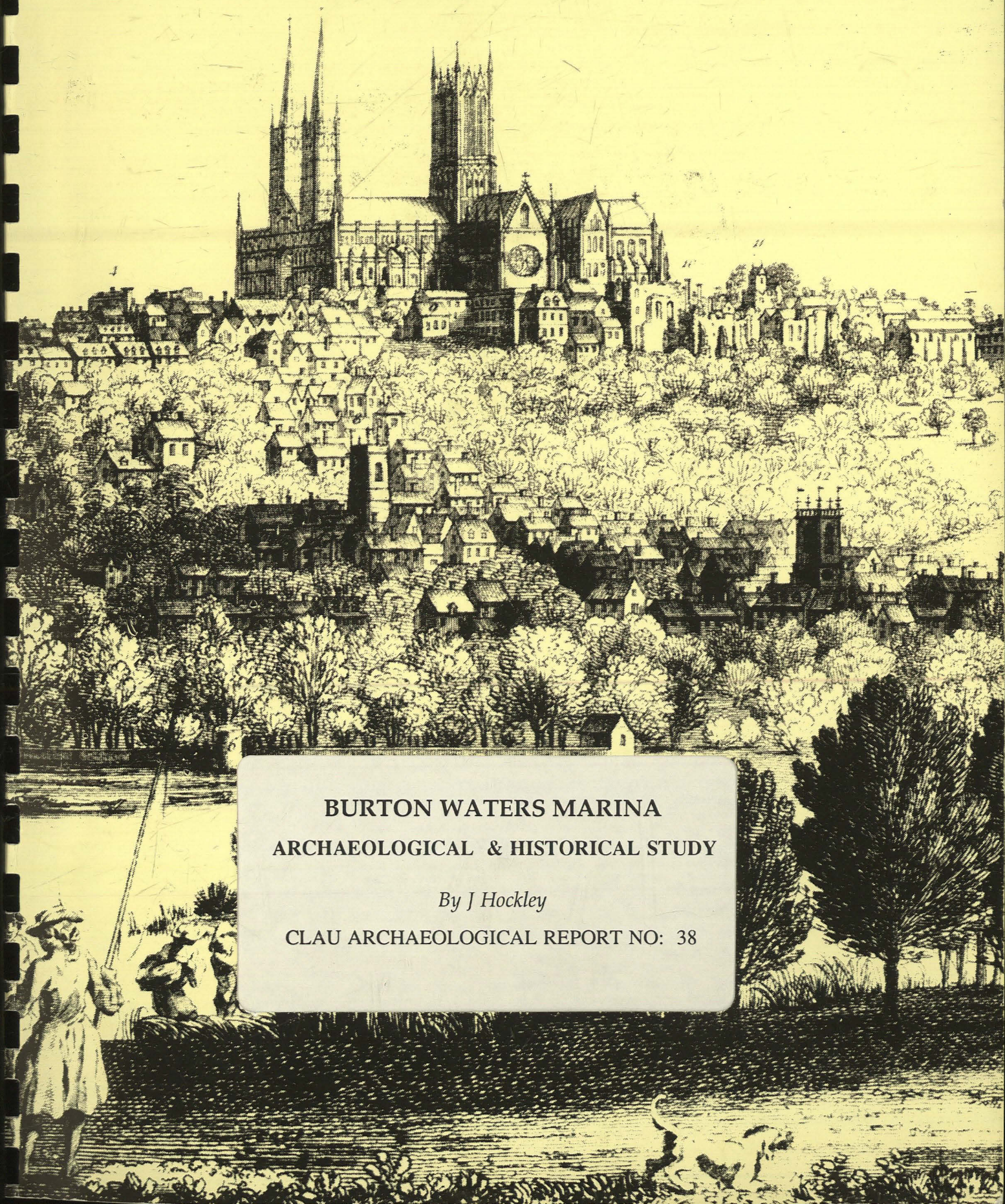
CITY OF
LINCOLN ARCHAEOLOGY
UNIT



BURTON WATERS MARINA

ARCHAEOLOGICAL & HISTORICAL STUDY

By J Hockley

CLAU ARCHAEOLOGICAL REPORT NO: 38

A Report to Eastman Securities Limited

January 1993

Prepared by

City of Lincoln Archaeology Unit
Charlotte House
The Lawn
Union Road
Lincoln
LN1 3BL

Tel: Lincoln (0522) 545326
Fax: Lincoln (0522) 548089

BURTON WATERS MARINA

ARCHAEOLOGICAL & HISTORICAL STUDY

By J Hockley

CLAU ARCHAEOLOGICAL REPORT NO: 38

PROPOSED BURTON WATERS MARINA
ARCHAEOLOGICAL AND HISTORICAL STUDY

CONTENTS **PAGE**

1.0 INTRODUCTION 1

2.0 SUMMARY OF RECOMMENDATIONS 2

3.0 SITE DESCRIPTION 3
- 3.1 Location and Topography 3
- 3.2 Geology 3

4.0 SCOPE OF ARCHAEOLOGICAL & HISTORICAL RESEARCH 4
- 4.1 Sites and Monuments Record 4
- 4.2 Aerial Photographs 4
- 4.3 Archive and other documentary sources 4
- 4.4 Land use/Topographic survey 4

5.0 SYNTHESIS OF ARCHAEOLOGICAL AND HISTORICAL KNOWLEDGE 5
- 5.1 Pre-Roman (1st century BC and earlier) 5
- 5.2 Romano-British period (1st - 4th centuries AD) 5
- 5.3 Anglo Saxon-Anglo Scandinavian period (5th to 11th centuries) 6
- 5.4 The Medieval period (late 11th - 15th centuries) 6
- 5.5 Post-Medieval (16th - 18th centuries) 6
- 5.6 19th Century and Later. 8
- 5.7 The Fossdyke Navigation - A Roman Canal ? 9

6.0 DISCUSSION:THE SIGNIFICANCE AND POTENTIAL OF THE ROUTE 10
- 6.1 Environmental Study 10

7.0 DEVELOPMENT PROPOSALS:IMPACT ON BURIED REMAINS 10

8.0 CONCLUSIONS AND RECOMMENDATIONS 11
- 8.1 Field Evaluation 11
- 8.2 Geotechnical Investigation 12
- 8.3 Archaeological Impact and Resource Management 12

9.0 HERITAGE DISPLAY PROPOSALS 12

10.0 REFERENCES & AKNOWLEDGEMENTS 13

ILLUSTRATIONS

Map showing location of the Site Fig. 1
Simplified Geological map Fig. 2
Plans showing locations of archaeological finds and other features described in text Fig. 3
Plan of proposed development Fig. 4
The Foss Dyke 1762 (J Grundy) Fig. 5
Part 1779 map of Lincolnshire Fig. 6
Part 1824 First Series OS map of Lincolnshire Fig. 7
Plan of Fossdyke Navigation 1826 Fig. 8
Part 1906 OS map showing Fen Cottages & buildings adjacent to the south boundary of the site Fig. 9

APPENDICES

Sites & Monuments Record Data Appendix

PROPOSED BURTON WATERS MARINA
ARCHAEOLOGICAL AND HISTORICAL STUDY

1.0 INTRODUCTION

This document has been prepared at the request of Eastman Securities Limited by the City of Lincoln Archaeology Unit. The Unit was commissioned to draw together all available information of archaeological and historical significance for the area of the proposed development (hereafter 'the Site') and, by assessing the possible impact of development, provide the basis for discussing further action in conjunction with the policy requirements of West Lindsey District Council's Department of Planning.

The Site is located immediately alongside the Fossdyke Navigation on land close to but beyond the urban settlement of Lincoln. It therefore provides an opportunity to investigate part of an area which was, for much of its history, dependent on and providing for the city. Moreover, the Site offers the possibility for understanding the development of the landscape from earliest times, including the formation of the Foss Dyke Roman canal from the pre-existing river Till.

The study document provides a synthesis of current archaeological and historical knowledge of the area concerned and proposes a strategy for further investigation of archaeological remains in accordance with the standards and recommendations outlined in DoE Planning Policy Guidance 16 (PPG16), published in November 1990.

The information in this document is presented with the proviso that further data may yet emerge. The Unit, its members and employees cannot, therefore, be held responsible for any loss, delay or damage, material or otherwise, arising out of this report. The document has been prepared in accordance the terms of the Unit's Articles of Association, the Code of Conduct of the Institute of Field Archaeologists, Management of Archaeology Projects (English Heritage, 1991) and the IFA Draft Standard on Archaeological Desk-Based Studies.

2.0 SUMMARY OF RECOMMENDATIONS

Although no major site of ancient settlement is recorded by the documentary sources, the study has identified four elements of archaeological potential which merit further investigation, these are:

A. The Fossdyke Navigation - Breaching of the existing embankment and excavation to form the marina basin, water sports and fishing lakes is expected to reveal evidence of the the pre-existing line of the river Till, its canalisation and any later reworking of its course.

B. The waterlogged alluvial and other deposits can be expected to provide high potential for the preservation of environmental, timber and other remains.

C. The area of slightly elevated ground in proximity to the former Woodcocks Hotel and Fen Cottages may contain evidence of early land use or occupation.

D. The disused section of the A57 road may overlie an earlier road or track between Lincoln and Saxilby.

The evidence contained within the existing Foss Dyke embankment will only be revealed when breaching groundwork is carried out (presumably within a coffer dam). It would therefore be useful to discuss the engineering methodology to be adopted for this and other groundwork, including any pre-construction geotechnical investigation, at the earliest opportunity. This would ensure that consideration may be given to the most cost-effective methods of incorporating the objectives and methodology of any further archaeological investigation into the engineering design and time-scale.

In order to establish the spatial extent, nature and probable survival conditions of such remains and deposits as may be contained within the Site, further examination through field evaluation should be carried out well in advance of the actual construction phase. Designed to provide cost-effective, site-specific information, the proposed field investigation strategy would be based on a staged programme of fieldwalking and drainage ditch section survey, possibly followed by geophysical survey of selected areas. This preliminary sequence of investigation would be designed to identify suitable locations for the excavation of evaluation trial trenches. The opportunity to combine trial trench work with the excavation of geotechnical trial pits would be the most economical method to enhance the findings of the evaluation.

The combined results from desk-top assessment and field evaluation would provide the necessary information upon which informed decisions could be made for the subsequent management of the archaeological resource. Consideration would be given to the options of preservation 'in-situ' and/or excavation prior to construction and/or a watching brief to monitor construction groundwork.

There is already sufficient information to indicate not only the need for further investigation but also suggest that valuable results will emerge on the formation of the Foss Dyke and changing land-use pattern from Pre-historic through Roman, Anglo-Saxon and Medieval periods to the present day.

