed species and their habitats are probable as a result of the canal restoration. These are thought likely to occur throughout both the construction works and the operational works, such as short and long-term disturbance to the waterbank and loss of land. However, mitigation measures can be formulated during the EIA to help reduce the extent of the impacts. Positive impacts may also be prepared including habitat restoration and bankside planting schemes. Further ecological surveys for all of the above listed protected species will be required to be undertaken prior to the commencement of the restoration works.

8.0 **Environmental Water Quality**

The quality of the rivers in the Witham Catchment is generally good to fair. The uppermost reaches of this water system are generally unpolluted, with the lower reaches being increasingly affected by eutrophication (LEAP 1999).

The potential impacts to the water quality are associated with the operation effects of the canal restoration including an increase in waste water entering the watercourse and a decrease to the aquatic vegetation and associated invertebrates. These impacts may be mitigated against by closer monitoring of the water quality by carrying out further invertebrate surveys and a macrophyte survey, to determine what aquatics are present in the canal to provide greater insight into the quality of the canal water.

9.0 Geology and Hydrology

Within the vicinity of the canal a series of alluvial, river and glacio-fluvial deposits are present underlain by solid geology comprising the Kimmeridge Clay Formation, Ampthill Clay Formation and West Walton Formation of Jurassic age.



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10.0 Water Resources

- 10.1 The Environment Agency has divided the Bain catchment into two water resource management units and has classified the River Bain as no water available and the Bain Sand and Gravels as water available.
- 10.2 Water supply for navigation purposes will be provided either by:
 - Storage of winter flow and augmentation of summer flows.
 - Pumping from the bottom of the canal to the top.
 - Combination of both these options.

11.0 Conclusion

- 11.1 Restoration of the canal will result in impacts both during restoration and operation of the canal. It is considered that the restoration works will result in a number of adverse impacts which will require substantial mitigation to reduce or prevent them. The majority of these are short term impacts, however the operation of the canal will also lead to a number of long-term adverse impacts, but these will be of a lower magnitude but will occur more frequently.
- 11.2 It is not only adverse impacts that will result from the works, there will also be positive impacts especially in relation to tourism and recreation, as restoring the canal will encourage visitors to the area which will have benefits for the local economy. An assessment of the impacts and mitigation will be further formulated throughout the EIA.



1.0 INTRODUCTION & BACKGROUND

1.1 General

- 1.1.1 Bullen Consultants was commissioned by Horncastle and Tattershall/Coningsby Canal Heritage Trust (H.A.T.C.H) to undertake a feasibility study into the restoration of Horncastle Canal, Lincolnshire. The stretch of canal under consideration runs from the Roman Town of Horncastle through Tattershall (Approximate National Grid Reference TF 261695 to TF 209555). This waterway continues north as the River Bain and to the south of Tattershall joins the River Witham (as shown in Figure 1 Site Location).
- 1.1.2 Horncastle Canal was originally two canals, the Horncastle Canal and the earlier Tattershall Canal, and the whole length was opened in 1802. The main length of the canal was created by the canalisation of the River Bain. It had two branches within Horncastle and two links to the River Witham at Tattershall. The canal is currently un-navigable, but has an important role in flood defence and land drainage.
- 1.1.3 The proposed works stem from the Lincolnshire Waterways Project. This has been developed by Lincolnshire County Council (LCC), British Waterways (BW) and the Environment Agency (EA) with the support of a wide range of local authorities and organisations. It is proposed to construct a new canal link, linking Lincolnshire to the River Nene at Peterborough, thence the River Ouse and the much wider national waterway network. The main objective of these works is to provide a vision for the waterways that brings together economic, community and environmental issues and raise the profile of the Lincolnshire Waterways as a tourist destination for a variety of leisure uses.
- 1.1.4 The Lincolnshire Network of waterway corridors largely orientates towards the east coast, although the county does provide a link to the River Trent and hence the national waterways network.
- 1.1.5 The length of canal in question passes through residential, amenity and agricultural land of various parishes including Roughton, Haltham and Kirkby on Bain, Tumby, Conningsby and Dogdyke in a southward direction from Horncastle to Tattershall. The complete stretch for restoration is approximately 11 miles long.

1.2 Approach

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1.2.1 Canals and river navigations are managed systems with canals being entirely manmade features. They can be a valuable resource for wildlife and humans. With regards to wildlife they provide habitat for flora and fauna, including a number of protected species, such as water vole (*Arvicola terrestris*) and otter (*Lutra lutra*). For humans they provide a wide range of recreational opportunities, including fishing, walking, cycling and boating and provide a tranquil atmosphere for both visitors and those who live adjacent to canals.



- 1.2.2 Restoring the canal and the subsequent recreational activities associated with the canal will have an impact on the natural and human environment. Therefore prior to any canal restoration works and increased use of the canal it is necessary to assess these impacts.
- 1.2.3 Horncastle canal has not been used for commercial navigation for approximately 100 years allowing the canal ecosystem to develop with minimal human disturbance. Therefore the impact on canal ecology is considered to be one of the main issues of this proposed restoration. There will be immediate effects to the biodiversity along the waterway and additional future impacts as a result of the increased exploitation of the canal, both of which need to be identified and interpreted. However, any development along the waterway needs to be considered on the basis that the existing system is not entirely natural.
- 1.2.4 As detailed in the AINA (Association of Inland Navigation Authorities) report 'Safeguarding the Waterway Environment', consideration needs to be given to:
 - The effects of navigation on the natural environment, including those due to craft movement and those due to creating and maintaining navigability.
 - The impacts of non-navigational uses, e.g. access for walking and cycling.
 - The need to balance the needs of wildlife and navigation.

1.3 Environmental Impact Assessment

- 1.3.1 Environmental Impact Assessment (EIA) is the process by which the likely impacts of a project upon the environment are identified, collated, measured and assessed to determine their significance. The analysis of predicted environmental effects then enables different options to be considered, together with identification of the scope for optimising positive effects and mitigating negative effects during the project design.
- 1.3.2 Requirements for EIA were introduced into the European Community under EC Directive 85/337/EEC, which came into force in 1988. Directive 97/11/EC, which amends Directive 85/337/EEC which came into force on 14 March 1999. Such directives are implemented in the UK via a series of regulations. Lincolnshire County Council have confirmed that the project will require an Environmental Impact Assessment to identify, predict and evaluate the key impacts of the proposed working to assist any decision making processes.
- 1.3.3 The output of the EIA is an Environmental Statement (ES), which is produced to inform decision makers and interested parties of all the potential impacts of a proposal on the environment and should provide sufficient information to allow a decision to be made.

Scoping Phase

1.3.4 As a first phase of the EIA process, this Environmental Scoping document has been prepared to provide a basis for consultation with statutory and non-statutory consultees. Additionally a questionnaire has been issued to all relevant landowners and local residents to obtain their initial views and opinions of the proposed restoration. An article has also be placed in the Horncastle News and Horncastle



Today website providing some information on the proposed restoration and asking for reader's views upon the subject.

- 1.3.5 This report will be used to ensure that the EIA focuses on the most important impacts of the restoration scheme and information submitted in this report will be refined and expanded upon throughout the EIA process, in response to consultation and agreed additional surveys.
- 1.3.6 The aim of this Scoping document is to:
 - Identify relevant legislation.
 - Identify key features, including ecological receptors.
 - Identify gaps in data and suggest further surveys to provide information needed to predict ecological impacts.
 - Outline the proposals and potential impacts on environmental receptors.
 - Outline preliminary ideas for impact avoidance and mitigation as well as opportunities for habitat enhancement and gain.
 - To facilitate consultation with interested parties and gain their views and concerns regarding the restoration.
- 1.3.7 Within this report the existing environment has been broken down into the following eight categories:
 - 1. Land Use

2. Landscape

- 3. Recreation, Amenity and Tourism
- 5. Ecology
- 7. Geology and Hydrogeology
- 4. Archaeology and Cultural Heritage
 - 6. Environmental Water Quality
 - 8. Water Resources
- 1.3.8 Section 5 of the report describes the existing environment under each of the above categories and Section 6 identifies the main potential impacts and outlines preliminary ideas for avoidance and mitigation measures. Finally Section 7 of the report details further surveys that are considered to be required to inform the EIA.

1.4 Study Area

- 1.4.1 The Study Area (termed as the land in an approximate 1km radius from the site area) is predominantly flat, grazed agricultural pasture land leading to scattered settlements along the route, as the waterway flows from Horncastle to Tattershall. Occasional plots of scrub and woodland are evident in places. Infrequent toiled sites were also present including a sand and gravel pit and some in-channel works. The eastern side of the waterway is bordered by the A153.
- 1.4.2 The ecological data search focused on the land use and records found from an approximate 1km radius from the waterway involved in this project. Despite the survey being concentrated on the canal corridor, different consultees responses were based on larger search areas (refer Appendix A Summary of Consultee Responses).
- 1.4.3 The archaeological study area was based on a search of 250m either side of the canal. It is thought unlikely that sites outside of this distance would be affected.

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2.0 METHOD OF ASSESSMENT

2.1 Baseline Data

- 2.1.1 This scoping report is based on data sourced from contacting all relevant statutory consultees, nature conservation groups, local naturalists and recreational groups to determine whether there are any existing environmental data records within the Study Area. To facilitate the desk top assessment a walkover survey was undertaken, the aims of which were;
 - To produce a general description of the watercourse and surrounding land use.
 - To assess the habitats present for their potential to support any protected species, particularly water vole and otter of which there are records for the Study Area.
 - To highlight any potential impacts which may transpire as a result of the proposed future arrangements and suggest any appropriate mitigation measures.
 - To suggest any further surveys that require being undertaken prior to any restoration plans being implemented so that appropriate mitigation can be devised.
- 2.1.2 As part of this scoping report an archaeological scoping assessment was also undertaken to determine the nature of the archaeological remains within the study area.

2.2 Consultation

- 2.2.1 An extensive list of consultees was contacted to request copies of any ecological/environmental information held for the canal and surrounding area. Of the twenty-one consultees contacted, so far results have been received from eleven, extending the knowledge of protected species and habitats in the area. These include Lincolnshire Wildlife Trust, Heritage Trust of Lincolnshire, Lincolnshire Bird Club, Butterfly Conservation (Lincolnshire Branch), The Inland Waterways Association, English Nature, branches of Lincolnshire Naturalists Union, Countryside Agency, Environment Agency and British Waterways.
- 2.2.2 Lincolnshire Historic Environment Record (HER), Heritage Lincolnshire, and the National Monuments Record (NMR) were all contacted for archaeological and cultural heritage data. Information was received from the HER and the NMR.
- 2.2.3 Appendix A gives full details of the consultees contacted and the consultee responses received.



