ENGLISH HERITAGE

National Mapping Programme

Witham Valley NMP Project

Summary Report

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1 SUMMARY

The Witham Valley National Mapping Programme (NMP) Project is part of a wider multi-disciplinary and multi-period project, Lincoln and the Witham Valley Project. The latter is designated one of a series of 'Beacon Projects' planned by English Heritage for the period 2003-2005. 'Beacon Projects' represent projects of regional or national importance wherein English Heritage is able to demonstrate its skills to government and partners (English Heritage, 2003, 1.8).

The aerial survey component, undertaken by English Heritage Investigators in York, was surveyed to NMP standards. The project started on 8th September 2004 and mapping was completed by 8th March 2005. The project mapped and recorded archaeological sites varying in date and type from prehistoric enclosures to twentieth century military remains. Records for 146 new sites, with a further 27 enhancements to existing records, were input to the National Monuments Record (NMR) database (AMIE).

An assessment of Lidar data for the Witham Valley was undertaken after the completion of NMP mapping. The Lidar data sample was given to English Heritage courtesy of Lincolnshire County Council and was part of the Environment Agency sorties flown in 1991.

The project was also carried out in collaboration with Cambridge University's Unit for Landscape Modelling (ULM, formerly CUCAP); their contribution being the loan of material from their Air Photo Library.

2 INTRODUCTION

The Witham Valley NMP Project forms a sub-project of the wider Lincoln and the Witham Valley Project. The latter, multi-disciplinary and multi-period project, will also include input from English Heritage's Archaeological Investigation team. External partners in the heritage and environmental sectors and specialists from university departments are also involved in research within the Witham valley. The Witham Valley Archaeology Research Committee's (WVARC) was established to produce a set of priorities to guide research in the Witham valley, which will facilitate better integration of research and management strategies. The WVARC also proposes close collaboration with the local authority and to seek active participation with local communities (WVARC, Pryor 2003, 81).

The archaeological potential of the Witham valley was highlighted in the recent publication, Time and Tide: The Archaeology of the Witham Valley (Catney and Start, 2003). It provided an evaluation of the archaeology through desk-based assessment, excavation and survey. The report also proposed a programme of research to investigate landscape change and settlement in the valley since prehistoric to the medieval times. It identified the need to extend the Lincolnshire NMP Project area (Bewley 1998), which had previously only covered the northern area of the valley, to also cover the southern valley (Everson and Stocker 2003, 14).

The aim of the National Mapping Programme (NMP) is to produce a comprehensive record of the archaeology of England, from prehistory to the twentieth century, through the interpretation and mapping of remains that are visible as earthworks, cropmarks, parchmarks and soilmarks on air photographs. Digital maps, at a nominal scale of 1:10,000 and supporting records were produced by the mapping project. This report provides a brief overview of the results of the project.

3 PROJECT MANAGEMENT

The mapping and recording for the project was carried out by Yvonne Boutwood and Dilwyn Jones, who shared responsibility for dealing with project co-ordination and liaison. David MacLeod was responsible for the management of the project. The project ran for six months and started on 8th September 2004 and mapping and recording was completed by 8th March 2005.

4 SCOPE OF THE SURVEY

4.1 Geographical Scope

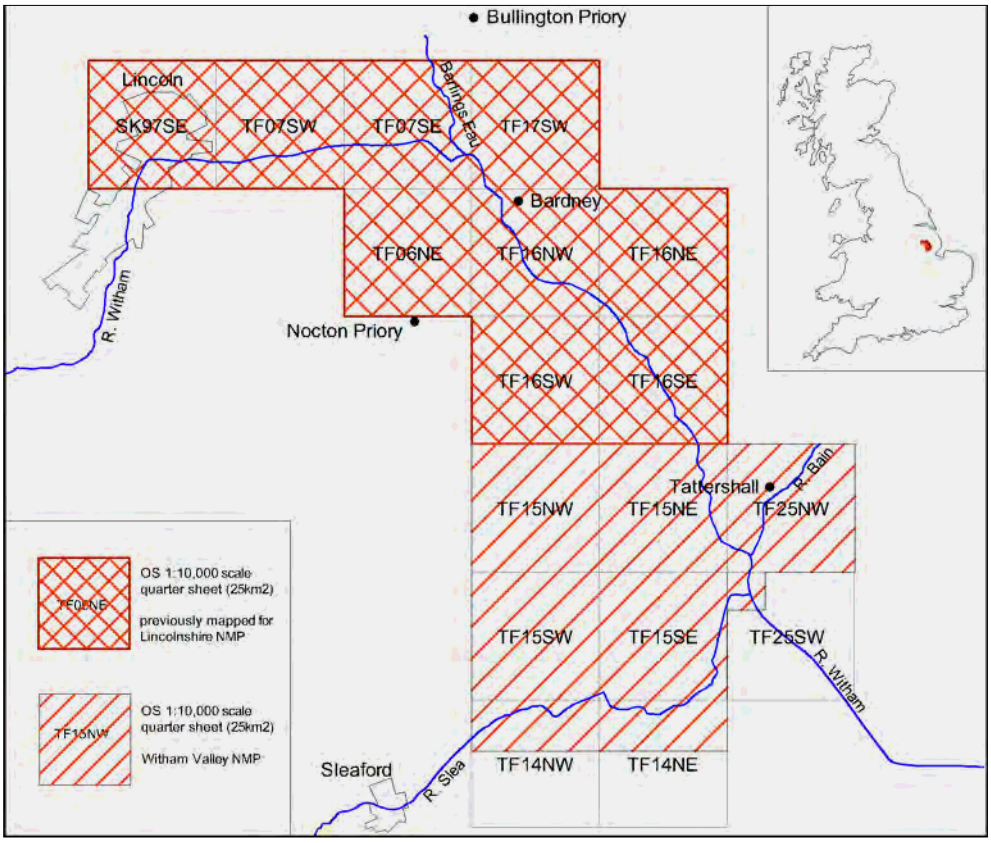

Figure 1 Witham Valley NMP Project area.

The River Witham rises in the Kesteven uplands in Leicestershire and flows through Lincolnshire to the Wash and is approximately 140km in length from source to sea. Its course is somewhat sinuous, flowing north to Lincoln where constrained by Lincoln Gap, it flows east, and then near Bardney it turns south east, finally to reach The Wash. It has its confluence with the River Bain and Kyme Eau near Tattershall (Catney 2003, 3).

The focus of this NMP study is an area of the middle Witham valley from Lincoln to Tattershall, which broadly lies within the flood plain and the 5m contour, with its limits in the north marked by the city of Lincoln, and in the south by the Rivers Slea and Bain (Everson and Stocker 2003, 7, fig 1). This forms a narrow corridor of land 35km long, and 8km wide for the most part. It tapers to less than 1km wide in the north, towards Lincoln, and opens out to about 15km in the south, where the Witham has its confluence with the River Bain and Kyme Eau. To the west the valley is bounded by the dip slope of the Jurassic Limestone ridge, by the chalk Wolds to the east, and the flatlands of the Fens to the south.

The NMP project area extends beyond the area described above, to cover 367 square kilometres (Figure 1). The project broadly adhered to NMP practice, which maps entire 1:10,000 Ordnance Survey quarter sheets (14 maps: SK97SE, TF06NE, TF07SW, TF07SE, TF15NW, TF15NE, TF15SW, TF15SE, TF16NW, TF16NE, TF16SW, TF16SE, TF17SW and TF25NW). However, for three maps (TF14NW, TF14SW and TF25SW) only selective areas were mapped, flanking the river Slea and its confluence with the River Witham, as large parts of these maps fall outside of sphere of interest of the Witham Valley Project. Two outlying sites at Bullington (TF17NW4) and Nocton priories (TF06SE1) were identified for inclusion in the study of monastic sites (Everson 2001). These two sites lie within the area previously mapped by Lincolnshire NMP and there are a few recent photographs for these sites.

4.1.1 Geology and soils

The underlying geology includes Jurassic limestone and clays and Quaternary drift deposits. These are overlain by deep deposits of alluvium, including marine and fluvial deposits, and peat. Sand islands and sand and gravel terraces protrude through the peat and alluvium. The lower stretches of the River Witham form part of the Fens and palaeochannels, which are part of an estuarine creek system, have been mapped from soils and aerial photographs (Catney 2003, 3-4, French and Rackham 2003, 35).