The project also presents an opportunity for comparative urban-rural studies with archaeological work to be carried out in conjunction with the Eastern Bypass, the A46 dualling south of Lincoln and the Birchwood Link Road/ Skewbridge Area development.

It is important that archaeological matters be effectively and efficiently incorporated into the scheme at the earliest possible time. This objective would be enhanced by the inclusion of a co-ordinating archaeologist at future project planning meetings.

3.0 SITE DESCRIPTION

3.1 Location and Topography NGR SK 933 736 (approximate centre of Site)

The 53 hectare Site in the parish of Burton lies approximately 4 km west of the ancient city of Lincoln in an area of generally flat and lowlying ground at an average elevation of c.4.7m OD. The city boundary forms the south- east limit of the development. (See Figs.1 & 4).

Bounded to the south-west by the embanked Fossdyke Navigation and to the north-east by the slightly elevated A57 Trunk Road, the Site, which contains the old by-passed section of the A57 road and the former Woodcocks Hotel complex, consists mainly of four fields under arable cultivation. The Site also contains several small areas of woodland and is subdivided by ditched, hedged and fenced boundaries. The fields contain a network of land drains which run into four surface water and flood relief drainage channels.

Being only slightly higher than sea level, much of the Site and surrounding area was subject to extensive seasonal flooding until it was drained by works begun in the 17th/18th centuries.

While the site does not contain any prominent topographical features to indicate ancient occupation or land use, evidence from other locations in proximity to the city suggests that the 4m OD contour is significant in defining flood levels and the lower limits of pre-historic and later land use. It is noted that the highest elevation on the Site (c.5.9m OD) is located in the vicinity of the former Woodcocks Hotel and pre-existing Fen Cottages.

3.2 Geology

The Site lies on a Flood Plain Terrace approximately 3km west of the Jurassic Limestone Scarp, known as the Lincoln Edge, which is cut by the river Witham at Lincoln forming the Lincoln Gap. It is believed that the gap was first cut in the Pliocene period, before the spread of the first ice-sheets nearly two million years ago, when the so-called 'Lincoln River' formed part of a pre-glacial pattern of drainage. The early gap being later modified by a series of ice-flows and an early course of the river Trent.

The geology of the Site consists primarily of alluvial drift, river terrace sands and alluvial clays and gravels. Solid geology of Jurassic Lower Lias Clay is believed to underlie the whole area (See Fig.2).

Gravel extraction has previously taken place in proximity to the Site. The cessation of this activity has led to the formation of the adjacent Burton Pits nature reserve and the water-filled borrow pits at Odder.

The topsoil overlying the Site varies between brown silty sand and grey silty clay. Soils are as much influenced by surface vegetation as by their underlying geology. The changes in the character of the soils can clearly be seen by such factors as ground geology and past and present agricultural practices and land utilisation. The soils of Lincolnshire are of varying ages; some, on river alluvium, are relatively recent while others have evolved over thousands of years, with a direct or indirect influence from human activity. It would therefore be useful if the strategic design for any further archaeological investigation of the Site included provision for sampling and analysis of overlying soils.

4.0 SCOPE OF ARCHAEOLOGICAL AND HISTORICAL RESEARCH

As there is no record of any archaeological excavation or other field work having been carried out on or near the Site, the evidence contained in this study is substantially derived from the examination of historical records and other documentary sources, including aerial photographic data within a 1km wide corridor centred on the Site.The results have been plotted on the 1:20000 scale plan (Fig.3) included in this report.

Information has been collated from the following sources:

4.1 Sites and Monument Records (SMRs)

The Lincolnshire SMRs were searched for records of all archaeological sites and finds within the examination corridor. Details of entries are shown in the Appendix.

4.2 Aerial Photographs

Land adjacent to the watered valley of the river Till would have presented suitable conditions for early exploitation and settlement, the buried remains of such activity often being revealed in aerial photographs as crop and soil marks. However such evidence in the examination area is sparse.

Much of the bypass route lies close to military air corridors and the RAF base at Scampton which means that the area has not been well served by the private pilots who are the main source of archaeological air photographs in Lincolnshire. An examination of the RCHME National Library of Air Photographs Database produced a negative result. A search of other sources produced only one air-photo showing the soil-mark evidence of a duck decoy in Burton Fen north of the Site. This post-medieval feature was believed to have been ploughed up between 1848 and 1846 (see F2, Fig.3 and Appendix).

Apart from the poor aerial photographic coverage this absence of cropmarks may be due to unfavourable variations in the type and thickness of overlying soils, the geological nature of underlying deposits, or the truncation of shallow features caused by modern deep ploughing. In the lower regions of the flood plain any remains that may exist are probably concealed at depth due to the accumulation of alluvial deposits since the Late Bronze Age (c.1000 BC).

4.3 Archive and other Documentary Sources

In compiling this report reference has also been made to cartographic and other material held in the Lincolnshire County Archives,Central Library Lincoln(Local History Collection) and the archives of the City of Lincoln Archaeology Unit.

4.4 Land Use/Topographic Survey

The Site was visually examined to record both topographic features and current land use.

5.0 SYNTHESIS OF ARCHAEOLOGICAL AND HISTORICAL KNOWLEDGE

5.1 Pre-Roman (1st century BC and earlier)

The first historical reference to Lincoln is in the Geography of Ptolemy, written early in the 2nd Century AD, which mentions LINDUM as being one of two chief cities of a local tribe, the Coritani, now thought to have been called the 'Corieltauvi'. Evidence for early settlement in Lincoln has remained somewhat elusive. While excavations to the east of Brayford Pool in 1972 produced pottery identified as being of late Iron Age or early Roman date the case for any substantial prehistoric settlement centred on the present city remains unproven although traces of 1st Century B.C. activity have been identified. However, to the east of Lincoln, excavations and chance finds have indicated a rich Iron Age culture and several important objects, including the Witham Shield, were found in dredging operations along the river.

It is believed that much of the land immediately south and west of the city, being only slightly higher than sea level, would have consisted of flood plain and marsh and, with the possible exception of naturally occurring mounds ('Holms' or islands eg Carholme and Hartsholme), most of the area below the 4m contour would have remained uninhabitable. Such a mound, found to the east of the Brayford in 1972, produced the first structural evidence for pre-Roman settlement in the city and three similar islands, exposed during recent ditch cleaning adjacent to the river Witham east of Lincoln contained surface scatters of worked flints and a stone axe.

Pre-historic activity at or near the Site is suggested by finds of stone and flint axe heads (See FI & F5 Fig.3 and Appendix) .

A natural lake, the Brayford Pool, existed immediately to the west of the Lincoln Gap by the time of the Roman conquest. The first syllable of the colloquial Roman name Lindum is derived from the Celtic word for 'lake', pool or marshy/watery place.

5.2 Romano-British Period (1st-4th century AD)

On historical evidence, the Roman army may have reached Lincoln by c. AD50 but dating of the earliest Roman structures excavated within the city indicates a date of c.AD54 - AD65. By c. AD96, Lincoln had the status of a 'colonia', a self-governing civic community which utilized the 'uphill' site of the former Neronian fortress. In the late 1st or early 2nd century a grid of streets was laid out on the ground to the south of the fortress with both timber and masonry buildings erected. Probably at the end of the 2nd Century, the colonia wall was extended almost down to the river front.

While the principal urban sprawl outside the walls appears to have been primarily confined to the southern suburb lining Ermine Street, together with extensive cemeteries to the north and east, there is increasing evidence of rural, semi-rural and industrial land use peripheral to the urban centre.

A number of pottery kilns have been found in the immediate environs of the city, including discoveries at the Racecourse and at Bracebridge and what is believed to be a major 3rd to 4th century industry in the Swanpool/Boultham area; possibly one of the largest such industries in late Roman Britain.

Romano-British settlement was often preceded by Iron-Age or earlier occupation. The use of pre-existing settlement sites and the study of the Iron-Age/ Romano-British interface in general is of particular importance. It is hoped that field investigation may provide vital archaeological evidence for further study.

While some Romano-British rural settlement in Lincolnshire has been shown to date from the late 1st century a very much larger number appeared for the first time after AD120. The greatest period of prosperity in rural Roman Britain appears to have been from about then until c.AD350. It is this period of more intense occupation of the hinterland, to serve the food needs of the city, that is associated with major Roman engineering projects such as extended road systems, canals and the rectilinear layout of fields, which were later much modified and overlaid with other systems.

In many areas of the country the arrangements of extensive Roman field systems and their ditched boundaries have been clearly revealed by air photography. However, no similar evidence has been located on or in proximity to the Site. This may stem from the reasons mentioned earlier in relation to aerial photographic coverage and/or soil and geological conditions, or truncation by deep ploughing.

Although outside the study area, a Roman burial and traces of a stone building were recorded near Long Leys Road during construction of the Lincoln Bypass. There are also documented remains of Romano-British settlements in Saxilby, Burton and Skellingthorpe, which, when considered in relation to sources of water and proximity to the city, demonstrate the potential for further remains and evidence of Roman utilisation of the landscape.

While roads were clearly of importance to the Romans, they also made extensive use of water transport, and there are two major artificial waterways in Lincolnshire which are generally accepted as being of Roman construction. These are the Car Dyke which

connects the Nene east of Peterborough with the Witham east of Lincoln (although its use as a canal for the transport of goods remains unproven and it is possible that it was constructed primarily for land drainage), and the Foss Dyke which connects the Witham west of Lincoln with the Trent at Torksey.

It is believed that the first 6km of the Foss Dyke was achieved by straightening the course of the river Till, but the early course of the canal and pre-existing river channels are unknown. It is hoped that groundwork on the Site may reveal evidence of the location and form of these early channels and the important artefactual and ecofactual remains that may be contained in within their infilling deposits (See also Section 5.7 - The Fossdyke Navigation).

5.3 Anglo Saxon and Anglo Scandinavian Period (5th-11th centuries)

Abandonment of the Roman City seems to have started in the late 4th Century with town life reduced to a small community between the 5th to late 9th centuries. Following the Viking take-over of Lindsey in 874, Lincoln became a centre for a Viking army and, subsequently, a Viking town. Evidence for increasing urbanisation in the 10th and 11th centuries has emerged from all parts of the former Roman city with Lincoln forming one, and probably the most important, of the so-called 'Five Boroughs' of the present East Midlands.

For the first 6km from from Lincoln to the junction with the river Till at Odder the Foss Dyke formed part of the southern limit of the Anglo-Saxon kingdom of Lindsey, establishing both the district and parish boundary which is maintained to the present day.

