LINDSEY ARCHAEOLOGICAL SERVICES
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A 16 SPALDING BYPASS BORROW PIT

ARCHAEOLOGICAL EVALUATION

and

WATCHING BRIEF 1993-4

NGR: TF 2450 1950

(LCNCC Museum Archive Accession No. 35.93)

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CONTENTS

List of Figures

List of Plates

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SUMMARY

The proposed borrow pit area was investigated by excavating and recording 44 trenches. Traces of the enclosures and ditches identified on air photographs were found but could not be dated. An unexpected extensive industrial feature was sampled and interpreted as a brickworks of post-medieval date, probably 17th century. Numerous later field ditches were identified but not fully excavated. A subsequent watching brief on the reduced area of the borrow pit produced no further information.

Introduction

An archaeological evaluation on the site of a borrow pit for the Spalding Bypass was carried out by Lindsey Archaeological Services (LAS) between 28th June and 8th July 1993. This was followed by an archaeological watching brief; both projects used the Site Code **SB 93**. The fieldwork, on behalf of Birse Construction Limited (Spalding), took place SE of Spalding on a 16ha plot immediately adjacent to the bypass construction site (Figs. 1 and 2). This site had previously been assessed for its archaeological potential which included an undated enclosure and droveway cropmark suspected to be of Iron Age or Roman date (Field and Tann 1993).

Planning Background

Birse Construction Ltd., main contractors for the construction of the A16 Spalding Bypass, submitted Planning Application H16/-/93 to Lincolnshire County Council Planning Authority in Spring 1993. The application was to extract material from an area centred on NGR TF 2500 1970 in order to build a temporary bund to compress a new road embankment prior to construction of the carriageway.

In line with the DoE Planning and Policy Guidance Note 16: Archaeology and Planning, a brief was set by Lincs. County Council Archaeology Section on 18th May 1993 describing an archaeological desk-based assessment stipulated for the vicinity of the application site. This was intended to indicate the presence of any archaeological constraint not identified in the initial appraisal phase. The report on the desk-based assessment was prepared by LAS and submitted in late May 1993 (Field and Tann 1993).

With the information from that assessment, an adequate programme of archaeological evaluation work was designed to mitigate the loss of significant archaeological deposits which might lie within the application area. The programme consisted of a non-intrusive geophysical survey of the entire application area (Johnson 1993) and concurrent complementary

intrusive sampling of the area. Following the evaluation phase the results were reported in the form of an interim note to both the Applicant and the Archaeology Section (Field 1993). In response to that information, archaeological monitoring of a reduced extraction area was requested and an approved specification for that watching brief was prepared by LAS dated 12th July 1993. The watching brief was conducted at intervals between August 1993 and March 1994.

Method

Forty-four trenches of lengths up to 51m were excavated by machine using a 1.8m wide un-toothed ditching bucket under close archaeological supervision (Fig. 2). A team of experienced archaeologists under the direction of Fred Coupland planned, excavated and recorded sections through features revealed in these trenches in order to recover information for their date, shape and function. Features and soils were described on the LAS Context Recording Form; trenches were planned at scale 1:100 or 1:50 and sections were drawn at 1:20. A photographic record was made of the features encountered.

The proposed extraction area extended over three arable fields ('set-aside' at the time of the evaluation) divided by two open drainage ditches (Pl. 1). LAS were asked to produce an interim report indicating the presence of any significant archaeological material on areas that the assessment had suggested contained nothing or little of interest, with the intention of extraction starting on part of the site as soon as possible (Field 1993). For this purpose the site was divided into three parts representing increasing levels of apparent archaeological survival or significance, designated Zones 1-3 (marked on Fig. 2). Zone 1 contained evaluation trenches 1-20, 23-25 and 44. Zone 2, where some archaeological remains were found, contained Trenches 21, 31 and 43. Zone 3 consisted of Trenches 22, 26-31, 32-35, 37-42 and test pit 36. The original trenching strategy aimed to position trenches regularly across the site but deliberately across the cropmarks and anomalous areas of magnetic conductivity; in practice, waist-high vegetation over part of the site resulted in some changes to the regular distribution of the evaluation trenches. A short preliminary report on the evaluation was prepared when the fieldwork had been completed, and approval was given for a Borrow Pit restricted to defined limits (Field 1993; Fig. 3).

The evaluation included a geophysical survey of the entire proposed borrow pit area, conducted for LAS by Oxford Archaeotechnics. This survey, directed by Tony Johnson with assistance from C. Jenner and P. Seaman, has been reported separately (Johnson 1993). The survey, consisting of magnetic susceptibility and magnetometry techniques, began immediately before the trenching and continued while the evaluation was in progress. Information was exchanged from both exercises and explanations sought for anomalies. The geophysical survey had difficulty in locating the features producing the enclosure cropmark but elsewhere on the site recorded an extensive anomaly which proved to be caused by dense brick rubble (Fig. 4).

THE EVALUATION TRENCHES

Zone 1 (Fig. 2)

Most of the trenches in this zone revealed silted up or backfilled drainage ditches and land drains; the density of these features reflected the poor natural drainage of the land. It was noticed that the course of some of these could be seen at ground level as cropmarks within the ripening crop, and the ditches and land drains seemed to be either parallel to, or at right angles to, the existing open drainage ditches. The complicated former arrangement of open ditches is not the pattern recorded on the earliest available maps, and it seems that land drainage benefited from the various large-scale fenland drainage schemes of the seventeenth century (LAO 2 Deeping Fen 1/5/1 1670; Darby 1956; Wright 1973). A traveller noted in 1657 that the raising of the Welland bank had left the land to the east well drained although the opposite (Deeping) fen was mostly submerged (Diary of Sir William Dugdale, May 1657; British Museum, Lansdowne MS. 722, ff. 29-38, cited by Darby 1956, 280). The effect of these schemes may have become insufficient by the 19th century and more ditches were cut. The open ditches across the borrow pit area follow the positions of ditches plotted early this century (OS 1903) although they have been straightened (Figs. 2 and 3). Intermediate ditches shown at that date have been filled.

It may be that the ground became drier for a time, so that regular cleaning of the numerous ditches was unnecessary, but less intensive use, a period of economic hardship or poor farming practices could also have resulted in the silting of the ditches. The peat upper fills of many of the post-medieval field ditches probably represent the redeposited last vestiges of a thin peat layer which had covered the clay until drainage had caused the peat to dry, shrink and erode away. Extensive peat shrinkage had been noticeable from the end of the 18th century and continued throughout the 19th century (Darby 1956, 237-240). Surface peat blown or washed into the ditches and not regularly scoured would have escaped further erosion while the land surface gradually peeled to the clay deposit below. Several of the late 19th-20th century land drains had been inserted immediately over filled ditches or placed in the partially silted features before they were deliberately backfilled. This indicates a comparatively recent planned programme of reclaiming land previously occupied by open drainage ditches. The reclamation programme was probably spread over several years but occurred while the former ditches survived as visible landscape features which provided the alignment for the replacement ceramic land drains.

Very few artefacts were found in these evaluation trenches; most were post-medieval or modern but 3 medieval sherds were found (Appendix 3). All these earlier sherds were in residual contexts.

Trench 1

Ditch 2, a shallow linear NE-SW ditch 1.15m wide and 0.26m deep, with gently falling concave sides and a flat base, had been cut into the light grey natural clayey-silt. Two fills were evident, the lower a light brown silt, the upper a narrow band of peaty clay (Pl. 2).

Trench 2
Ditch 6, a linear feature 1.80m wide and 0.56m deep with a flat base on a NE-SW alignment had been dug into the dark orange-brown clay natural. The lowest fill was an silty clay which was below a thin layer of peaty clay, sealed by another layer of silty clay (Pl. 3).

Trench 3
Ditch 30 (4.30m wide and in excess of 0.52m deep, but the high water table restricted excavation) lay on a NW-SE alignment, dug into dark orange-brown natural. Evidence of at least seven fill lenses was noted and interpreted as gradual natural sedimentation within the feature.

Trench 4
Ditch 17, 2.2m wide and 0.6m deep, NW-SE alignment, cut through two layers thought to be natural deposits. The uppermost layer was a dark brown clay layer 13, 0.3m thick, above a light brown silt layer 14. Both had orange mottling, thought to be from iron salts in moist soil. The primary fill of the ditch was a silty peat, and the upper fill contained more clay (Pl. 4). A land drain was approximately at right angles to the ditch.

Trench 5
Ditch 22, 3.3m wide and 0.9m deep, was on a NE-SW alignment. The dark brown clay primary fill, was sealed by a thicker layer containing organic material (Fig. 5). Above this, the latest fill was a clay with a higher silt content than either of those below it. The organic middle layer 19 produced several late-19th/20th century pot sherds, glass bottle fragments and a horseshoe. This appears to have been a quite recently backfilled feature with vegetation incorporated into the soil fill.

Trench 6
This trench contained Ditches 54 and 58, approximately at right angles. Ditch 58 was 4.20m wide and more than 0.78m deep. It lay on a NE-SW alignment and contained at least two fills; the lower was a very dark peaty clay, the upper was a dark brown silty clay (Pl. 5). Ditch 54 was 3.80m wide and 0.45m deep with a flat base, aligned west to east (Pl. 6). Three quite similar brown silty clay fills were distinguished. A land drain was exposed almost parallel to Ditch 58.

Trench 7
This trench also contained two ditches, 31 and 39 almost at right angles, but the high water-table again restricted the investigation. Ditch 31 was 3.9m wide and 0.96m deep, with a narrow, flat base. Although some initial silting appeared to have taken place it had probably been deliberately backfilled. A land drain had been laid along the course of this field ditch before it was backfilled.

Ditch 39 was about 3.6m wide and 1.2m deep, aligned north-south. The mixed fill appeared to represent deliberate backfilling (Pl. 7). A single medieval sherd was recovered from the lowest fill but this was probably not contemporary with the ditch excavation.

Trench 8
Investigation of Ditch 61 was also hampered by the water-table. It was about 3m wide and 1.2m deep, aligned west - east.

Trenches 9 and 11 contained a land drain.

Trench 10
Ditch 63 was not excavated. It was about 3m wide and on a NW-SE alignment. The upper fill visible below the topsoil was a yellow/brown silt. Lying along the centre of this fill was the cut for a land drain, with another land drain approaching this at right angles slightly further to the east.

Trench 14
Ditch 112 was not excavated. It was 2.00m - 2.50m wide, aligned NE-SW and with a peat upper fill. It was interpreted as post-medieval.

Trench 15
This trench was designed to investigate a linear spread of high magnetic content that had been located by the geophysical survey. Ditch 126 was 3m wide on a NW-SE alignment and contained a large quantity of slag, responsible for the high magnetic reading. This slag thought initially to be from a post-medieval industrial site producing large quantities of brick wasters uncovered by the trenching in Zone 3, 200m to the west. The discovery of modern bottle glass and electrical wire in association with the slag changed this interpretation and the excavation was abandoned. The source of this modern backfilling material is not known but it may be from demolition of buildings at Tointon's Farm immediately north of the evaluated area. The fill represents the most recent archaeological evidence for a continuing process of amalgamating small fields on the site.

Trench 16 contained only a land drain.

Trenches 17, 19, 23 and 24 contained no features.

Trench 18
Ditch 105, 2.3m wide and on a NW-SE alignment, was thought to be a continuation of Ditch 126 in Trench 15; the geophysical survey had also indicated a high magnetic reading here. The trench encountered water immediately below the topsoil and no further investigation took place.

Trench 20
This trench was also waterlogged and the subsoil flecked with deposited iron salts, implying that the drainage here had been poor for some time. Three land drains crossed the trench. A NE-SW band of grey silt, 122, crossing

predominately brown natural, may have been a silted-up ditch about 1.5m wide.

Trench 25
Ditch 172 was examined largely by the means of a machined scoop. The ditch was at least 0.6m deep, aligned NE-SW. The upper fill appeared to be redeposited topsoil, implying a deliberate backfilling, but an underlying fill contained peat from which a sample was taken for possible pollen analysis.

Trench 44
Ditch 160 was aligned north-south. An almost parallel land drain just to the west confused the width of the ditch but it seemed to be about 2m wide and 0.7m deep. This feature was partially examined by machine because of the high water-table in order to recover a partial profile (Pl. 8).

ZONES 2 and 3 (Fig.2)
Trenches 28, 29 and 41: no archaeological features.

Trenches 26, 31 and 40 contained only land drains.

Trench 42
A probably post-medieval ditch (182) at least 0.8m deep and 2.2m wide crossed this trench from SW-NE, cutting through the pale brown natural silt and filled with a clayier silt. A land drain cut the fill, which contained infrequent brick fragments.

The Palaeochannel: Trench 27 and Test Pit 36
During the archaeological evaluation the contractor's engineers began a series of mechanically excavated test pits to inspect the depth and structure of the natural deposits. Most of these holes within the evaluation area were dug with archaeological supervision in case archaeological remains were encountered. A sequence of deposits including peat was exposed in the NW corner of the area and that test site was included in the LAS recording system as Test Pit 36.

Test Pit 36
The north face of the 3 x 2m, 2.1m deep test pit was cleaned and recorded before a series of spot samples were taken for pollen analysis of most of the deposits (Pl.10; Appendix 4). The sequence was as follows:

layer	**depth**	**level O.D.**
modern ground surface		3.08m
topsoil	0-0.20m	
lenses of pale yellow sand	0.20-0.72m	
grey silt	0.72-0.82m	
fibrous peat	0.82-1m	2.08m
grey silt	1.00-1.05m	
yellow sand with iron mottles	1.05-1.90m	
grey-brown sand	1.90m-	

Trench 27
Evaluation Trench 27, in the SW corner of the borrow pit area, located another series of natural deposits which were sampled. A broad channel, about 11m wide and with a north-south course was located in this trench (Pl. 11).

layer	depth	level O.D.
modern ground surface		2.75m
topsoil	0-0.30m	
brown silt	0.30-0.55m	
light brown silt	0.55-0.90m	
grey clay-silt	0.90-1.05m	
peat	1.05-1.20m	1.55m
grey clay-silt	1.20m-	
base of trench	1.40m-	

The visual appearance of these two sequences was quite different but tentative correlation of the pollen stratigraphy enabled some conclusions about the local environment in antiquity to be drawn (Brayshay 1993, reproduced as Appendix 4)). The earliest deposit was identified as a coastal salt-marsh, which changed to freshwater reed swamp with tall herb fen plants. Higher layers demonstrate a return to coastal salt-marsh associated with a slightly higher sea-level, which was succeeded by reed swamp together with grassland or pasture. No date is available for this final phase but it might reflect medieval land use of partly drained land.

It was interesting to note the coincidence of the palaeochannel course to the alignment of Fen End Lane (which now ends at Tointon's Farm), a north-south aligned field boundary shown on the 1903 2nd edition OS map (with no ditch) linking Fen End Lane with the Barrier Bank, and a cropmark mapped as a bank but interpreted as the remains of a recent track (Palmer, 1993, 2; OS 1903; Fig. 2). From these indications, Fen End Lane may be seen as the medieval route between Spalding and Cowbit beside a natural and ancient stream channel, before the Barrier Bank and the present road was constructed.

The Enclosures (Fig.2)
The desktop assessment completed before this evaluation drew attention to air photographs of a cropmark site extending into the SW part of the evaluation area (Field and Tann 1993). The photographs were interpreted as recording two enclosures and an associated droveway of Iron Age or Romano-British date. The evaluation was intended to investigate the features producing these cropmarks and to determine their archaeological significance. The geophysical survey was unable to locate these features rapidly but slight anomalies were identified after further work (Johnson 1993, 16-18). Trenching across these anomalies was conducted in close co-operation with Oxford Archaeotechnics and ditches corresponding to those on the air photographs were located for excavation (Fig. 6). Even after

removal of topsoil the ditches' magnetic readings were very low, their fills being almost identical to the material through which the ditches had been dug.

The two separate enclosures were identified as Enclosure I (the hexagonal feature) and Enclosure II (the smaller rectangular enclosure to the east). It had been thought that the enclosures might have been of Iron Age or Romano-British origin but no diagnostic finds of any period were recovered from the sectioning of the ditches. The upper fills of peat showed no appreciable visual difference to that found within the drainage channels of Zone 1.

Enclosure I: Trenches 37-39 (Fig.6)
The ditches which formed the limits of this polygonal enclosure on the air photographs produced very slight geophysical anomalies but presented readily visible physical features between 0.4m and 0.56m deep.

Ditch 332 was 1.85m wide and 0.56m deep, with sloping sides and a rounded base cut through clayey silt natural. Two fills were present: the primary fill was a grey-brown clay which rose on each side of the ditch to the base of the topsoil. The upper fill was a very dark peaty clay.

Ditch 304/324 was 2.2m wide and varied from 0.41m in Trench 39 to 0.5m in Trench 38 (Pl. 12). The sides were sloping and the base almost flat. The primary fill, a dark grey-brown clay, rose to the surface of the subsoil. An intermediate fill of lighter clay was sealed by a thicker, very dark clayey peat layer 300 (Pl. 13). It was this peat layer which had masked the magnetic variation of this ditch. No archaeological finds were made in these features but samples were taken for pollen analysis.

Enclosure II: Trench 43 (Fig. 7)
Aerial photography had indicated an open ended rectangular enclosure at the northern end of the droveway or land division 200. Trench 43 was positioned to locate both the longer sides of this feature but only one shallow ditch was found. Ditch 143 was 0.93m wide and 0.18m deep, on a NW-SE alignment. It contained two fills, a primary fill of a light clay overlain by a very dark peaty clay. The topsoil/subsoil interface in this trench was uneven and a similarly shallow opposing ditch might have been removed by ploughing since the air photographs were taken in 1958 and 1959.

The Droveway: Trench 21 (Figs. 2 and 7)
The air photographs indicated that Enclosures I and II were linked by a single slightly curving ditch leading NE from the east side of Enclosure I. This feature was interpreted as a droveway or land division contemporary with the enclosures. It was an aim of the evaluation that this ditch be located and investigated. The County Archaeological Officer had previously requested that LAS left a corridor of intact deposits along the southern edge of the evaluation area unless this proved inappropriate. This strategy was designed

to permit possible future study of an extensive ancient farming landscape thought to have covered much of the area.