A wide range of soil types occur within the project area (1:250,000 Soil Map of England and Wales, Sheet 4 Eastern England, 1983 legend: 343a, 512a,c, 711f,r,s,t, 812c, 813c, 821b, 851a,b, 1024b). An evaluation of soil types in relation to cropmark distribution was undertaken for Lincolnshire NMP (Carter 1998, 98-102). This indicates that the potential for cropmark formation is good for some soil types. The erosion of blanket peat that covers the area, reveals archaeology beneath, sometimes seen as soilmarks.

4.2 Archaeological Scope

The aim of the National Mapping Programme is to increase our understanding of the historic environment. It achieves this by identifying, interpreting, mapping and recording all probable and possible archaeological features visible on air photographs as cropmarks, soilmarks, parchmarks and earthworks. The landscape of the Witham valley potentially encompasses all these types of evidence. The NMP Sphere of Interest draft report (RCHME 1997) documents the scope of the NMP; the main aspects relevant to the type of landscape within the Witham valley are summarised below.

4.2.1 Earthwork archaeology

All extant earthworks identified as archaeological in origin were mapped. All available ground survey plans were used to assist and enhance the air photograph interpretation and mapping.

4.2.2 Levelled archaeology

All cropmarks, soilmarks and parchmarks identified as archaeological in origin were mapped.

4.2.3 Post medieval and modern field boundaries

Field boundaries that have been removed (upstanding or levelled), but are depicted on first edition Ordnance Survey or later edition maps, were generally not mapped. However, where they occurred with newly identified field boundaries, that were not depicted by the Ordnance Survey, then some were mapped to provide a wider context for the field systems.

4.2.4 Medieval and post medieval ridge and furrow

Ridge and furrow was mapped, using a simple graphical depiction, delineating the extent of area and direction of the furrows. The difference between levelled and earthwork ridge and furrow was distinguished. The state of preservation of the latter was evaluated from the latest photography, which in the case of the Witham Valley Project was mainly from vertical photographs. For those maps already mapped by Lincolnshire NMP (see 5.1) the specification for that project differed, in that only extant earthwork ridge and furrow was mapped. Only oblique photography was accessed for these maps and used to update the mapping.

4.2.5 Industrial features and extraction

Historic features were mapped, in particular those associated with canal transport. Some small scale local extraction was recorded, such as sand and gravel extraction and clay pits, particularly when in close proximity to other archaeological features. Post 1945, modern quarries were not mapped.

4.2.6 20th century military features

As it is within the brief of English Heritage to record former military features, these were mapped. In the case of military airfields, the extent of the monument area was outlined.

4.2.7 Buildings

The foundations of buildings visible as cropmarks, soilmarks, parchmarks, earthworks, or ruined stonework were mapped, except when they were depicted on first edition Ordnance Survey or later edition maps. However, in some circumstances they were recorded to illustrate a particular association. This also applies to roofed or unroofed buildings, which were generally not recorded.

4.2.8 Geomorphological features or natural deposits

Geomorphological features and natural deposits were not mapped. When such features occurred in the context of archaeological sites their nature was clarified within the monument data text.

4.2.9 Drainage and irrigation

Drainage and irrigation systems are not normally mapped for NMP projects. However, such reclamation schemes form a significant component of the post medieval and earlier landscape and subsequently were mapped for this project.

5 SOURCES

5.1 Air Photographs

All readily available air photographs were consulted (see below*), which effectively means those held in three main collections. The National Monuments Record (NMR) was the prime source. A search for photographs (ref. no. 55983) identified there were 1090 specialist obliques and 2372 vertical prints for the project area. Additionally, some photographs are held in the Photograph Library of Cambridge University Unit for Landscape Modelling (ULM). Thirdly, Lincolnshire County Council Planning Department hold additional vertical photographs taken by Hunting Surveys Limited, However, these were not consulted as the NMR archive held some 1966 Hunting Surveys' sorties for part of the project area.

The vertical photographs held by the NMR, comprise mainly RAF and Ordnance Survey sorties with some Hunting Survey and Meridian Airmaps photographs, which range in date from 1942 to 1983. The specialist oblique photographs range in date from 1930 to 2003, which includes specialist military photographs, taken in 1942 and 1947 and those from recent reconnaissance.

There was a distinction drawn between maps previously mapped as part of the Lincolnshire NMP Project (SK97SE, TF06NE, TF06SE, TF07SW, TF07SE, TF16NW, TF16NE, TF16SW, TF16SE, TF17NW and TF17SW), and those not previously recorded by NMP (TF14NW, TF14NE, TF15NW, TF15NE, TF15SW, TF15SE, TF25NW, TF25SW) Figure 1. * For those maps that overlap with the Lincolnshire NMP area, the mapping was revised by only examining the oblique photographs that post-date the completion of the mapping phase of the Lincolnshire NMP Project (1.1.1996). In the case of the remaining eight maps all readily available photography was examined.

Other forms of remote sensing imagery (eg LiDAR) were not used during the mapping phase of the project. However, an evaluation of some LiDAR images, covering part of the project area, was carried out subsequent to the mapping.

5.2 Monument data

The National Monuments Record database AMIE was consulted as was the Historic Environment Record for Lincolnshire. Where possible concordance between these two datasets was made in AMIE. There are several scheduled monuments in the project area.

5.3 Previous Survey Work and Research

Between 1992 and 1997 the county of Lincolnshire, excluding the area of North Lincolnshire (formerly South Humberside) and the Lincolnshire Fens, was mapped at a

scale of 1:10,000 and recorded as part of the NMP (Bewley 1998, RCHME: Lincolnshire NMP, AMIE Event UID 1030638).

At the same time, from 1991 to 1995 part of the Lincolnshire Fens were also mapped at a scale of 1:10,560 for the NMP by Air Photo Services (Palmer 1996, RCHME: Lincolnshire Fenland NMP, AMIE Event UID 1077494). The project was not completed, but three of the Fens maps (TF14NW*, TF15NW and TF15SW) overlap with the Witham Valley Project area. As they do not meet the current NMP standards and specification, these maps were re-examined and mapped for the Witham Valley Project (* see 4.1).

Prior to this, a pilot project along the Fen edge was done by the RCHME Air Photographs Unit between 1979 and 1981. The South Lincolnshire Fenland Project mapped both archaeological and geomorphological features at a scale of 1:10,560 (RCHME: South Lincolnshire Fenland Project, AMIE Event UID 942673).

More recently as a prelude to the wider Witham Valley NMP Project a pilot study was carried out at Fiskerton in early 2003 (Jones 2003, EH: Fiskerton Survey Project, Aerial Survey component, AMIE Event UID 1372610), to evaluate methodologies and the potential of different remote sensing techniques to record the archaeology of flood plain deposits.

The evaluation of the Witham valley archaeology through desk-based assessment, excavation and survey, which has been recently published (Catney and Start, 2003), was useful for informing the project on a wide range of issues.

Some sites have been excavated and were surveyed and researched within the context of medieval settlement in West Lindsey (Everson *et al* 1991). A sub-project of the Lincoln and Witham Valley Project was proposed by English Heritage Archaeological Investigation team (Witham Valley Abbeys: Earthworks Survey). It identified a number of sites that require aerial survey input (Everson 2001).

6 METHODOLOGY AND RECORDING

6.1 Mapping Methods

Mapping methods were in accordance with practices developed for the National Mapping Programme. Oblique and vertical photographs were scanned and rectified using appropriate software (AERIAL 5.24). Ordnance Survey raster 1:10,000 maps were used for control and as a base for mapping in Autodesk Map 2004. Where appropriate, topographic information was derived from Ordnance Survey Land-Form PROFILE (scale 1:10,000) and the height data used to create Digital Terrain Models for photo rectification. Accuracy for the Ordnance Survey map is in the range of ±8m and rectification of photographs is normally within ±2m. Mapping conventions and the layer structure used in the Autodesk Map drawing files is summarised in Appendix 1. For the maps that were previously mapped for Lincolnshire NMP (SK97SE, TF06NE, TF06SE, TF07SW, TF07SE, TF16NW, TF16NE, TF16SW, TF16SE and TF17SW), which were manually transcribed, the locational accuracy is within the range ±15m. These transcriptions were scanned as raster files and were not digitised for the Witham Valley Project. The drawing conventions used for Lincolnshire NMP are detailed in the Lincolnshire Project review (Kershaw 1997, appendix 8.8). For any new archaeological features within this overlapping area of the two NMP projects, both the Autodesk Map drawing files and raster files need to be viewed together.