While fields were probably in continued use from the 5th century, rural settlement also appears to have gathered pace during this period, as is later evidenced by the Domesday survey in the 11th century.

There is no recorded evidence of activity of this period in proximity to the site although the early registers of Burton by Lincoln make frequent reference to Haddow, the westernmost farm in the parish. It is possible that Haddow (later Haddo, Haddon, Hathow and now Odder), located immediately outside the northwest boundary of the Site, may derive its name from the Anglo-Saxon word 'how' or burial place, possibly of a chieftain named Hadda, or more remotely from the Anglo-Saxon word for an area of heath or heather.

5.4 The Medieval Period (late 11th-15th centuries)

At the time of the Norman conquest Lincoln was home to perhaps 6-7000 people and formed one of the largest settlements in the newly conquered kingdom.

The origins of many modern place-names in both the city and surrounding area, recorded by the Domesday survey of AD1086, indicate a broad spread of Anglo-Saxon and Danish settlement, including the villages of Skellingthorpe, Saxilby and Burton. The last mentioned name was derived from the Old English 'burh-tun', 'a farm by a burh' (a fortified place). Domesday records the village of Burtone as being the King's land held by the Bishop of Lincoln, Robert de Tosney, Gilbert de ghent, Peter de Valognes and Sortebrand.

The existence of a bridge known as Bishops Bridge to the east of the Site suggests the presence of a road or track linking the city with the village of Saxilby, along the line of the later A57 road. The first documented bridge at this location is believed to date from 1474-5 and gains its name from the Bishop of Lincoln who is known to have held land in this location.

While it is likely that land in the area was in agricultural use during this period there is no evidence to suggest medieval occupation on, or in the immediate vicinity of the site.

The 12th and early 13th century was a period of great prosperity for the city with a significant volume of trade being conducted via the Foss Dyke canal, but by the early 14th century river traffic had stopped due to silting of the channel. While some attempts were made to re-open the waterway these met with little long-term success and trade via this route rapidly diminished.

5.5 Post-Medieval (16th-18th centuries)

The late 14th to 17th centuries saw a period of decay in the city. This was a national economic phenomenon due partly to the ravages of the Black Death which was locally made worse by the loss of trade privileges to Boston and the related poor state of the river Witham and Foss Dyke. The city declined in importance and the population shrank, many houses and churches were demolished and by the second quarter of the 16th century large areas of the city were in a ruinous state. While some localised redevelopment was carried out, further damage and destruction occurred during the civil war in the mid 17th century.

Silting of the Witham and Foss Dyke resulted in regular and increasingly extensive flooding of the land to the east, west and southwest of the city. Attempts to reopen the waterway encouraged by Cardinal Wolsey led to the appointment, by Henry VIII, of a Commission of Sewers in 1518. One of the commissioners, William Atwater, Bishop of Lincoln

recorded the deplorable condition of the canal and that '' certain men of experience and skill with whom the bishop has taken counsel are of the opinion that it would be greatly to the advantage or the city and its citizens and the people of the neighbourhood if a certain dyke, called Foss Dyke, which begins at the river Trent near Torksy, and runs towards Lincoln were dug out and made deeper, wider and longer as far as Lincoln. For, as it is stated, merchants, as well native as foreign, would bring their goods to Lincoln at less cost, and also the citizens and inhabitants of Lincoln would be able more easily and safely to convey their commodities and saleable goods to other places''.

Clearing of the Foss Dyke was started in 1520 but the combination of Atwater's death and lack of funds led to the work being abandoned in 1521.

Structured use of the land in the area of the Site probably commenced early in the 16th century. Prior to this time much of the land had been common pasture but in 1518 the Common Council enclosed an area at Bishops Bridge which was let for 60 years. Further council revenue was generated by the enclosure and renting of land beyond Bishops Bridge, between the Foss Dyke and John Hutchinson's close. In 1524 further land was enclosed which led to the origin of Waves Farm. The first mention of this property occurs in the Lincoln City Lease Book of 1613 with a reference to a 'close at ye Waths' and later 'the Waithes'. The earlier spelling indicates that the name is derived from the Scandinavian 'vao' or 'vaio' meaning 'a ford or fords'. The location of the present farm east of the Site and south of Bishops Bridge suggests that a meaning 'the fords' would be topographically appropriate.

By 1572 further efforts were being made to find ways and means of scouring the Foss Dyke ''so that yearly sufficient water might be brought out from the Trent to the city'' but once again it appears that little work was done.

A new scheme to clear the channel was initiated in 1625 to assist in restablishing the wool trade in the city; work was started, but ended in failure in 1635.

The Civil War and its aftermath led to further neglect of the waterway and a downturn in trade with the city, a situation not reversed until 1671 when an act was passed for improving the navigation between Boston and the river Trent which resulted in a trade increase. However the lack of a well-managed drainage system caused further problems. These were highlighted in 1681 when Henry Stone of Skellingthorpe began a suit against the mayor and others for hindering the water passing to the Trent and thereby flooding several of his grounds at Skellingthorpe.

The Foss Dyke was once more recorded as being impassable in 1717, but navigable again by 1744. This was probably as a result of work started by Richard Ellison under a lease for the Fossdyke Navigation taken from Lincoln Corporation in 1740. In 1747 Ellison's son (also named Richard) made 'a new cut out of the old channel' and 'erected a new wharf where the old river had silted up.' He also provided 'a way for keels from his wharf into Brayford.' These works carried out under the Ellison lease probably established the present course and the towpath structured edge on the north bank of the canal.

During the 18th century Enclosure Acts were being introduced throughout the county but in many places agricultural methods were poor. An inspection by Arthur Young in 1771 reported that by Lincoln he found inadequate rotation of crops, scarcely any idea of improving poor soils, no folding of sheep, and that fen meadows were largely undrained. This probably refers to the 'low grounds' shown on a 1762 map of the Foss Dyke (See Fig.5) which is the earliest map recording Hathow, or more precisely 'Hathow High Ground' northeast of the junction between the river Till and Foss Dyke. A later map of 1779 (See Fig.6) shows a bridge over the Till at this location, here called Haddon Bridge.

It is recorded that farmers commonly came to market in narrow cock-boats and that fishing and fowling were important occupations. There were duck decoys at various locations including those at Skellingthorpe and in Burton Fen as shown on the early 19th century map of the area (See Fig.7).

Some drainage of the area was carried out in the last quarter of the 18th century. This had the effect of reducing the incidence of flooding and bringing more land into agricultural use. This work was probably undertaken by the Lincoln Court of Sewers, the body responsible for drainage prior to the enactment of extensive drainage operations early in the 19th century.

A number of windpumps were constructed in the area for the purpose of pumping excess water into the early drainage system and the Foss Dyke. Many such pumps were replaced by steam driven pumps in the 19th century.

During the second half of the 18th century the Brayford Pool was rapidly turned into an inland port, and by 1817 substantial wharves, warehouses and coalyards had been established on both north and east banks. Regular river traffic used both the Witham and Foss Dyke for the transport of goods and people between Boston, Lincoln the Trent and beyond.

5.6 19th century and later

The 19th century saw further development of the city and wider area resultant from the raising of the south bank of the Foss Dyke, related drainage works, the mid-century introduction of a railway service, and further expansion of industry.

Following a series of major floods during the last ten years of the 18th century, extensive drainage of the area was accomplished under the West Drainage provisions of the Lincoln and County Drainage Act of 20th July 1804. This stated that fens, meadows and commons in Boultham, Skellingthorpe and Burton "are subject to be overflowed or otherwise annoyed with water for want of proper banks, drains and outfalls" and provided for "the draining and improving of said lands" and "for enclosing lands in the said parishes". Lord Monson, the principal owner, together with the mayor and other owners and proprietors of land in the area were appointed commissioners for the West Drainage. Sir John Rennie was the engineer for the project and Anthony Bower was appointed surveyor tasked with providing the commissioners with a surveyed map and plan of the drainage area. (It has not been possible to locate such maps or plans at the time of drafting this report). The clerk to the drainage commissioners described the project: 'the lands within the level and now constituting what is called the Lincoln West Drainage and which in ancient time lay open to the rivers Witham and Foss being much on a level with the beds of those rivers, were about the year 1808 reclaimed from the flood at considerable cost..... partly by means of embankments against the said rivers and partly by catchwater drains to intercept the upland waters. Thus protected against floods from without, these low lands ..... had still to be relieved of their own internal springs, rainwater etc, and this was effected under the same Act by means of main drains in the centre or low parts of the fen'.

The Catchwater and Main Drains which traverse Burton Fen, to the north of the Site, between Carlton Bridge and Bishop Bridge were formed under the 1804 act. These works had some immediate success. In 1806 a correspondent in Lincoln noted that "fat beef was growing where fishes lately swam", but all work was not complete until 1816.

Although considerable effort was expended in maintaining a navigation depth in the Foss Dyke in 1819 traders were complaining that the channel was so silted up that they could not pass even with vessels drawing only two feet of water. The waterway had always been difficult to maintain. The banks stood 10-14 feet above the water, and being mainly sand were constantly collapsing, especially if a vessel ran against them. However the 1826 Plan of the Fossdyke Navigation (See Fig.8) suggests the waterway was navigable at that time.

By 1837 Richard Ellison IV, the lessee of the navigation, being aware of the activities of railway promoters, did not want to be committed to new expenditure and much of the upkeep of the canal was left in the hands of the city and the various merchants who continued to trade by water.

Following mid-19th century acquisition by the Great Northern Railway, the Foss Dyke ceased to be Lincoln's commercial highway as waterborne trade gradualy gave way to the age of steam. The acceleration of industrial development in the late 19th century led to rapid expansion of the railways with changes in land use and related development of the wider area being accurately depicted following the introduction of national survey maps.

The first edition of the one-inch Ordnance Survey map of Lincolnshire published in 1824 based on the survey carried out between 1818-1821 and updated in 1890 to show the railways (part reproduced as Fig.7) provides a useful overview of the proposed development area. It is the earliest map located to date which makes specific reference to occupation at Hathow and Hathow Bridge (now Odder) at the junction of the Foss Dyke and river Till near the northwestern extemity of the Site. A steam pump was installed near here in 1840-42 to lift the Till water into the Foss Dyke. The same map also records a road or track between the Foss Dyke and the Saxilby Road prior to the construction of Fen Cottages and a ferry point on the Skellingthorpe side of the canal south-west of Waves Farm.

The records of railway construction indicate that gravel for embankments was obtained from local sources and it is probable that the gravel pits at Burton Fen were originally formed during the late 19th and early 20th century period of railway construction.