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3.0 PROPOSED RESTORATION

3.1 Introduction

- 3.1.1 The majority of the Horncastle and Tattershall Canal was closed in 1889 due to the decline in the use of the canal in favour of the railways and the continual maintenance costs. Since its closure the canal has generally been left alone apart from turning the lock structures into formalised weirs.
- 3.1.2 To restore the canal to its former glory there are several options to consider. At present there is no preferred option as the economic assessment needs to be carried out and the environmental impacts need to be assessed.

3.2 Proposed Works

- 3.2.1 Figure 3 shows the Location of the Proposed Engineering Works between Horncastle and Coningsby. In general the engineering works will consist of reinstating the locks along the original alignment of the canal where practical.
- 3.2.2 The main works that are required between Horncastle and immediately upstream of Coningsby are as follow:
 - **Refurbishment of eight locks between Horncastle and Tumby** This will include reinstating lock gates and any works required to the lock structure so that it can operate as a lock. The lock structures will be finished in similar materials as was used on the original canal with oak lock gates. If there is a limited amount of room for the lock gate beam then other types of gates would be considered, such as guillotine gates. By-washes are to be provided at every lock to allow water to bypass the lock gates if required.
 - New marina and canal storage reservoir It is proposed that a new marina be constructed to the south of Horncastle to accommodate the boats that would use the canal. It is envisaged that to run the canal some water for the navigation will need to be stored for use during the summer months.
 - *Kirkby on Bain* Since the original line of the canal has been filled in; a new section of canal will be cut between downstream of Red Mill Bridge and the end of the village. The new cut will also need a completely new lock structure. In the Kirkby on Bain area there may also need to be a storage area for the canal for water to be stored over the winter for use in the summer months. The water may need to be back pumped to the start of the canal.
- 3.2.3 The Leakage rate requires further investigations and where there is a problem then a new lining will be provided.
- 3.2.4 Between Coningsby and the River Witham there are two main options that the route of the canal could take, Figure 4 shows the Location of the Proposed Engineering Works for this stretch. Originally there were two entrances to Horncastle canal below



Tattershall, one route was along Gibson's Cut to the west and the other was south to Dogdyke. Due to developments along the line of Gibson's Cut, such as the A153 Sleaford Road Bridge and the embankments along the Witham, it is felt that trying to re-open this section of the canal would be costly and quite problematic. Therefore it has been decided to concentrate on the route between Coningsby and Dogdyke.

3.2.5 Since the canal was closed, bridges across the watercourse have been constructed without taking the navigation into consideration. Subsequently a number of road and footbridges that cross the canal do not have the required headroom to allow the passage of boats. To overcome this situation there are two options:

Option A – Raising Bridges

- Raise Butts Lane Bridge
- Raise Wharfe Lane Bridge
- Raise Coningsby Footbridge
- New canal cut round Tattershall Gauging Station with new lock
- Refurbishment of Coningsby Lock, immediately upstream of Wharfe Lane Bridge.
- Dredge channel from Coningsby Lock to Dogdyke.

Option B – Deepening Channel

- Dredging of channel from Tattershall Gauging Station to Dogdyke.
- Deepening channel between Coningsby Lock and Tattershall Gauging Station
- Underpinning of bridges (Wharfe Lane, Butts Lane and Coningsby Footbridge)
- New canal cut around Tattershall Gauging Station
- New lock position at Coningsby Lock.
- 3.2.6 It is envisaged that with Option B that the channel would be deepened to such a depth that another new lock near Tattershall Gauging Station would not be required. At present both options are investigated with respect to the economical appraisal.

3.3 Flood Flows

- 3.3.1 There are a number of options to consider when looking at the effects of restoring the canal on flood flows. The aim of the restoration is to either maintain a similar flooding regime or slightly improve the situation. Any proposal for the canal would not add to the flooding issues of the catchment.
- 3.3.2 One option to deal with the flood flows is to allow water to overtop the lock gates; however it is thought this would not allow the flood flow to pass without over topping the banks to flood adjacent land.
- 3.3.3 Another option for the flood flows is to close the canal and open all the lock gates. Guillotine gates would be required for this option as traditional gates, opening against the flow could not be opened once a flood had started. If this option was chosen then it means that the canal would need to be refilled before it could be used again. Additional water would need to be stored to allow for the canal to be refilled. Also this has an economic impact, as the canal would only be seasonal employment instead of a job all year round.



3.3.4 The final option for flooding would be to let the water bypass the locks. This would be achieved by sizing the by-wash to allow for the passage of flood flows. A mechanical gate that can be raised or lowered or a concrete weir structure would control the amount of water allowed to bypass the lock structure. This would be more economically feasible as the canal would be able to stay open all the time, creating year round employment.

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4.0 LEGISLATION AND PLANNING

4.1 A number of national and international conservation regulations will be taken into account during the EIA as well as local planning policies.

LEGISLATION

4.2

Habitats Directive 92/43/EEC

The main objective of this directive is to maintain or restore habitats or species of European importance (listed in Annexes) to a favourable conservation status. This is translated into British Law under Statutory Instrument No. 2716 'The Conservation (Natural Habitats &c.) Regulations 1994'.

- 4.3 The directive requires member states to:
 - Designate sites to form part of the EC 'Natura 2000' network. This will comprise of Special Areas of Conservation (SAC) under the Habitats Directive and Special Protection Areas under the Wild Birds Directive.
 - Protect the designated sites.
 - Protect those species and habitats listed in the Annexes of the directive.
- 4.4 Each member state must submit a list of proposed Special Areas of Conservation to the European Council; these are referred to as candidate Special Area of Conservation (cSAC). For the purpose of considering a development, cSACs included in the list submitted to the European Council should be treated in the same way as a designated SAC (Planning Policy Guidance 9 (PPG9) paragraph 13.).
- 4.5 In terms of species, those listed on the Habitats Directive under Annex IV(a), whose natural range is within the UK, are listed in Schedule 2 of the Conservation (Natural Habitats, & c.) Regulations 1994. Under this legislation it is an offence to:
 - Deliberately capture or kill any wild animal of a European Protected Species;
 - Deliberately disturb any such animal;
 - Deliberately to take or destroy the eggs of such an animal;
 - Damage or destroy a breeding site or resting place of such a wild animal;
 - Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal (or plant) of a European protected species, or any part of, or anything derived from such a wild animal.
- 4.6 European protected species which could be found in the Study Area include bats, otter, spined loach (*Cobitis taenia*), white clawed crayfish (*Austropotambius pallipes*) and great crested newt (*Triturus cristatus*).

Conservation of Wild Birds Directive (79/409/EEC)

This directive was adopted in 1979 and applies to birds, their eggs, nest and habitats. This directive requires member states to:

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- Take special measures to conserve the habitats of certain particularly rare species and of migratory species, (English Nature 1998).
- To establish and designate Special Protection Areas (SPA).
- 4.8 This legislation applies to kingfisher (*Alcedo atthis*), recorded in the Study Area.

Wildlife and Countryside Act 1981 (as amended)

- 4.9 This Act is the principle mechanism for the legislative protection of wildlife in the UK. It provides legal protection against destruction of wild animals and plants listed under the schedules of the Act.
- 4.10 The act also enables English Nature to protect areas of national importance by designating them as Sites of Special Scientific Interest (SSSI). Notification of a SSSI includes a list of operations that may be harmful to the special interest of the site. The new Section 28 in Schedule 9 of the CRoW Act (refer 4.14) provides significantly enhanced protection for SSSI's.
- 4.11 Areas of Outstanding Natural Beauty (AONB's) were formally designated under the National Parks and Access to the Countryside Act of 1949 to protect areas of the countryside of high scenic quality that cannot be selected for National Park status due to their lack of opportunities for outdoor recreation (an essential objective of National Parks). The Countryside Agency is responsible for designated AONB's and advising Government and others on how they should be protected and managed.
- 4.12 Under Schedule 5 of this act, certain species of animal are protected and Section 9 (1) and (4) of this act makes it is an offence to:
 - Intentionally kill, injure or take any wild animal included in schedule 5,
 - Or damage, destroy or obstruct access to, any structure or place used for shelter or protection;
 - Or disturb any such animal while it is occupying such a structure or place.
- 4.13 The Wildlife and Countryside Act also provides general protection of breeding wild birds, with regard to their nests and eggs and makes it an offence to intentionally:
 - Kill, injure or take any wild bird;
 - Take, damage or destroy the nest of any wild bird while that nest is in use or being built;
 - Take or destroy an egg of any wild bird.
- 4.14 Animals fully protected under schedule 5 of this act which could be found in the study area include otter, water vole, white clawed crayfish, and great crested newt.

Countryside and Rights of Way Act (CRoW)

4.15 Reinforced protection is also given to SSSI under the Countryside and Rights of Way Act (CRoW) 2000 (Part: Nature conservation and wildlife protection). CRoW came

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4.16



into force on 30 January 2001 and The Act applies in England and Wales and has five parts:

- Access to the countryside.
- Public rights of way and road traffic.
- Nature conservation and wildlife protection.
- Areas of outstanding natural beauty.
- Miscellaneous and supplementary.

Badger (Meles meles) Protection Act (1992)

The Protection of Badgers Act 1992 protects both badgers and their setts. The Act makes it an offence to kill, cruelly ill-treat, or trap a badger. Any structure or place which shows signs of current use by a badger is protected meaning it is an offence to intentionally damage, destroy, or obstruct setts and to disturb a badger whilst it is occupying a sett.

The Hedgerows Regulations (1997)

- 4.17 In England and Wales the Hedgerow Regulations 1997 are intended to protect important countryside hedges from destruction or damage. The Regulations include historical, ecological and archaeological criteria.
- 4.18 Under the Hedgerow Regulations 1997, the removal of any hedgerows, or sections of hedgerows require a Hedgerow Removal Licence from the Local Planning Authority (LPA). The Hedgerow Regulations 1997 criteria assess whether a hedgerow is 'important'. If the hedgerow is not important, the LPA cannot refuse permission to remove the hedgerow. If the hedgerow is important, the LPA will decide if the circumstances justify removal of an important hedge. Unless satisfied that removal is justified, the LPA must refuse permission and issue a hedgerow retention license.

Ancient Monuments and Archaeological Areas Act (1979, amended 1983)

4.19 Scheduled Ancient Monuments (SAMs) are designated under the Ancient Monuments and Archaeological Areas Act (1979) as amended by the National Heritage Act (1983). Sites scheduled under this legislation are considered to be of national importance, and are protected by law. Scheduled Ancient Monument consent is required before any work is undertaken within the boundary of a Scheduled Ancient Monument.

POLICIES AND PLANS

Sites of Local Nature Conservation Importance (SNCI's)

4.20 SNCI's are designated at a local level through inclusion within local or unitary development plans for their regional or local conservation interest. They are usually adopted by Local Authorities for planning but have no statutory protection.