Subsequent to the mapping phase of the project, an assessment of Lidar data for the Witham Valley was undertaken. The Lidar data sample was given to English Heritage courtesy of Lincolnshire County Council and was part of the Environment Agency sorties flown in 1991. The Lidar sample only covered part of the Witham Valley NMP project area. The major part of this falls within the area that was previously mapped for Lincolnshire NMP project and there was no opportunity to re-examine the photography used to map these features. Vertical and oblique photography was available for the area of the new maps of the Witham Valley project, but this was only covered by a small sample of Lidar. The Lidar tiles were viewed as digital elevation models (DEM) and in some cases manipulated as false sunlit DEM with height exaggeration. Two aspects were examined for this Lidar evaluation. Firstly, the potential of the Lidar for mapping new archaeological features, additional to those previously recorded from aerial photographs for NMP. Secondly, to note the types of geomorphological feature visible. Study of such features can aid reconstruction of palaeo-environments, which may also lead to prospection for new archaeological sites.

6.2 Recording Practice

All mapped features were recorded in the English Heritage National Monuments Record database, AMIE. New records were created (172), or existing monument records were amended (27), following NMR Heritage Datasets: Monument Recording

Guidelines. Within the Autodesk Map drawing files data was also recorded in an attached data table (see Appendix 2). Morphological information for selective sites was input to the Aerial Survey Morphological Recording Module.

7 DATA ARCHIVE AND DISSEMINATION

7.1 Copyright

The copyright of the air photo mapping and associated records produced by this project lies with English Heritage. Permission to reproduce and publish any of this material must be sought from NMR Enquiry and Research Services, NMRC, Kemble Drive, Swindon SN2 2GZ.

7.2 Project Archive

This project produced 15 Autodesk Map 2004 drawing files, one for each of the whole or part 1:10,000 quarter sheets (SK97SE, TF06NE, TF06SE, TF07SW, TF14NW, TF14NE, TF15NW, TF15NE, TF15SW, TF15SE, TF16NW, TF16SE, TF17SW, TF25NW and TF25SW). Copies of the digital drawing files are deposited in the archive of the NMR. Aerial Survey York and Swindon also retain copies of the digital files, for day to day access. The Autodesk Map drawing files are the prime digital archive data, but were also printed at a scale of 1:10,000 and supplied to the NMR archive. Copies of the Lincolnshire NMP transcriptions and raster files are also deposited in the NMR archive. Further copies of this project report (AER/2/2005) can be obtained from the NMR archive.

7.3 Project Dissemination

Copies of the Autodesk Map 2004 drawing files and AMIE records have been supplied to Lincolnshire County Council HER. Copies have been made available to partners engaged in the wider Lincoln and Witham Valley Project, and the Witham Valley Archaeology Research Committee.

8 SUMMARY OF PROJECT RESULTS

In the northern half of the valley, the eleven maps previously surveyed as part of the Lincolnshire NMP Project were updated from new aerial reconnaissance. This yielded 14 new records and amendments to 11 records in the AMIE database. For the new maps at the southern end of the valley, which encompassed five complete maps and portions of three others, this yielded 132 new records and amendments to 16 others. In other words, 89% of the records for this project were new to the National Monuments Record (equating to 19% of the total number of NMR records for the project area). This summary combines the results from the two NMP projects to provide an overview of the archaeology of the valley as evidenced by the aerial record. In the discussion at the end of the report, consideration is given of the contribution aerial survey evidence makes to support the idea of 'ritual continuity' in the valley since prehistoric times.

The report provides an overview of the archaeology of the valley using the aerial photographic record as its primary source of information. Other sources of archaeological and historical data have been consulted to complement the aerial evidence. The NMP data is evaluated chronologically to provide 'period' overviews of the history of the valley, spanning the millennia from early prehistory to modern times. In the text sites are referred to by their NMR number and Appendix 3 lists their corresponding NMR Unique Identifier Number (UID), which is used in the attached data tables in the Autodesk Map drawings. The monument types recorded by this project, in AMIE and the Autodesk Map drawing attached data tables, are in accordance with English Heritage's thesaurus and are listed in Appendix 4.

8.1 Prehistoric

8.1.1 Funerary monuments

The earliest diagnostic prehistoric monument form identified in the Witham Valley Project area is represented by a single levelled Neolithic long barrow at Greetwell. In Lincolnshire as a whole the monument type displays a very nucleated pattern of distribution with the overwhelming majority, located on the uplands of the chalk Wolds. The remainder are dispersed the length of the Jurassic limestone ridge, as far south as Harlaxton, one of the sources of the Witham (Jones 1989). The river valley, floodplain location of the Greetwell example is unusual for a long barrow in the county. A mound, lying to west of Catley Priory, was identified from air photographs and scheduled as a long barrow (TF15NW25, scheduled monument: 27900). However, this project has re-evaluated the photography and re-interpreted the mound as possible spoil heaps associated with medieval or post medieval extraction, rather than a Neolithic long barrow.

The Greetwell long barrow lies amidst a dispersed group of round barrows, a monument type that occurs in numbers in the project area (Figure 2). Within this

landscape Bronze Age round barrows are widely distributed between Greetwell in the north and South Kyme on the Kyme Eau in the south. They are visible as denuded earthworks in the alluvium, or the levelled mounds and ring ditches are visible as soilmarks or cropmarks. Though widespread, the monuments show distinct clusters or concentrations at several focal points, which suggests their siting was a deliberate and culturally significant act. These barrows occur along the edge of the flood plain, or in areas of higher ground along the valley edge that lay outside the limits of marine incursion/sedimentation laid down in post glacial times. The interpretation of three mounds as Bronze Age barrows, in Branston Fen, centred on TF 0879 6916 (TF06NE22) would therefore appear to be unlikely, considering the palaeoenvironmental history of the valley, which suggests the area was submerged during the Bronze Age.

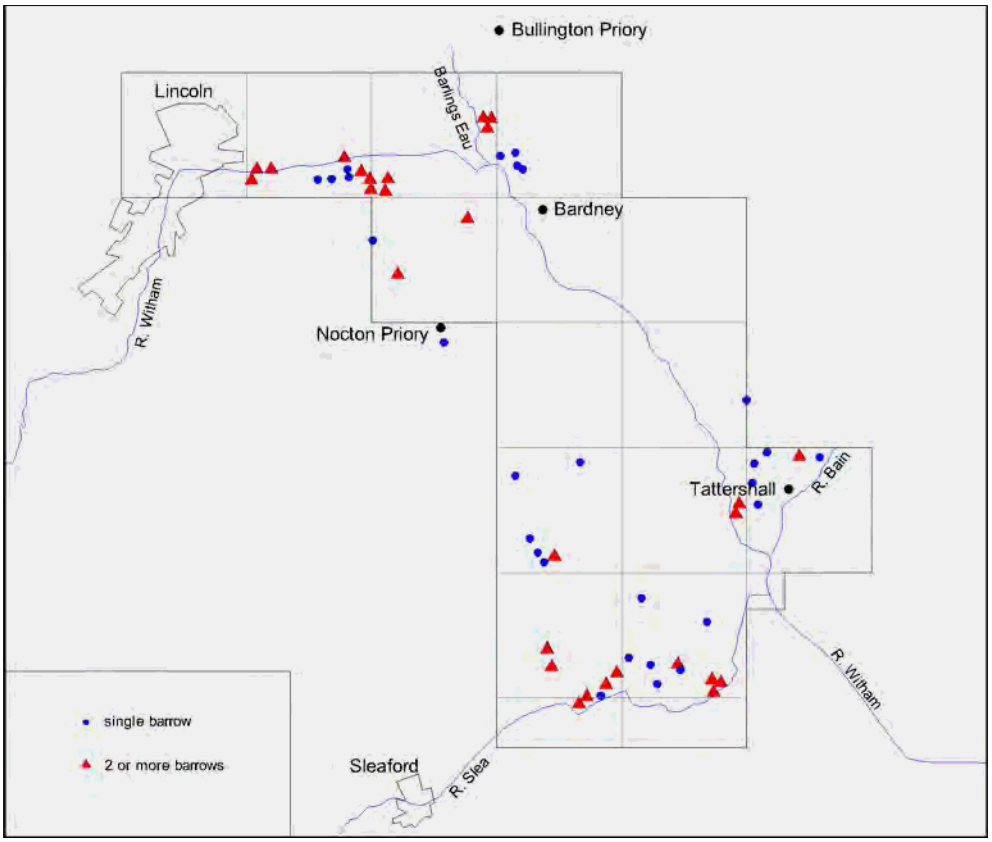

Figure 2 Distribution of Bronze Age round barrows in the project area.