Later 19th and early 20th century development on the Site is depicted by the 1906 OS map of the area including the construction of Fen Cottages in the area of the former Woodcocks Hotel and a small group of buildings alongside the southern site boundary (See Fig.9).

5.7 THE FOSSDYKE NAVIGATION - A ROMAN CANAL ?

Archaeological excavation has shown that the Roman colonia at Lincoln was a well appointed and important centre. Its position on a system of roads and waterways may have made a significant contribution to the prosperity of the town in Roman times.

The construction of the Car Dyke and the 18km of the Foss Dyke constitute a formidable achievement and it has been suggested that they formed elements of a unitary system of transport connecting the farming area of the fenland with the military north.

It should be noted that there is no absolute proof that these artificial waterways are Roman. But as they can be shown by medieval documents to be of pre-Norman construction they seem to belong in concept and execution to the Roman period.

The river Witham east of the city has produced several important finds, including nineteen log boats which attest to Roman and earlier use of the river and settlement along its edge. But similar evidence from the Foss Dyke has remained somewhat elusive. Roman pottery kilns have been excavated alongside the canal at Little London near its junction with the Trent and an inscribed sepulchral tablet was found near the edge of the waterway at Saxilby. Possibly the most significant object is a bronze statuette of Mars found near Torksey in the bed of the Foss Dyke when it was being cleaned out in the 18th century. This discovery lends weight to the argument that the canal is of Roman date, and although the statuette could have been thrown away or lost at a later date it is much more likely to have been lost during the Roman period when such objects were in use for religious observances. Further evidence for Roman construction and use of the waterway is demonstrated by a rim and neck of an amphora which was found in 1969 during dredging of the Foss Dyke adjacent to the Site (see F4 - Fig.3 and Appendix).

If the Foss Dyke was planned and dug early in the 2nd century then it is likely that military personnel were drafted to do the work, just as they were drafted to build Hadrians wall. An alternative possibility is that the work was under the control of the veterans of the newly founded colonia at Lincoln. If so it was perhaps people compulsorily settled in or near the fenland at this time who actually carried out the work under the supervision of ex-military engineers.

It is likely that the construction work was organised in labour gangs, each being responsible for a stretch of digging in much the same way that Hadrians Wall was built. Temporary labour camps along the canal, whose course was laid out by surveyors, were necessary to house the labour gangs while work was in progress. Such camps probably being sited on adjacent areas of slightly higher ground above flood or marsh level.

The cutting of the channel through lowlying land is unlikely to have presented any great difficulty, and for the first 6km of its 18km course from Lincoln the engineers were able to use and probably straighten the bed of the Witham's tributary river, the Till, which now runs into the canal at Odder near the north-west extremity of the Site.

Maintaining the waterway was probably as difficult during the Roman period as is shown to have been the case during its medieval and later history. This then raises the secondary questions that if built in the second century for how long did it survive as an element in the Roman transport system, and can evidence be found which would indicate a possible date when it fell into disuse either during or after the period of Roman occupation?

It is hoped that at least some of these questions can be answered by further investigation on the Site both in advance of and during construction groundwork.

6.0 DISCUSSION: THE SIGNIFICANCE AND POTENTIAL OF THE SITE

While the documentary evidence suggests limited potential for early occupation and land-use on the Site, its location and the anticipated nature of development groundwork presents a unique opportunity to secure important information relating to the canalisation of the Foss Dyke from the pre-existing river Till and the possibility of illuminating the past environment by sampling waterlogged deposits.

Previous archaeological investigation along the line of the Foss Dyke between Lincoln and Torksey has been minimal but east of Lincoln the Witham valley and its adjacent fens have produced considerable evidence of settlement since pre-historic times. Discoveries from this area include a group of pre-historic and later metalwork, rivalled in quality and quantity only by discoveries from the Thames. Nineteen log boats have also been recorded, some of which were pre-historic in date.

More recent work in the upper Witham fen has identified areas of fine sand emerging as islands from beneath surrounding areas of peaty humic soils. Thought to represent part of an irregular sand and gravel buried valley floor of Pleistocene date, these sand islands must have provided convenient well drained sites for Bronze Age inhabitants.

While the existance of similar features on or in proximity to the Site is unknown, two of the recorded finds (See F1 & F5 Fig.3 and Appendix) provide evidence of pre-historic activity in the area. The slightly elevated ground near the centre of the Site may contain evidence of early land-use.

Preliminary geotechnical investigation of part of the site was carried out by Construction Materials Testing Limited in 1982. Four 150mm shell and auger boreholes being sunk to depths of between 4.5m and 5m. The logged results indicate depths of alluvial sandy clay deposits varying from 1.25m to 5m, the latter suggesting the presence of a buried river channel to the north of the present course of the canal.

6.1 Environmental Study

The potential for preservation of timber and other organic or environmental material in the waterlogged deposits across the Site, presents an opportunity to investigate the urban-rural relationship in proximity to the city. This will enable a comparative study to be made of the various land-uses since the earliest human exploitation of the area.

Such investigation should also provide useful information on such matters as earlier river courses, tidal influence and river levels.

Environmental studies are crucial to the understanding of past economic systems and climatic conditions, and it is therefore important that any programme of further evaluation incorporates provision for environmental sampling and analysis.

It should be noted that statements on the potential and relative merits of any remains arise from the excercise of professional judgement and should be seen as comments designed to aid the formulation of response strategy and not necessarily as the only viable judgement that could be made.

7.0 DEVELOPMENT PROPOSALS: IMPACT ON BURIED REMAINS

As detailed engineering drawings for the proposed scheme have not been studied it is not possible to provide a precise assessment of groundwork impact. Nevertheless the design proposals indicate that ground intervention will consist of:

a) Localised geotechnical/groundwater investigation by means of machine excavated trial pits or trenches. It is recommended that provision is made for archaeological recording in concert with this work (See also Section 8.2).

b) The formation of specific working areas and compounds for site accomodation and contractors plant which may involve the removal of topsoil.

c) Deep excavation to form the marina basin, fishing lakes and water sports lake.

d) The breaching of the Foss Dyke embankment to form the entrance to the marina basin.

e) Excavation to form foundations for new buildings, service roads and associated trenching for services and drainage.

f) General groundwork associated with landscaping of the Site.

Such work together with attendant use of heavy duty earth moving equipment will almost certainly expose and destroy archaeological evidence contained in buried deposits. However, as the nature and extent of any archaeological remains on the Site is unknown this imposes a further limitation on the impact assessment process. Therefore, it is vital that adequate archaeological information of the area be secured at the earliest possible time.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Although this study has not positively identified the presence of ancient occupation or settlement on the Site, the possibility of such evidence cannot be entirely discounted, particularly in areas having an elevation of c.5m and above, which, if not used for permanent habitation, may have been occupied temporarily during the construction of the Foss Dyke canal.

As the spatial extent, nature and survival conditions of any remains or other possible archaeological evidence is largely unproven, a detailed field evaluation of the Site is the next and, most important part of the assessment process. The results from evaluation, when considered in relation to development design proposals, would provide site specific information, from which an archaeological impact statement and appropriate resource management strategy could be developed.

The magnitude, complexity and potential time scale of the project requires a substantial, well organised and ordered archaeological commitment to ensure that the archaeological resource is properly managed. It is equally important that the archaeological process is fully integrated with all aspects of the development and that all concerned be presented with the maximum quantity and quality of information at the earliest possible time. It is clearly desirable that all parties proceed from a position of knowledge, an objective that will only be achieved by a fully integrated response to all aspects of assessing and managing the archaeological resource. The importance of a carefully designed programme of archaeological field evaluation cannot, therefore, be overstated.

Recommendations for further investigation of the archaeology of the Site are based upon:

a) The existing documentary and archive record for the area.

b) Our current understanding of the proposed development design.

c) The probable extent of ground disturbance to be caused by construction works.

d) The principal assessment criteria contained in PPG16, including the 'importance' of remains known or thought to exist, the policy of preservation 'in situ' and the alternative of preservation by record, i.e. through provision for excavation and/or watching brief.

e) Our professional judgement on the merits of any possible remains, which should be seen as an aid to formulating stategy and not the only viable judgements that could be made.

8.1 Field Evaluation

Preliminary examination of the archaeological potential can be achieved through fieldwalking, topographical survey, geophysical survey, machine or hand excavated trial trenches, drainage ditch section surveys and, where the early progamming of engineering investigation allows, the observation and recording of geotechnical trial pits.

To allow sufficient time for the processing of evidence and preparation of the resultant report, a field evaluation must be carried out well in advance of earliest construction groundwork. As suitable ground conditions are a pre-requisite to certain aspects of effective field survey, particularly fieldwalking, the timing of such work becomes critical. As most of the Site consists of arable land the winter months usually provide the most ideal fieldwalking conditions.

Having regard to the total area of the proposed development and the information revealed by this study, we recommend that an evaluation would best be carried out as a staged process with various levels of survey intensity related to the type and probable extent of remains which might be contained within the Site. This would provide the most cost-effective method of securing the maximum information in the shortest possible time.

An outline design for staged field evaluation would consist of :

STAGE I - Fieldwalking and Drainage Ditch Section Survey.

a) Fieldwalking the Site to retrieve and plot surface displaced artefacts and record any other visible ground surface features including areas suitable for environmental sampling and investigation.

b) Any necessary preliminary survey work to establish primary datums and survey grid for subsequent stages of evaluation.

c) Drainage ditch section survey in selected locations to record local stratigraphic sequences and evidence of archaeologically significant deposits or remains.

The results from Stage I would be correlated with the existing record and other pertinent data, to produce a design for Stage II - Geophysical Survey.

STAGE II - Geophysical Survey

Using the information secured from Stages I and the desk-top study to target probable location of remains, a geophysical survey might then be carried out to locate and define suspected buried features.

NOTE : The use of geophysical techniques would

be subject to a preliminary investigation of site conditions and suitability for survey with particular reference to limiting factors such as geology, ground conditions, modern disturbances and, most important of all, the type of archaeological features expected.

STAGE III - Trial Trench Excavation

Using the combined results from all earlier stages of evaluation, localised trial trench excavation would be carried out to;

a) Identify the depth, nature and survival conditions of any archaeological remains in the area of proposed development.

b) Assess the importance of any remains encountered.

c) Assess the nature and quality of preservation of organic/alluvial deposits which could contain evidence of early environmental conditions.

d) Assess the probable impact of development on surviving remains and recommend modification to development design which would enhance the in situ preservation of remains.

e) Assess the potential and possible need for further archaeological excavation or recording prior to, or during, the construction phase; recommend the appropriate course of action and provide designs and cost estimates for such work.