Local Nature Reserve (LNR)

TAC/INADAEO/1/A

4.21 Local Nature Reserves are designated under the National Parks and Access to the Countryside Act 1949 by Local Authorities in consultation with English Nature for their locally important wildlife or geological features. They are intended for education and amenity in addition to conservation.



Non-Statutory Policy Initiatives

The UK, and Lincolnshire Biodiversity Action Plans (BAP)

- 4.22 The UK Biodiversity Action Plan (BAP) was launched in 1994 with the aim 'To conserve and enhance biological diversity within the UK, and to contribute to the conservation of global biodiversity through all appropriate mechanisms'. The UK BAP comprises a series of Action Plans for 'priority' species and habitats, determined by the fact that they are either globally threatened or are rapidly declining in the UK. The action plans outline measures required to conserve these priority species and habitats.
- 4.23 This national strategy is delivered at local level via Local Biodiversity Action Plans. The Lincolnshire Biodiversity Action Plan is one such plan, providing information on priority species and habitats in Lincolnshire.
- 4.24 The Lincolnshire Biodiversity Action Plan (BAP) (published in 2000 by Lincolnshire Wildlife Trust) identifies a number of Species Action Plans and Habitat Action Plans. Water vole, otter, brown hare (*Lepus capensis*), grass wrack pondweed (*Potamogeton compressus*), spined loach, compressed river mussel, white clawed crayfish and Witham orb mussel are species included in the Species Action Plans. Habitats include rivers, canals and drains; reedbeds; and standing water (eutrophic).

Local Environment Agency Plans (LEAP)

- 4.25 The Environment Agency is committed to a programme of Local Environment Agency Plans in order to produce a local agenda of integrated action for environmental improvement. LEAP's help to identify and assess, prioritise and solve local environmental issues.
- 4.26 The LEAP referred to combines and replaces the Lower Witham Catchment Management Plan and Upper Witham LEAP which were produced in 1996 and 1997 respectively.

Countryside Character Areas

4.27 Countryside Character Areas are sub-divisions of England, each with a broadly cohesive countryside character. There are 159 of these in England on which strategies for both ecological and landscape issues can be based. The Countryside Agency extensively uses this framework to describe and shape objectives for the countryside, for its planning and management.

RSPB Birds of Conservation Concern 2002 – 2007

- 4.28 An assessment of the population status of birds which are regularly found in Britain has been undertaken by leading governmental and non-governmental organisations. Each of the 247 species assessed have been placed on a list (Red, Amber-or Green), the purpose of which is (in combination with additional information) to guide conservation action between 2002 and 2007.
- 4.29 Bird species whose breeding or non-breeding population has declined, or range contracted, rapidly (by > 50%) or moderately (by between 25 49%) over the last 25 years were placed on the red and amber lists respectively. Red list species are those that are Globally Threatened according to IUCN criteria with 'high conservation

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concern' and amber list species are those with an unfavourable conservation status in Europe with 'medium conservation-concern'.

4.30 Additionally the Royal Society for the Protection of Birds (RSPB) operates a harrier protection scheme around the Wash and inland Lincolnshire, and this includes Lincolnshire waterways. The scheme aims to safeguard Marsh and Montagu's harriers (*Circus aeruginosus; Circus pygargus*) by nest protection, provision of advice and monitoring and to allow areas of undisturbed reed fringes to become established.

Planning and Policy Guidance 15 & 16

4.31 Two Planning Policy Guidance notes PPG15 and PPG16 have relevance to cultural heritage and archaeology. PPG 15: Planning and the Historic' Environment (September 1994) gives advice on matters pertaining to listed buildings, Conservation Areas and other elements of the historic environment. PPG16: Archaeology and Planning (November 1990) provides advice with regard to the preservation and recording of archaeological sites. PPG16 emphasises the need to preserve nationally important archaeological remains, whether scheduled or not, *in situ*. For other remains, their importance should be weighed against other factors, including the need for the development, in deciding whether preservation is necessary.

OTHER RELEVANT INITIATIVES

Ancient Woodland Inventory

4.32

Areas of woodland listed within English Nature's Ancient Woodland Inventory (AWI) comprise woods which have had a continuous woodland cover since at least 1600 AD and have only been cleared for underwood or timber production. Woodlands listed under the AWI are split into ancient semi-natural woodland, comprising stands of ancient woodland which do not obviously originate from planting and ancient replanted woodland, which includes planted woodland on an ancient woodland site of any age of a broad-leaved, mixed or coniferous type. AWI woodlands are not protected by any legislation, but help to identify woods that require special treatment in order to retain their nature conservation interest.

Grassland Inventory

4.33 Areas of grassland listed within English Natures Grassland Inventory. This inventory has been produced with the aim of making lowland grassland data available for conservation management schemes in the wider countryside (MAGIC 2003).

Woodland Grant Schemes

4.34 The Woodland Grant Scheme (WGS) provides incentives for the creation and management of woodlands and forests. It aims to improve existing woodland and create new wooded areas. All woodlands and forests can be considered for grants, although generally they have to be at least 0.25ha in area and/or 15 metres wide.

Local Environment Agency Plans

4.35 Local Environment Agency Plans (LEAP's) are rural land based schemes which plan to improve the environment of a particular river and its surrounding area.

Countryside Stewardship Scheme

4.36 The Countryside Stewardship Scheme (CSS) is a grant scheme that aims to make conservation part of farming and land management practice and offers payments for



changes in management which improve the natural beauty and diversity of the countryside. The scheme operates throughout England and the agreements run for ten years.



5.0 EXISTING ENVIRONMENT

5.1 Introduction

5.1.1 To assess the potential environmental impacts of the proposed Horncastle Canal restoration project and to suggest any further survey work required to be undertaken as part of the EIA, it is necessary to describe the existing environment. Information regarding Horncastle Canal and the Study Area has been obtained from desk based studies and a walkover of the full length of the proposed restoration area.

5.2 Land Use

- 5.2.1 The land immediately adjacent to Horncastle Canal is predominantly agricultural with scattered settlements along the route as the waterway flows from Horncastle and Tattershall (located to the far northern and southern points respectively). Key roads in the area are the A158, which passes through Horncastle in an east-west direction, and the A153, which passes through in a north-south direction.
- 5.2.2 Other adjacent land use includes occasional scrub and woodland areas, worked sand and gravel pit, a golf course, Leisure Park and important buildings and structures of historic interest.
- 5.2.3 The whole area is designated a Countryside Stewardship Scheme Target Area and a large proportion of the adjacent farmland, particularly to the west side of the canal is under Countryside Stewardship Agreements. Land to the east side supports the majority of the land under Woodland Grant Schemes for the area.

5.3 Landscape

- 5.3.1 The existing canal has formed an integral part of the landscape since 1802 and despite since becoming un-navigable and less utilised, it remains a significant area for wildlife and retains important history both to local residents and historians. The landscape ranges from poorer quality worked sand and gravel pit areas to good quality attractive landscape, predominantly agricultural and rural areas.
- 5.3.2 The landscape is simple and open and the underlying feature of the concerned area is broad low-lying arable vale, rich in ridge and furrow and other medieval remains. A regular pattern of medium sized fields with enclosed hedgerow edges exists and there is variable woodland cover. There are sparse, nucleated settlements throughout the area.
- 5.3.3 The existing Horncastle Canal was created to follow the same general route to that of the River Bain and is formed in places from the canalisation of this river. Where the canal is not directly in the river's path, they flow parallel to one another.
- 5.3.4 The Countryside Agency has developed a national map of Countryside Character Areas, eight of which are within or partly inside Lincolnshire. The Agency has identified the key features and a number of proposals for shaping the future of the



county's landscape. Central Lincolnshire Vale Character Area applies to Horncastle waterway and proposed ideas for shaping the future include hedgerow re-instatement; new woodland on open clay farmland; wet grazing; and washlands.

5.4 Recreation, Amenity and Tourism

- 5.4.1 Tourism is an important component of the Lincolnshire economy. Horncastle and surrounding towns attract tourists by means of various attractions such as Tattershall Castle, the Battle of Britain Memorial Flight Visitor Centre and the Aviation Heritage Centre. Opportunities such as canal restoration schemes provide the chance to diversify the facilities currently available to tourists.
- 5.4.2 Public Right of Way exists along part of the canal. Footpaths leading in and out of Horncastle and Tattershall towns continue for approximately five kilometres along the waterway, but a large part along the canal is surrounded by privately owned farmland.
- 5.4.3 Canals can provide suitable site for fishing and from the signs noted along the canal it would appear that private fishing clubs have fishing rights along Horncastle Canal.

5.5 Archaeology and Cultural Heritage

- 5.5.1 Consultation with the Historic Environment Record (HER) and the National Monuments Record (NMR) revealed information regarding 118 archaeological sites, within 250m of the canal. Of these, six are Scheduled Ancient Monuments. These are the Roman walls in Horncastle (TF 2575 6958); a medieval churchyard cross at St Benedict's Church (TF 2460 6382); Tattershall Castle & College (TF 2110 5754); Butter Cross in Tattershall (TF 2124 5789); Tattershall Grammar School (TF 2121 5758) and Dogdyke Pumping Station (TF 206 558).
- 5.5.2 There are also 23 Listed Buildings within the study area, three of which are Grade I Listed and two which are Grade II*. The remainder are Grade II Listed. In addition to these Listed structures, three of the Scheduled Ancient Monuments are also Listed. The Grade I Listed Buildings comprise St Michael's Church and Church Close (TF 2223 5804), and the Church of St Benedict (TF 2461 6384).
- 5.5.3 All of the known archaeological sites and Listed Buildings can be seen in the accompanying gazetteer in Appendix B.
- 5.5.4 There are several known sites of prehistoric date within the study area. The earliest site around the canal dates to the Mesolithic (10,000 3500 BC) period and comprises a Mesolithic flint scatter. Three known sites date to the Neolithic (3500 2000 BC) and include an early Neolithic site, and two find spots of Neolithic axes. In addition, there are a further three sites which date from the late Neolithic or the early Bronze Age, and include the site of a barrow, and two flint scatters. A further site encompasses an area occupied in both the Neolithic and the Bronze Age, at which Roman and post-medieval pottery has also been found.
- 5.5.5 The Bronze Age (2000 700 BC) is represented by pits, a ring ditch, and the find spot of an early Bronze Age beaker. There is little known evidence within the study area dating to the Iron Age (700 BC 43 AD), which is represented solely by two find



spots, one of an early 1st century AD bronze trumpet, which was dredged from the River Witham, and one of pottery, which may be Saxon in origin, rather than Iron. Age. This dearth of evidence from the Iron Age may be due to a lack of archaeological work rather than a lack of archaeology.