At the northern end of the Witham valley, in the narrow corridor of floodplain between the Lincoln Gap and the confluence of the Barlings Eau, round barrows are found in significant numbers. On the north side of the river, on Willingham Fen, for a distance of some 2km, a scatter of 15 barrows occur, dispersed across the floodplain below the 5m contour. A separate, smaller group of 6 barrows, lies in close proximity to these, at Fiskerton (Jones 2003). On the south side of the river on Washingborough Fen, a similar dispersed scatter occurs with 29 round barrows recorded across an area 3km long, with its eastern limits corresponding roughly with the extent of maximum marine

incursion in the latter half of the second millennium BC (French and Rackham, 2003, fig 1).

Further south, along the main river valley flood plain, barrows appear to be less numerous, and more scattered, but occasional small groups are evident. A cemetery of seven barrows occurs on the western edge of Ruskington Fen (TF15SW23), a dispersed group of five at Tattershall on the east side of the river, below the 5m contour (TF15NE5, 19 & 20), and up to 12 in the area of Damford Grounds on the north side of the Kyme Eau (TF15SE23, 28, 35-37, & 45).

On the periphery of the flood plain, very dense concentrations of barrows that form large discrete cemeteries are identifiable at Low Barlings, in Stainfield parish (33 barrows) at the northern end of the valley, Walcott Commons, on the west side (22 barrows), and in Anwick parish in the south (at least 17 barrows). In each case, the siting of the cemetery appears to be linked topographically to the river courses of tributaries that flow into the Witham. The Low Barlings cemetery is sited on the edge of the flood plain just below 5m OD, at a point where the Stainfield Beck has a confluence with the Barlings Eau, approximately 1.5km north of the point where the Eau joins the Old River Witham. Walcott Commons group lies at 9m OD between ridges of higher ground (at 10m) on an island of boulder clay in the surrounding peat on the west side of the valley. Further south at Anwick, a large cemetery is sited on a former island, where the River Slea does a dog-leg at Haverholme. Both the cemeteries at Low Barlings and on Walcott Commons have monastic sites in their immediate vicinity. At Anwick, there is no monastic site but one lies 2.5km away and the two sites lie on opposite sides of the river.

The dimensions of most round barrows recorded from air photographs, does not exceed 30m in diameter. However, one circular enclosure or 'ring ditch' at Coningsby (TF25NW62) has dimensions of 62m across, which may indicate a different monument type, perhaps an enclosed cemetery?, or a different date. Analysis of those in Essex determind that barrows with mounds larger than 30m diameter tended to be Roman in date (Lawson *et al* 1981, 24).

8.1.2 Prehistoric settlement and enclosures

The air photograph evidence for prehistoric activity in the valley, other than that presented by funerary monuments, is scarce. Several enclosures have been identified that may be attributed to an Iron Age or Roman date on the basis of their morphology, but there is generally a dearth of associated archaeological material to confirm date and function.

An exception occurs as a large double-ditched curvilinear cropmark enclosure (200m by 172m) recorded on the sand and gravels at Tattershall Thorpe, and examined by Chowne (1986) (TF25NW17). Situated on an elevated position on the sands and gravels, overlooking the Rivers Bain and Witham, the enclosure was dated to the later

Iron Age, but its function could not be confirmed conclusively; it possibly represents a stock enclosure rather than a defended settlement site.

A second cropmark enclosure (TF07SE31) recorded at the northern end of the valley on Stainfield Fen, at the confluence of the Barlings Eau and Stainfield Beck may belong to this type. It occupies a similar riverine position and is of a similar scale (360m by 160m), and though more irregular in shape, is defined by characteristic double ditches with intervening broad bank. Unlike Tattershall Thorpe the Stainfield enclosure contains a number of features, none of which is necessarily contemporaneous with the main enclosure. Chowne (*ibid*) drew attention to the similarity of form of Tattershall Thorpe to other ditched earthwork enclosures in the county, but none of which occupied a similar low lying position. A closer parallel was provided by the Iron Age enclosure of Cherbury Camp in the upper Thames Valley (Chowne 1986, 184). Another close parallel for Tattershall and Stainfield may be provided by the undated 'marsh fort' earthwork enclosure recorded near Tickhill, South Yorkshire, within the landscape of Romano-British field systems recorded by Riley (1980, 66-67, plate 15, & map 11).

Two other enclosures of curvilinear form, indicative of 'native', pre-Roman tradition, are known; one at Bardney (TF07SW68) and the other at Nettleham (TF07SW64). The latter contains a round house, suggesting we are dealing with a farmstead. Two other suggested round houses, in close proximity, are recorded on the margins of the floodplain at Tattershall Thorpe, close to a known area of Romano-British settlement west of Park Farm (TF25NW79). A prehistoric date might also be appropriate for an irregular curvilinear enclosure on the edge of the flood plain near Westfield House, Southrey (TF16NW23).

8.1.3 Multiple-ditched boundaries

A feature of the limestone uplands and its immediate environs are prehistoric multiple-ditched linear boundaries (Boutwood, 1998). This is in contrast to the Lincolnshire chalk Wolds where the natural topography may have made similar boundary delineations unnecessary. Discontinuous portions of one boundary, that follows a slightly sinuous course for 2.3km between Greetwell Hall Farm and Greetwell Lane Farm, are recorded on the north side of the Witham in Greetwell parish (TF07SW61) . Recent aerial reconnaissance has revealed new stretches of this boundary. Towards the northern end of the boundary two small enclosures are found attached or aligned on it. In the south two fragments of (undated) single linear ditch some 2.5km apart are recorded on the floodplain at TF 0067 7110 and TF 0380 7171. Both fragments have round barrows in their vicinity and follow a course that runs at right angles to the multiple-ditched boundary. Whether the single linears are associated with the multiple ditched boundary system, however, cannot be determined.

8.2 Roman

8.2.1 Car Dyke

The most readily identifiable feature of Roman date visible on aerial photographs in the valley is the Car Dyke (NMR LINEAR 53), originally thought to be a canal, but now believed to be part of a 1st and 2nd century AD fen drainage system. It follows a sinuous course down the south side of the Witham floodplain hugging the valley slope at 5m OD from Washingborough in the north, to Ferry Bridge on the Slea in the south. The dyke is visible for long stretches on aerial photographs. Although some sections survive as earthworks and are scheduled, large sections have been levelled and are visible as cropmarks or soilmarks. The central ditch of the dyke had substantial flanking banks, which possibly acted as flood defences.

8.2.2 Settlement enclosures

Roman settlement sites are not well attested in the aerial record for the valley. A few complete and fragmentary enclosures of simple rectilinear form are recorded that may, tentatively, be assigned a Roman date, but the evidence from the limited area under investigation is sparse and fragmentary, overall.

As a rule when considering the question of the date of cropmark enclosures the conventional assumption is made that rectilinear forms represent an intrusive 'Roman' tradition, distinct from the earlier, 'native', pre-Roman tradition, where enclosures of curvilinear form were the norm. An anomalous situation occurs at North Greetwell where a rectilinear enclosure (TF07SW66), containing a round house, is cut by the modern road, which is the presumed course of the Roman road from Lincoln to Wragby, hence the enclosure may pre-date the Roman road.