8.2 Geotechnical Investigation

Where engineering investigation of strata and ground/water table conditions is carried out early in the development programme the field evaluation can sometimes be augmented by observation and recording of deposits and features exposed during the excavation of geotechnical trial pits.

While we understand that the locations for geotechnical investigation are determined by engineering requirements we recommend early liaision on the siting of trial pits so that the most cost-effective locations for combined geotechnical/archaeological tests may be established.

8.3 Archaeological Impact and Resource Management

The resultant Archaeological Impact Statement would indicate the quality and sensitivity of the archaeology and probable impact the proposed development would have on surviving remains. The assessment of impact is highly site specific and demands a responsible and accurate approach.

Of the various critera to be considered, the 'importance' of remains within a local and national context and potential loss or damage by volume of archaeological deposit, are probably the most significant. Professional judgement will play a major part in establishing degree of impact and developing a suitable Resource Management Strategy.

The preliminary information thus secured, would provide the basis upon which informed decisions could be made and appropriate zoned response proposals developed in relation to the overall project design, construction programme and groundwork methodology. Such proposals might include the 'in-situ' preservation of remains or archaeological excavation in advance of construction and/or a watching brief to monitor and record remains exposed by construction groundwork.

The City of Lincoln Archaeology Unit would be pleased to undertake the field evaluation programme and, in this regard, we recommend further discussion to agree an appropriate archaeological specification, programme of work and cost based on the proposals outlined above.

9.0 HERITAGE DISPLAY PROPOSALS

The Foss Dyke canal has played a significant role in the history and changing fortunes of the city and surrounding area and, assuming it was originally constructed in the second century AD, stands as testimony to the engineering skills and construction techniques of the Roman period.

As a major tourist and leisure attraction the development presents an ideal opportunity to identify and display the history of the canal to both local residents and visitors alike. We therefore recommend that consideration be given to possible methods of commemorating this nearly 2000 year old engineering achievement within the context of the development design.

In conclusion, we believe a thorough archaeological investigation of the area concerned is of vital importance in extending our understanding of the use and development of the landscape in close proximity to this major historic urban centre.

Compiled by John Hockley with contributions from M J Jones.

10.0 References

Cameron, K, Place Names of Lincolnshire, Vol.1, Lincoln. 1985.

Coles, J M, et al, Excavations of Late Bronze Age or Iron Age date at Washingborough Fen, Lincolnshire History and Archaeology, vol 14, 1979.

Construction Materials Testing Ltd - Report on Site Investigation at the Fossdyke Canal Site, Lincoln, December 1982.

Costall Allen Design, Burton Waters, Report and Environmental Statement, 1991.

Darling, M J & Jones, M J, Early Settlement at Lincoln, Britannia, Vol. XIX, 1988.

DoE Planning Policy Guidance - Archaeology and Planning, PPG16, London, HMSO.

Hill, J W F, Medieval Lincoln, Cambridge University Press, 1965.

Hill, J W F, Tudor and Stuart Lincoln, Cambridge University Press, 1956.

Hill, J W F, Georgian Lincoln, Cambridge University Press, 1966.

Hill, J W F, Victorian Lincoln, Cambridge University Press 1974.

May, J, Prehistoric Lincolnshire, History of Lincolnshire, Vol I, The History of Lincolnshire Committee, Lincoln, 1976.

Owen, D M, Church and Society in Medieval Lincolnshire, (History of Lincolnshire, Vol V, Lincolnshire Local History Society), 1981.

Simmons, B B, The Lincolnshire Car Dyke:Navigation or Drainage?, Britannia, vol X, 1979.

Wheeler, Fens of South Lincolnshire.

Whitwell, J B, Roman Lincolnshire, (History of Lincolnshire, Vol.II, Lincolnshire Local History Society, 1970; new edition 1992)

Wilkinson, T J, Palaeoenvironments of the Upper Witham Fen:A Preliminary View, Fenland Research I, 1987.

Aknowledgements

This study has been a collaborative undertaking and I would therefore aknowledge, with grateful appreciation, the contributions made by the Lincolnshire SMR office and Michael J Jones, Director of CLAU, who also edited the text.

I would also thank Costall Allen Design who gave kind permission to reproduce the plan of the proposed development and last, but by no means least, the support of all my professional collegues, in particular my research assistant Janet Hooper, for her dilligent scrutinty of maps and other documents.