Trench 21 was positioned to cross the cropmark ditch close to the existing open ditch in order to reduce the potential damage of archaeological excavation. Ditch 200 was located by the trench as a feature 3.2m wide by 0.72m deep, with sloping sides and a flat base. The primary fill was a light grey silt which had apparently entered from the south. A deposit of grey-brown clay overlay it on the northern side of the ditch, extending to the base of the topsoil. This deposit may have been the remains of an upcast bank that had slid naturally into the ditch. This in turn had been followed by three later fills (again from the southern side) which were probably natural silting; a grey-brown clay, a very dark peaty clay, and finally a thin layer of silty peat (Pl. 14). Soil samples were taken from the lower fills for pollen analysis.

The Brick Kiln Features (Figs. 2,4, 9-11)

The survey revealed an unexpected area of high magnetic content 180m north of the enclosure which did not seem to match with cropmark information. The very high readings indicated a highly magnetic area affected by considerable heat; together with the distribution of readings, and scatters of brick and associated rubble found in the excavation, it is thought that a late medieval/early post-medieval brick kiln had been situated close to this point. The magnetometer survey identified an area which may have been the kiln itself, which was deliberately avoided to prevent any damage. Trenches 34 and 35 revealed clusters of features which were interpreted as pits dug for clay. Further pits, thought to be connected with the kiln, were found in Trenches 30, 32 and 33 (Pl. 8). All had been deliberately backfilled but with such a small part of the complex exposed it was not possible to determine whether they were filled while the industrial process was continuing or after the abandonment of the site. The topsoil in this area contains many small fragments of brick and this waste is known to extend to the north under the recently constructed bypass.

Trench 30

This trench located the eastern side of a large feature with an irregular edge (124). The fill contained frequent large brickbats, many of which had become surrounded with a green glaze. It was thought to be a claypit.

Trench 32

Parts of two large features cutting the natural silt in Trench 32 were not excavated. They were separated by a very thin peak of undisturbed soil, 0.12m wide. Pits 102 and 104 were interpreted as claypits associated with the brick kiln to the west; Pit 104 was at least 18m wide.

Trenches 22 and 33

Part of a feature at the western end of Trench 33 (110) was thought to represent the eastern edge of claypit 104, but has since been reinterpreted as part of a 4m wide NW-SE field ditch (132) present in Trench 22. No

evidence for any possible features associated with the brick kiln was found east of these trenches, suggesting that the ditch may have provided a boundary to that activity.

The topsoil/subsoil horizon in Trench 33 seemed to have been disturbed, perhaps on a large scale by mechanical movement of soil from east to west. This might have occurred if uneven heaps of kiln waste or pit depressions survived into the 20th century and were deliberately levelled.

The large features in Trenches 30, 32 and 33 were not excavated (Pl. 9), and their depths and dimensions are unknown. It was noticed that all the pits were in an area of quite fine silt, sandy in places, and the material removed may not have been clay. This cannot be confirmed without knowing the strata through which the features were dug.

Trenches 34 and 35

Two evaluation trenches were positioned at right angles across the edge of the area of high magnetic readings (Pl. 15) This strategy relied heavily on the advice and co-operation of Oxford Archaeotechnics staff as the deliberate intention was to avoid the core of the high values but to ascertain the nature of the source (Fig. 4). Cleaning of the subsoil horizon in both trenches revealed brick and rubble scatters and areas containing frequent brick and charcoal fragments (Pl. 16). The surface indications had suggested that these features were likely to be quite shallow but they were found to contain numerous fills and continue to considerable depths. The evaluation period was too short and the space insufficient to investigate these in detail and very small parts of the pits were sampled to determine whether they represented abandoned industrial features or waste pits. The ground had been extensively disturbed here and soil that seemed to be subsoil frequently proved to be redeposited over layers of brick rubble. The processes associated with this industrial activity had clearly produced large heaps of soil and brick wasters which had been levelled over this area. No evidence of structures was found but the geophysical survey had intimated that these might lie slightly north of these trenches.

Trench 35

Layer 400, a red-brown silty-clay levelling spread at the northern end of Trench 35, sealed Pits 428, 431 and 433 (Pl. 17; layer 400 overlies them all).

Pit 428 had a steeply sloping north face, but lay at the edge of a sampled area and was not excavated. It was sealed by fills 424-6 which seemed to have been cut by Pit 433, although those fills did not appear to be filling Pit 428. The section revealed a succession of steep sided pits which had been excavated through neighbouring backfilled features (Fig. 10). A thin baulk of the clay natural had been left between each pit, which suggests that if any were contemporary they had a function which required them to be separated. The complex sequence of backfilling with deposits of varying volumes implied that tipping of similar material had extended over a period of time, rather than being the consequence of a single operation.

Pit 431 had an almost vertical southern face and the upper fills contained charcoal, brickbats and smaller fragments (Pl. 18; 401 is natural).

Pit 433 seemed to have been excavated through the backfill of Pits 428 and 431 into the natural clay (Fig. 10). It was at least 3.56m wide and over 1m deep. The material from the lowest fill examined was similar to the natural clay apart from some charcoal flecks. It was thought that this fill was probably a primary fill of slumped natural material from the open pit contaminated by worm action; this feature is unlikely to have been much deeper here. Fill 413 was thought to be a peat layer, but the excavators considered that it may actually have been saturated charcoal.

Pit 444, 5m to the south of the levelling spread 400 was at least 0.65m deep and 2.5m wide. The upper fills consisted of alternate deposits of brick rubble and grey silty clay (Pl. 19). Below this was a thin layer of red dusty material which was much thicker on the southern edge where it rose to the top of the pit (Fig.10). This deposit was interpreted as ash from a furnace. The south face of the pit dropped almost vertically from the surface but the north side was not conclusively located; the base of the pit was not reached.

Pit 443 lay 0.20m south of Pit 444 but there was no stratigraphic relationship between the pits or their fills. The north edge dropped almost vertically: it seemed likely that both features had been in use simultaneously for the edges to respect the other so carefully (Pl. 20). This pit was 1m deep with an almost flat base. The fill consisted of numerous fine tip bands tipped from the north side, comprising a dark red clayey silt with frequent charcoal inclusions. A small quantity of brickbats were present.

The dark red silt fill was overlain by an entirely different deposit of grey silt containing very little brick dust or fragments. The edge of this tipped slightly steeper than the adjacent tip lines of red soil and it was unclear whether this represented another, later, pit cutting through backfill of Pit 443 or further backfill of the same feature from a different source. This sequence was recorded as Pit 445.

Trench 34

Several distinct deposits crossed the trench below the topsoil, aligned approximately north-south (Pl. 21). Small sections were dug to examine these layers or fills and most were found to be exposures of fills from large and deep features (Figs. 9 and 11).

Excavation of Pit 521 produced a confusing sequence of fills and deposits which were identified as of different origins (Pl. 22). The uppermost fills extended over 5m in width, to about 0.5m deep. The most recent elements contained small quantities of brick rubble but were mostly soil; an intermediate layer had dense rubble and red brick dust. Below this lay a peaty deposit 0.2m thick. Lower deposits were of silty clay with very occasional traces of brick fragments or charcoal. During excavation the peat

and earlier deposits were thought to be fill layers of a deep archaeological feature over 0.8m deep but they were later interpreted as natural disturbances, depressions and possible palaeochannels silted in antiquity before more recent contamination by worm or animal activity in the fine silt (Pl. 23).

Pit 561 had an almost vertical west face and a steeply sloping shelved east face (Pl. 24). It was 2.5m wide and 0.8m deep with a fairly flat base. It contained several fills with differing characteristics; most had been tipped in from the west. The primary fill contained brickbats against the western face. Above this was a thick very mixed fill consisting of lenses of light brown silt and much darker soil. This seemed to be redeposited topsoil and pat, probably from stripping overburden above the natural clay. The overlying fills contained frequent brickbats and red brick dust or furnace waste.

Pit 581 lay immediately to the east of pit 561, separated by a 0.1m peak of undisturbed natural silty clay. The sides dropped abruptly to a depth of 0.8m and a width of 4.8m (Pl. 25). The primary fill included occasional pieces of brick but these were absent from the overlying deposit of silts, topsoil and peat lenses with charcoal. This was overlain by layers of red material with brick and furnace waste sandwiching a peaty layer. It is unlikely that this represents a peat formation period during the life of the brick-producing site or before the site was levelled; it is thought that the peaty soil was from overburden clearance and tipped as a waste material.

Pit/posthole 605 was a much smaller feature, 0.8m wide and 0.6m deep, with steeply sloping sides and a rounded base. The lowest fill had the appearance of redeposited topsoil although the overlying layer was very similar to the natural silt. The upper fill contained frequent brickbats. The shape and size of this feature suggest it may have been a large posthole perhaps predating the brick-making activity.

Ditch 601 had very different fills and profile to the other pits in Trenches 34 and 35 and was interpreted as a field boundary ditch (Pl. 26). It was 3.6m wide and more than 0.7m deep, but the water-table prevented further investigation here. The sides sloped unevenly, with a shelf on the west side that might have been evidence for a recut channel. The adjacent pit/posthole 605 may have been associated with the earliest phase of this ditch, as the recut had been dug through that feature. The ditch was interpreted as of post-medieval date, probably in use before, during and after the brick making site.

The Watching Brief

The results of the evaluation were verbally reported to the County Archaeological Officer immediately the site was completed in order to reduce delays in the planning process. Permission for clay extraction from part of the proposed borrow pit area was given, subject to a condition requiring a watching brief of the site. The extent of the reduced extraction area was marked by posts and then fenced (Fig. 3). Lindsey Archaeological Services

was commissioned to continue their involvement with the site and monitoring took place between late August 1993 and early March 1994.

The borrow pit was formed in a number of operations, interrupted by prolonged spells of wet weather which created quagmires on the surface and obscured the stripped or quarried surfaces (Pl. 27). The purpose of the Borrow Pit was to provide considerable quantities of ballast to lay on the new road's brick rubble base and cause it to consolidate in preparation for the construction of the A16 bypass carriageway (Pl.28). The speed of the topsoil stripping meant that the surface of the clay layer was never clean enough to identify or pursue features for long with precision (Pls. 29 and 30). In some instances the peat fills of the post-medieval ditches were readily visible either in plan (Pl. 31) or in section (Pl. 32) but frequently only deep ruts indicated the position of the moister fills (Pl. 33). During the quarrying of the clay material ceramic land drains were apparent in section but conditions were unsuitable for recognising early features had they been present (Pl. 34). A 1m wide NW-SE aligned backfilled feature 6m to the west of (and parallel to) the open ditch between Zones 1 and 2 represented the only extensive feature observed; this was interpreted as a land drain course. After a small number of visits where no artefacts and only backfilled post-medieval drainage features were observed, the watching brief visits were reduced in frequency and then ended with the agreement of the Assistant County Archaeological Officer.

Discussion

Enclosures I and II (Trenches 21, 37-9, 43)

Although the evaluation located the ditches depicted on the air photographs, it was not possible to add as much further information about the site as had been hoped. This was exacerbated by the inability of the geophysical surveys to recover clear signals of these ditches or other lesser associated features which were not visible as cropmarks. The overhead high voltage power lines which cross Enclosure I also restricted the positions where exploratory excavation could be conducted.

The cropmarks reflect quite shallow ditches (**Ditches 304, 324, 332**) which contain peat in their upper surviving fills. The date of this formation or deposit is not yet known; peat exists in the upper fills of post-medieval features elsewhere in the evaluation area. **Ditch 324** produced minute fragments of brick and brick slag which might have spread from the post-medieval kiln area 200m to the NE. The size of these pieces means that they are unreliable in determining the age of the ditch as worm or animal action could easily have enabled them to contaminate earlier layers. The overlying topsoil contained slightly larger pieces of brick and tile but no other finds.

The only physical evidence for a date earlier than the post-medieval period is in the form of pollen sampled from these ditches. Analysis showed a close correlation between the spectra of these fills and that of a nearby palaeochannel recorded in **Trenches 27 and 36**, with the ditches filling as an environment of freshwater reed swamp and *cyperaceae* (sedges)

predominated (Brayshay 1993). The upper peat deposit at a Cowbit Marsh sampling point from an earlier study showed a peak in reed swamp/ sedge fen pollen which was dated to 2595+/- 60bp, (Cowbit Wash 7g; Shennan 1986). If the peat deposit in the upper surviving fills is a product of the same formation episode, the decline of these features as landscape features can be dated to the Iron Age.

Another possible indicator for an Iron Age or Romano-British date is the alignment of the Droveway ditch. This corresponds with the pattern of enclosure ditch cropmark alignments on an extensive landscape surviving 3km to the NW and 2km to the NE (Phillips 1970; sites 2120, 2520, 2620). Dates from pottery surface finds at these sites cluster around the mid 2nd to late 3rd century AD. The difference in this general alignment of fields may reflect an entirely different axis to the edge of habitable land or natural drainage affected by relative sea-level conditions.

The palaeochannel revealed in **Test Pit 36 and Trench 27** (assuming it is a single feature) follows an alignment similar to that of Fen End Lane. Pollen from the natural feature was sampled and this included a sequence very similar to that of the ditches of Enclosure I. This implies that the now redundant and entirely filled channel was contemporary with the Enclosure.

The south-east corner of Enclosure I (**Ditch 304**) was found to follow round as a single excavation episode, confirming that the cropmark does actually reflect a polygonal enclosure rather than coincidental unrelated features. The desktop assessment for this project identified a similar polygonal enclosure at Deeping Fen (Field and Tann 1993).

On the basis of these similar dated sites this cropmark site should be preserved unless reliable evidence for a much later date can be produced. Further trenching would probably be inconclusive and open area excavation of the site might prove the only way to determine its age beyond doubt.

The Brickworks

It is difficult to describe this industrial complex accurately because such a small part was examined. No physical remains of a kiln were located (the evaluation deliberately avoided the areas of greatest potential for highly fired material) The sectioned features have been described as pits although their full shape and size could not be recorded. The dimensions recorded may not be at all representative of their complete form; some may be part of functional features that only became backfilled when the process was abandoned. The width and depth of those examined appears too small for efficient clay quarrying and they have not made use of all the available silty clay. Trench 35 lay within an area of much lighter, sandier soil than any of the other evaluation trenches; it seemed a strange place for clay pits but well-drained ground is apparently essential for some stages of the preparation of bricks (Mayes 1965, 97).

The evaluation trenches did not locate any trace of structures or working surfaces despite being on the periphery of the magnetic anomalies. The arrangement of features uncovered off York Street in Boston, Lincs. does not seem to represent a parallel (Mayes 1965).

Much larger pit features were identified in Trenches 30, 32 and 33. The surface fills contained brick wasters, but none of the red fired soil of the features in Trenches 34 and 35. These are more likely to represent the clay source for the kiln. None of these were excavated but ceramic remains included in the uppermost revealed fills were of century date.

The process of brick-making seems to have been a seasonal one, with clay moved after harvest (presumably when the summer heat had ended and the action of excavating the material was less difficult, but before the winter deterioration of tracks and roads) but formed into bricks and fired the following spring. Construction seems to have taken place immediately the bricks were ready, avoiding storage problems and maximising the weather for building. Drayner Massingberd noted that a brick chimney (which used 5000 bricks) was to be built in the Spring of 1657, and that it was completed in early June; an entry from a Cheshire land agent in 1727 reminded that "It is best to cart clay at Michaelmas and make the bricks next spring" (Barley 1986, 183).

The two methods employed to fire bricks were the clamp or the brick-built kiln. With the clamp technique the stack of raw bricks was packed with fuel (wood or furze), covered with soil or turves to retain heat, and then fired. The clamp might hold as many as 100,000 bricks but produced a sizeable proportion of over or under-fired bricks. The use of clamps lasted longest in Kent, Essex and Sussex (Barley 1986, 181). Brick built kilns were smaller (each kiln could produce 20,000 bricks per firing) but proved more consistent; observation of an experiment in 1968 found that 75% of the bricks were perfect (Barley, op. cit.). Wood was used as fuel, both for kilns and clamps, until the 18th century when coal began to take its place. The frequency of charcoal inclusions and the absence of recorded coal fragments may be evidence that wood was used on the Borrow Pit site, and perhaps by inference that the site pre-dates the 18th century.

At least one Clamp type kiln is known to have been in use at Spalding at the end of the 17th century. The Inventory of the late William Copeland (bricklayer of Spalding) in 1690 included reference to 'the Brick Clamp Field' where he owned 'earth cast and tempered, hovils [shovels?] and other materials, and a parcel of timber' (LAO LCC Admon 1690/36). Excavation of the apparent centre of the Spalding Bypass Borrow Pit brickworks complex might be the only way to identify whether the bricks were fired there and if so, in what type of kiln.

Any dating of the Cowbit Road brickworks cannot be considered satisfactory on the basis of the small part of the site investigated. No documentary references could be found for any industrial activity on the site, which may

suggest that the brickworks was of earlier rather than later date. The bricks from the site include complete examples although some were obvious wasters and it would be convenient if those artefacts could be dated. Unfortunately the documentary history of brick building is disjointed and reflects very localised variations. The royal attempt to set a brick size in 1477 (about 216mm x 100mm x 100mm) was unsuccessful, as was the 1571 Statute (insisting on dimensions about 229mm x 114mm x 51mm). The imposition of a Brick Tax in 1794 led to an increase in brick sizes (to flout the tax by reducing the numbers needed) but it was not until the mechanisation of brickmaking in the mid 19th century that dimensions became more standardised at about 229mm x 114mm x 75mm. Brick dimensions cannot yet be used as a reliable dating mechanism despite regional attempts to prepare chronologies (M. Clark, pers. comm.).

A list of rates of wages in 1680 in Holland district notes the dimensions of the 'larger size' bricks (305mm x 152mm x 76mm) (Gooch 1940, 233-40). A mid 19th century specification for bricks supplied by a Cowbit farmer required a minimum burnt size of 229mm x 114mm x 70mm (LAO 2 Deeping Fen 3/3/2/2). The bricks found during the evaluation were all in the order of 260-265mm x 115-125mm x 60-75mm; neither reference compares closely with those found.