Several non diagnostic enclosures of simple rectilinear form that are not associated with finds are recorded from the project area, from the area of higher ground above 5m OD. Consequently it is not possible to come to firm conclusions regarding their date and function. Simple square shaped enclosures occur at North Greetwell (TF07SW69), with dimensions 50m by 40m and an entrance on the east; adjacent to the Kyme Eau in South Kyme parish (TF15SE17), with dimensions of 66m by 58m and an entrance on the north side; also at Woodhall Spa on the edge of the flood plain (TF16NE33), measuring 75m by 60m, with internal pits; and to the east of Lodge Farm in Tattershall Thorpe, which has a roughly rectangular form, measuring 71m by 46m.

Surface finds attest activity in the Roman period north of Park Farm in Tattershall Thorpe on the east of the floodplain above the 5m contour. Finds, of 3rd to 4th century date together with kiln debris indicate a possible industrial site. Aerial photographs show a confusion of cropmark features across the area, including geological marks, drainage features, and likely archaeology that are difficult to unravel. Potential enclosures are recorded from the area, and to the southeast towards Tattershall Carr.

8.2.3 Possible temple sites

In the valley three cropmark sites have been identified, which are put forward as potential Roman or Romano-Celtic temple sites on the basis of their distinct morphology. North Greetwell (TF07SW67) in Reepham parish and Red Bridge, in Stixwould (TF16SE34) and Woodhall parish, are both on the north side of the river; and the third, Branston Fen (TF06NE24) in Branston and Mere parish, is on the opposite side of the valley. All three sites display a regular and rectilinear form, most striking in the case of Branston Fen, with inner and outer enclosures, and a single entrance, very reminiscent of temenos sites that enclose some temples. (cf. Gosbeck's Farm, Colchester, in Frere & St. Joseph 1983, 218-9, photo 136). Most significantly, Romano-British pottery and debris are recorded from the area of the site at Branston Fen. To the northeast vertical photographs show an isolated short length (300m) of 'agger'-like linear bank. The bank seems to underlie medieval ridge and furrow and pre-dates it, therefore it may potentially be a Roman road (TF06NE23), but the evidence is insufficient to indicate an association between the two.

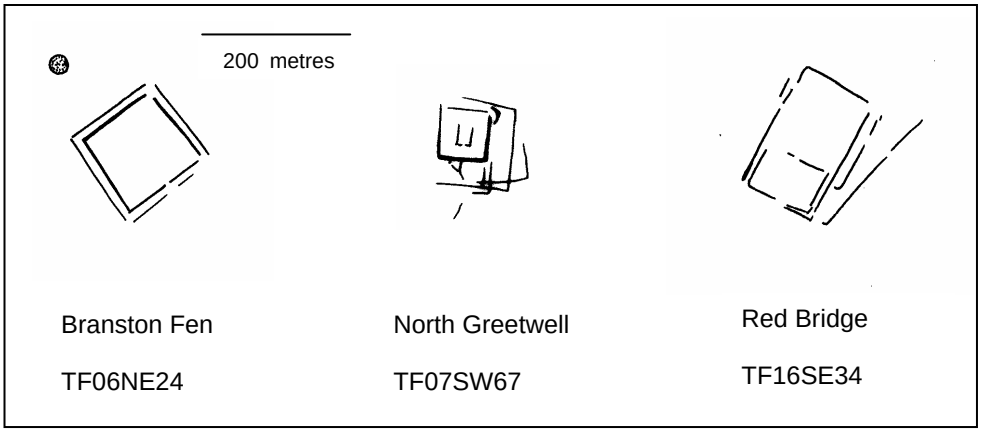

Figure 3 Roman and Romano-Celtic temple sites.

8.2.4 Roman fort

The site of a 'camp' in North Kyme parish (TF15SE5) was alleged to be a Roman fort. It initially was recorded as an earthwork, but is now levelled and visible as a cropmark on vertical aerial photographs. The quality of the aerial evidence is poor, but the substantial ditches are more suggestive of a medieval moated site or manorial enclosure. Three medieval potsherds are recorded from this location (SMR number 63167).

8.3 Early medieval

One cropmark site recorded in the valley has been interpreted as potentially representing an early medieval settlement site. Originally designated either a prehistoric or Roman date, it has been reassessed as being more likely early medieval on the basis of its morphology. There are no material finds recorded from its immediate

vicinity. The site is located at Haverholme Bridge, at the southern end of the project area, on the north side of the Slea, on the valley edge at 7m OD, and approximately 0.6km from the site of Haverholme Priory, situated on the opposite bank of the Slea. The cropmarks comprise a series of linked or conjoined circular and sub-rectangular enclosures, 18-30m across, that extend for almost 300m along the southern edge of a former stream. The form and dimensions of the enclosures resemble those at the excavated Anglo-Saxon cropmark site of Riby Crossroads (TA10NE33) situated at northern end of the Lincolnshire Wolds.

8.4 Medieval

8.4.1 Settlements and field systems

The Witham Valley Project area encompasses the area of the valley between Lincoln and South Kyme and the areas that fringe it. The evolution of settlement in part of this area, in West Lindsey district, had been examined previously as part of a wider, higher level survey by RCHME in the 1980s (Everson *et al* 1991). In the medieval period settlement was confined to the area of higher ground along the valley edge, above 5m OD, outside the area of low lying floodplain that only underwent large scale drainage and land reclamation in the 18th century.

In the project area south of the Witham, in Kesteven, there is little evidence from the aerial record for earlier settlement remains at existing villages, apart from possible crofts and trackways at Potterhanworth, in Branston and Mere (TF06NE26). No traces are visible of former settlement remains at Priory Hill, Thorpe Tilney, and the suggested site of the deserted medieval hamlet of Tilney (TF15NW12).

A small earthwork moat is recorded at Wood Cottages, Branston and Mere (TF06NE3). The dubious earthwork moat at Metheringham (TF06SE7) now lies beneath a housing development. The ‘camp’ in North Kyme parish, originally interpreted as a Roman fort (TF15SE5), has been re-interpreted as a possible moated site (see 8.2.4).

8.4.2 Monastic sites

Bardney Abbey (TF17SW2)

A Benedictine house, with surviving earthworks of the abbey, cloister and ranges of buildings, some within ditched enclosures. Bardney is thought to have been a minster in the Saxon period. A substantial moat surrounds the precinct, enclosing an area 360m by 290m, with entrance on the west. Several fishponds are associated with the moat, with others to the south. An extensive system of water channels extends to the west for 0.5km. A rabbit warren situated to the east may be associated with the abbey. Part of the site was occupied in the post dissolution period by a house with walled garden.

Barlings Abbey (TF07SE5)

A Premonstratensian abbey sited on an island called Oxeney, approached via a causeway on the north. Monastic remains of the church, cloister, and gardens lie within a precinct bounded by a complex network of interlocked ponds and water channels, with numerous other ponds. The site was occupied by a 17th century house that led to the reuse and modification of monastic features, and creation of a water garden (Everson *et al* 1991, 66-69, fig 50).

Bullington Priory (TF17NW4)

The site of a Gilbertine priory visible as earthworks and cropmarks, with complex of monastic buildings surviving as low earthwork banks, contained within a precinct enclosure, measuring 240m by 190m. A moated site with an elaborate water management system lies on the east side of the precinct. Low additional water channels and ponds lie to the west. Recent reconnaissance did not reveal any new features at this site.

Catley Priory (TF15NW6), Catley Grange (TF15NW2)

A Gilbertine Priory occupying an oval shaped island of boulder clay (at 9m OD) in fen peat on the west side of the Witham floodplain. Early prehistoric activity/occupation is well attested in the surrounding area by numerous stray finds, and by a large Bronze Age barrow cemetery adjacent to the monastic precinct (cf. Barlings Abbey).

The monastic earthworks have been the subject of detailed ground survey by English Heritage (Hunt, 2005). Combined with the evidence from aerial photographs of levelled remains in adjacent fields, this has enabled a more complete picture of the priory site. On the east the course of the outer precinct boundary is clearly discernible as cropmarks, defined by a ditch with inner and outer bank, with dimensions of 250m north-south, and 190m east-west, maximum. The area to the north of the inner precinct forms a narrow block 94m by 82m.