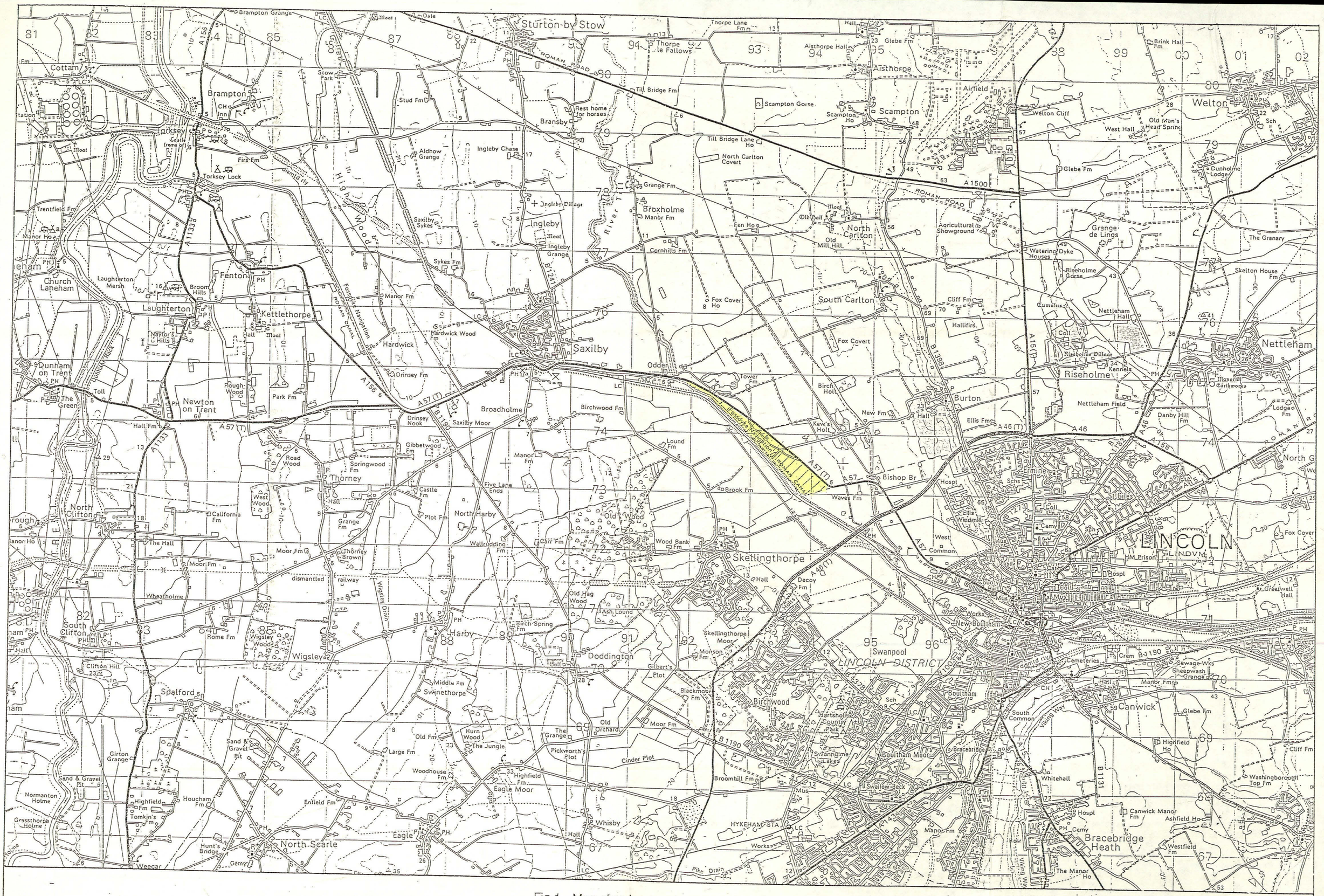


Fig.1 - Map showing location of the Site

City of Lincoln Archaeology Unit

January 1993

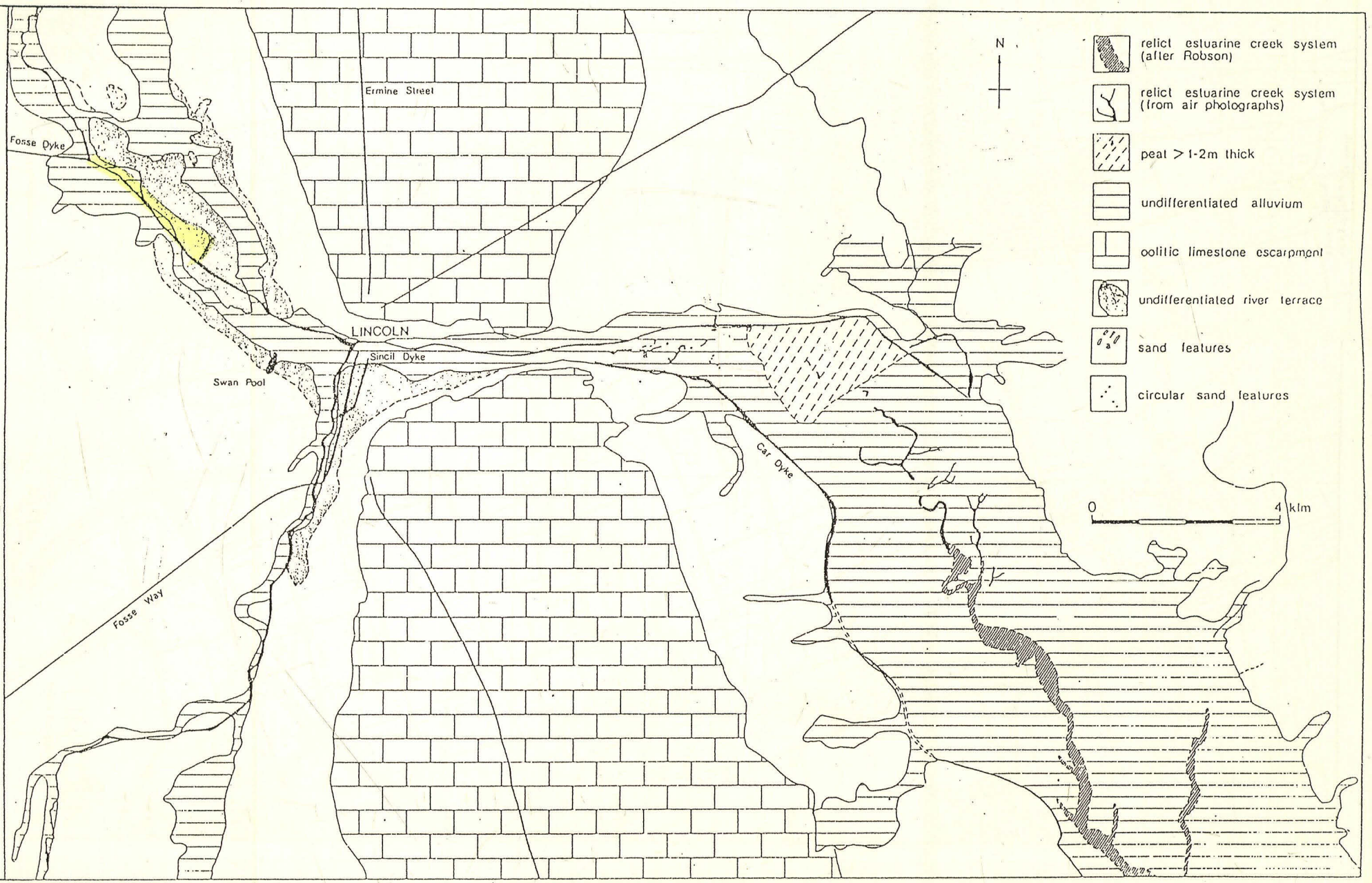
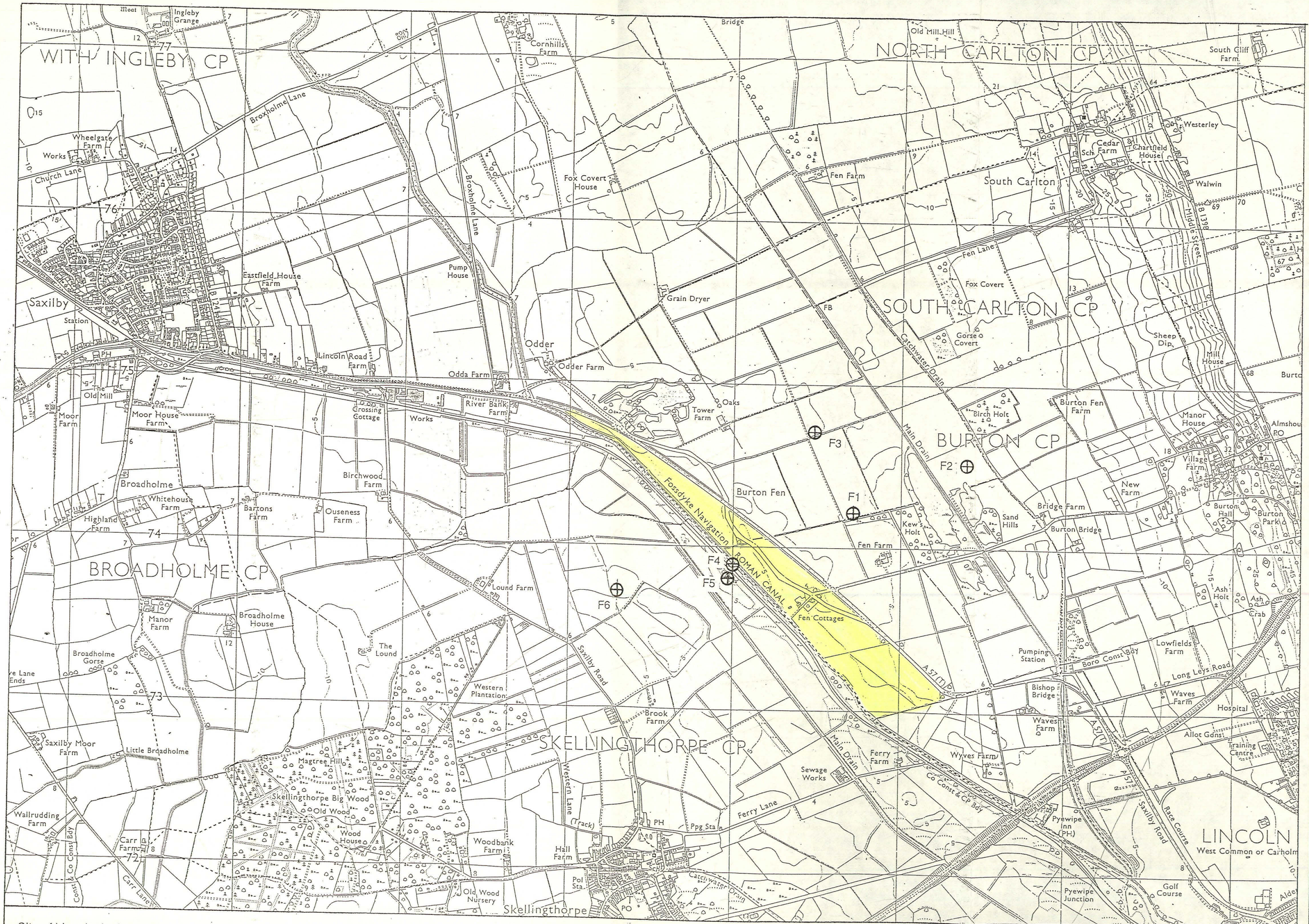


Fig.2 - Simplified geological map

City of Lincoln Archaeology Unit

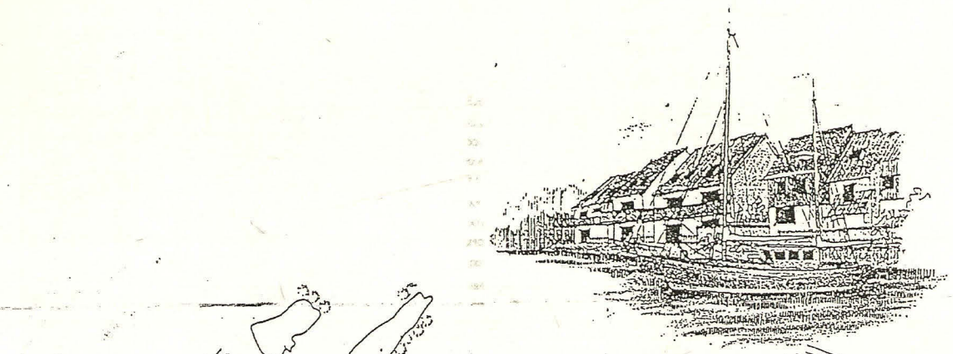
January 1993

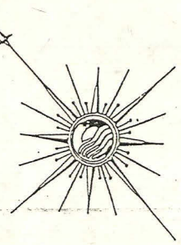


City of Lincoln Archaeology Unit

Fig.3 - Map showing locations of archaeological finds and other features described in text.

January 1993

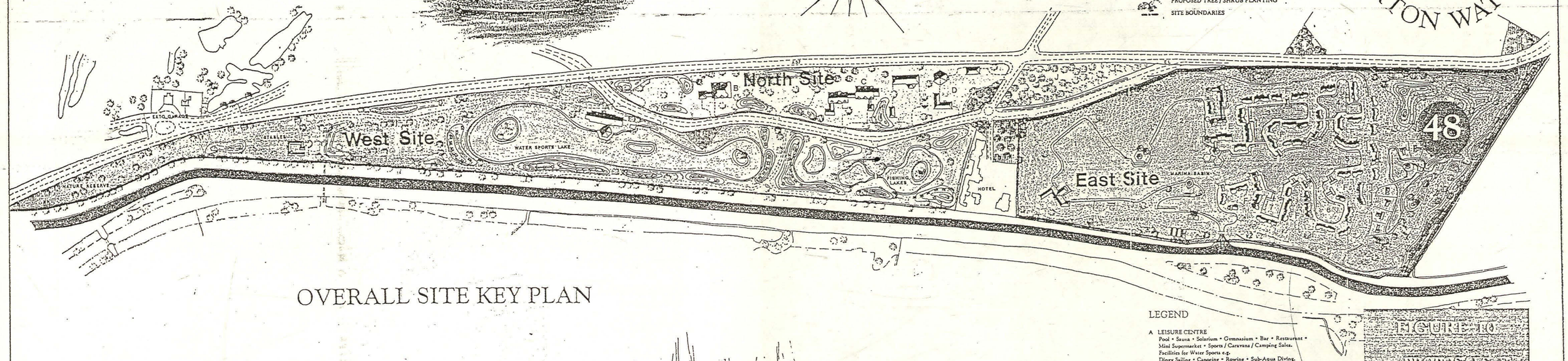




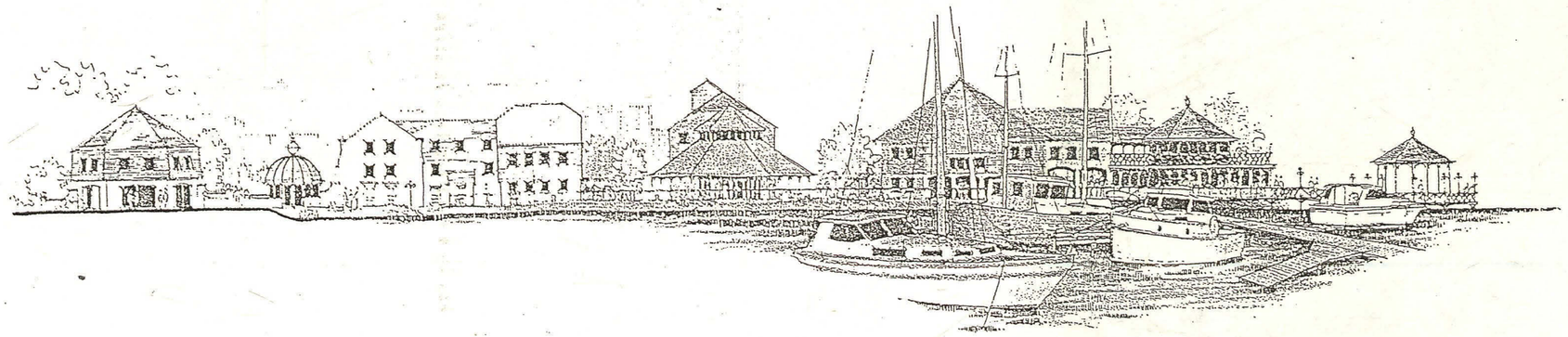
KEY

- ACCESS ROADS
- FOOTPATHS
- BANKING
- ELEVATED GROUND LEVELS
- WATER
- FOOTBRIDGES
- OPEN SURFACE/WATER DYKES
- EXISTING TREE / SHRUB BELTS
- PROPOSED TREE / SHRUB PLANTING
- SITE BOUNDARIES

BURTON WATERS



OVERALL SITE KEY PLAN



LEGEND

A LEISURE CENTRE
Pool • Sauna • Solarium • Gymnasium • Bar • Restaurant • Mini Supermarket • Sports / Caravans / Camping Sales. Facilities for Water Sports e.g. Dingy Sailing • Canoeing • Rowing • Sub-Aqua Diving.