Spalding and its environs, lying close to the North Sea coast and amidst copious quantities of silt clay, was well placed to respond to the introduction of brick-making and building. Several brick-built structures survive in the area which have been identified as of early date:
Spalding: Abbey buildings: medieval
Spalding: Ascoughfee Hall: 1429
Cowbit Church: early 15th century (the centre part is supposed to have been built by Prior de Moulton of Spalding c. 1400; it was later lengthened to link with the new west tower (consecrated 1487) (Pevsner 1964, 501)
Tydd St. Mary's Church (tower and nave)
Boston: Grammar School 1567
Hussey Tower c.1510

Despite these fifteenth/sixteenth century dates, the earliest documentary references from the district are from the seventeenth century, probably reflecting greater production. A document of 1617 describes the partial blocking of a watercourse near Ely (50km from Spalding) with "... earth, tile sheards, brickbats and great stones..." (British Museum Harleian Ms 5011, ff. 44b/46, Item 7; cited by Darby 1956, 270-1). In 1649 the manorial court at Crowle in Lincolnshire considered the case of a man making bricks on the common and selling them outside the manor (Barley 1986, 183). The notebook of Drayner Massingberd from Bratoft in the county noted the bricks he had made from 1652, when between 33-48000 could be manufactured at each firing of the kiln (Barley 1986, 182). Brick elements become part of surviving place names from the same period, including the Gainsborough, Lincs. example of 'Brickkiln Close' about 1690 (Barley 1986, 183).

The earliest located reference to brick labourers at Spalding was in 1635 from a bricklayer's Inventory (LAO Inv. 143/65). Brickmakers, bricklayers and strikers of bricks were listed in the 1680 list of wage rates in Holland district (Gooch 1940, 233-40) and another Spalding bricklayer's Inventory survives from 1687 (LAO Inv. 187/172).

The only located source of clay known to have been used for bricks at Spalding was much closer to the town than the Borrow Pit site and of 19th century date. Deep pits dug in Clay Lane, SE of the town, supplied clay for brickmaking for housing built between 1826 and 1842; the pits were later backfilled as rubbish tips (Wright 1973, 3; Gooch 1940, 435). From the date of the artefacts and the absence of located documentation it is unlikely that the evaluation found a site of Victorian date. Fieldwalking in the adjoining parish of Cowbit located a spread of brick material close to Handkerchief Hall, about 0.4km from the new site (Healey, pers. comm.).

The pottery recovered from the site was not found in abundance, but a larger proportion dates to the 17th-18th centuries and this may be an indication of the industrial activity taking place there. The road from Crowland through Cowbit to Spalding ran beside the bank of the River Welland, a 6.5km stretch of which was raised to 'a much greater bignesse and height ... by the Adventurers' shortly before 1657 (Diary of Sir William Dugdale, May 1657; British Museum, Lansdowne MS. 722, ff. 29-38, cited by Darby 1956, 280). The Barrier Bank, along the top of which the A1073 Spalding - Cowbit road passes, was constructed as a flood defence in response to an Act of 1666 (Wright 1973). One explanation of the brickworks is that it acted as a local supply of material needed for the extensive drainage scheme beside the site - a seventeenth century version of the bypass Borrow Pit? The Barrier Bank linked Hawthorn Bank (protecting Spalding) with Wash Bank (protecting Crowland), and was intended to keep Welland floodwater from South Holland Fen. There is a documented description of brick (with stone) used to construct a 'strong sluse [sluice]' at the confluence of the Bedford River and the Ouse, in use by 1657 (Diary of Sir William Dugdale, cited by Darby 1956, 276). The same source describes part of the nearby 'Podike' stream as "... faced with brick for the space of 2 miles or more, for the better strengthening the banks...". In a later example of the tradition, 100,000 bricks were ordered in March 1848 from Thomas Hall the younger, a farmer from Cowbit by the Trustees of the Crowland and Cowbit Washes Drainage body for drainage of the Washes (LAO 2 Deeping Fen 3/3/2/2). Thirty thousand of the bricks were to be marked 'drain', and the cost was to be 27/6d [£1.37] per 1000.

A 1626 terrier of lands in Spalding survives but no mention of a brickworks was found in the relevant entries; it is unlikely that a contemporary site would have escaped mention given the topographical detail included (LAO Spalding Sewers 453/15). The borrow pit brickworks site appears to be delimited by a small enclosure which remained as a field into this century at the southern limit of Fen End Lane (OS 1903). It has been suggested elsewhere in this report that Fen End Lane continued as a medieval route on the alignment of

the palaeochannel (and track cropmark) to the parish boundary and the conjunction with the Barrier Bank. If this were the case, the location of the brickworks site would have become bypassed about 1666.

Conclusion

The desk top assessment recorded the presence of the cropmark site, described above as Enclosures I and II and the Droveway, within the area of the proposed borrow pit and the potential for further possible prehistoric remains. Unfortunately the evaluation was to unable to throw any light on its date or function. However, the discovery of the hitherto unknown brick kiln complex highlights the value and importance of undertaking evaluation work.

The evaluation also established the low archaeological potential for the rest of the proposed borrow pit area and the option of further archaeological excavation was considered unnecessary.

The results of the archaeological evaluation led to a re-definition of the borrow pit area which excluded the western area containing the brick kiln complex and Enclosures I and II.

The desk top assessment also described the important Mesolithic land surface which has been identified from borehole surveys adjacent to and within the study area, lying at a depth of c. -6.6m O.D. The field surface varied from no lower than +1.2m O.D. in Zone 1, to about +2.45m OD close to the pylons beside Enclosure I. The watching brief confirmed that no visible surface archaeological remains were disturbed within the newly defined borrow pit area, and also that the excavations did not penetrate the later marine deposits or disturb the earlier land surface beneath.

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Jane Young and Judy Wilkinson (City of Lincoln Archaeology Unit) examined the medieval and post-medieval pottery from the evaluation and Jane Young

prepared the report on ware types and date ranges. Hilary Healey contributed information on past fieldwalking finds from Cowbit.

Illustrations for this report were prepared by David Taylor (Nottingham University, Department of Archaeology). The report was collated and produced by Jane Frost.

Fred Coupland, Naomi Field and Geoff Tann
Lindsey Archaeological Services
7th December 1994

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LOCATION

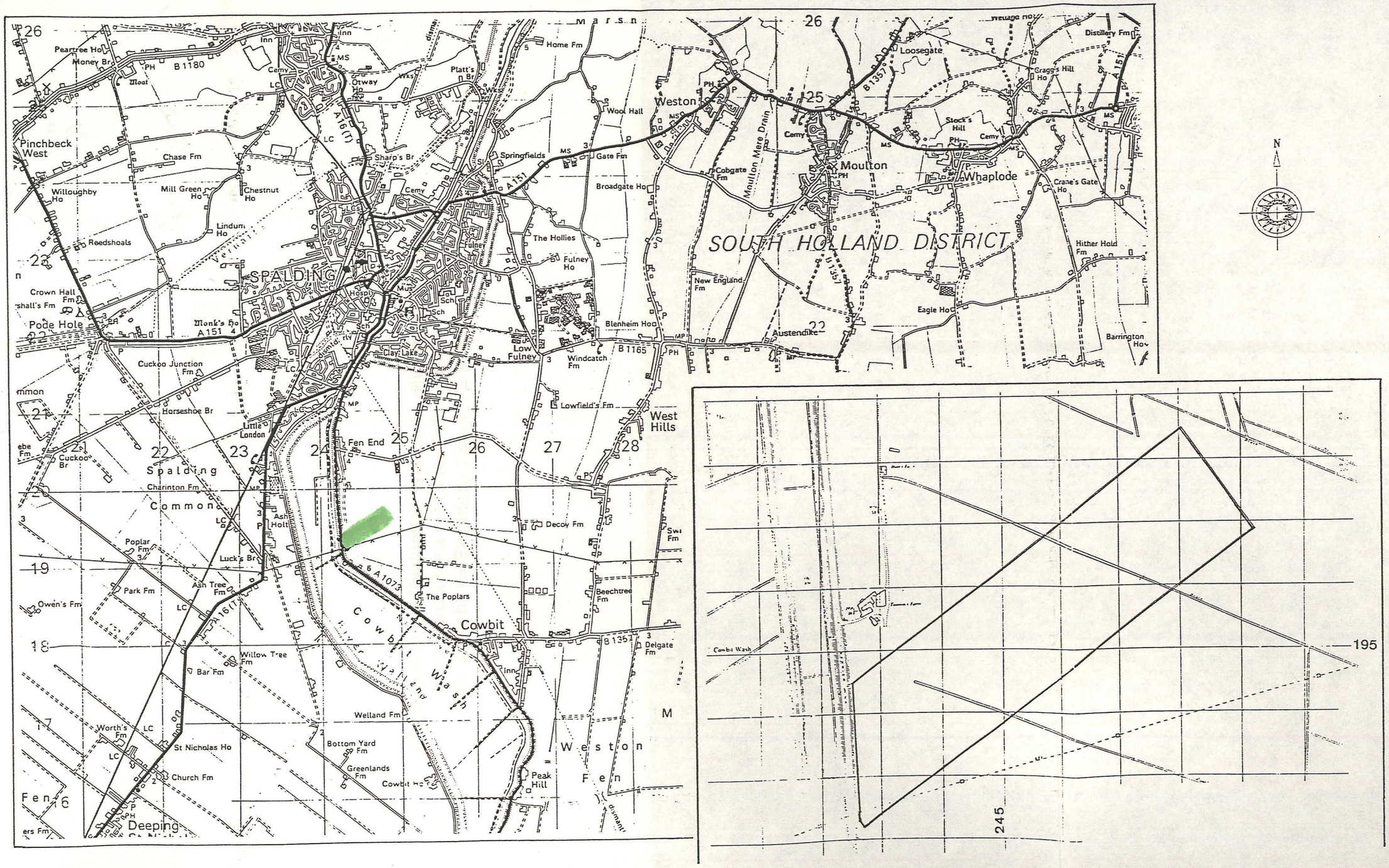


Fig. 1 Location of the Spalding Bypass Borrow Pit. Reproduced from the 1:50000 and 1:2500 OS map with the permission of the Controller of HMSO, Crown copyright, Licence no. AL50424A. (After Johnson 1993)

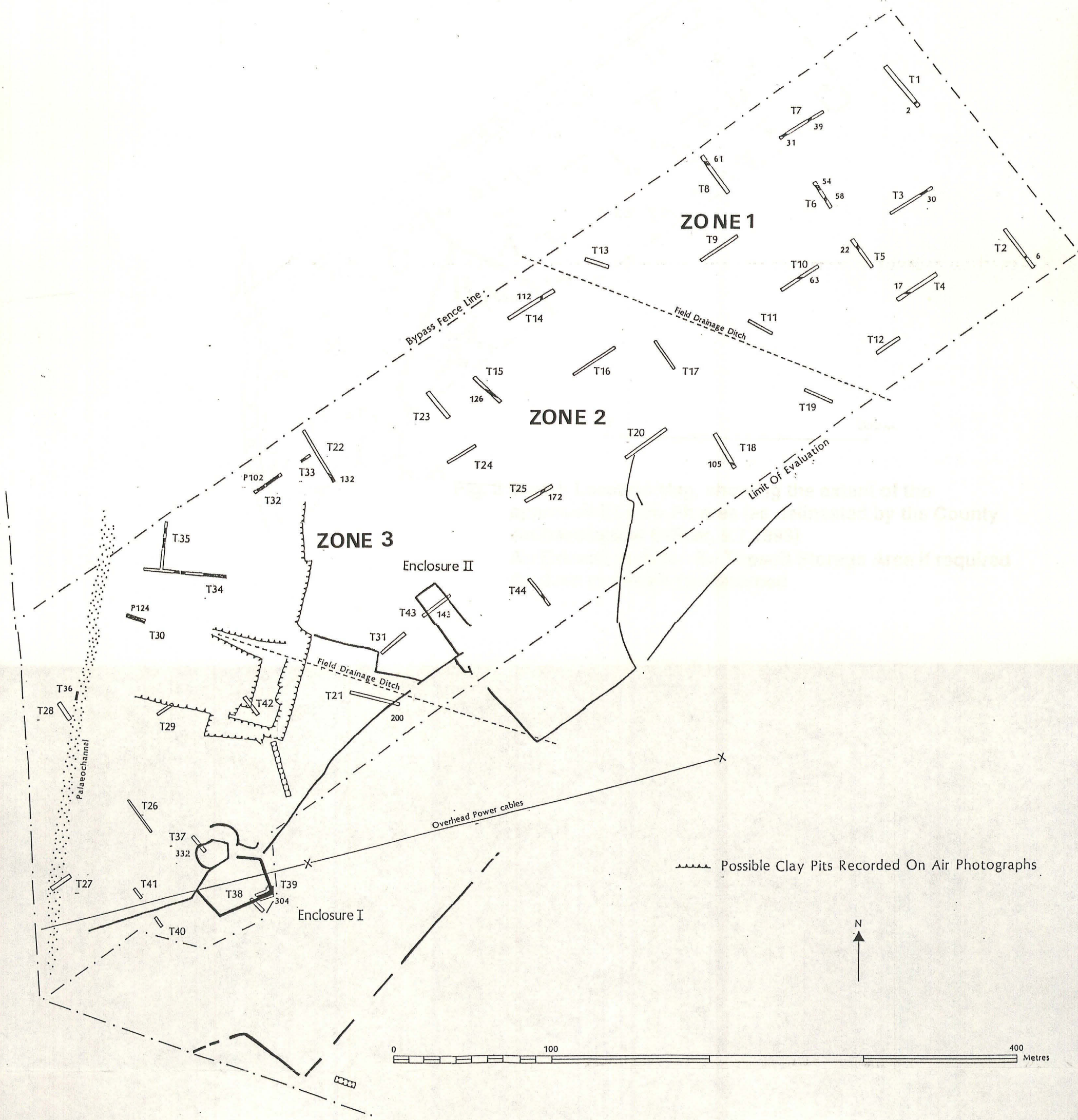


Fig. 2 Plan of the Evaluation Trenches, with superimposed plot of cropmark features (after Palmer 1993)
T= Trench; X= Electricity Pylon; P= Pit

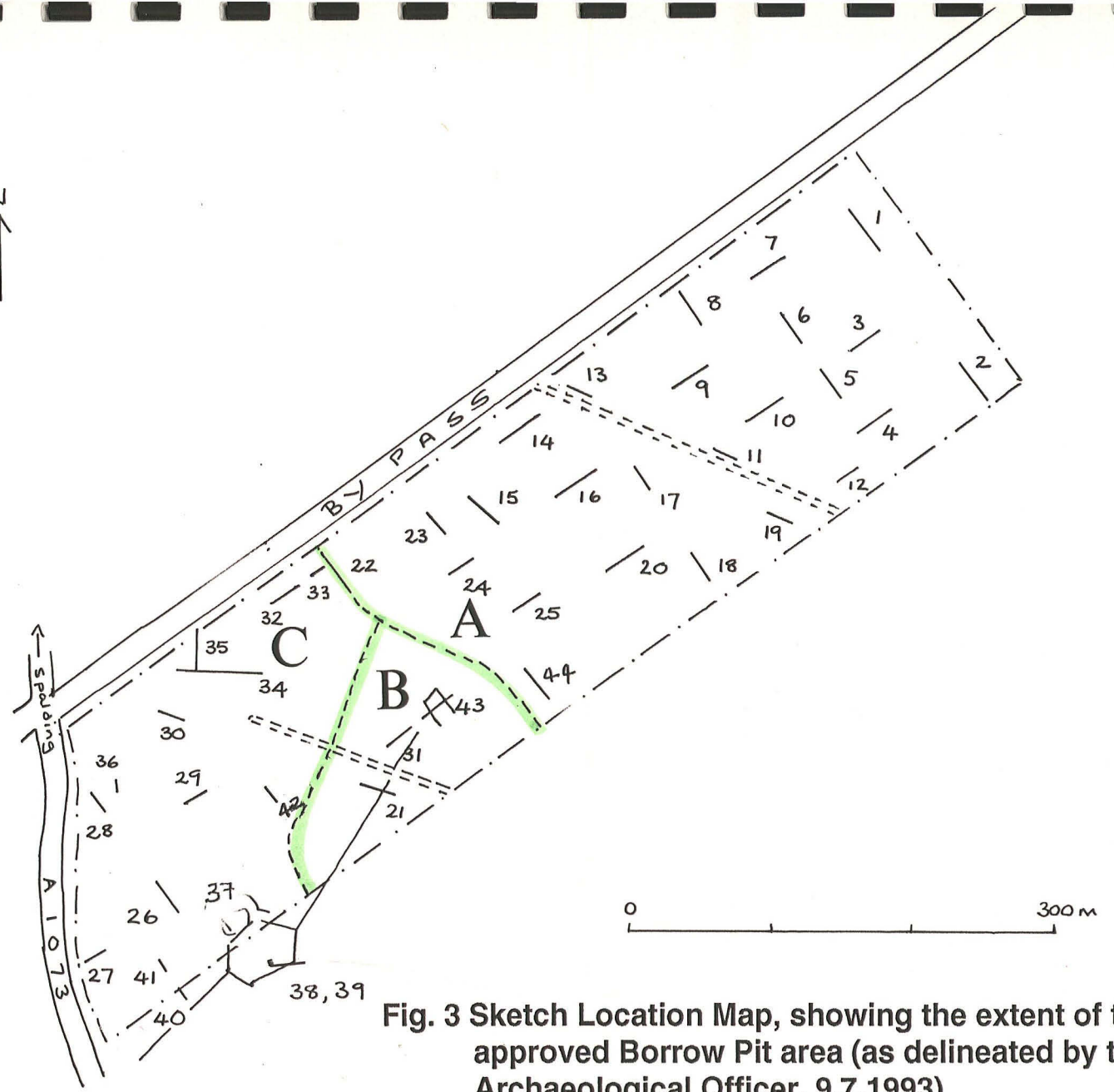
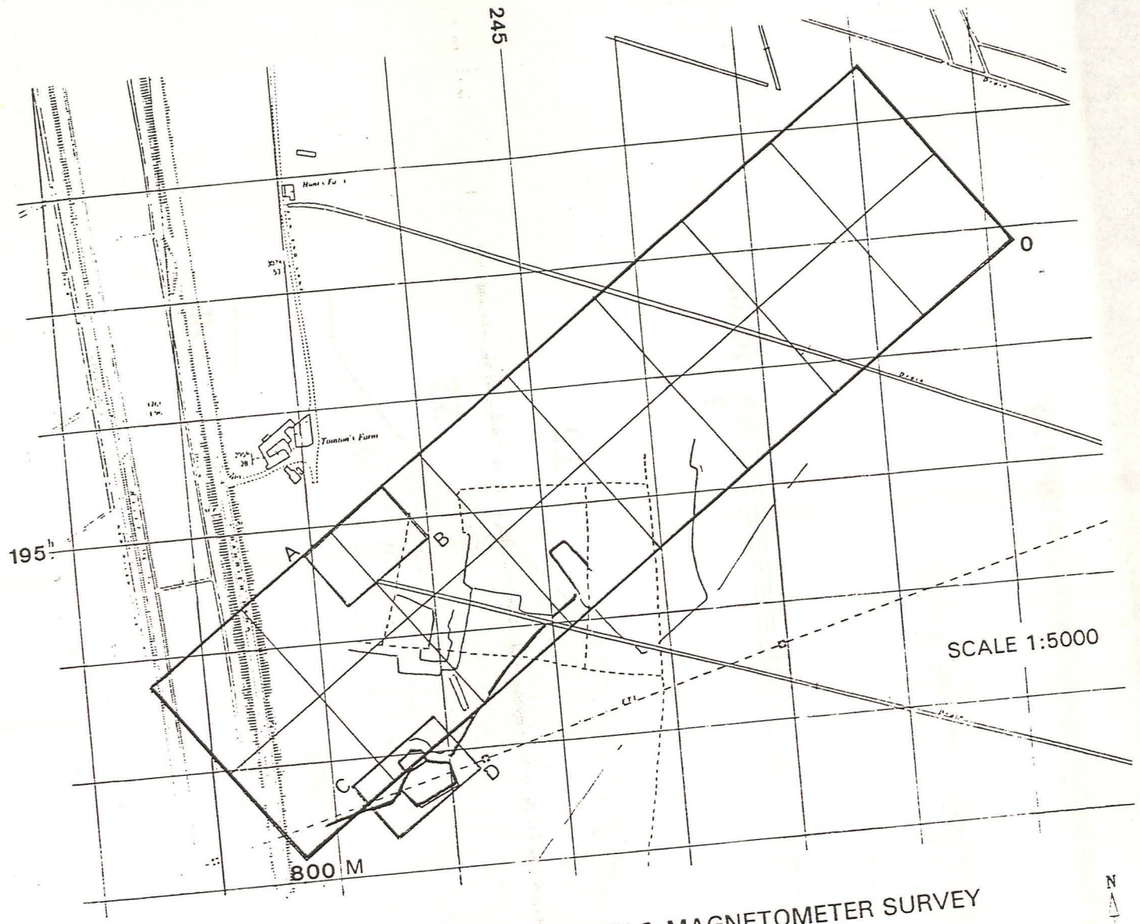