The field to the west of the precinct, now ploughed over, previously contained earthwork ridge and furrow cultivation, with a substantial headland formed on the southern boundary of the field, parallel to the line of Queen's Dyke. The course of the Queen's Dyke (TF15NW39) extends westward visible as a ditch and bank. The latter becomes the more prominent feature as it extends northwest from the priory for 2.7 km to TF 1043 5767, its course coinciding with the parish boundary. Three mounds, now levelled, also lie in this field and are of uncertain date and origin. Medieval burials were found associated with two of them. The relationship of the mounds with the ridge and furrow is uncertain from the aerial photographs, hence they may either pre-date or post-date it. They may potentially be re-used Bronze Age barrows, or medieval/ post medieval pillow mounds (TF15NW5).

A short distance (0.7km) to the west of the priory are the cropmarks of a rectangular moated site, 207m by 135m, that has been identified as a grange of Catley. The evidence indicates the presence of buildings and fishponds (TF15NW2).

Nocton Park Priory, Abbey Hill (TF06SE1)

An Augustinian Priory dissolved and a secular house constructed from the ruins; this was subsequently abandoned and the buildings dismantled in the 17th century. The earthwork remains and foundations are contained within an asymmetric precinct enclosure (170m by 170m), with series of plough levelled fishponds and connecting water channels visible to the northeast. Recent reconnaissance did not reveal any new features at this site.

A double ditched feature (TF06SE25) that skirts the monastic precinct in part on the west and on the south, provided access to the abbey from the west (TF 0729 6450). The trackway forms a fork at TF 0759 6460, the southern branch continuing in a straight line eastward for about 300m, and stopping short of, but on the same bearing as Nocton Fen Lane (corresponds to track marked on Ordnance Survey 6" map 1890-1). The lane extends to the Witham and has the site of a medieval fishery recorded at its extremity. This raises question of whether Nocton Fen Lane marks an original route (?causeway) linking Nocton Priory to the River Witham.

Haverholme Priory (TF14NW1)

No traces of monastic remains are identified on aerial photographs at the site of Haverholme Priory. The features that are seen represent areas of the formal garden and fountain associated with the post dissolution house, which are all depicted on the 1888 Ordnance Survey map.

Kirkstead Abbey (TF16SE4)

The Cistercian abbey of Kirkstead has been subject to detailed ground survey by RCHME. Within the moated precinct the monastic buildings survive as earth banks or wall foundations except for the upstanding remains of the southeast corner of the south transept of the abbey church. Apart from the moat, church and claustral area, much of what survives represents the remains of a post dissolution house and gardens (TF16SE19). The original site of the abbey may have been located to the south at St Leonards. The area lies within ditched enclosures, which are visible as cropmarks on aerial photographs, and part of a larger field system (TF16SE18).

South Kyme Priory (TF14NE1)

The site of the Augustinian priory at South Kyme lies on the south side of the River Slea where the river changes direction sharply in a dog-leg. The monastery lay some 200m north of the river, the intervening area occupying a later, 14th century castle. The river shows a similar change of direction at Anwick, some 3.5km to the west, where we find a large barrow cemetery occupying the angle of land so formed.

At South Kyme Bronze Age metalwork is recorded from the south side of the river (TF14NE3) and from the castle site itself (SMR number 62525) but from an unknown provenance. At Barlings Abbey and Catley Priory the monastic foundations occupy sites with barrow cemeteries immediately adjacent. The reasons for siting the monastery at South Kyme well back (200m to the north) from the river are speculative but the discovery of Bronze Age metalwork from the intervening area indicates prehistoric activity here of some form, perhaps funerary, that may have made the location inappropriate on religious grounds. This would not have been a concern to the later castle builders who would be concerned more with the site's strategic advantages.

The monastic precinct lies to the north of the castle, within an area approximately 300m by 400m bounded by substantial boundary ditches. Earthworks to the north of the church are now levelled and show as cropmarks and soilmarks on aerial photographs. These indicate areas of demolished buildings and a complex of ditched enclosures and ponds. From the aerial photographic evidence it is difficult to distinguish phasing and to differentiate monastic features from those belonging to the medieval/ post medieval manor house. To the west of the church a group of embanked enclosures, possible building platform and ponds, survived as earthworks in the1980s.

Stainfield Priory (TF17SW1)

A house of Benedictine nuns with no structural remains surviving. Earthworks associated with the priory lie to the northwest of the church and post dissolution house, Stainfield House. The priory earthworks comprise an extensive complex of fishponds, fishery mounds, breeding tanks and associated buildings. The whole lies within an earthwork precinct boundary, with monastic retting or tanning pits on the exterior (Everson *et al* 1991, 175-6, fig 124).

Stixwould Priory (TF16NE12).

Remains of the precinct boundary, fishpond complex and buildings are visible as earthworks and some as cropmarks, at the Cistercian nunnery at Stixwould. In 1538 it was granted to Sir Robert Tyrwhitt whose descendants constructed a large house, park and formal gardens on the site.

South of the Priory a substantial bank was interpreted as a possible Roman road, but later discounted (TF16NE27) as a medieval or post medieval field boundary. A reappraisal of the evidence (plus detail obtained from LiDAR images) suggests the bank may be a potential monastic routeway running in a south westerly direction towards the River Witham at Red Bridge (from TF 1736 6552 to TF 1673 6520). Also at this location, adjacent to the River Witham, is a large mound (50m diameter) visible as cropmarks (TF16NE17). The mound is associated with medieval finds that include pottery, net sinkers and fish smokers, which suggests it functioned as a fish processing site, elevated above the flood plain and could be linked to monastic fishing rights.

Tupholme Abbey (TF16NW3)

Tupholme was a house of the Premonstratensian order and the site of was occupied by a post dissolution house and formal garden. Aerial photographs show surviving earthworks and soilmarks/ cropmark features. The majority of earthworks are associated with the house, and show a formal arrangement of closes, paddocks, and gardens, reflecting in part the layout of the monastic ranges, with an outer precinct and inner court, at the centre of which occurs the standing remains of the south wall of the abbey refectory. Additional sections of the outer precinct, were revealed as cropmarks, on the western edge of the site and were mapped for the project. Everson and Stocker (2003, 7, fig 1) show a causeway connecting Tupholme with Stixwould Priory, but this was not confirmed from the aerial photographs.

8.5 Post medieval

8.5.1 Drainage and irrigation

Beginning with the Roman Car Dyke (NMR LINEAR 53) and continuing into post medieval times, the landscape of the Witham valley has been subject to attempts to develop irrigation systems for land reclamation or improvement. (Grigg 1966, 22-32, fig 4). The impact of most recent schemes is reflected in the different pattern of fields visible today in the floodplain and the higher ground along the edges of the valley. Consequently, drainage/irrigation features are a common feature in the aerial record of this cropmark responsive zone. In those areas where drainage features do not appear to be associated with the contemporary field pattern, or are not recorded on historical Ordnance Survey maps, the pattern has been mapped by the project as a significant archaeological phenomenon.

Linear drains presumably dug as part of post medieval land reclamation schemes figure prominently in the landscape of the valley in Tattershall parish, east of the river. The cropmarks (TF15NE22, TF25NW94) form a confusion of overlapping lines, not all necessarily archaeological in origin within which elements of a network of drains are discernible that extends across an area 2.7km by 1.3km. The main components appear to be made up of a series of double drains which zig-zag across the floodplain, onto which are connected subsidiary single drains. A bank of upcast material is visible between the ditches of the main drains in places. Along Marsh Lane, Tattershall, the drainage appears to have been planned in a more formal grid arrangement.

8.5.2 Industry and communication

Traces of minor scale, piecemeal extraction of sand and gravel are recorded at several points along the edge of the valley. At Tattershall, extraction on a much greater, industrial scale has produced a landscape of minor lakes. To the south of these where the Bain has its confluence with the Witham, clay pits are recorded of the former Tattershall Brickworks (TF25NW59).

The mania for canal construction in the late 18th century led to the building of the Tattershall or Gibson's Canal sometime in the 1780s. This linked the Bain to the Witham Navigation, and was later extended to Horncastle, which was operational by 1802. At Tumby a small basin (harbour) was created giving access to the canal; the position is marked on the Ordnance Survey 6" map (1958). To the west of the basin and west of Tumby Lock vertical photography records cropmarks of channel like features interpreted as possible earlier 'lodes' that provided access to the river (TF25NW93, TF25NW71).