B BOWLING
Games Room • Bar / Food.

C MULTI PURPOSE COMPLEX
Tennis • Badminton • Netball • Squash • Five-a-Side Football • Roller Skating • Pistol / Rifle Range • Indoor Bowls • Electronic Golf Driving Range • Archery • Snooker.

D MOTOR-SIDE SERVICES
Food • Accommodation • Vehicle Recovery • Passenger Car Showroom.

E COMMERCIAL AREA
Chandlery • Craft Workshops • Market • Small Retail Units with Storage • Accommodation and Offices over • Yacht Brokerage • Site Management Centre • Fast Food • Bakery • etc.

F RESIDENTIAL

G AMENITIES
Showers / Toilets • Washing Facilities.

H WATERSIDE ENTRANCE
Towpath Footbridge • Queing Jetty • Water Level Contol Hydraulic Barrier.

FIGURE 10
PROPOSALS

CAD
Costall Allen Design

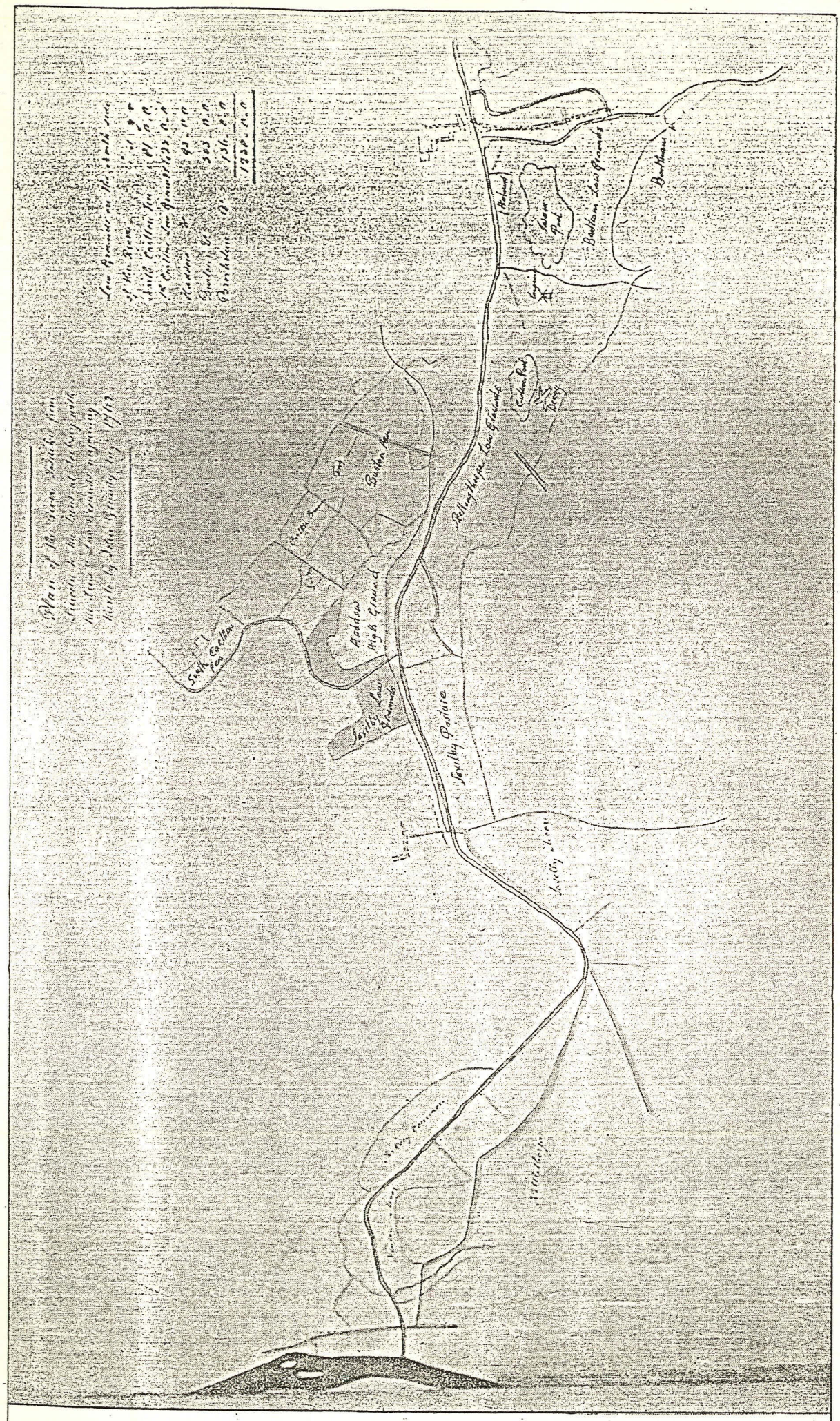


Fig.5 - The Fossdyke 1762 (J.Grundy)