Fig. 3 Sketch Location Map, showing the extent of the approved Borrow Pit area (as delineated by the County Archaeological Officer, 9.7.1993)
A= Extraction Area B= Topsoil Storage Area if required
C= Area to remain Undisturbed

SPALDING, LINCOLNSHIRE



MAGNETIC SUSCEPTIBILITY & MAGNETOMETER SURVEY

KEY
MAGNETIC SUSCEPTIBILITY SURVEY
GRADIOMETER SURVEY
CROPMARKS

Fig. 4 Gradiometer Survey Plot of the Brickworks vicinity (reproduced from Johnson 1993, Figs. 5 and 6)

Site : spalding Mesh : 1-6	Gradiometer Survey		Scale 1:443
Shade Plot (Clip)		Size x 1	Block Off
Minimum -1 Maximum 1 Contrast 1 Units Std.Dev.		Grey Levels 17 Palette Positive	Black Positive White Negative

Oxford Archaeotechnics

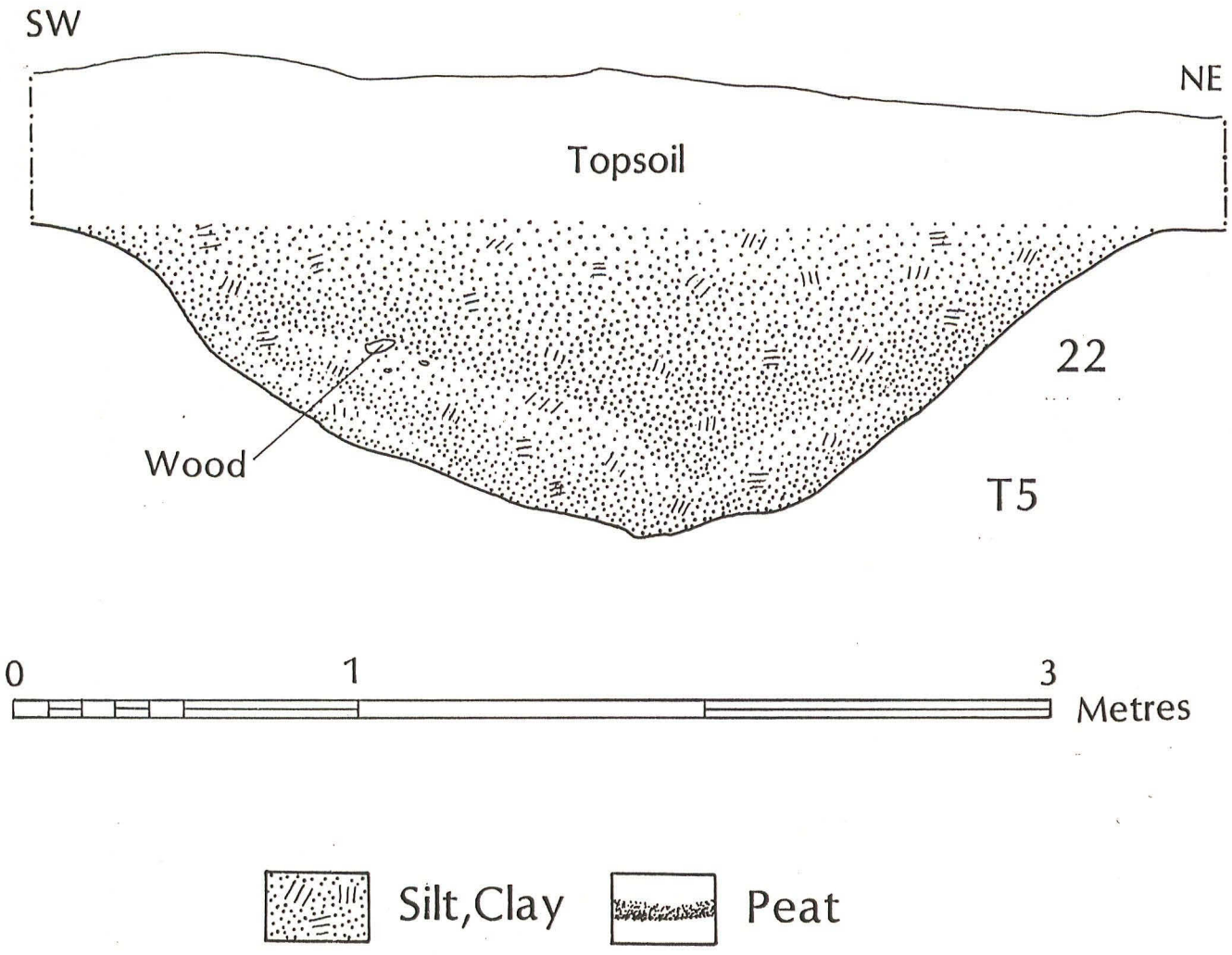


Fig. 5 Section across post-medieval field drainage Ditch 22, Trench 5

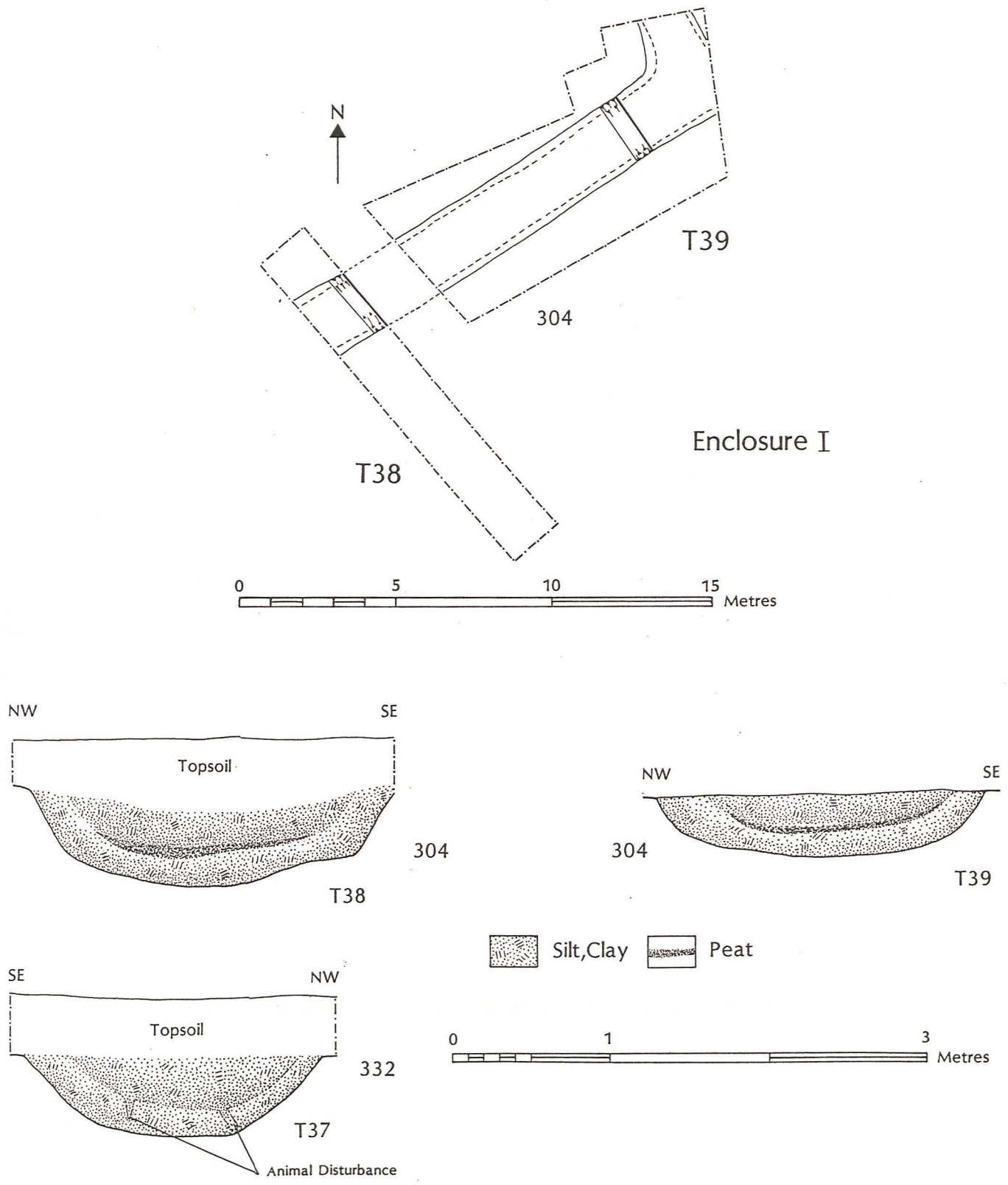


Fig. 6 Enclosure I: Plan and sections of Ditch 304, and section across Ditch 332

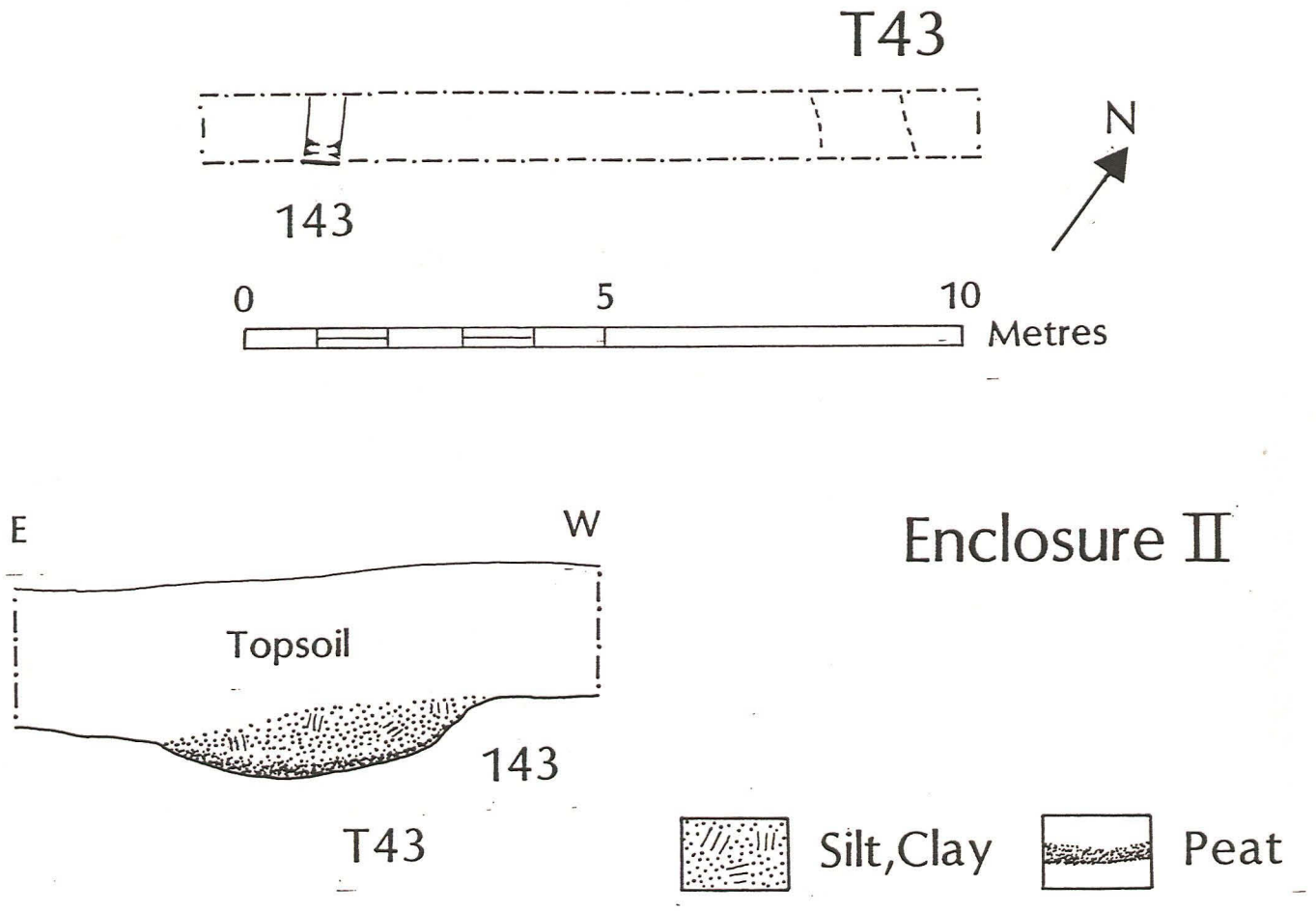


Fig. 7 Enclosure II: Plan and section of Ditch 143

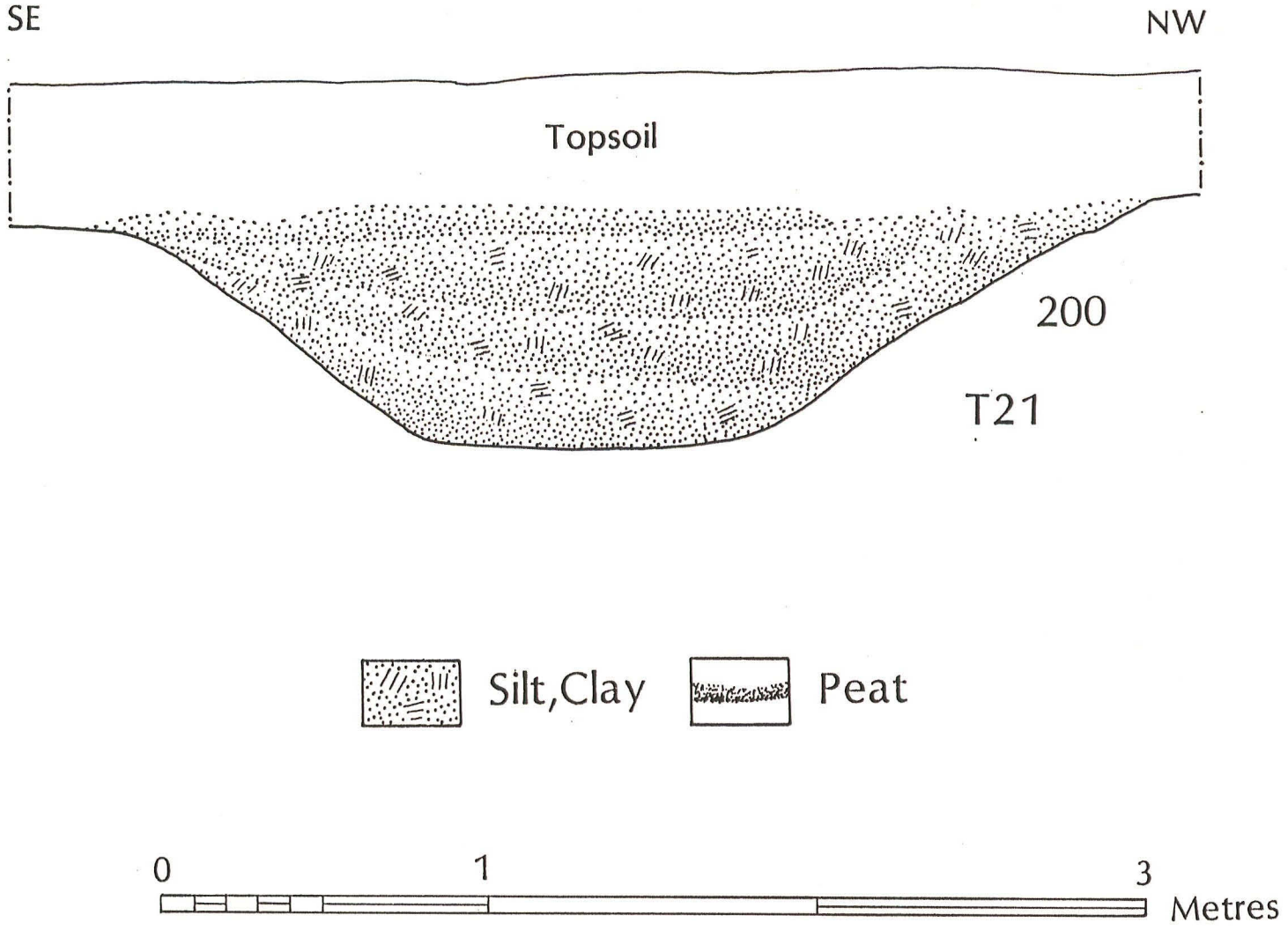


Fig. 8 Section across Droveway Ditch 200

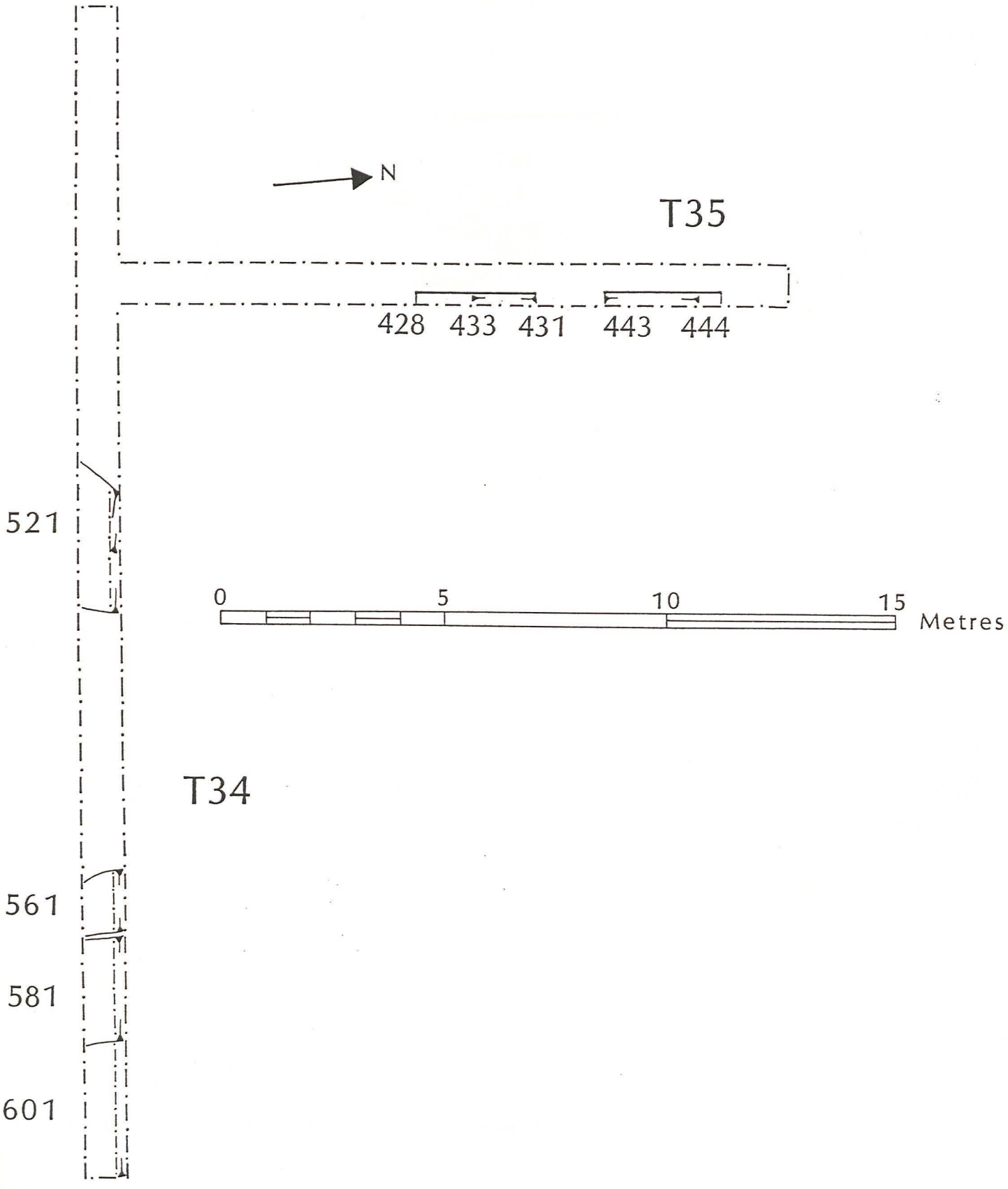


Fig. 9 Plan of Trenches 34 and 35 (Brickworks Features)

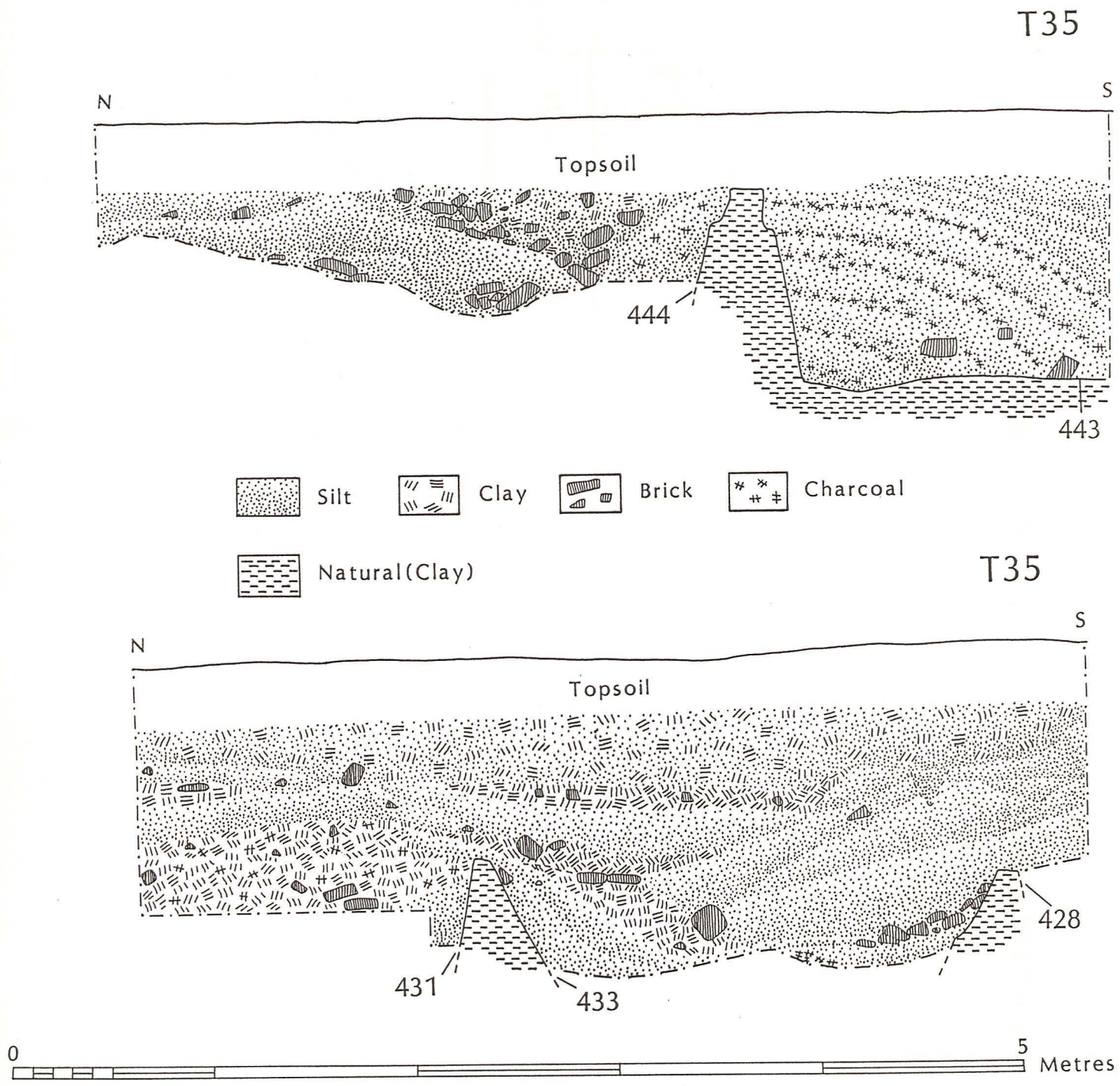


Fig. 10 Sections of part of Pits/Kiln features 428, 431, 433, 443 and 444

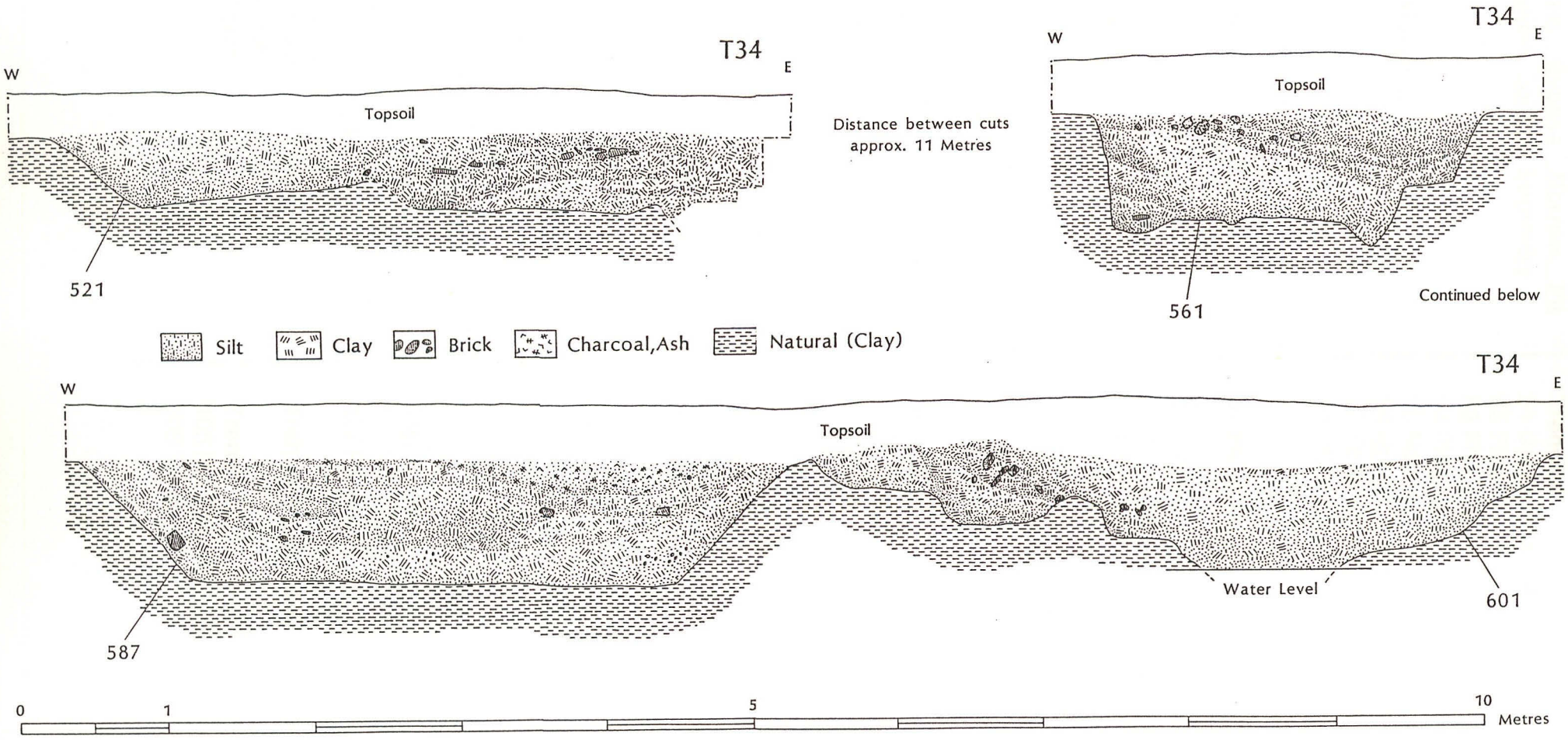


Fig. 11 Sections of Pits/Kiln features 521, 561, 587 and 601

Appendix 1

Spalding Bypass Borrow Pit Evaluation: Context Summary

Context Summary

Trench 1
1 Fill of 2
2 PM Ditch
3 Upper Fill of 2
4 Topsoil
5 Natural

Trench 2
6 PM ditch cut
7 Fill of 6
8 Fill of 6
9 Natural
10 Upper Fill of 6

Trench 3
23 Fill of 30
24 Fill of 30
25 Fill of 30
26 Fill of 30
27 Fill of 30
28 Upper Fill of 30
29 Fill of 30
30 PM Ditch
60 Natural

Trench 4
11 Fill of 12
12 Modern Land Drain
13 Natural
14 Natural
15 Upper Fill of Ditch 17
16 Fill of Ditch 17
17 PM Ditch

Trench 5
18 Upper Fill of 22
19 Fill of 22
20 Fill of 22
21 Natural
22 PM Ditch

Trench 6
51 Upper Fill of 54
52 Fill of 54
53 Fill of 54
54 PM Ditch
55 Natural
56 Upper fill of 58
57 Fill of 58
58 PM Ditch

Trench 7
31 PM Ditch
32 Upper Fill of 31
33 Fill of 31
34 Fill of 31
35 Fill of 31
36 Fill of 31
37 Subsoil
38 Same as 37
39 PM Ditch
40 Natural

Trench 8
61 PM Ditch
62 Natural

Trench 9: no features

Trench 10
63 PM Ditch
64 Natural
65 Fill of 63

Trenches 11-13: no features

Trench 14
111 Fill of 112
112 PM Ditch

Trench 15
126 PM Ditch
127 Fill of 126

Trenches 16 and 17: no features

Trench 18
105 PM Ditch
106 Fill of 105

Trench 19: no features

Trench 20
116 Fill of 117
117 PM Ditch
121 Fill of 122
122 PM Ditch

Trench 21
200 Droveway Ditch
201 Fill of 200
202 Fill of 200
203 Fill of 200
204 Fill of 200
206 Upper Fill of 200
207 Topsoil
208 Subsoil
209 Natural
210 Natural

Trench 22
131 Fill of 132
132 PM Ditch ?Brick kiln boundary

Trenches 23 and 24: No features

Trench 25
171 Fill of 172
172 PM Ditch and Posthole

Trench 26: No features

Trench 27
66 Palaeochannel layer
67 Palaeochannel layer
68 Palaeochannel layer
69 Palaeochannel layer

Trenches 28 and 29: No features

Trench 30