- 5.5.6 In addition to these sites, two find spots of artefacts of prehistoric date are also known. One was the find spot of a bronze axe, and the other of a flint flake. The exact date of these artefacts has not been determined.
- 5.5.7 There are nine known sites of Roman date (43 AD 450 AD), as well as the scatter of Roman pottery discussed above. Horncastle was a Roman walled town and therefore the number of sites of Roman date within the vicinity is not unexpected. The Roman walls in Horncastle are protected as a Scheduled Ancient Monument. The Roman sites mainly comprise the find spots of Roman artefacts, including a bronze skillet (a type of frying pan), a hand quern, used for grinding corn, Roman coins, and pottery. Settlement evidence is represented by cropmarks and pits of Romano-British date.
- 5.5.8 There is an abundance of material from the medieval and later periods. The earliest sites within the period are find spots. The find spot of pottery of possible Iron Age date may in fact date to the Saxon period. Another find spot is likely to be Viking in date. This is the find spot of a 'comb'-shaped rib bone. Other find spots of medieval date within the study area include a roof finial, a bronze seal matrix, a French jetton (a type of token), and pottery, including a pottery jester's head.
- 5.5.9 A number of medieval structures survive, including churches and crosses. All but one of the medieval structural remains are designated, either as Listed Buildings, or as Scheduled Ancient Monuments. The Scheduled Ancient Monuments and Grade I Listed Buildings are described above. The unlisted medieval structure is described as 'The Hall'.
- 5.5.10 A number of areas contain evidence of ridge and furrow, which survives either as earthwork remains, or else it is recorded on aerial photographs. The ridge and furrow is indicative of past agricultural practices, and may indicate the spread of settlements.
- 5.5.11 A number of medieval villages have either shrunk or been deserted. Examples include Roughton, Dalderby, and Fulsby near Tumby. All of these place-names are medieval in origin. Dogdyke is also a village of medieval origin.
- 5.5.12 The other sites of medieval date include a medieval fishery site, where net sinkers were found and the alleged site of a medieval maze, the Julian Bower maze, quarry pits, and a field boundary.
- 5.5.13 The sites of post-medieval date within the study area encompass buildings, industrial sites and sites related to transport. The buildings include a 17th century house, a General Baptist Chapel, Tattershall Bridge, and a school close to the bridge.
- 5.5.14 The industrial sites include Langton Hill Maltings and Grain Warehouse, and a former smithy near Taterhsall. Dogdyke Pumping Station, a Scheduled Ancient Monument, was also constructed in this period.

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- 5.5.16 The other sites of post-medieval date include parallel banks, which may be related to the extraction industry, a ditch, and a number of find spots of coins, pottery, and other items.
- 5.5.17 As well as the sites discussed above, there are a number of sites of unknown date. These include cropmarks of enclosures and linear features, which may date to the later prehistoric or Roman periods; several find spots; a causeway between Billinghay and Tattershall; a ditched mound; and an altered river course.
- 5.5.18 As with any area, there is a possibility that previously unrecorded sites may be discovered. The types of sites most likely to be discovered are those of medieval date, and post-medieval remains associated with the canal itself. However, it is likely that later prehistoric remains survive somewhere within the study area, and the proximity of Horncastle suggests that further Roman remains may survive. Further work would be required to further determine this likelihood.

5.6 Ecology

- Ecological Data received from Consultees regarding Protected Species and Habitats
 5.6.1 Water vole, otter, badger, brown hare, bats and great crested newt have all been recorded within the Study Area (the site and the surrounding area up to an approximate 1km distance). There is also potential for additional protected species which have presently only been recorded outside of the Study Area; white-clawed crayfish which inhabit the watercourse north of Horncastle, spined loach, compressed river mussel and the Witham orb mussel, which are present within the catchment.
- 5.6.2 Records from as recently as 2003 are held for all of the protected species recorded in the Study Area.
- 5.6.3 Numerous Schedule 1 listed breeding birds also occur in the area. These include barn owl (*Tyto alba*), kingfisher, hobby (*Falco subbuteo*), little ringed plover (*Charadrius dubius*) and golden oriole (*Oriolus oriolus*). Additional species currently of high and medium nature conservation concern are of high prevalence within the Study Area.
- 5.6.4 There are no reported cSAC's or SPA's within the Study Area.
- 5.6.5 North of the Study Area lies the nationally protected Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB). This has been designated for its scenic quality, geology, topography, wildlife, historical and cultural qualities.
- 5.6.6 Eight Sites of Special Scientific Interest (SSSI) lie within 2km of the proposed stretch of canal due for restoration. These include Fulsby Wood (TF 256614), an ancient acidic oak woodland; Troy Wood (TF 250590), an extensive oak woodland found on fen-edge sands and gravels; two units under Tattershall Carrs (TF 215590: TF

214595), ancient woodlands on fen-edge sands and gravels; Tattershall Old Gravel Pits (TF-196595), which support excellent examples of aquatic plant communities;-Kirkby Moor (TF 225625), an extensive area of heathland over fen-edge sands and gravels; Woodhall Spa Golf Course (TF 210643), maintaining fine examples of heathland communities; and finally Moor Farm (TF 223637), a nationally scarce habitat of lowland raised *Sphagnum* bog. (The location of these can be seen on Figure 2 -Location of Protected Sites in the Study Area.)

5.6.7 The Lincolnshire Wildlife Trust provided data for twenty-one Lincolnshire Wildlife Trust Reserves and Sites of Nature Conservation Interest (SINC's) within 1km of Horncastle Canal. These SINC's have not been re-surveyed recently, nor have they been assessed to determine whether or not they meet current rigorous criteria for identification as County Wildlife Sites, however fifteen are located along or directly adjacent to Horncastle Canal. (The location of these can be seen on Figure 2 – Location of SSSI's and SINC's in the Study Area.)

Terrestrial Habitat

5.6.8 The immediate site area of the canal mainly comprises a raised embankment, used as the walkway for the public footpath along part of the canal and also as an informal walkway for the remaining sections. Despite this being limited to a narrow strip of land, manages to support a variety of habitats. These include hedgerows, occasional scrub and woodland area and pasture land with scattered mature trees.

- 5.6.9 The channel banks are mostly colonized by emergent aquatic vegetation, with ruderal type vegetation becoming frequent in places. The dominant vegetation in the marginal zone of the waterway is reed sweet-grass (*Glyceria maxima*) almost forming a semi-continuous sward along the watercourse and coupled with the presence of earth banks for burrowing are terrestrial features favoured by the water vole. Potential water vole burrows were observed in places over the course of the walkover, particularly evident around Tattershall.
- 5.6.10 Neighbouring land to the canal path supports suitable habitat for badger and brown hare, due to the presence of areas of countryside with a mixture of agricultural types and land uses. This ensures that throughout the year they have access to a regular and plentiful food supply. The habitat present alongside the canal is predominantly agricultural land, the majority of which is grazed.
- 5.6.11 Mature trees and structures such as bridges and houses present in the study area could provide potential roosting areas for species of bat. Canals provide suitable habitat for feeding bats as they support an abundance of insect life. The adjacent pasture land and occasional woodland could also provide suitable foraging areas.
- 5.6.12 A raised embankment is present alongside the majority of the canal, and typically supports grazed grassland with occasional areas of greater vegetation diversity (complete details should be available upon completion of the Phase 1 Ecological Survey). Wooded cover is occasional along the immediate route and there are only occasional fence lines or hedgerows either alongside or between the canal and the adjacent land.



Aquatic Habitat

- 5.6.13 The canal contains good aquatic habitat for water vole due to the presence of permanent water with slow-water flow and a suitable channel width of approximately 5-10 metres which are favoured by water vole (English Nature *et al*, 1998).
- 5.6.14 Despite otters utilising a variety of different habitats, the main factor which determines areas used by this mammal is the availability of shelter in which to sleep and breed. Holes in the canal / river-banks, hollow trees, and cavities amongst tree roots, piles of rocks, wood or debris may all be used. Otter also needs areas above ground such as sections of scrub and tall, dense bankside vegetation to use as resting sites. Some of these features are present along the questioned section of canal, and since fish also inhabit the waterway, suitable potential foraging opportunities and habitat for otter exists particularly in the form of the presence of suitable bankside habitat providing opportunity for resting/holt sites.
- 5.6.15 Potential aquatic habitat for great crested newt exists in the study area in the form of Mediaeval Fish Ponds and/or the smaller waterbodies of those forming part of Tattershall Leisure Park. These waterbodies were not surveyed in the initial walkover but are around the location of a positive great crested newt record.

5.7 Environmental Water Quality

- 5.7.1 Invertebrates are a good basis for the biological assessment of water quality due to their relatively quick response to the physical and chemical characteristics of the river which means they can respond to pollutants that occur infrequently, they do not move far and provide a picture of water quality and quantity integrated over time.
- 5.7.2 The water quality identified from the data search revealed an overall good standard for the watercourse. The invertebrate species and families identified are generally indicative of still to very slow flowing water. At Thornton Bridge however, records indicate that organic pollution incidents at this site may be having a detrimental effect on the water quality and hence the aquatic invertebrate fauna.
- 5.7.3 The quality of the rivers in the Witham Catchment is generally good to fair. The uppermost reaches of this water system are generally unpolluted, with the lower reaches being increasingly affected by eutrophication (LEAP 1999). The LEAP comments that the Old Bain has recorded significant failures against its River Ecosystem targets due to the effects of high nitrate levels and the demand for oxygen by microscopic organisms and low flows.

5.8 Geology and Hydrogeology

Published Geology

5.8.1 The geological map shows the canal to be located mainly in an area of alluvium described as '*silt and clay, peaty in part*'. River Terrace deposits flank the alluvial deposits comprising '*sands and gravels*'. Along the central and southern regions of the canal undivided River and Glaciofluvial Sheet Deposits of '*sands and gravels*' occur along the route of the canal. The map indicates the drift deposits to extend 5 to 10m below ground level.



- 5.8.2 The solid geology beneath the canal comprises 'grey shelly limestone and clay' of the Kimmeridge Clay Formation; 'grey, shelly, commonly silty and partly calcareous mudstone' of the Ampthill Clay Formation; and 'grey, shelly, silty calcareous mudstone' of the West Walton Formation; and 'grey, locally shelly calcareous mudstone' of the Oxford Clay Formation. The Group are of Upper Jurassic age and dip gently to the northeast.
- 5.8.3 No faults are shown near the ground surface within the vicinity of the canal.
- 5.8.4 The British Geological Survey (BGS) borehole database identified ten exploratory holes along the length of the canal.
- 5.8.5 The sequence of geology identified from the boreholes can be summarised as follows:
 - Alluvial deposits comprising sand and river gravels between 1.4m and 7.1m thick;
 - Glacial Till between 3.2m thick and up to 20.2 m thick;
 - Ancholme Group Clays encountered between 10.5m and 19 mBGL;
 - Groundwater was encountered in 6 of the ten boreholes within or close to the base of the alluvial sands and gravels.