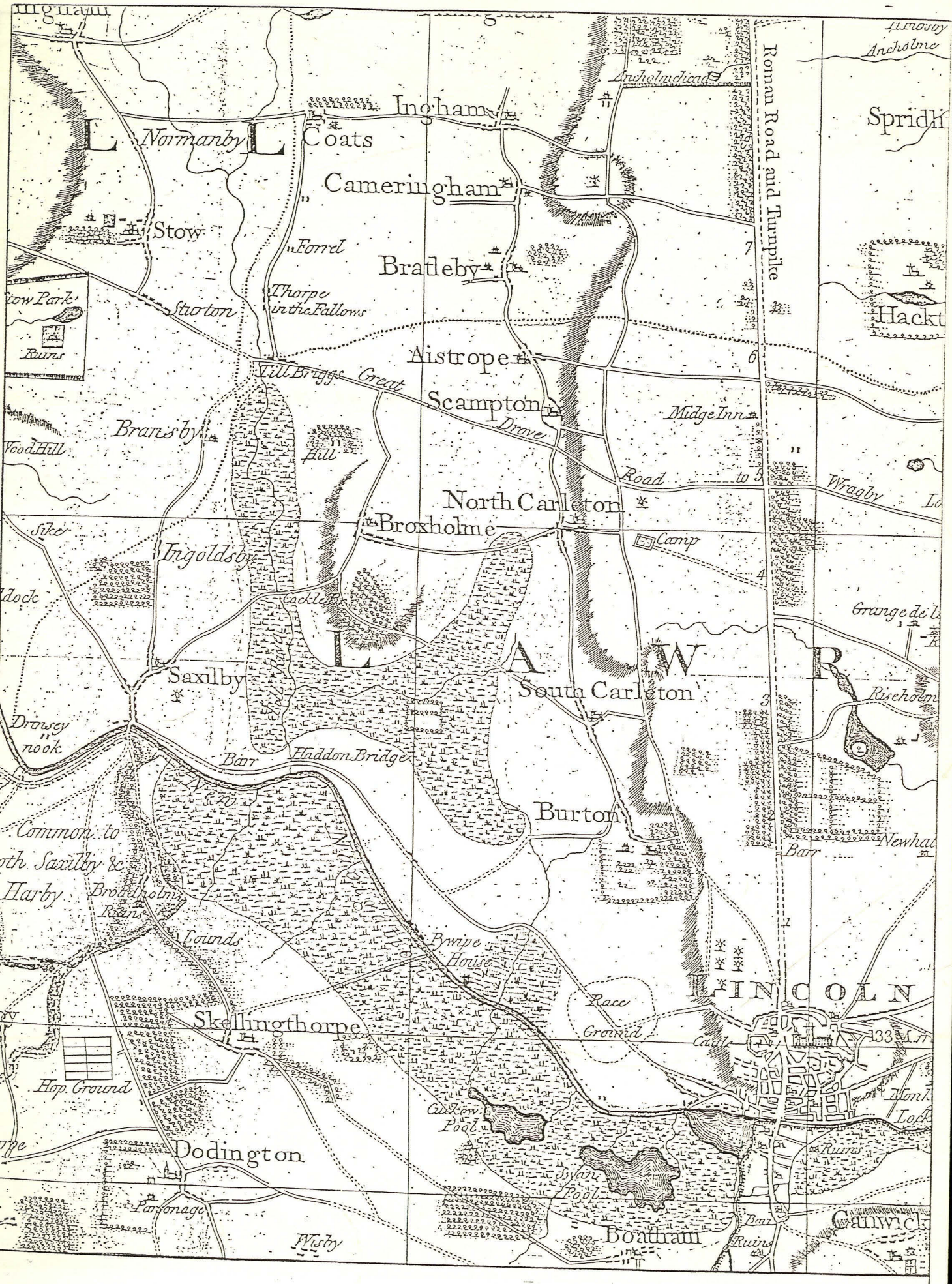


Fig.6 - Part 1779 map of Lincolnshire

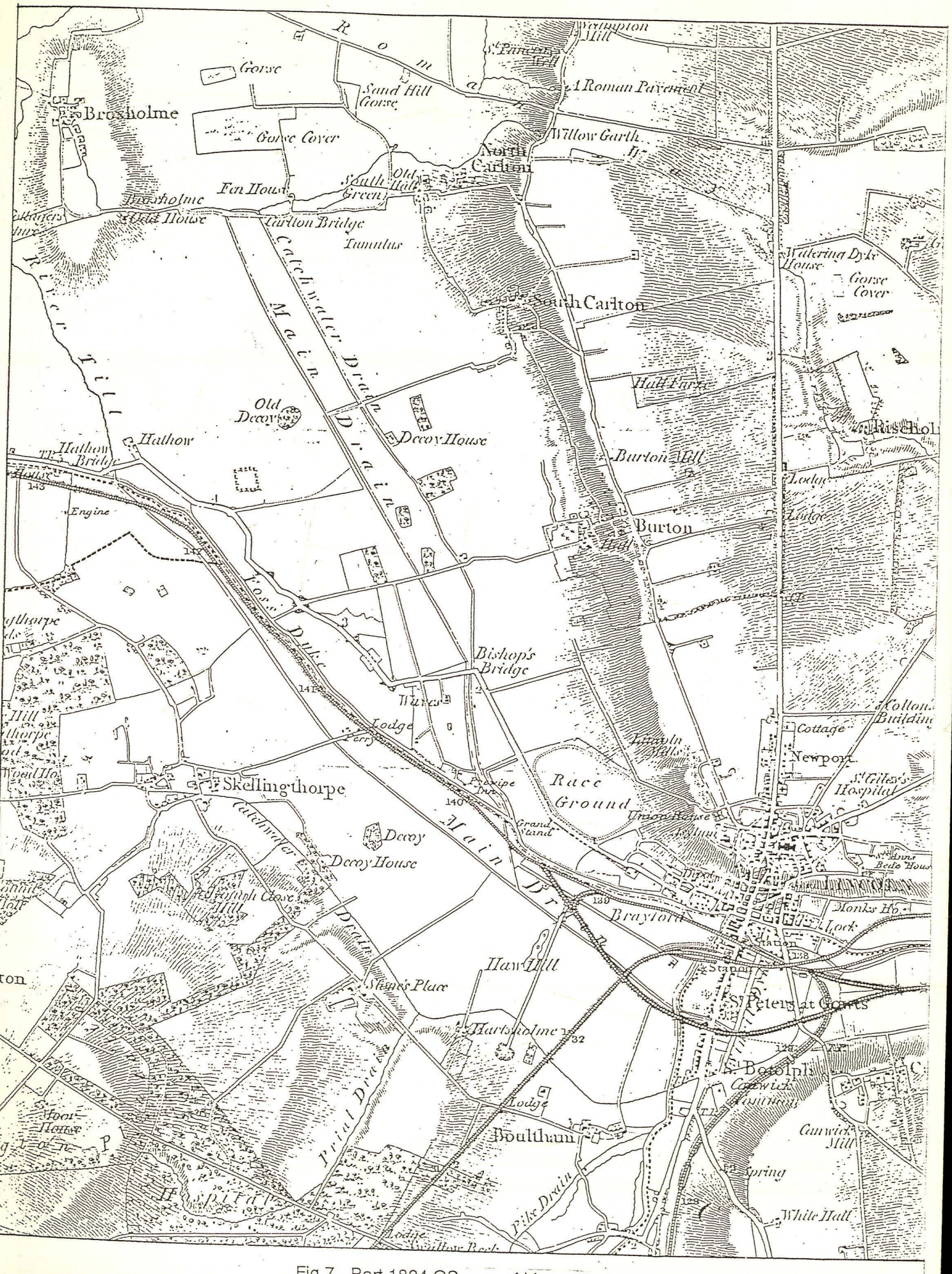
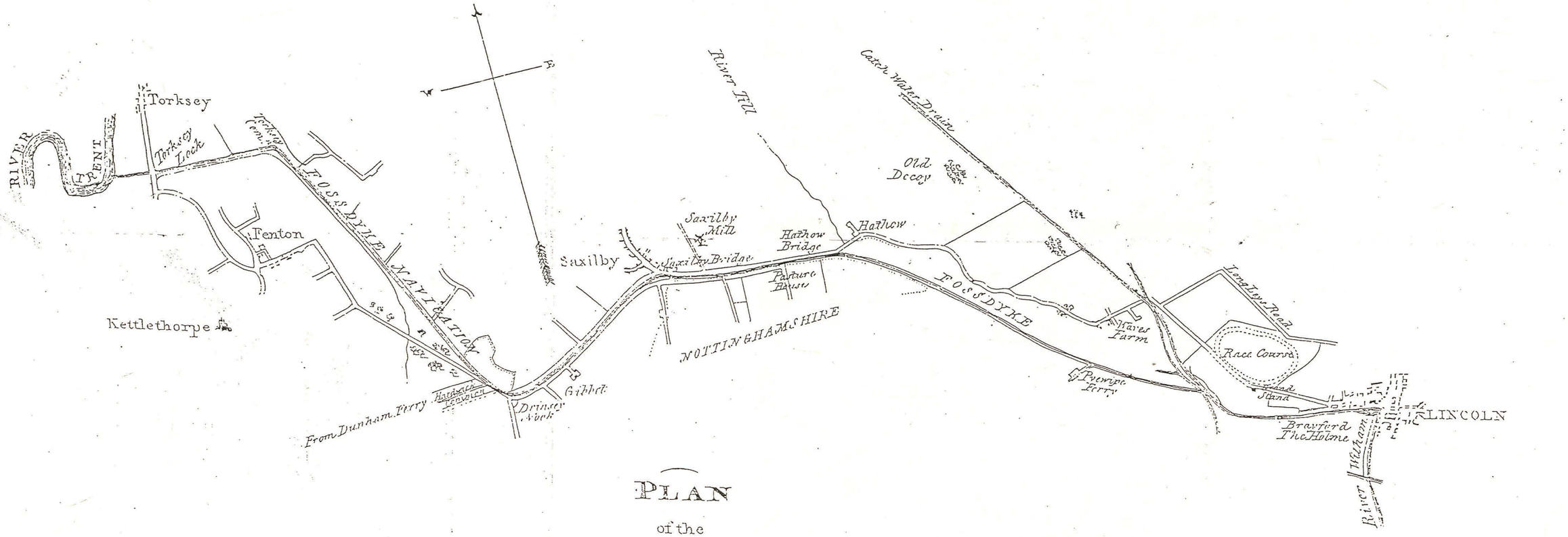


Fig.7 - Part 1824 OS map of Lincolnshire



PLAN

of the

FOSSDYKE NAVIGATION

from

Lincoln to the Trent.

1826

Published by J. W. Drury, Post Office, Lincoln.

Drawn by J. Sandby Padley.

Scale of Miles. 0 1 2 3

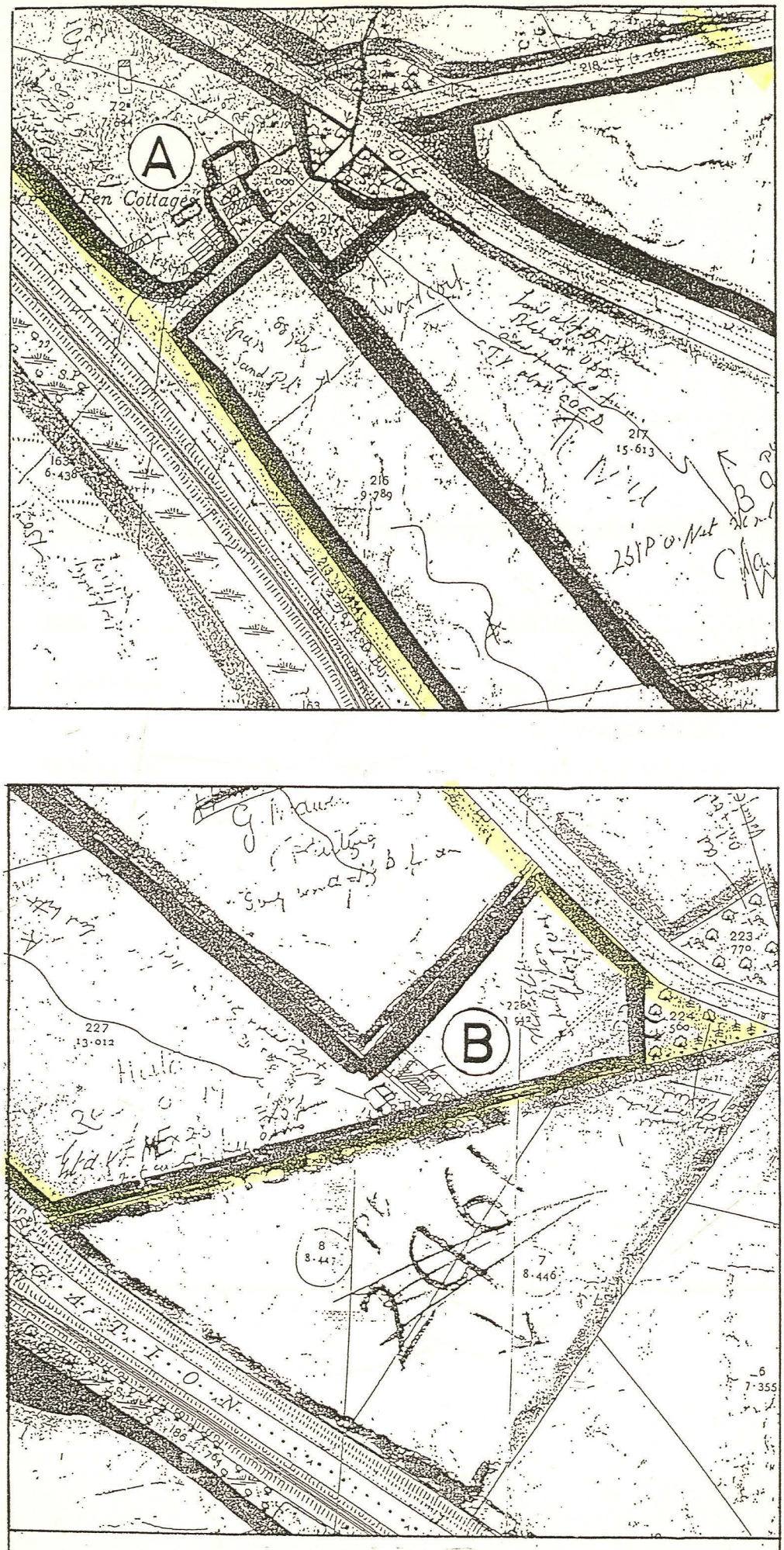


Fig.9 - Part 1906 OS map showing location of A - Fen Cottages
B - Buildings adjacent to south boundary of the Site

APPENDIX

Sites and Monuments Data

Details of isolated finds and other archaeological features noted during examination of the records held by the Lincolnshire SMR. The OS grid reference locations have been plotted on the 1:20000 scale map (Fig.3) included in this report.

CARD No. - Lincolnshire SMR reference
PAR - Parish
BUR = Burton
SKE = Skellingthorpe
LM - In Lincoln Museum

PLOT No.	NGR	CARD No.	PAR	DESCRIPTION
F1	SK 9373 7420	A	BUR	Small thin-butted polished stone axe, found in 1959 by Mr C C Davis. LM (13.59).
F2	SK 9440 7450	B	BUR	Soil-mark. Duck decoy. Air photo by Dr J K St Joseph. Cambridge University. (0005-6 Ex).
F3	SK 9348 7470	C	BUR	Bronze Statue of nude male believed to be 18/19th century figure from ornamental fountain. Probably dredged from Main Drain during cleaning operations in 1964.
F4	SK 9300 7380	F	BUR	Complete rim and neck of Roman amphora. Found in Foss Dyke during dredging operations in 1969.
F5	SK 9298 7381	L	SKE	Polished brown flint axe, 125mm long. Found in 1976.
F6	SK 9230 7370	R	SKE	Fragment of Roman lock and a 2nd century coin of Antoninus Pius found in 1981.