123 Fill of 124
124 Pit for clay extraction

Trench 31: No features

Trench 32
103 Fill of 104
104 Pit for clay extraction
107 Fill of 104
108 Fill of 104

Trench 33
109 Fill of 110
110 Pit for clay extraction or PM Ditch

Trench 34
520 Fill of 521
521 Pit/ Kiln feature
522 Natural
523 Natural
524 Natural
525 Natural
526 Natural
530 Fill of 521
550 Upper fill of 521
560 Fill of 561
561 Fill of 561
562 Topsoil
563 Fill of 561
564 Fill of 561
565 Fill of 561
566 Fill of 561
567 Fill of 561
568 Fill of 561
569 Natural
570 Upper Fill of 561
580 Upper Fill of 581
581 Pit/ Brick kiln feature
582 Fill of 581
583 Fill of 581
584 Fill of 581
585 Fill of 581
586 Fill of 581
587 Fill of 581
588 Natural
589 Fill of 581
590 Layer/?Fill
591 Natural
600 Fill of 605
601 Pit/ Brick kiln feature
602 Upper Fill of 601
603 Fill of 601
604 Fill of 601
605 Pit/ Brick kiln feature
606 Fill of 605

Trench 34...
607 Fill of 605
609 Fill of 605
610 Topsoil
611 Natural
612 Subsoil

Trench 35
400 Upper Fill of 433
401 Natural
402 Fill of 431
403 Fill of 431
404 Fill of 431
405 Fill of 431
406 Fill of 431
407 Fill of 431
408 Fill of 433
409 Fill of 433
410 Fill of 433
411 Fill of 433
412 Fill of 433
413 Fill of 433
414 Fill of 433
415 Fill of 433
416 Fill of 433
417 Animal Disturbance
418 Fill of 433
419 Fill of 433
420 Fill of 433
421 Fill of 433
422 Fill of 433
423 Fill of 433
424 ?Natural
425 ?Natural
426 ?Natural
428 Pit/Brick kiln feature
429 Animal Disturbance
430 Fill of 444
431 Pit/Brick kiln feature
432 Fill of 431
433 Pit/Brick kiln feature
434 Fill of 445
435 Fill of 445
436 Fill of 445
437 Natural
438 Fill of 444
439 Fill of 444
440 Fill of 443
441 Fill of 444
442 Fill of 444
443 Pit/Brick kiln feature
444 Pit/Brick kiln feature
445 Pit/Brick kiln feature
460 Layer/?Fill
500 Layer/?Fill
510 Layer/?Fill
610 Topsoil

Test Pit 36
70 Palaeochannel layer
71 Palaeochannel layer
72 Palaeochannel layer
73 Palaeochannel layer
74 Palaeochannel layer

Trench 37
330 Upper Fill of 332
331 Fill of 332
332 Enclosure Ditch
333 Natural
334 Natural
335 Natural
336 Natural

Trench 38
321 Upper Fill of 324
322 Fill of 324
323 Fill of 324
324 Enclosure Ditch
325 Topsoil
326 Natural

Trench 39
300 Same as 301
301 Upper Fill of 304
302 Fill of 304
303 Fill of 304
304 Enclosure Ditch

Trench 41: no features

Trench 42
181 Fill of 182
182 PM Ditch

Trench 43
141 Upper Fill of 143
142 Fill of 143
143 Enclosure Ditch
144 Natural
145 Topsoil
151 Topsoil

Trench 44
160 PM Ditch
161 Upper Fill of 160
162 Fill of 160
163 Fill of 160
164 Fill of 160
165 Natural

Appendix 2: The Finds

Context **Finds** (frag. = fragment)

Zone 1 (post-medieval or modern features)

4 1 medieval pottery sherd
1 fired clay lump

19 1 concrete lump
4 frags. dark green bottle glass (Newark firm)

39 1 medieval pottery sherd

126 slag (glass and iron)
11 frags. glass
clay pipe stem frag.
19 modern pottery sherds (heated)
brick wasters

171 brick and tile frags.
clinker
iron staple (modern)
3 frags. glass

Enclosure I (Ditch 324)

321 upper ditch fill brick and slag frags.

322 ditch fill brick frag. (v. small)

325 topsoil bone x 3
roof tile frag.; brick and brick waste frags.