Hydrogeology

5.8.6 The Hydrogoelogical Map of England and Wales shows the canal to be in an area, which is underlain by impermeable rocks, generally without groundwater except at shallow depth.

- 5.8.7 The Groundwater Vulnerability Map shows the canal to be located on a '*Minor* Aquifer (Variably permeable)' with soils of '*high leaching potential*'. The minor aquifer comprises the alluvial and river terrace drift deposits. The underlying Ancholme Group is classified as a Non-Aquifer.
- 5.8.8 Minor Aquifers are described as 'fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flows to rivers'.
- 5.8.9 Soils of high leaching potential are described as 'Soils with little ability to attenuate diffuse source pollutants and in which non-absorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or to shallow groundwater'.
- 5.8.10 Perched groundwater may also be encountered within the glacio-fluvial deposits and Glacial Till deposits, occurring as an unconfined aquifer.



5.9 Water Resources

- 5.9.1 The River Bain is fed in its upper reaches by the unconfined chalks and Spilsby sandstone, and has been classified as no water available for abstracting purposes from the river at low flows.
- 5.9.2 The Bain sands and gravels have the existing abstracting licences and is currently classified as having water available.
- 5.9.3 Clearly restoration of navigation will require the storage of winter flows and augmentation of summer flows.
- 5.9.4 The Bain gravels are an important local groundwater resource. The Environment Agency in this Catchment Abstracting Management Strategy (CAMS) has assumed from the available data, that hydraulic continuity between the sands on gravel and the Horncastle Canal and River Bain is poor.



6.0 POTENTIAL IMPACTS & SUGGESTED MITIGATION MEASURES

6.1 Introduction

6.1.1 The proposed canal restoration project shall result in both constructional impacts linked to the restoration, and operational impacts. The eight categories discussed previously are considered again in this section with regard to these potential impacts which they may accrue, followed by outline mitigation measures for future works of this scheme. The impacts identified are only indicative at this stage and will be expanded upon during the EIA and revised by further survey work (refer to Section 70) and consultee responses.

6.2 Land Use

- 6.2.1 Some agricultural land will be permanently lost as a consequence of the proposed canal restoration scheme, and some shall undergo substantial change. Consultation with local planning authorities and defra will be held to seek their in-confidence views, particularly regarding CSS land.
- 6.2.2 The effect on the local land drainage will be one of the principal concerns of the Internal Drainage Board and the local farmers. The main concerns will be flood flows and dry weather flows and these will need to be addressed, and adjacent landowners will need to be consulted.
- 6.2.3 Landholdings have already been identified and an initial assessment of farm severance including existing accesses and requirements for new accesses will be carried out. There will be disruption to the farming activities through loss and/or severance of areas of agricultural land.
- 6.2.4 The siting of working areas over the course of the potential works should be designated in agreement with landowners to minimise disturbance and the majority of these work sites should be some distance away from most centres of population.

6.3 Landscape

- 6.3.1 The canal restoration works will have a small permanent visual impact on the landscape of the area. There will be temporary loss of vegetation and slight alterations to the actual channel, but it is anticipated that there will be very little long-term effect.
- 6.3.2 The proposed works follow the current path of Horncastle Canal from Horncastle south to Tattershall. However once leaving Tattershall town centre, there are two route options; that continuing in the path of the canal, bearing south-west to Dogdyke and another along the course of the River Bain heading southwards, but which one has not yet been confirmed.



6.4 Recreation, Amenity and Tourism

- 6.4.1 Restoration of Horncastle Canal would assist in increasing access to the national waterways network, by acting as an important link to the River Trent. It would also further the enjoyment of the countryside whilst protecting its character.
- 6.4.2 The restored canal and associated projects would benefit the local economy by encouraging more people to the area and help to spread the economic and employment benefits more widely. The restoration scheme would also offer additional valuable and attractive recreational opportunities to the area.
- 6.4.3 Potential positive impacts of the restoration project could be the assistance of the passage of water for flood, alleviation and drainage, and additional water resource benefits. However, inappropriate and extensive human use of the waterway corridor has the potential to cause considerable damage to the wildlife components. Some potential impacts of the proposed increased human exploitation include path erosion, an increase in litter and noise and disruption to wildlife and habitats.
- 6.4.4 There will be a potential disruption to the local community and land use during the construction period, since some small areas of land take will be necessary to establish working areas, site compounds and access tracks. Temporary disturbance to the recreational use of and access to the canal corridor shall also occur and there will be a potential increase to the traffic on roads, lanes and tracks in the vicinity of the worked areas over the period of construction. This could result in some disruption to traffic flows, increased noise levels and poor air quality in the vicinity of the sites. Routes to and from each worked site should be carefully chosen to minimise the impact on other traffic and local residents. This impact is only temporary and signs will be erected warning of the presence of construction and delivery vehicles.
- 6.4.5 In order to minimise these potential impacts, a balance needs to be struck between the need to protect the environment and that to enhance the public use of the canal. Mitigation measures can be suggested once a clearer illustration of the canal restoration has been decided upon. The Local Planning Authority will need to be satisfied that the existing highway network and other utilities have sufficient capacity to accommodate for the development of the canal and the associated increase of people to the area.
- 6.4.6 General mitigation measures can be suggested including;
 - Varied standards of footpath surfacing with the use of high quality surfacing where erosion risks are perceived to be greatest.
 - Increase safety to the verge by instigating management, comprising twice yearly cutting to keep the edges of the path and waterway visible and ensure trees or shrubs do not become established and damage or destroy the bank.
 - The Countryside Agency, English Tourist Board and Rural Development Commission have together produced a set of 'Guiding Principles for tourism in the Countryside'. The principles contained in these guidelines will be adopted for the restoration scheme.



6.5 Archaeology and Cultural Heritage

Impacts

- 6.5.1 The proposed improvements will have a number of impacts on known archaeological sites and Listed Buildings. The main impact upon archaeological sites will be caused by the proposed storage areas. Of the known archaeological sites, the prehistoric or Roman trackway (TF 2482 6216 to TF 2431 6192) and ridge and furrow (TF 2577 6898) will be directly affected. However, it is likely that the storage areas, as well as the proposed new canal cutting at Kirkby-on-Bain may contain previously unrecorded archaeological sites.
- 6.5.2 The dredging of the canal for reinstatement would be undertaken by an excavator working alongside the canal. In areas where the line of the River Bain was utilised for the canal, there is a potential that archaeological artefacts may be recovered from the riverbed. Additionally, previously unrecorded features alongside the canal may be impacted upon, but further survey is required to clarify this. The remnants of the railways which cross the canal may also be impacted by this process.
- 6.5.3 There will be an operational visual impact upon a number of Listed Buildings alongside the canal. These are mainly located within the villages which run alongside the canal. However, once the works are completed, it is likely that the improvements to the canal will enhance the setting of these, and other, buildings.
- 6.5.4 Restoration of the locks along the canal will provide a beneficial impact to the canal as a whole, and to these historic structures.

Mitigation

- 6.5.5 In the first instance, a full desk-based archaeological assessment and walkover survey of the affected areas should be undertaken to further determine the impact of the proposals upon the cultural heritage of the area. This will also inform better of the likelihood of discovery of previously unrecorded archaeological sites, and to assess the nature and survival of any historic structures associated with the canal.
- 6.5.6 This desk-based assessment will inform of the need for further mitigation, but it is likely that geophysical survey and trial trenching will be required within areas proposed for storage, as well as along the length of the proposed new cut.

6.6 Ecology

Impacts

- 6.6.1 Constructional impacts from the restoration plan will include;
 - Disturbance and/or potential loss to water vole and otter habitat.
 - Potential disturbance to breeding birds as a result of disturbance or removal of mature trees, areas of scrub, marginal vegetation or hedgerows in the Study Area.
 - Potential disturbance to roosting bats as a result of works nearby to mature trees, existing structures, areas of woodland and the planned work to the waterway.



consultants

- Potential disturbance to great crested newt as a result of the associated works to the restoration plan disturbing both potential newt terrestrial and aquatic habitat.
- Potential disturbance to spined loach, white clawed crayfish, Witham orb mussel and compressed river mussel. Despite none of these species being recorded in the Study Area, they inhabit the local river catchment and so have the potential to be impacted upon.
- Loss of bankside vegetation and bankside from the proposed widening of the canal channel.
- Potential disturbance to adjacent SINC's and potential disturbance to SSSI's within the Study Area.

6.6.2 Operational impacts arising from the restoration plan will include;

- Long term disturbance to Horncastle Canal, its associated habitats and supported species including water vole, otter and potentially spined loach, white clawed crayfish, Witham orb mussel and compressed river mussel as a result of increased human intrusion and the associated works of the restoration plan such as continual dredging of the watercourse at regular intervals.
- Potential disruption to adjacent watercourses such as the River Bain via the associated works, for instance potential water level changes.
- Loss of land, in particular landtake to associated features of this project (such as marinas, passing places or settling pools) in areas of agricultural land and improved pasture with scattered mature trees which will result in permanent loss of habitat.
- Potential disturbance to adjacent SINC's and potential disturbance to SSSI's within the Study Area.
- Increase in the distribution of unwanted vegetation by boats along the watercourse.
- Potential physical damage to the unprotected banks and to vegetation growing in the waterway as a result of the wash from powered boats.
- Potential impact to the aquatic plants via a reduction to the light levels from cloudier water resulting from silt dislodgment from the waterway bed by the churning of propellers.
 - Potential algal growth promotion could be encountered due to high silt depositional rates after dredging processes.

Mitigation

Water vole & Otter

- 6.6.3 General mitigation measures relating to watercourses are essential regarding any planned works to areas where water vole and otter are present. These and further mitigation measures will be formulated during the EIA and facilitated by further survey work.
- 6.6.4 Suggested probable mitigation procedures to be applied directly to water vole include their exclusion from the work areas by trapping and translocation methods, as well as



substantial habitat restoration and bankside planting schemes in order to improve the habitat for water voles.

- 6.6.5 It is suggested that the canal restoration procedure is staggered whereby the complete canal stretch is divided into sections which are worked consecutively. This would enable parts of the suitable water vole and otter habitat alongside the water channel to remain suitable for habitation at all times throughout the complete operation.
- 6.6.6 If otter are found to be present in the area after further surveys are performed, mitigation would need to be formulated in consultation with English Nature and the need for a defra otter licence determined.

Bats

6.6.7 Thorough mitigation strategies can be devised to reduce the potential impacts to bats, but further surveys will be required to identify these. Such mitigation procedures could include;

To avoid, as far as possible, the felling of mature trees which have the potential to provide a bat roost.

- If the felling of mature trees cannot be prevented, the tree should be inspected by an experienced bat surveyor, as should any suitable structures that may be demolished. If bats are found to be present, a licence must be obtained from defra.
- The replacement of any broadleaved trees due to be felled with native broadleaved trees.
- The replanting or replacement of any hedgerows which are to be removed using native species.