8.5.3 Other features

Post medieval stock enclosures

South of the Slea in South Kyme Fen, aerial photographs show three small square shaped cropmark enclosures, with dimensions ranging between 14m and 21m (TF14NE26, 27 & 28). Visible as earthworks on early photography, the features are levelled and possibly represent stock enclosures. Other similar shaped features are recorded on the Ordnance Survey map of 1889 (county series, 1:250*0 scale) in this part of the fen.*

Duck decoys.

Two probable duck decoys are recorded at Swanpool, Lincoln (SK97SE141), and Old Abbey Farm, Kirkstead, Woodhall Spa parish (TF16SE5). The latter represents a recognised, concentric form, (cf. South Carlton, Everson et al 1991, 55, fig 43). The former, more irregular form, comprises a multi-ditched sub-circular feature, with associated feeder channels and ponds.

8.6 20th century military features

Several wartime airfields with their ancillary establishments fall within the project area: Fiskerton, Bardney, Blankney, and Coningsby. Fiskerton and Blankney were decommissioned at the end of the War, RAF Bardney in 1963, and Coningsby continues in military use. Searchlight batteries are visible on early post war verticals at Coningsby and Bardney. Former ancillary camps are recorded at Westmoor Farm, Martin, which served RAF Metheringham, and Leedsgate Farm, Tumby, to serve RAF Coningsby. Two hexagonal pillboxes, now demolished, are recorded on the east bank of the Witham, adjacent to Tattershall Bridge. The crisp cropmarks of several pit-like features lie to the west of the runway at Coningsby airfield; probably recent in origin, there is the possibility that these represent bomb craters.

8.7 Discussion

The survey of the aerial evidence forms one component in a multi-disciplinary and integrated survey of the middle Witham valley supported by English Heritage. The Witham valley survey is identified as a 'Beacon Project' of regional and national

significance wherein English Heritage can use its skills and work closely with partners in the Heritage sector (English Heritage, 2003).

Only the northern end of the Witham valley had been surveyed in the original Lincolnshire NMP (Kershaw, 1998), and the project design for the Witham Valley Project required that the southern end of the valley was recorded to NMP standards, to provide a complete overview of the archaeological landscape.

The chance discovery of votive metalwork from the river over the last two centuries, combined with the discovery and subsequent excavation of an Iron Age timber causeway at Fiskerton in 1981, plus their own research of monastic sites in the valley, led Everson and Stocker (2003) to believe that monasteries and the causeways with which they were associated (Figure 4), were inextricably linked with a tradition of ritual deposition in the valley with origins in late prehistoric times.

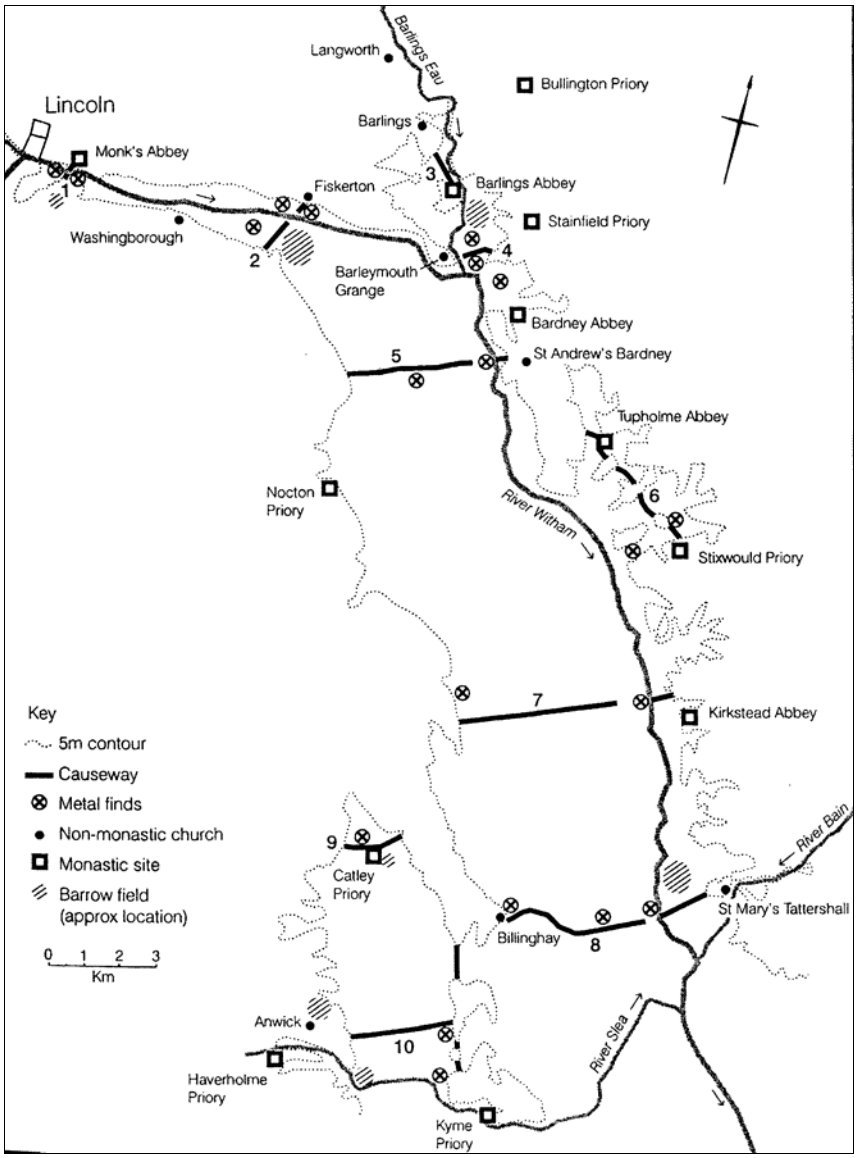

Figure 4 Monastic sites and causeways from Everson and Stocker (2003, 7, Fig 1)

Work by Jones (1998) has highlighted the change in the ritual tradition during the Neolithic, with a shift in focus from the ancestral uplands of the Wolds to the main river valleys of the region by the Later Neolithic. This is indicated by the appearance of new forms of ritual-type monuments focussed in complexes at strategic points in the river network. By late prehistoric times the ritual tradition had undergone further change with focus transferred from earthwork monuments to topographical features in the natural landscape; especially rivers, lakes, and meres. The archaeological evidence derived from aerial photography tends to reflect the change (and continuity) in the ritual tradition in the county over the millennia.

From about the middle of the third millennium BC ritual focus in the county was centred on the monumental complexes of the Welland valley and Harlaxton in the southern limestone. By the late first millennium BC, the development of a more politically stable and structured society, focus had shifted to the river itself and its attendant lacustrine features (May, 1984). This is indicated by the rich votive metalwork deposits found in the river and from the site of the causeway at Fiskerton. Some of the ironwork finds from Fiskerton find comparison with the votive offerings discovered at Llyn Cerrig Bach, Anglesey (Fox, 1947). Votive metalwork deposits of similar date are recorded from other lakes in Wales (eg. Llyn Fawr, Glamorganshire) and the wider Celtic world. The strong Celtic association and tradition in the Witham deposits is further supported by place-name evidence, with the ‘Lin’ element in Lincoln (Latin, ‘Lindum’), derived from the Celtic word for ‘lake’, which occurs in Welsh as ‘llyn’, and in the Irish place-name ‘Dublin’ (‘black lake’).

Apart from the evidence derived from the Witham and at Fiskerton, the idea of ritual continuity in the valley from late prehistoric times into the Roman period can be supported in the aerial record at three sites, interpreted as ’temene’ and possibly Romano-Celtic in origin, at Branston Fen, North Greetwell and Red Bridge.

From their research on the monastic foundations in the valley, Everson and Stocker (2003, fig 1) identified ten medieval causeways with the suggestion that these may have earlier prehistoric antecedents. One of the principal objectives of the aerial investigation was to shed light on this thesis, and identify any potential new causeway sites. The likelihood of this happening was uncertain; the excavated timber causeway at Fiskerton was not visible on aerial photographs, nor could it be located by remote sensing techniques in ground survey. Many of the proposed causeways are masked on aerial photographs by later features, such as hedge lines and roads, and therefore were not mapped by the project.