Brick kiln features

430 Pit 444 2 sherds Dutch red earthenware, 14th-16th century
1 sherd Chinese export porcelain, mid 17th-20th century

520 Pit 521 brick, glazed, sunken margin
1 sherd 18th-19th century Staffordshire pottery
bone x 1

530 Pit 521 brick, unglazed, ? x 130 x 65mm
iron object

580 Pit 581 brick, large waster slag lump

610 topsoil brick waster, glazed all sides, 175mm x 130mm x 53mm
4 sherds medieval pottery
3 sherds brown earthenware, 16th-18th century
1 sherd glazed red earthenware, late 16th-18th century, Boston kiln 17th century
5 sherds black-glazed ware, 17th-20th century
1 sherd tin-glazed earthenware, 17th-19th century
1 sherd white salt-glazed pottery, 1720-1780
2 sherds modern pottery
clay pipe stem x 4
animal tooth ?sheep
glass x 4
slate fragment

Brick kiln features, typical dimensions of bricks:

250mm+ x 115mm x 70mm
255mm+ x 115mm x 65mm
265mm x 125mm x 75mm (with sunken margin)
260mm x 125mm x 60mm (with sunken margin)

Appendix 3

Spalding Bypass Borrow Pit 1993
Assessment Report on the Post-Roman Pottery

By
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28th November 1994

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SB93: Assessment Report on the Post-Roman Pottery

Judy Wilkinson and Jane Young

CLAU 28.11.94

1. Introduction

A small group of 46 sherds was submitted for assessment. The pottery was examined where necessary under a x20 binocular microscope and was recorded at basic CLAU archive level (ware type by sherd count with note of diagnostic vessel form) using CLAU classification (see Appendix 1). The basic archive is described in Appendix 2.

2. Condition

All of the Medieval material was well abraded as a result of ploughsoil damage. Few of these sherds had diagnostic features and little glaze survived. It was difficult to assess whether they were originally glazed or not. These sherds have been archived as having no glaze as opposed to being unglazed. The remaining Post-medieval and early modern material was less abraded. The early modern (LPM) pottery from context 126 was heavily burnt and may have originated from an ash pit.

3. Overall Chronology and Source

SM93 produced a small assemblage of pottery ranging in date from the medieval to the early modern period. There is little medieval material present and due to it s worn state none of it can be attributed to an exact date or source. Post-medieval and early modern material was recovered from contexts 126, 430, 520, 562 and 610. Non of the groups are large and varied enough to give precise dating. The only vessel of note is a red earthenware skillet (DUTR) found in context 430. Similar vessels were made in the Low countries from the 14th to the 16th centuries.

Table 1. SB93 POTTERY: Number of sherds of each fabric type presented by feature

	39	4	520	430	610	562	126	Total
MEDLOC	1	1			2	1		5
MEDX					1			1
DUTR				2				2
BERTH					3	1		4
GRE					1			1
BL					5	1		6
TGE					1			1
STMO			1					1
CEP				1				1
WS					1			1
LPM					2	1	19	22
MISC		1						1
Total	1	2	1	3	16	4	19	46

APPENDIX 1: CLAU LIST OF WARE TYPE NAMES

Ware code	Description
BERTH	*BROWN EARTHENWARE 16th to 18th*
BL	*BLACK-GLAZED WARE 1600-1900*
CEP	*CHINESE EXPORT PORCELAIN 1650-1900*
DUTR	*DUTCH RED EARTHENWARE 1350-1550*
GRE	*GLAZED RED EARTHENWARE L16-18th; Boston kiln-17thC*
LPM	*MODERN*
MEDLOC	*MEDIEVAL LOCAL*
MEDX	*MEDIEVAL NON-LOCAL*
MISC	*MISC*
STMO	*STAFFS MOTTLED 1700-1800*
TGE	*TIN-GLAZED EARTHENWARE 1600-1800*
WS	*WHITE SALT-GLAZED 1720-1780*

APPENDIX 2: SB93 WARE TYPES BY CONTEXT

Context	Ware	Sherds	Form	Comments	Date of layer
4					11th to 15th centuries
	MEDLOC	1	-	QUARTZ FE MICA;NO GLZE;	
	MISC	1	-	TINY FRAG;R OR MED;	
39					11th to 15th centuries
	MEDLOC	1	-	BASE;SOOT;NO GLAZE;PALE FABRIC;	
126					early modern
	LPM	19	-	HEAVILY BURNT	
430					17th to 18th centuries
	CEP	1	BOWL	-	
	DUTR	2	SKILLET	SV;? ID	
520					late 17th to 18th centuries
	STMO	1	MUG	-	
562					early modern
	BERTH	1	-	L17TH/18TH;	
	BL	1	-	L17TH/18TH;	
	LPM	1	-	-	
	MEDLOC	1	-	GLZE	
610					early modern
	BERTH	3	-	SV;STAFFS;L17TH/18TH;	
	BL	5	-	L17TH/18TH	
	GRE	1	-	-	
	LPM	2	-	-	
	MEDLOC	2	-	SV;NO GLZE;	
	MEDX	1	-	CU GLZE;	
	TGE	1	-	BURNT	
	WS	1	CUP	-	

Appendix 4

PALYNOLOGICAL ANALYSIS OF SEDIMENT SAMPLES FROM SPALDING BYPASS BORROW PIT

ARCUS NO. 155
AUGUST 1993

REPORT BY:
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ARCUS

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PALYNOLOGICAL ANALYSIS OF SEDIMENT SAMPLES FROM SPALDING BYPASS BORROW-PIT.

1. Summary.

Sediment samples from Spalding Bypass Borrow-pit were provided by Lindsey Archaeological Trust for pollen analysis. The samples which consisted of 28 spot samples from trench profiles at the site were assessed for presence/absence of pollen and quality of pollen preservation. Examination of the processed samples from the site showed generally good pollen preservation and high pollen concentration values in the majority of the samples, which were then analysed.

2. Introduction.

Pollen analysis was carried out on profiles from 7 trench profiles from the Spalding Bypass Borrow Pit. The sediment samples consisted of sequences of marine clays, fen peats, silts and sands. The individual sediment profiles are described in the results section of this report. The aims of the analysis were to examine samples from 'natural sequences' which it was hoped would provide an undisturbed record of local vegetation which would correlate with samples from enclosure ditch and hexagonal enclosure deposits. The samples from the enclosure ditches also had the potential to examine land use history in an adjacent area of field systems which had been identified from aerial photographs.

3. Method.

The samples were prepared for pollen analysis using standard KOH digestion and acetolysis procedures (Faegri & Iversen 1975) with additional treatments with Lipsol to deflocculate clays and micro sieving to remove fine and coarse residues. *Lycopopodium clavatum* spores were added in known quantity to the pollen preparation in order to facilitate the calculation of pollen concentration values (Benninghof 1962). Pollen was counted using an Olympus BH microscope operating at x400 and x600 magnification. Identifications were made with reference to Moore *et. al* (1991) and the University of Sheffield reference collection..

The results of the pollen analysis were computerised using TILIA 1.10 and TILIA*GRAPH 1.17 (Grimm 1991) which was used to plot the pollen percentage diagrams from each trench. Three pollen sums were used calculate pollen percentage values

1. A principle total land pollen sum (tlp), comprising all taxa which were taken to be members of the atmospheric pollen rain falling in the catchment area, all arboreal and herbaceous types are expressed as a percentage value of this sum.

2. Total land pollen + Aquatic taxa (tlp + Aq.), used to calculate the percentage value of all obligate aquatic plants.

3. Total land pollen + Pteridophytes (tlp + Pt) used to calculate the percentage value of fern spores.

This procedure aims to reduce any 'swamping' effect caused by an abundance of locally derived aquatics or Pteridophyte spores on the percentage calculations which might obscure significant fluctuations in the pollen representation of the land pollen taxa.

4. Results.

4.1 Natural sequence profiles.

Trench 27.

6 pollen samples were analysed from contexts 66, 67, 68 and 69.

The sediment sequence recorded at Trench 27 was as follows:

Depth	C/No.	Description.
0 - 30 cm		Brown clay loam (top soil)
30 - 56 cm		Brown silt.
56 - 90 cm	66	Light brown silt.
90 - 104 cm	67	Grey clays/silts.
104 - 115cm	68	Peat.
115 - 140 cm	69	Grey clays/silts.

Description.

Two distinctive pollen assemblages were recorded in the analysis.

1. Pollen sample 11 (Context 69, 120 cm)

Characterised by low arboreal pollen frequencies (< 8% tlp) with *Betula, Almus, Pinus, Quercus* and *Corylus* present with pollen percentage frequencies of <2% tlp respectively and a high proportion of grass, sedge, and herb pollen. Gramineae (44% tlp) , Chenopodiaceae (38% tlp), *Plantago maritima* (4% tlp) are particularly well represented as is *Typha angustifolia* (10% tlp + Aq.). Other herbaceous taxa present in low but significant frequencies included species of Compositae Liguliflorae, Compositae Tubuliflorae (e.g. *Cirsium*), and *Armeria maritima.* Pteridophyte spores present included Filicales (7% tlp + Pt.) and *Pteridium* (3% tlp + Pt.)

2. Pollen samples 9 & 10 (Context 68, 114 - 105 cms.

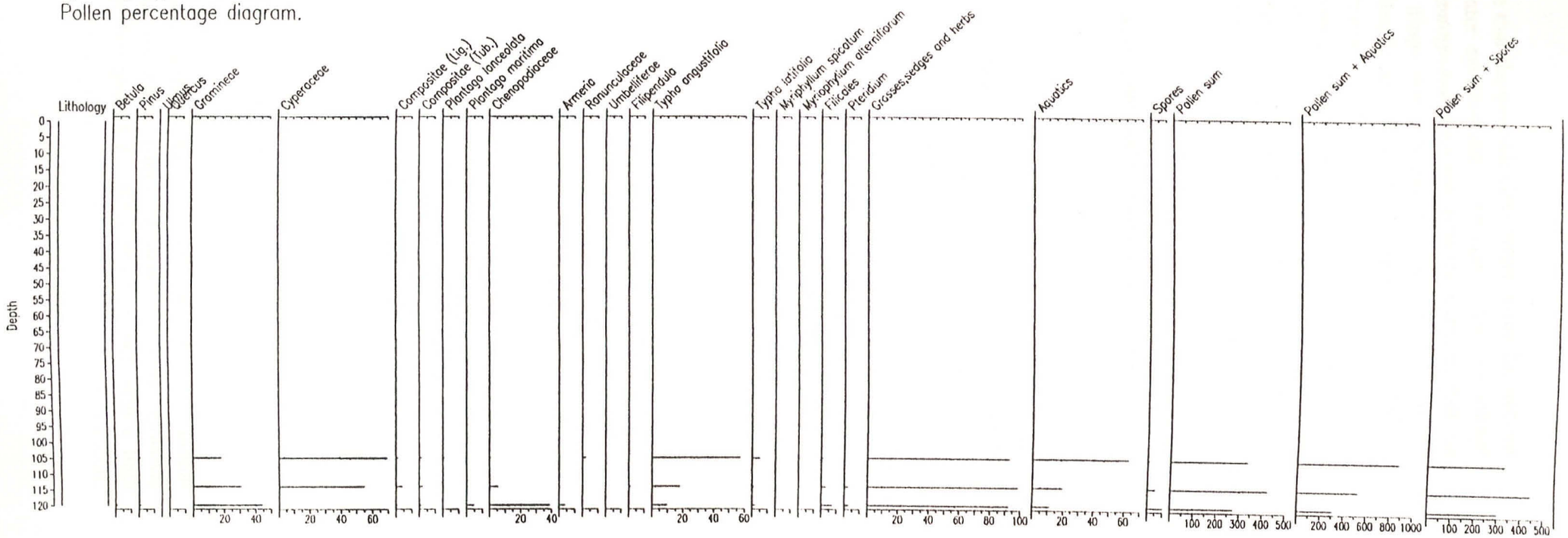
Characterised by low arboreal pollen representation (2 - 7% tlp), high percentage frequencies for grass, sedge, and herbaceous pollen taxa (c.92 - 98% tlp), and increasing *Typha angustifolia* (18 - 56% tlp). *Cyperaceae* pollen is particularly well represented (c. 50 - 70% tlp). In contrast Chenopodiaceae frequencies declined from the relatively high levels record at 120 cm to c.5% tlp. Other herbaceous taxa recorded in low but significant frequencies included species of Compositae Liguliflorae, Compositae Tubuliflorae, Ranunculaceae, Umbelliferae, *Plantago lanceolata* and *Filipendula.*

Aquatic species present included *Typha latifolia, Myriophyllum spicatum* and *Myriophyllum alterniflorum.*

Pteridophyte spores included Filicales and scarce grains of *Pteridium.*

3. Pollen samples 7,6,5, were found to be non-polleniferous.

Spalding Bypass Trench 27
Pollen percentage diagram.



Discussion.

The basal pollen spectra from Trench 27 indicate that the grey/silt clays which form this deposit probably accumulated in a marine / brackish water environment. The high pollen percentage frequencies of Chenopodiaceae together with *Plantago maritima* and *Armeria maritima* indicate the local presence of salt marsh and/or coastal fringe plant communities. Although it was not possible to differentiate the Chenopodiaceae pollen to species level it is suggested that such an abundance of Chenopodiaceae pollen could represent a coastal marsh community in which species such as *Salicornia* or *Atriplex* may have been present. Similar modern communities are described by Adam (1981) typically found on firm clay substrates in the coastal zone. Freshwater reed swamp communities are also well represented evidenced by abundant Cyperacaea, *Typha angustifolia* and *Typha latifolia* pollen.

This phase was followed by a distinct change in environmental conditions and vegetation at the site which are evidenced by the sedimentary change from marine clays to humic peaty clays. Cyperaceae pollen frequencies dominate the pollen spectra, *Typha angustifolia* is present, and there is corresponding decline in salt marsh - coastal fringe vegetation indicators (Chenopodiaceae and *Plantago maritima).* A large proportion of the Gramineae pollen was found to be typical of *Phragmites* pollen as described by Faegri and Iversen (1975), and although Hall (1992) cautions against the positive identification of fossil *Phragmites* it seems reasonable to suggest that the ecological conditions at the time would favour the colonisation of the marsh by a reed swamp in which *Phragmites* an important element.

Trench 36.

Pollen samples 12-18 were analysed.

The sediment sequence recorded at Trench 36 was as follows:

Depth	C/No	Description
0 - 20cm	70	Brown clay loam (top soil)
20 - 22cm	70	Lensed pale yellow sand.
72 - 84cm.	71	Grey silt.
84 - 98cm	72	Peat
98 - 104cm.	72	Grey silts
104 - 192cm.	73	Yellow mottled sand.
192 - 210cm	74	Grey/brown sand.

Description.

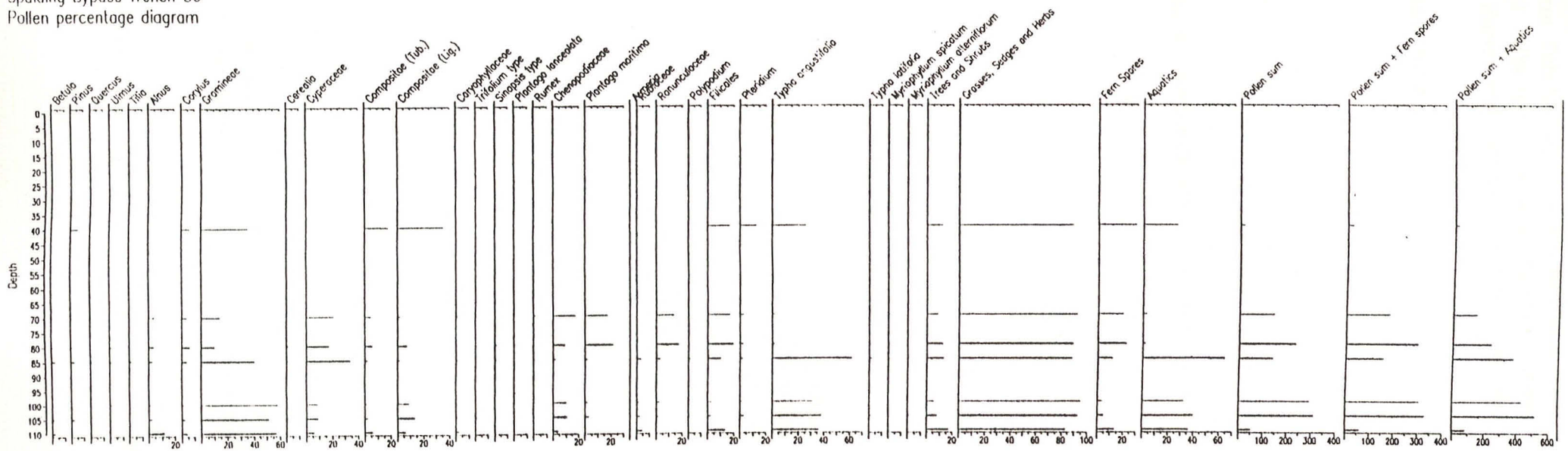
Pollen samples were analysed from between 40 - 110 cms.

Three distinctive pollen assemblages were recorded in the analysis.

1. Basal samples 80 - 110 cm.

Characterised by low arboreal pollen frequencies which included consistent, but low pollen percentage frequencies of *Betula, Pinus, Quercus, Almus, Ulmus, Tilia* and *Corylus*. Grasses, sedges and herbaceous taxa dominate the pollen spectra (*c.* 80% tlp) together with a high proportion of aquatic species notably *Typha angustifolia* (30 - 40% tlp + Aq.). Herbaceous

Spalding Bypass Trench 36
Pollen percentage diagram



pollen types with good pollen representation included Chenopodiaceae (2 - 10% tlp), Compositae Liguliflorae (2 - 12% tlp), Compositae Tubuliflorae (1 - 5% tlp), Rubiaceae (*Galium* type - 2 - 4% tlp), and Ranunculaceae (1 - 3% tlp). Scarce grains of Cruciferae (*Sinapsis* type), *Trifolium*, *Plantago lanceolata*, *Rumex* and *Armeria maritima* were also recorded.

Pteridophyte spores included Polypodium, Filicales and *Pteridium*.