Breeding Birds

6.6.8 It is suggested that buffer zones are created between arable land and watercourses, to provide particular benefit to birds. Further surveys should also be performed to identify any impacts. Vegetation clearance during breeding season (from late February through to August) could have a detrimental impact upon these species and so should be avoided as much as possible.

Badger

6.6.9 It is suggested that a badger survey is performed to determine the exact location of any badger setts, the movements of badger within the area and to assess the territory size. If there are any setts within 30 metres of the works then a licence would be required in order to undertake the work and mitigation would need to be formulated in agreement with English Nature.



Great Crested Newt

6.6.10 If this species is found to be present in the Study Area there are some general mitigation principles that will need to be adhered to. If great crested newt are found to be present within 500 metres of the working areas mitigation would need to be formulated in consultation with English Nature following Spring population surveys and a defra great crested newt licence applied for in advance of any works.

Spined loach, White clawed crayfish, Witham orb mussel & Compressed river mussel
6.6.11 Further studies should be performed to locate the exact locations of these species and if present in the Study Area, mitigation measures will need to be devised.

Protected Sites

6.6.12 Designated SSSI's and SINC's must be protected when any works are undertaken and caution measures adhered. It is important to realise that actions taken outside protected areas still have the potential to impact on the sensitive habitats and species of note.

6.6.13 Additional general mitigation measures may be suggested including;

- The actual and potential ecological effects of the existing and future transfer of biota around the county should be assessed.
- A speed restriction could be enforced along the waterway and provide a healthier environment for vegetation.
- Bank erosion and ecosystem disruption can be prevented by avoiding 'constraint channels' where the channel width is too small and physical resistance to the passage of boats occurs. Damage could be mitigated by propulsion systems that minimise the resistance to the passage along the canal.
- It is suggested that silt depositional rates are monitored as a mitigation measure against an increase in algal growth.

6.7 Environmental Water Quality

- 6.7.1 If the water flow changes after the restoration of the canal due to the necessity of raising the water levels, this may lead to changes to the invertebrate fauna.
- 6.7.2 A potential decrease to the diversity of invertebrates could transpire as a result of the restoration of the canal. This is due to the likelihood of a reduction of the aquatic and emergent vegetation leading to a reduction in the number of microhabitats available for the invertebrates.
- 6.7.3 Water quality could also be affected by the potential increase of waste water being emitted from the barges and boats along the canal.
- 6.7.4 It is suggested that a macrophyte survey is carried out to determine what aquatics are present in the canal. This could help to provide greater insight into the quality of the canal water.



6.8 Geology & Hydrogeology

- 6.8.1 In order to restore the canal, the process of canal dredging and lock restoration will be required along its length. This would enable the water depth to increase from approximately 0.3m to 1.5m, and therefore create a maximum channel depth of approximately 4.5 mBGL.
- 6.8.2 The geological map shows glacio-fluvial sands and gravels exposed at the surface on either side of the alluvial deposits, which flank the canal. This suggests that the current canal bed is within alluvial deposits which are in turn underlain by glacio-fluvial sands and gravels. By excavating to a deeper level, these high permeability glacio-fluvial deposits (sands and gravels) will become exposed. This could potentially impact the water levels within the canal due to seepage occurring during the dry season. Disruption could also occur within the wet season if reserve flow occurs at the base of the canal bed, leading to instability problems. If this situation were to arise, suggested mitigation measures may include the re-lining of the canal to help avoid this condition.
- 6.8.3 Potential impacts may also arise due to the increase in canal water depth. This could leave the permeable sands and gravel deposits exposed, so that the increased water pressure at the dredged bed will alter the seepage conditions acting on the sides and base of the canal which may create instability.
- 6.8.4 It is suggested that cable percussive boreholes or window sampling holes followed by dynamic probing at 50-100m spacing along the length of the canal embankment should be excavated to determine the geology of the canal base and sides. This additional information will then provide geotechnical parameters to allow stability and seepage assessments to be undertaken.

6.9 Water Resources

- 6.9.1 Measures such as storage and back-pumping may need to be considered to control water resources and the effects of these including further land take should be managed. Storage reservoirs can be managed to provide an environmental asset.
- 6.9.2 The EA have commented in their draft LEAP that local water resources in the catchment of the Bain are scarce in summer months and cannot sustain any increase in abstraction, therefore the EIA will need to fully consider flood defence and water quality as well as impact on water resources.

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7.0 REQUIREMENTS FOR FURTHER SURVEYS & FINAL CONCLUSIONS

- 7.1 Certain general mitigation measures have been suggested based upon the findings from the ecological walkover and information received from consultees. However, for comprehensive mitigation measures to be achievable, further assessment will be required.
- 7.2 As part of the EIA it is suggested initially that further ecological surveys are performed along sample sections of the allocated stretch of canal in order to determine the presence/absence of various protected species. Subsequently, up to two years prior to the proposed works, appropriate ecological surveys should be carried out along the complete stretch of Horncastle Canal due for restoration.
- 7.3 A list of further surveys suggested follow;

It is suggested that due to suitable habitat and recent positive records for water vole and otter, further ecological surveys to identify population numbers and territory size of both species are performed in spring months (or between late April to early October) before any work commences (according to Water Vole Conservation Handbook (English Nature: 1998)). These surveys will be vital to monitor the levels of activity and to provide a clearer mapping of the exact location of recently used sections of the waterways in order that specific mitigation can be put in place well in advance of any works.

Mammal surveys for badger and brown hare will also be required. This will determine if brown hare are still using the area; the exact location of any badger setts, the movements of badger within the area and assess the territory size. This will allow specific detailed mitigation to be developed.

High quality bat foraging habitat occurs throughout the study area and it is suggested that additional surveys into the extent of the bat populations and size of roosts should be carried out. This should include night-time surveys to establish the exact location of roosts and flightlines. Potential roost sites which may be removed as a result of the works should be thoroughly checked by a licensed bat surveyor at an appropriate time of year for the existence of roosts.

A great crested newt survey is required to determine if this species could potentially be affected by the restoration scheme and if there are any more waterbodies nearby or adjacent to the canal which could be inhabited by this species.

The watercourse will also need to be assessed for the presence of white-clawed crayfish, spined loach, Witham orb mussel and compressed river mussel which are all recorded in nearby or contiguous watercourses. Mitigation for these



species will then be able to be identified based on their presence/absence or locality to the canal.

A Phase 1 Ecological Survey along the complete stretch of canal should be performed prior to any works, to provide a framework for the site area and surrounding land.

No records regarding aquatics have yet been received and so it is suggested that a macrophyte survey is carried out to determine what aquatics are present in the canal. This could also help to provide greater insight into the quality of the canal water.

A full archaeological desk-based assessment and walkover survey is required to fully assess the proposals, and to further determine the extent of known sites, and the likelihood of discovery of previously unrecorded sites. The results of this report will inform requirements for further work.

Landscape and Visual Impact Assessment Survey.

Detailed Slope Profile and Assessment of Strength Parameters of the underlying soil and side slopes of the canal.

Detailed Assessment of water resources in the catchment will be required.

7.4 It is also considered essential to pursue consultation with the statutory consultees and the relevant officers in the Local Authorities as the restoration planning progresses. This would ensure other consultees were up to date with regard to the proposed canal restoration options, to gain formal views as well as identifying relevant information which will assist in the assessment of the scheme.

7.5 Early consultation is essential with the Countryside Agency and the Local Authority Landscape Architects, to identify any relevant Landscape Strategies or initiatives for the area.



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Summarised Consultee Responses

An ecological data search was carried out which involved contacting a number of conservation organisations, local naturalists groups and individuals, to request copies of any information held for the canal and surrounding area (within a 1km radius, termed 'Study Area'). The data obtained via a summary of consultee responses follows;

	NAME	ORGANISATION & DEPARTMENT	DATE CONTACTED	RESPONSE RECEIVED	SUMMARY OF RESPONSE
	Mrs. H. Bingley	Lincolnshire Wildlife Trust	12/07/04	29/07/04	Information on site notification for all designated sites within 1km of Horncastle Canal was received. These included Lincolnshire Wildlife Trust Reserves, Sites of Nature Conservation Interest (SNCI's) and Sites of Special Scientific Interest (SSSI's). A description of each designated site including habitat type depiction, status and general background information was received. Twenty-one SNCI's are recorded but these have not been re-surveyed recently nor have they been assessed to determine whether or not they meet the current criteria for designation as County Wildlife Sites. There was information also given for two recorded SSSI's. A list of notable species recorded within 1km of the canal was also received. Recent records of protected species were included; water vole, otter and badger and numerous protected bird species.
	Mr. D. Start	Heritage Trust of Lincolnshire	12/07/04	16/07/04	They informed that no ecological data records are kept at the Heritage Trust, but that such information is available through the Lincolnshire Wildlife Trust (already contacted). They do however hold archaeological data for the area, of which they provided relevant contact details.
•	Mrs. J. Eastmead	Lincolnshire Bird Club	12/07/04	16/08/04	Eleven tetrads (each 2 x 2km) were covered to provide a suitable search for Horncastle Canal Study Area. The data given was collected between 1985 - 1989, but all more recent reports suggest that for most of the breeding species, their range remains very similar. Specially protected Schedule 1 species under the Wildlife & Countryside Act 1981 (as amended) are recorded in the area such as barn owl (<i>Tyto alba</i>), kingfisher (<i>Alcedo atthis</i>), hobby (<i>Falco subbuteo</i>), little ringed plover (<i>Charadrius dubius</i>) and golden oriole (<i>Oriolus oriolus</i>). Additional species currently of high and medium conservation concern (also known as 'red' or 'amber' list species respectively) are of high prevalence in the Study Area.
	Mr. A. Binding	Butterfly Conservation Lincolnshire Branch	12/07/04	02/08/04	All butterfly records for the Horncastle Canal Study Area between 1980 and 2004 were received. Species of particular note include Essex skipper, painted lady (<i>Cynthia cardui</i>), brown argus (<i>Aricia agestis</i>) and holly blue (<i>Celastrina</i> <i>argiolus</i>) all from August 2003.
	Mr. D. Carnell	The Inland Waterways Association	12/07/04	02/08/04	No direct ecological data was received; however information was given which could impact on the feasibility study area. HALCRO consultants carried out a study into Bain Valley Options Development in 1999 which could hold relevant information. We were also informed of the East Lindsey District Council Environmental Officer, Chris Mayes who has expressed a wish to be included in the consultation, similarly to Kate Percival of Lincolnshire County Council and riparian landowners. We were also informed that Water Supply Figures for the last 10-15 years could be provided if necessary.