An examination of the distribution of causeways across the flood plain shows them spaced at regular intervals down the valley, connecting the monasteries with the river Witham. Very noticeable however is the absence of causeways in the central valley, giving Nocton Park Priory, located on the west, and Stixwould on the east, access to the river; this discrepancy may be more apparent than real. Aerial photography shows a

ditched trackways adjacent to Nocton Park Priory running east towards Nocton Fen Lane, but stopping short of it. Consideration needs to be given to the suggestion that the lane may have originally formed the monastic causeway to the river.

At Stixwould, on the opposite side of the valley, the evidence is more tangible. Records (SMR number 400042) identified a possible Roman road southeast of Newstead Farm, Stixwould, later discounted (TF16NE27) as a medieval or post medieval field boundary. However, a reappraisal of the evidence (plus detail obtained from Lidar images) suggests this embankment running down the ridge towards the valley bottom may be a road linking to an undiscovered causeway. It south-westerly course from Stixwould is also in the general direction of a suggested Romano-British temple ('temenos' site) at Red Bridge. Perhaps it is also significant that aerial photography shows a medieval 'fishery mound' in the immediate vicinity, adjacent to the river that could be linked to monastic fishing rights, and like causeways, be a focus for river based rituals (Everson and Stocker, 2003, 11-12).

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APPENDIX 1 AUTODESK MAP LAYERS AND DRAWING CONVENTIONS

Layer Name	Layer content	Attached data tables	Layer colour	Linetype
0	None (Autodesk Map 2004 requirement)	none	7 (white)	CONTINUOUS
BANK	Closed polygons for features such as banks, platforms, mounds and spoil heaps	MONUMENT & MONARCH	1 (red)	CONTINUOUS
BANKFILL	Solid fill for BANK layer polygons	MONUMENT & MONARCH	1 (red)	
DITCH	Closed polygons for cut features such as ditches, ponds, pits or hollow ways	MONUMENT & MONARCH	3 (green)	CONTINUOUS
DITCHFILL	Solid fill for DITCH layer polygons	MONUMENT & MONARCH	3 (green)	
EXTENT_OF_AREA	Closed polygons outlining complex or extensive remains such as military airfields and camps	MONUMENT & MONARCH	8 (grey)	DASHEDX2
GRID	Grid lines at 1km intervals	NONE	7 (white)	CONTINUOUS
LARGE_CUT_ FEATURE	For large cut features such as quarries or pits	MONUMENT & MONARCH	5 (blue)	ACAD_ISO02W100
MONUMENT _POLYGON	Closed polygons encompassing all the features comprised within a single AMIE record.	MONARCH ONLY	7 (white)	CONTINUOUS
RIGARREWK	Polyline showing the direction of ploughing in outlines of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan)	CONTINUOUS

RIGARRLEVEL	Polyline showing the direction of ploughing in outlines of levelled or crop mark ridge and furrow	MONUMENT & MONARCH	6 (magenta)	ACAD_ISO03W100
RIGDOTSEWK	Closed polygon defining the furlongs or extent of area of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan)	DOTX2
RIGDOTSLEVEL	Closed polygon defining the furlongs or extent of area of levelled or cropmark ridge and furrow	MONUMENT & MONARCH	6 (magenta)	DOTX2
STONEWORK	For exposed stonework such as walls also for concrete structures	MONUMENT & MONARCH	8 (grey)	CONTINUOUS
STONEWORKFILL	Solid fill for STONEWORK layer polygons	MONUMENT & MONARCH	8 (grey)	CONTINUOUS
VIEWPORT	an administrative layer to allow printing	NONE	7 (white)	CONTINUOUS

APPENDIX 2 AUTODESK MAP DATA TABLES

MONUMENT DATA TABLE

The Monument Data table consists of five fields that were input directly through Autodesk Map 2004. The contents of these fields duplicates those that are entered in the National Monuments Record Database AMIE.

FIELD NAME	FIELD CONTENT	Sample data for Kyme Tower
MONARCH	AMIE Unique Identifier (UID)	351033
PERIOD	Date of features (EH Thesaurus)	MEDIEVAL
TYPE	Monument type (EH Thesaurus)	KEEP
EVIDENCE	Form of remains (EH Thesaurus)	RUINED BUILDING
PHOTO	NMR or other reference for the photograph from which the feature was mapped and the date of photography	TF1649/14 NMR 1866/427 26-Nov-1980

MONARCH DATA TABLE

The Monarch Data table comprises just one field that records the AMIE Monument UID.

FIELD NAME	FIELD CONTENT	Sample data for Bardney Abbey
MONARCH*	AMIE Unique Identifier (UID)	351575

* MONARCH is a former name of the National Monuments Record database re-named AMIE. The table retains the former name to facilitate download into the English Heritage GIS system HSIS.

APPENDIX 3 LIST OF NMR MONUMENT NUMBERS AND UIDS

NMR NUMBER	NMR UID
SK97SE141	1084693
TF06NE3	349336
TF06NE22	1066316
TF06NE23	1066317
TF06NE24	1066318
TF06NE26	1066320
TF06SE1	349405
TF06SE7	349425
TF06SE25	1066586
TF07SE5	349597
TF07SW61	1047192
TF07SE31	1043908
TF07SW64	1047195
TF07SW66	1047197
TF07SW67	1047198
TF07SW68	1047199
TF07SW69	1047200
TF14NE1	351030
TF14NE3	351036
TF14NE26	1408782
TF14NE27	1408796
TF14NE28	1408798
TF14NW1	351056
TF15NE5	892921
TF15NE19	1404410
TF15NE20	1404412
TF15NE22	1404490

TF15NW2	351187
NMR NUMBER	**NMR UID**
TF15NW5	351198
TF15NW6	351201
TF15NW12	351217
TF15NW25	1394627
TF15NW39	1407384
TF15SE5	351235
TF15SE17	1406630
TF15SE23	1406768
TF15SE28	1406872
TF15SE35	1406981
TF15SE36	1406993
TF15SE37	1406998
TF15SE45	1406646
TF15SW23	1408190
TF16NE12	351339
TF16NE17	351354
TF16NE27	1032201
TF16NE33	1047675
TF16NW3	351367
TF16NW23	1043962
TF16SE4	351409
TF16SE5	351412
TF16SE18	898271
TF16SE19	898276
TF16SE34	1047318
TF17NW4	351484
TF17SW1	351572
TF17SW2	351575

TF25NW17	352675
TF25NW59	1404830
NMR NUMBER	**NMR UID**
TF25NW62	1404876
TF25NW71	1404987
TF25NW79	1405135
TF25NW93	1405394
TF25NW94	1409041

APPENDIX 4 MONUMENT TYPES USED IN THE PROJECT

BANK (EARTHWORK)
BOUNDARY
BOUNDARY BANK
BOUNDARY DITCH
BUILDING
BUILDING PLATFORM
CANAL BASIN
CAUSEWAY
CLAY PIT
CURTAIN WALL
CURVILINEAR ENCLOSURE
DECOY POND
DITCH
DRAIN
DRAINAGE DITCH
DUCK DECOY
ENCLOSURE
EXTRACTIVE PIT
EXTRACTIVE PIT/POND
FIELD BOUNDARY
FISHPOND
FORT
HOLLOW WAY
KEEP
LODES
MACULA
MILITARY AIRFIELD
MILITARY CAMP
MOAT
MONASTIC PRECINCT
MOTTE
MOUND
MULTIPLE DITCH SYSTEM
NARROW RIDGE AND FURROW
PILLBOX
PILLOW MOUND
PIT
PLOUGH HEADLAND
POND
POND BARROW
POST HOLE
RECTILINEAR ENCLOSURE
RIDGE AND FURROW
ROUND BARROW
ROUND HOUSE (DOMESTIC)
SAND/GRAVEL PIT
SEARCHLIGHT BATTERY
SPOIL HEAP
SQUARE ENCLOSURE
TOWER
TRACKWAY
TRENCH
WALL
WATER CHANNEL

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