2. Samples 13, 14 (70 - 80cm)

Characterised by low arboreal pollen, high Cyperaceae and herbaceous pollen representation and a decline in *Typha angustifolia* and Gramineae pollen percentage frequencies. Gramineae declines to (*c.*10 - 14% tlp) and to *Typha* (*c.* 2% tlp). There was a corresponding increase in herbaceous taxa such as Chenopodiaceae (8 - 17% tlp), Ranunculaceae (14 - 17% tlp) and *Plantago maritima* (17 - 21% tlp). Scarce grains of Caryophyllaceae, Cruciferae (*Sinapsis* type), *Rumex* and *Plantago lanceolata* were also recorded.

Pteridophyte spores included Filicales (*c.*20% tlp + Pt.) and *Pteridium* (<2% tlp + Pt.)

3. Sample 12 (40cm)

Characterised by High pollen percentage frequencies for Gramineae (35% tlp), Compositae Liguliflorae (35% tlp), *Typha angustifolia* (26% tlp) and Compositae Tubuliflorae (17% tlp). *Pteridium* (26% tlp + Pt.) and Filicales (12% tlp) are also well represented.

Discussion.

The pollen spectra in the four basal samples suggest that environmental and vegetation conditions were similar to those described from samples 9 & 10 (Trench 27). The pollen representation of plant species associated with reed swamp and tall herb fen had increased up the profile probably in response to increasingly freshwater rather than marine influence on the vegetation.

However sedimentary and vegetation changes occurred between 70 - 80cm which suggest a change in environmental conditions at the site. There is a reduction in the pollen representation of reed swamp and tall herb fen species and a corresponding increase in salt marsh taxa (Chenopodiaceae and *Plantago maritima*) suggesting a period during which a landward shift in the zoneation patterns of the coastal plant communities (transgressive sea level) occurred.

The upper pollen spectra (40cms) indicate the return of reed swamp vegetation together with grassland / pasture? (see discussion below) to the area.

Summary of pollen data from 'natural sequences'

The sedimentary and pollen analytical data from trenches 27 and 36 suggest a sequence of environmental and vegetation changes in the area which appear to be influenced by fluctuations in relative sea level. Tentative biostratigraphic correlation between the two columns suggests that at the start of the sequence coastal salt marsh communities were an important element of the local vegetation. This phase is represented by only one sample (the basal sample from Trench 27).

The second phase in the sequence appears to involve a transition to freshwater reed swamp and tall herb fen communities. Modern vegetation and pollen taphonomic studies which describe the

distribution and habitat requirements of reed swamp communities provide an analogue for palaeoenvironmental conditions in the area at this time. The pollen spectra in both trenches 27 & 36 are similar to those recorded from modern reed swamp communities (Brayshay 1992 ; Kent *et.al* in press) which correspond to NVCcategory S4 (*Phragmites australis* reed swamp and reedbeds). *Phragmites australis - Typha* spp. reed swamp communities occur in modern coastal vegetation in the 'upper marsh' (*sensu* Adam 1981) and provide an indication that sea-level has fallen slightly resulting in a decline in the local vegetation of coastal salt marsh communities.
This phase appears to have been followed by a return to slightly higher sea level (as evidenced by the increase in coastal salt marsh pollen taxa in the upper levels in trench 36 and the non-polleniferous deposit (contexts 66 & 67) in trench 27).

A final phase in which reed swamp communities were present again together with some grassland / pasture is indicated at 40cm, Trench 36.

4.2 Enclosure Ditch profiles.

Trench 21.

4 samples were analysed (Pollen samples 1 - 4, 30-60 cm.)

The sediments recorded in trench 21 was as follows.

Depth.	C/No.	Description.
0 - 8cm.	206	Top soil
8 - 32cm.	203	Humic clay
32 - 54cm	202	Brown/grey clay.
54 - 74cm	201	Brown/grey clay + orange mottles.

Description of pollen data from Trench 21.

Characterised by low arboreal pollen representation and high pollen percentage frequencies for Gramineae (30 - 70% tlp), Cyperaceae (9 - 25% tlp) and *Typha angustifolia* (15 - 21% tlp + Aq.). Chenopodiaceae percentages decline from 25% tlp to 4% tlp. Other herbaceous taxa present in low but consist amounts included Compositae Liguliflorae, Compositae Tubuliflorae (*Cirsium* spp., *Centaurea* type), Leguminosae and *Plantago lanceolata.*

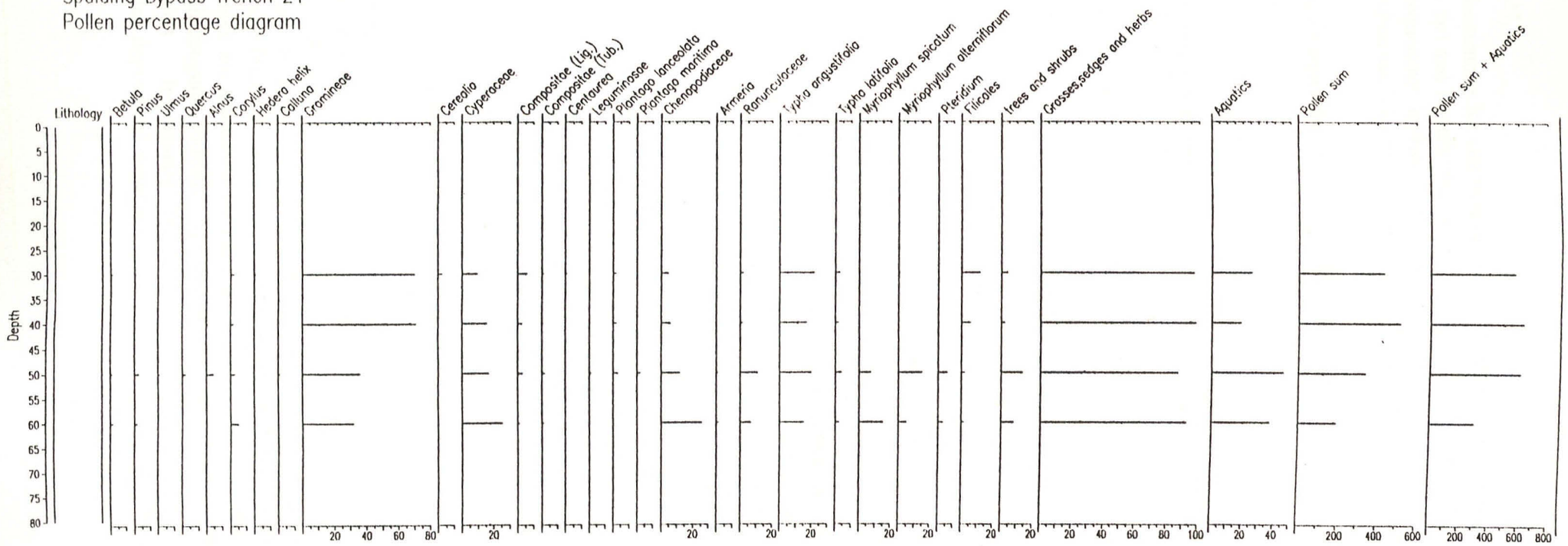
Trench 37

4 samples were analysed (Pollen samples 19 - 22: 30 - 60cm)

The sediments recorded from trench 37 were as follows:

Depth	C/No.	Description
0 - 30cm	325	
30 - 70cm.	330	Peaty humic clay
70 - 88cm	331	Grey/brown clay
88 -	334	Grey/orange sandy silt.

Spalding Bypass Trench 21
Pollen percentage diagram



Description of pollen data from Trench 37.

Characterised by high pollen percentage frequencies for Gramineae (32 - 71% tlp), Cyperacaea (7 - 20% tlp), *Typha angustifolia* (*c.*34% tlp) and Ranunculaceae *c.*5% tlp. Other herbaceous taxa recorded in low but significant frequencies included *Plantago maritima*, species of Caryophyllaceae, Cerealia, *Spergularia*, Rubiaceae (*Galium* type), *Filipendula, Caltha, Mentha aquatica* and *Valeriana.*

Pteridophyte spores included low percentage frequencies of Filicales and *Pteridium.*

Discussion

The enclosure ditch deposits associated as they are at this site with evidence of a field system provide an opportunity to discover information about potential agricultural / cultivation activity at the site. Pollen recruitment in such situations is dominated by locally derived pollen (i.e. pollen originating from the surrounding vegetation and from the plant communities colonising the ditch itself.

The pollen spectra from the two ditch profiles indicated that during the period of sediment accumulation the dominant local vegetation consisted of freshwater reed swamp and tall herb fen communities with abundant Cyperaceae, Gramineae (possibly *Phragmites*) and *Typha* spp.

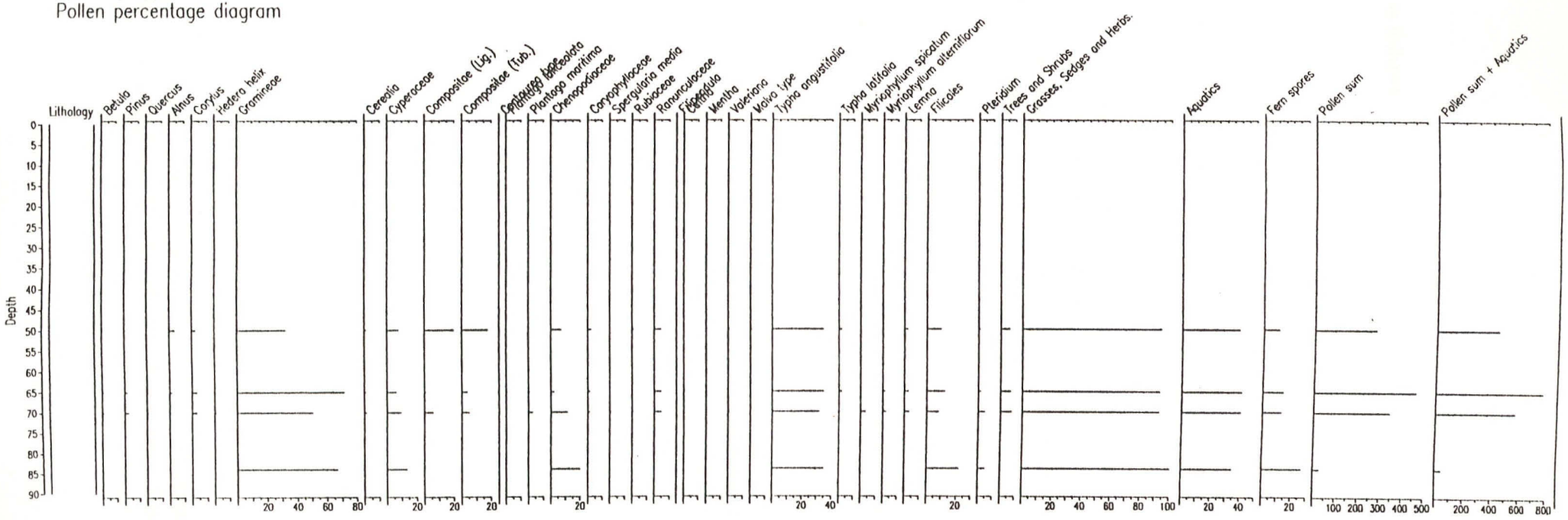
There is good biostratigraphic correlation between these pollen spectra and those of the 'natural sequences' - (Trenches 27 & 36) which suggests that the ditches were infilling at a time when local vegetation was of a similar nature.

However in all the profiles the presence of some pollen taxa which may be indicative of disturbed ground and / or cultivation and grassland are recorded. Turner (1964) and Behre (1981) suggest that the presence of Chenopodiaceae, Compositae species (such as *Taraxacum, Artemisia, Centauria* and *Cirsium)*, Rumex spp., *Plantago lanceolata, Pteridium* and *Sinapsis* in the pollen spectra are evidence of anthropogenic activity. Particular indicator types (e.g. *Plantago lanceolata, Centauria, Cirsium* type) together with Chenopodiaceae and *Pteridium* are all present in the pollen spectra from the ditch and natural sequence profiles.

The presence of Chenopodiaceae alone cannot, in this situation, be taken to indicate disturbance or cultivation as it is also present in the 'natural' profiles where it is interpreted as deriving from salt marsh vegetation. As Chenopodiaceae is a large genus with many species it is possible that the Chenopodiaceae pollen in this situation may be derived from salt marsh species (e.g. *Salicornia* spp., *Atriplex hastata, Suada maritima, Halimione portulacoides*) as well as those favouring disturbed ground (e.g. *Chenopodium album*).

However the presence of a wide variety of other pollen taxa associated with disturbance combined with scarce grains of Cerealia pollen suggest that some arable agriculture may have been occurring in the vicinity of the site. As with the Chenopodiaceae pollen the identification of the Cerealia pollen beyond genus level causes interpretative problems. The grains examined in this analysis were identified as *Arvena / Triticum* type (Andersen 1979) which includes some wild grasses (*Glyceria* for example) which are associated with fen and reed swamp vegetation. The pollen representation of other anthropogenic 'indicator' species suggests that pasture was more common than arable cultivation. Importantly there is no significant increased representation of these taxa in the ditch deposits to suggest that arable cultivation was taking place.

Spalding Bypass Trench 37.
Pollen percentage diagram



4.3 Hexagonal enclosures.

Trench 38.

Pollen samples 23 - 26

The sediments recorded at Trench 38 were as follows:

Depth	C/No.	Description
0 - 44cm	325	Top soil
44 - 66cm	321	Humic clay
66 - 74cm	322	Humic clay.
74 - 90cm.	323	Peaty humic clay.

Description of Trench 38 pollen data.

Characterised by typically low arboreal pollen percentages and high Gramineae, herbaceous and Aquatic pollen percentage frequencies. The basal spectra (84cm) differs slightly from the upper samples in this profile. It is differentiated on the grounds of the higher percentage frequencies of Cyperaceae (30% tlp), Chenopodiaceae (13% tlp) and *Plantago maritima* (4% tlp).

The two samples 76 & 70 cm show an increase in Gramineae pollen (73 - 76 tlp) and a corresponding decline in Cyperaceae (7 - 8% tlp). *Typha* pollen is also well represented (30 - 40% tlp). Scarce grains of Caryophylleceae, Compositae Tubuliflorae (*Cirsium, Centaurea, Artemisia)*, Ranunculaceae, Compositae Liguliflorae, *Sinapsis* type, *Plantago lanceolata* were recorded
Aquatic pollen taxa included species of *Myriophyllum* and *Caltha.*
Pteridophyte spores included Filicales and *Pteridium.*

The upper most sample (60cm) showed a similar pollen spectra to the rest of the profile but is differentiated by increased pollen percentage frequencies for Compositae Liguliflorae (26 % tlp), Compositae Tubuliflorae (*Cirsium* type), Filicales (6 -5% tlp + Pt) and *Pteridium* (3 - 5% tlp + Pt).

Trench 39

Pollen samples 27 & 28 ; 14 & 30cm.

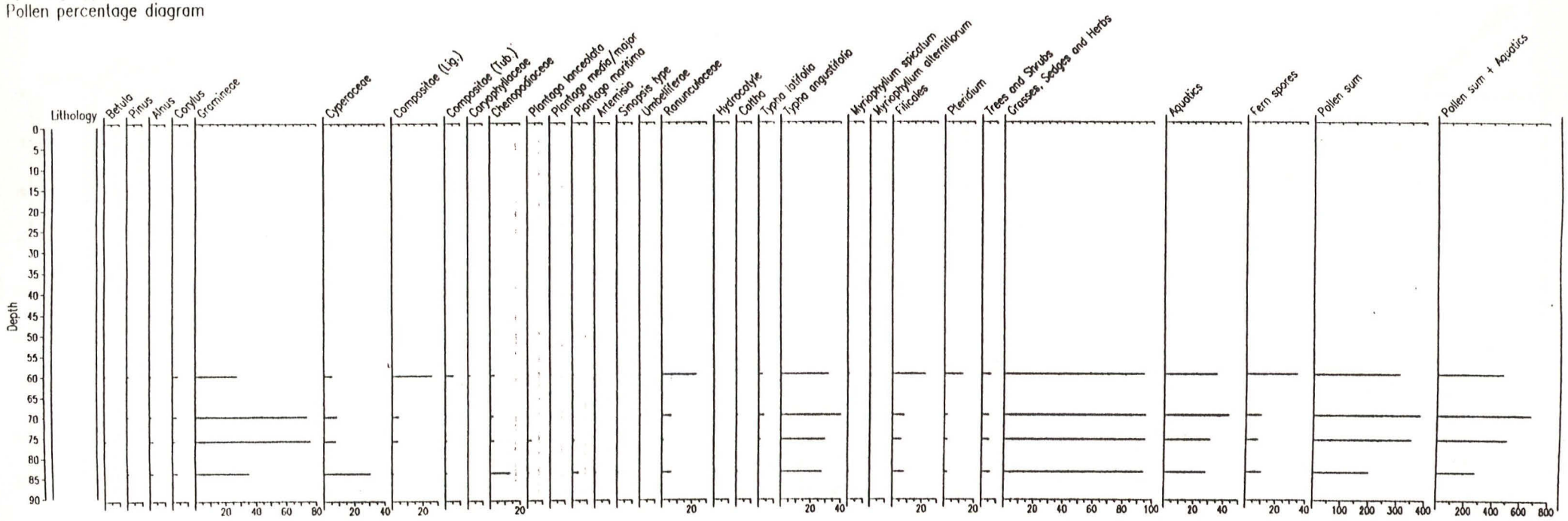
The sediments recorded at Trench 39 were as follows

Depth	C/No.	Description
0 - 20cm	301	Brown humic clay
20 - 24cm	302	
24 - 40cm	303	Grey brown clay
40 -	326	

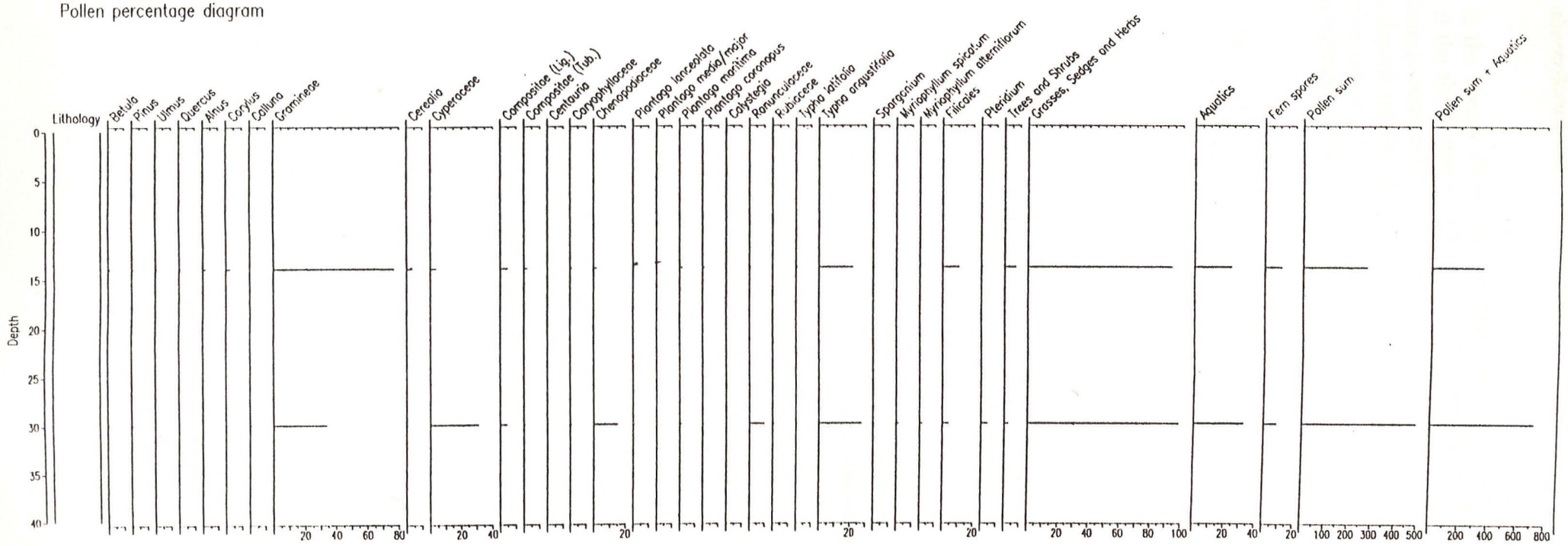
Description of pollen data from Trench 39

Characterised by high pollen percentage frequencies for Gramineae (*c.*40% tlp), Cyperaceae (28% tlp), *Typha angustifolia* (26 % tlp + Aquatics) and Chenopodiaceae (14% tlp). Less frequent herbaceous taxa included Compositae Liguliflorae, Compositae Tubuliflorae, *Plantago lanceolata, Plantago media/major, Plantago maritima* and Rubiaceae (*Galium* type)

Spalding Bypass Trench 38.
Pollen percentage diagram



Spalding Bypass Trench 39
Pollen percentage diagram



Myriophyllum spicatum and *Myriophyllum alterniflorum* were also recorded.