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	Ms. R. Gorman	English Nature	12/07/04	06/08/04	English Nature informed of six SSSI's within 2km of the proposed Horncastle Canal Site Area. These include Fulshy Wood, Troy Wood, Tattershall Carrs, Tattershall Carrs, Tattershall Carrow, State Sta
					Gravel Pits, Kirkby Moor and Moor Farm. These sites have since been researched from English Nature's website and citations downloaded.
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	Mr. & Mrs. Faulkner	Lincolnshire Naturalists Union; Lincolnshire Bat Group	12/07/04	06/08/04	Data regarding bats, other mammals and herptiles were received from records collected over a number of years from numerous sources. The data received principally concerned bat records are roosts. Numerous records of bat sightings and roosts
					between 1973 and 2004 for Horncastle, Haltham, and Kirkby on Bain, Tumby, Coningsby and Tattershall were received.
					Sites in Tattershall and Horncastle were listed due to additional mammal and herptile records. These included water vole and otter records from as recently as 2003 and
· ·					great crested newt records from 2003 and 2004 around Tattershall Castle moat. A record of smooth newt, brown hare and common shrew was also stated.
		*			They expressed an interest to be consulted regarding an new records made if survey work was intended, client confidentiality permitting.
•	Ms. K. Davenport	Countryside Agency	12/07/04	12/08/04	An email was sent to inform of a relevant website to consu www.countryside.gov.uk) for details of Central Lincolnshire
					Vale Character Area Extract, the objectives of which they would wish to see incorporated into any future restoration proposals.
	Mrs. A.	Environment	12/07/04	15/10/04	Their response included information regarding groundwater.
	Quincy	Agency	, 12/0//01		contaminated land, ecology, public register, flood defence and conservation.
•	-				The site does not lie within a currently defined Source Protection Zone, around which are public water supply abstractions which are particularly sensitive to groundwate
					pollution. The Agency's Policy and Practice for the Protection of Groundwater classifies the site as high unperphility Minor Aquifer
			· · ·		The Agency is aware of 4 sites within 1km of Horncastle Canal which may have contamination issues. Site
					sites have impacted or are impacting on the site in question. Summary data for the Bain revealed the water quality to
	· · · ·				generally be good and invertebrate species and familied present are indicative of still to very slow flowing water. Records from Thornton Bridge indicate that organic
•					pollution incidents here may be having a detrimental affect upon the water quality. It is mentioned that there is some reservation regarding the water resources situation and
					potential ecological damage associated with low flows. Radial search responses, performed from the approximate centre of the site over a radius of 9km informed of recent
					pollution incidents, discharge consents, GQA (General Quality Assessment) and RQO (River Quality Objectives)
					Surface/groundwater quality and details of any relevant Public Register Entries.
					Information on navigation Authority, Utilisation of flood
					rivers as navigation and warnings, Winter mooring/off-line mooring use, Seepage/stability, Erosion control, Change in water level, New bank profile to be a minimum of 4m wide
	· · · · · · · · · · · · · · · · · · ·		· ·		crest, Water resources, Navigable depth, Weed control for navigation, Land drainage consent for works, Lock types

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				and overflow weirs, Low flow maintenance at Fulsby/Roughton Penstocks and Horncastle swimming baths sluice and Kirkby on Bain. Further confirmation of historic data for water vole and otter was included. Both these mammals are active in the Study_
				Area along the Bain/Horncastle Canal, but current status can only be established and verified by up-to-date surveys.
Mr. A. Dawson	British Waterways	12/07/04	05/08/04	An email was received informing of no holdings of substantial ecological data. On the River Witham, British Waterways (BW) are the navigation authority and have very little land holdings. However, on other waterways such as the surrounding canals, they gather ecological data to inform maintenance work such as repairs to banks. They state that the margins of Horncastle Canal support emergent plants, particularly reed sweet grass (<i>Glyceria maxima</i>) and that water vole can be found along the banks. A combined
				invertebrate dataset from the Environment Agency for the entire Witham and Fossdyke navigations is held by BW, since invertebrates are associated with the bankside vegetation. It was also suggested on the basis of Horncastle being a disused canal, that it is likely to have a substantial emergent plant growth and possibly aquatic plant interest, if succession has not lead to reed swamps. Spined loach (<i>Corbitis</i> tenia) has been recorded in the
				Witham catchment and so the activities involved in restoration and operational use of the canal could have an impact on this species. An additional record of two non-statutory sites in the Study Area were revealed; Mill Drain and Castle Leisure Park, Tattershall.
Mrs. I. Weston	Lincolnshire Naturalists Union (Plants)	03/11/04	N/A	No response received to date.
Mr. R. Chadd	Lincolnshire Naturalists Union (Dragonflies)	03/11/04	N/A	No response received to date.
Mr. N. Bromidge	Lincolnshire Naturalists Union (Fish)	03/11/04	N/A	No response received to date.
Mr. J. Watson	Lincolnshire County Council	12/07/04	N/A	No response received to date.
Mr. J. Sharpe	Royal Society for the Protection of Birds	12/07/04	N/A	No response received to date.
Mr. N. Starks	Woodland Trust	12/07/04	N/A	No response received to date.
Dr. A. A. Richards	Lincolnshire Angler's Consultative Association	12/07/04	N/A	No response received to date.
Mr. C. Parker	The Witham & District Joint Anglers Federation	12/07/04	19/11/04	Telephone response from Mr. Stuart Oxborough to inform of two actively fished lakes in Tattershall and the south-east side of the Horncastle Canal for approximately 0.5km. Species principally caught are chubb and carp.
Mr. D. Kent	National Federation of	12/07/04	N/A	No response received to date.

	Anglers				
Mr.	Sheffield	12/07/04	N/A	No response received to date.	
Wagstaff	Piscatorial Society				
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Ms. A.	Lincolnshire	12/07/04	N/A	No response received to date.	
Townsend	Badger Group				
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APPENDIX B

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REFERENCE	GRID	PERIOD	SUMMARY
NUMBERS	REFERENCE	and the second	
SAM No. 22675	TF 2460 6382	Medieval	Churchyard Cross, St Benedict's Churchyard. Built of limestone, with a base of 0.9m
204.002, LI43096			square, and 0.23m above the ground. An octagonal shaft segment 0.88m high
		·	remains. Scheduled Ancient Monument, Listed Building Grade II.
SAM No. 22720	TF 2110 5754	Medieval	Tattershall Castle & College. Originated as an enclosure castle constructed in the 13 th
TF 25 NW 1	· · · ·		century. It was rebuilt as a fortified house in the 15 th century, and occupied until
TF 25 NW 2			1693, when it fell into disrepair. It includes Holy Trinity Church, a medieval parish
TF 25 NW 36			church transformed into a secular college, founded in 1439-1440 by Lord Cromwell,
TF 25 NW 38			and dissolved in 1547, with an almshouse attached to it. Parts of the college still
457.023-457.034			remain, and the church was repaired in the 19 th century. Scheduled Ancient
LI40156, LI42861,			Monument; Listed Buildings Grade I & Grade II.
LI43560, LI43561			
SAM No. LI 264	TF 206 558	Post-Medieval	Dogdyke Pumping Station. Fen drainage pumping station, containing an 1855 beam
TF 25 NW 16			engine. It was disused by 1970. Scheduled Ancient Monument.
LI43558		·	
SAM No. 22633	TF 2124 5789	Medieval with modern	Butter Cross, Tattershall. The cross is of stepped form, consisting of five steps
457.013, LI43559		additions	octagonal in plan. The lowest step is of modern date and made of red sandstone and
			concrete. The remaining steps are medieval in date and built of limestone blocks. On
			top of the steps is a socket-stone and shaft. The shaft contains carvings of shields and
· · ·			figures; a crucifix sits on top, a modern addition. The full height is 5.7m. Scheduled
			Ancient Monument; Listed Building Grade I.
SAM No. 22687	TF 2121 5758	Medieval	Tattershall College. Grammar School founded 1439, built of red brick with ashlar
TF 25 NW 35		•	dressings. Dissolved in 1545, though thought to have continued in use. Converted to
LI43557, LI43560			form part of Tattershall Brewery in the late 18 th century. Scheduled Ancient
			Monument; Listed Building Grade II*; Guardianship Monument.
LI1880	TF 2575 6958	Roman	Roman wall of Banovallum. Scheduled Ancient Monument.
105.001, 105.002	TF 2224 5808		No. 47 High Street & The White Bull. Listed Buildings Grade II.
105.003	TF 2269 5841		No. 131 High Street. Listed Building Grade II.
105.004, 105.005	TF 2223 5802		Church Close & Church of St Michael. Listed Buildings Grade I.

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NUMBEDS	GRID	FERIOD	SUMIMAKI
105.006	TF 2245 5813	1	Elizabethan House No. 58 High Street Listed Building Grade II
105.009, 105.010	TF 2239 5791	······	Nos. 47 & 49 Silver Street Listed Buildings Grade II
105.012	TF 2246 5820	· · · · · · · · · · · · · · · · · · ·	No. 97 The Cedars High Street, Listed Building Grade II.
204.001, LI0254	TF 2461 6384		Church of St Benedict. Listed Building Grade I.
233.012, 233.013	TF 2572 6966		No. 25 Bridge Street & warehouse to rear. Listed Buildings Grade II.
233.064	TF 2571 6951		Banovallum House. Listed Building Grade II.
233.093	TF 2571 6969		No. 1 Grundy's Court, Prospect Street. Listed Building Grade II.
233.117-233.146	TF 2556 6960		Listed Buildings on West Street. Listed Buildings Grade II & Grade II*.
250.001 & 250.002	TF 2437 6244		Church of St Mary, and gravestone. Listed Buildings Grade II.
LI40121			
250.003	TF 2415 6255		Cherry Tree Cottage. Listed Building Grade II.
250.004	TF 2427 6232		Old Rectory. Listed Building Grade II.
250.005	TF 2422 6241		Rose Cottage. Listed Building Grade II.
457.001	TF 2118 5775		Bridge House. Listed Building Grade II.
457.003	TF 2135 5789	· · · · · · · · · · · · · · · · · · ·	No. 10 High Street – Old Vicarage. Listed Building Grade II.
457.003	TF 2229 5829		No. 33 Hunters Lane – Hunters House. Listed Building Grade II.
457.007-457.012,	TF 2128 5784		Listed Buildings in Market Place. Listed Buildings Grade II & II*.
457.014-457.017		· · ·	
TF 25 NW 3, LI40182	TF 2223 5804	Medieval	St Michael's Church. Originated in the late medieval period, and still in use. A late
			Norman capital, now used as a credence, is all that remains of the earlier church.
			Listed Building Grade I.
4571.021 & 457.022	TF 2096 5755	· · · · · · · · · · · · · · · · · · ·	Nos. 1 & 2 Castle Cottages. Listed Buildings Grade II.
457.035	TF 2118 5780	·	The Old School and School House. Listed Building Grade II.
457.004	TF 2205 5829	×	Grange Farmhouse. Listed Building Grade II.
Linear 1015	TF 25 69	Post-Medieval	The Horncastle Railway opened in 1855 from the Lincoln and Boston Branch of the
		· · · · · · · · · · · · · · · · · · ·	East Lincolnshire Railway to Horncastle. It closed in 1954.
TF 15 NE 6	TF 194 571	Post-Medieval	Horncastle Canal. Entry refers only to the section at Tattershall. Constructed before
			1792. Blocked by embankment and now disused.
TF 25 NW 14	TF 22 58	Prehistoric?	Bronze Axe. Provenance unknown.

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REFERENCE	GRID	PERIOD	SUMMARY
NUMBERS	REFERENCE		
TF 25 NW 26	TF 213 577	Medieval	Medieval fishery site near River Bain. Net sinkers were found.
TF 25 NW 33	TF 2255 5832	Post-Medieval	A 17 th century house.
TF 25 NW 41	TF 2266 5839	Post-Medieval	General Baptist Chapel. Built in 1862 with a three-bay front in polychrome
			brickwork.
TF 25 NW	TF 2207 5805	Medieval or later	The Hall.
TF 26 NE 16	TF 2554 6930	Medieval	Julian Bower Maze. Alleged site of a medieval maze. The name may refer to a small
LI42221			earthwork at TF 2563 6935.
TF 26 NE 40	TF 2534 6905	Medieval	Possible ridge and furrow mapped from poor quality aerial photographs.
TF 26 NE 42	TF 2556 6731	Roman	Possible Roman settlement seen as cropmarks. Consists of 6 conjoined enclosures on
LI86703			average 35m by 25m. Settlement is aligned SW-NE in parallel with the River Bain.
TF 26 NE 64	TF 254 694	Post-Medieval	Site of railway station on the Horncastle Branch Railway, which opened in 1855,
			closed to passengers in 1954, and closed entirely in 1971.
TF 26 SW 30	TF 2419 6384	Post-Medieval	Group of four possible post-medieval parallel banks, 60m in length, visible on aerial
LI84897			photographs. They are located close to an area of extraction and may be related to
			this industry.
TF 26 SW 34	TF 2482 6216	Prehistoric/Roman	Possible prehistoric or Roman trackway visible as cropmarks. It is defined by two
LI84895	to		interrupted ditches 250m in length, aligned north-south. The ditches diverge at the
	TF 2431 6192		northern end of the track, forming a possible funnel.
TF 26 SW 42	TF 2386 6042	Unknown	Enclosure of unknown date known from aerial photographs. It forms an incomplete
			rectangular ditched enclosure, 10m wide.
TF 15 NE 2	TF 196 562	Iron Age	Early 1 st century AD bronze trumpet or carnyx dredged from the River Witham in
LI82908			two pieces.
TF 15 NE 4	TF 19 56	Roman	Find spot of a Roman bronze skillet ¹ , the handle stamped CARAT.
TF 15 NE 7	TF 196 563	Roman?	Find spot of a hand quern, possibly Roman.
LI82998			
TF 25 NW 4	TF 2122 5670	Neolithic	Find spot of a Neolithic polished stone axe.
LI40154			
		· · · · · · · · · · · · · · · · · · ·	

¹ Skillet – a form of frying pan

REFERENCE	GRID	PERIOD	Cinewiny
NUMBERS	REFERENCE		SUNIVIARY
TF 25 NW 10	TF 2129 5711	Neolithic	Find spot of a Neolithic polished store ave
LI40155			a me spot of a recontine poissied stone axe.
TF 25 NW 15	TF 20 57	Roman	Find spot of Roman coins
TF 25 NW 39	TF 210 555	Post-Medieval	Site of Dogdyke Bailway Station on the Dirt Line Little Dire
			closed 1963
LI40117	TF 2412 6395	Roman	Scatter of Roman notter:
LI40118	TF 2416 6249	Roman	Find spot of Roman notion
LI40147	TF 2310 5985	Neolithic / Bronze Age	Barrow
LI40160	TF 212 575	Medieval	Mediaval finds in Tother 1. 11
LI40161	TF 2138 5789	Unknown	Find met of on any 11, 11
LI40162	TF 211 575	Post-Medieval	Collection of methods and in the second seco
LI40165	TF 222 583	Unknown	Eind enert of energy light in the second sec
LI40166	TF 2235 5822	Farly Medieval	Find spot of an enamelled bronze Escutcheon ² .
LI 40168	TF 212 579	Medieval	Madiguel mas f f 11 is 11 f
LI40169	TF 215 580	Post-Medieval	Find most of a hold in the form of a house.
LI40171	TF 2110 5755	Post-Medieval	19th and groat of James I.
LI40172	TF 2138 5721	Medieval	To century seal.
LI40175	TF 1985 5745	Neolithic to Bronze A ac	Find spot of a pottery jester's head.
LI40186	TF 223 581	Mediaval	Scatter of flints.
LI40188	TF 218 581	Medieval & Dest	Find spot of a medieval bronze seal matrix.
	11 210 301	Madiaval	13 to 19 century pottery found at Coningsby.
LI40192	TF 2150 5732	Neolithia / Bronza A	
LI40193	TF 2165 5750	Modieval & David	Scatter of flints
	11 2105 5750	Medieval & Post-	Find spots of medieval and post-medieval pottery.
LI40213	TF 249 650	Medieval	
LI40283	TF 2418 6372	Medieval	Find spot of medieval pottery.
	11 2410 03/3	Post-Medieval	Haltham Lock.

² Escutcheon – Either the material found around a keyhole; a type of bucket; or a type of bowl designed to be suspended, usually from a roof. In this instance, without further information, it is impossible to tell exactly which this example is. ³ Finial – Ornament found at the top of a roof or spire.

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REFERENCE	GRID	Period	SUMMARY	
NUMBERS	REFERENCE			
LI40284	TF 2409 6099	Post-Medieval	Fulsby Lock.	
LI40383	TF 2487 6475	Medieval	Deserted medieval settlement near All Hallow's Church, Roughton.	· .
LI40387	TF 2480 6595	Medieval	Shrunken Medieval Village – Dalderby Village, Roughton.	
LI40423	TF 2432 6498	Medieval?	Shrunken Medieval Village – Roughton.	
LI40434	TF 2442 6100	Unkńown	Cropmarks, Fulsby Hall, Tumby.	
LI40436	TF 2416 6037	Medieval	Ridge and furrow, Tumby Park.	
LI40437	TF 2378 6008	Unknown	Cropmarks of an enclosure and linear features.	
LI40443	TF 2035 5770	Unknown	Linear features recorded on aerial photographs.	
LI40444	TF 2125 5770	Unknown	Cropmark enclosure, close to the Bede House, Tattershall.	
LI40445	TF 2012 5715	Unknown	Cropmark enclosure.	
LI40551	TF 1945 5740	Bronze Age	Ring ditch, Tattershall.	
LI40552		Unknown	Linear cropmark.	
LI40603	TF 2442 6442	Unknown	Cropmarks of a field system, trackway and other linear features.	
LI41872	TF 2563 6935	Unknown	A ditched mound to the west of Horncastle.	
LI41888	TF 2547 6957	Unknown	Find spot of a bone-shaped object found in Horncastle.	
LI41895	TF 2562 6928	Unknown	Find spot of a copper alloy ring.	
LI42207	TF 2555 6935	Post-Medieval	Find spot of a token found near the River Bain.	
LI42220	TF 257 680	Bronze Age	Find spot of an early Bronze Age beaker.	
LI42899	TF 246 613	Unknown	Linear cropmark, west of Fulsby Wood, Tumby.	
LI42932	TF 2128 5758	Medieval	Find spot of a French jetton found in Tattershall.	
LI43056	TF 2242 582	Roman	Find spot of Roman greyware.	
LI43116	TF 2187 5779	Post-Medieval	Various post-medieval finds from Coningsby area.	
LI43313	TF 207 562	Unknown	Human remains found in lake. Period unknown.	-
LI43443	TF 2530 6938	Post-Medieval	Langton Hill Maltings.	1
LI43444	TF 2535 6943	Post-Medieval	Langton Hill Grain Warehouse.	
LI43586	TF 2171 5766	Post-Medieval	Find spot of a Tudor coin.	· ·
LI43587	TF 2171 5772	Post-Medieval	Find spot of an Elizabethan three pence.	
LI80742	TF 218 581	Unknown	Linear feature at Gartree School.	
LI80751, LI80752	TF 2230 5798	Medieval	Medieval quarry pits and other linear features of unknown date.	

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REFERENCE	GRID	PERIOD	SUMMARY
NUMBERS	REFERENCE		
LI80753	TF 2232 5796	Prehistoric	Find spot of a flint flake.
LI80791-LI80793	TF 2422 6249	Romano-British &	Site of a possible Romano-British pit, possible medieval middens, and other undated
		Medieval	features at Reddings Farm.
LI80854, LI80855,	TF 236 602	Neolithic, Bronze Age,	Neolithic to Bronze Age occupation site, with a flint-working site. Roman pottery
LI80858, LI80861		Roman & Post-Medieval	and a post-medieval artefact scatter have also been found.
LI80862	TF 235 603	Unknown	Altered river course.
LI80868	TF 2355 6036	Iron Age or Early	Find spot of Iron Age or Saxon pottery.
		Medieval	
LI80867	TF 2361 6040	Medieval	Ridge and furrow.
LI82109	TF 2577 6898	Medieval	Possible ridge and furrow north west of Stafford Gardens.
LI82594	TF 2371 6087	Mesolithic	Mesolithic flint scatter.
LI42788	TF 2377 6087	Neolithic	Early Neolithic site at Tattershall Thorpe.
LI82613, LI82615	TF 2372 6085	Late Neolithic/Bronze	Late Neolithic or early Bronze Age pits, and late Bronze Age pits.
		Age	
LI82727	TF 196 563	Post-Medieval	Tattershall Bridge.
LI82800	TF 2117 5780	Medieval or later	Field boundary.
LI82977	TF 204 557	Medieval or later	Settlement of Dogdyke.
LI82992	TF 1957 5614	Post-Medieval or later	Former smithy, adjacent to Royal Oak Public House.
L182994	TF 1973 5606	Post-Medieval & later	School near Tattershall Bridge.
LI83329	TF 1588 5502	Unknown	Causeway between Billinghay and Tattershall.
LI40250	TF 242 609	Medieval	Lost hamlet of Fulsby, Tumby.
LI85149	TF 2420 6072	Medieval to	Ridge and furrow.
		Post-Medieval	
LI86236	TF 2117 5780	Unknown	Undated ditch and pit.
LI42898	TF 2545 6802	Unknown	Linear cropmark northwest of Thornton Lodge Farm.

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