Discussion

The pollen spectra from the basal sample in the Trench 39 profile correlates well with other spectra from the grey/brown clay deposits at the site in that it included a higher proportion of salt marsh species (Chenopodiaceae and *Plantago maritima*). However freshwater reed swamp is also well represented suggesting that this deposit represents a transitional brackish/freshwater environment. As in many of the other profiles this situation changes as sedimentation becomes increasingly humic and coastal / salt marsh indicator species decline as reed swamp vegetation becomes more locally wide spread.

The upper sample from trench 38 also correlates well with upper samples from the enclosure profiles and natural sequences with the increased representation of possible cultivation/ pasture indicators.

Summary

The pollen record from the Spalding Bypass site provides evidence of changing environmental and vegetation conditions through time and in association with archaeological sites. The vegetation sequence recorded at the site appears to involve a transition from a brackish/ freshwater environment to a freshwater reed swamp situation, possibly followed by a return to some form of limited marine incursion (see Trench 36) which may have resulted in the arrest of a hydroseral succession to fen wood. Interestingly there appears to be little evidence of local woodland.

The pollen spectra from the enclosure ditches and hexagonal enclosures correlates well with the sequence from the natural deposits. The basal samples from the ditch deposits suggest that the ditches were cut down to an old marine inundation surface and that freshwater reed swamp and Cyperaceae dominated communities were locally abundant as the ditches infilled.

Evidence for human activity in the area is difficult to interpret because many of the typical cultivation 'indicators' occur in natural salt marsh, grassland and reed swamp communities. However it is suggested that there is some evidence for some pastoral and possibly arable land use in the area.

Interestingly there is good biostratigraphic correlation between these data and that of Shennan (1986). The upper peat deposit from Cowbit Wash has a Local Pollen Assemblage Zone (Cowbit Wash 7-g) which has a similar peak in reed swamp / sedge fen pollen taxa. The *Typha angustifolia* rise is dated at 2595 $\pm$ 60 bp however radio-carbon dates would be required to confirm any chronological correlation between the sites.

Recommendations

The pollen samples analysed from the Spalding Bypass Borrow pit had generally good states of pollen preservation and a good diversity of pollen taxa which warranted analysis for this report. If further excavation work was undertaken at the site, further palynological analysis would be valuable. This work would be valuabley augmented by plant macrofossil analysis which would help to solve some of the interpretative problems mentioned above, particularly those associated with identifying land use history.

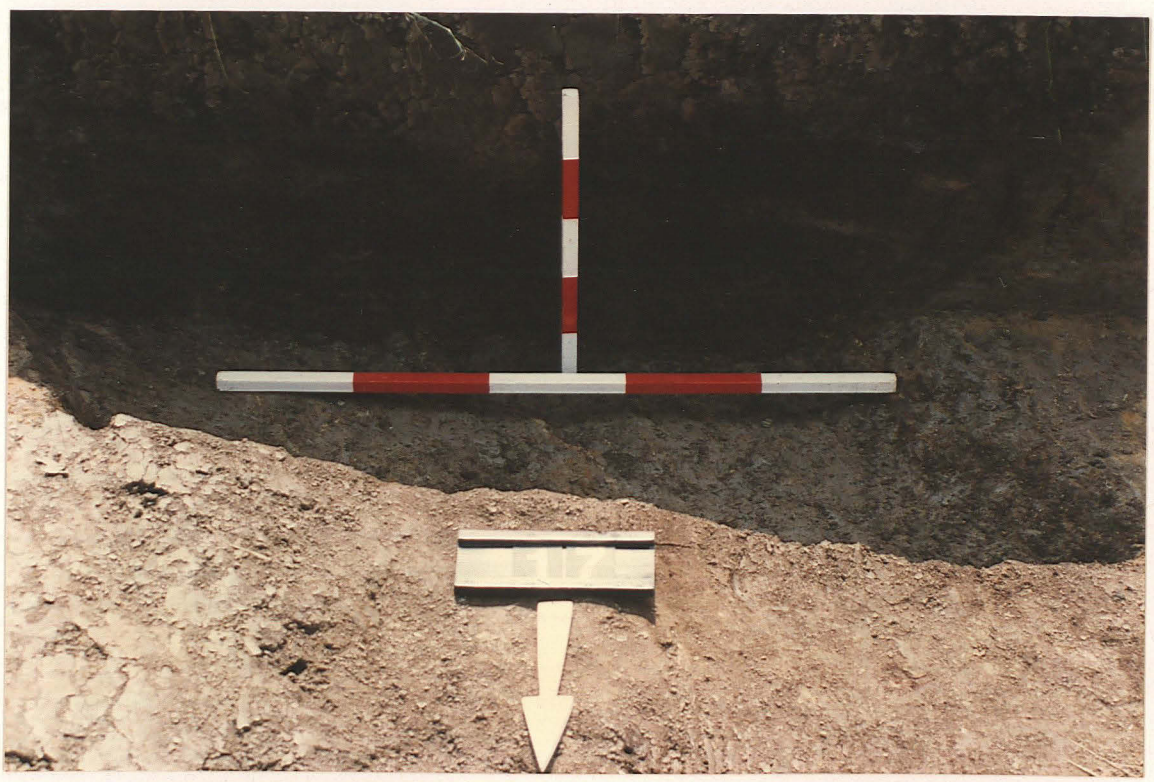
B.A. Brayshay
18.8.1993.

Pl. 1 View of the evaluated area, looking NE from the A1073 Barrier Bank

Pl. 2 Section excavated through Ditch 2 (scales: vertical (v) 0.5m, horizontal (h) 1m)

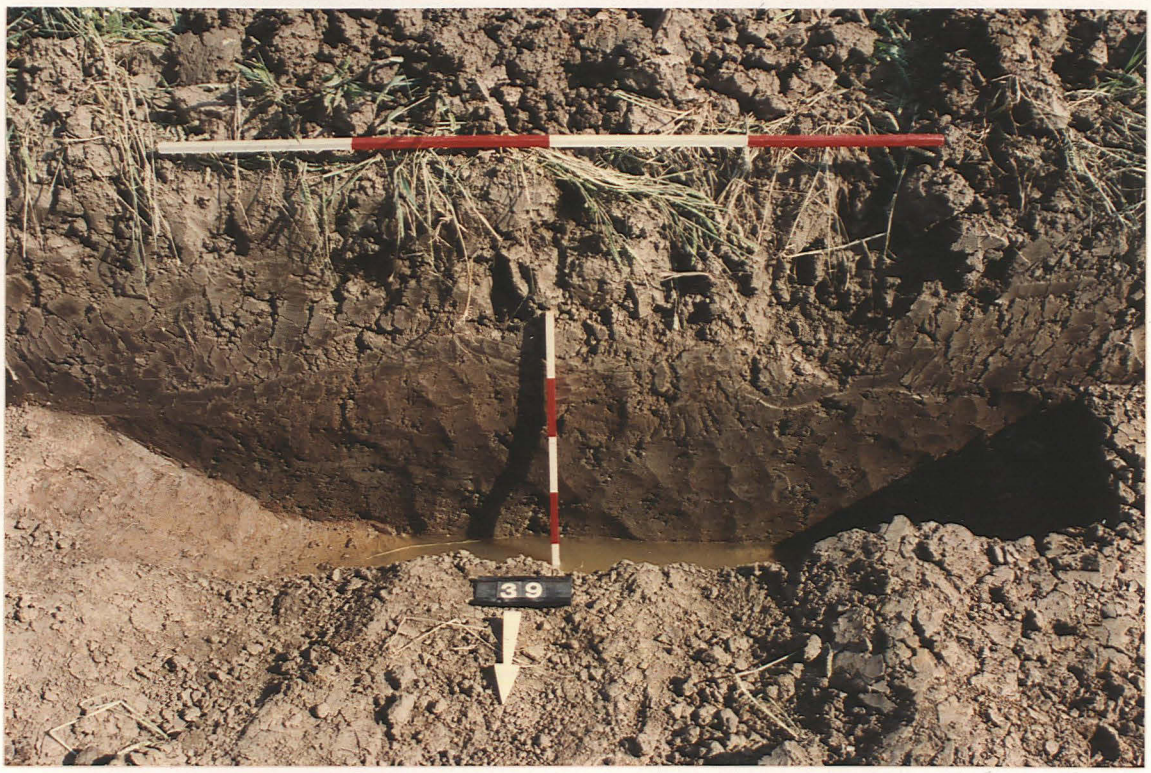
Pl. 3 Section across Ditch 6, showing peat fill (scales: v 0.5m, h 1m)

Pl. 4 Peat filling Ditch 17 (scales: v 0.5m, h 1m)



Pl. 5 Section across Ditch 58 (scales:v 1m, h 2m)

Pl. 6 Section across Ditch 54 (scales:v 1m, h 2m)



Pl. 7 Deliberately backfilled Ditch 39 (scales:v 1m, h 2m)

Pl. 8 Section across Ditch 160, crossing the trench at an angle and partly removed by a machined scoop. Note the modern land drain laid within the fill. (scales:v 1m, h 2m)

Pl. 9 View of Trench 32, showing diagonal band of light silt in foreground between darker fills. This may be part of a complex of backfilled large pits associated with the brickworks. The bypass fenceline is visible at the top left. (scales: 1m and 2m)

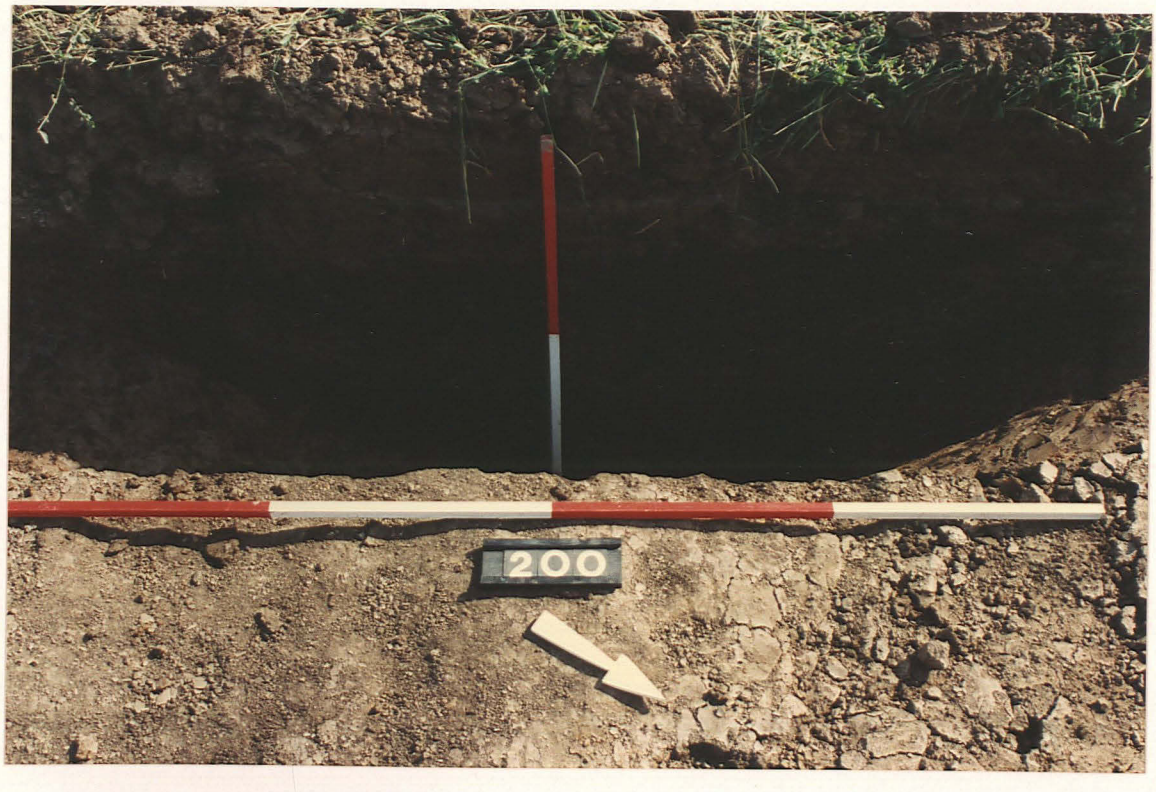
Pl. 10 Palaeochannel sediments and peat visible in NW face of Test Pit 36, with traffic in the background using the A1073 road along the Barrier Bank. (scale: 2m)

Pl. 11 Deposits filling palaeochannel visible in north face of Trench 27. (scale: 2m)

Pl. 12 Cropmark feature Enclosure Ditch 304/324 at the SE corner of Enclosure I, Trench 39. The peat upper fill partially masked this ditch during the geophysical survey. (scales 2m and 1m)

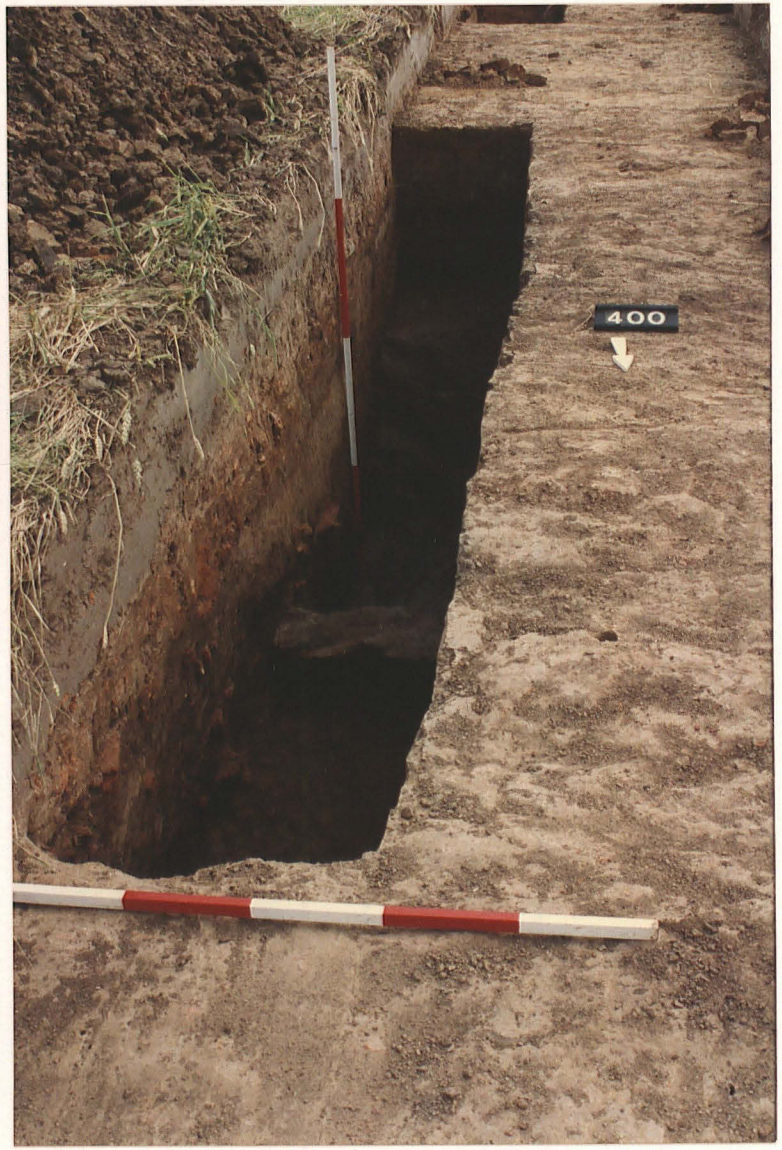
Pl. 13 Section across Enclosure Ditch 304/324 in Trench 38, looking east.

Pl. 14 Section across possible Droveway Ditch 200 in Trench 21, showing the peaty upper fill. (scales: v 1m, h 2m)



Pl. 15 View of Zone 3, from the bypass and looking south along Trench 35. The Barrier Bank is in the background.

Pl. 16 Initial cleaning of Trench 34, showing mixed deposits and brick fragments, looking NW.

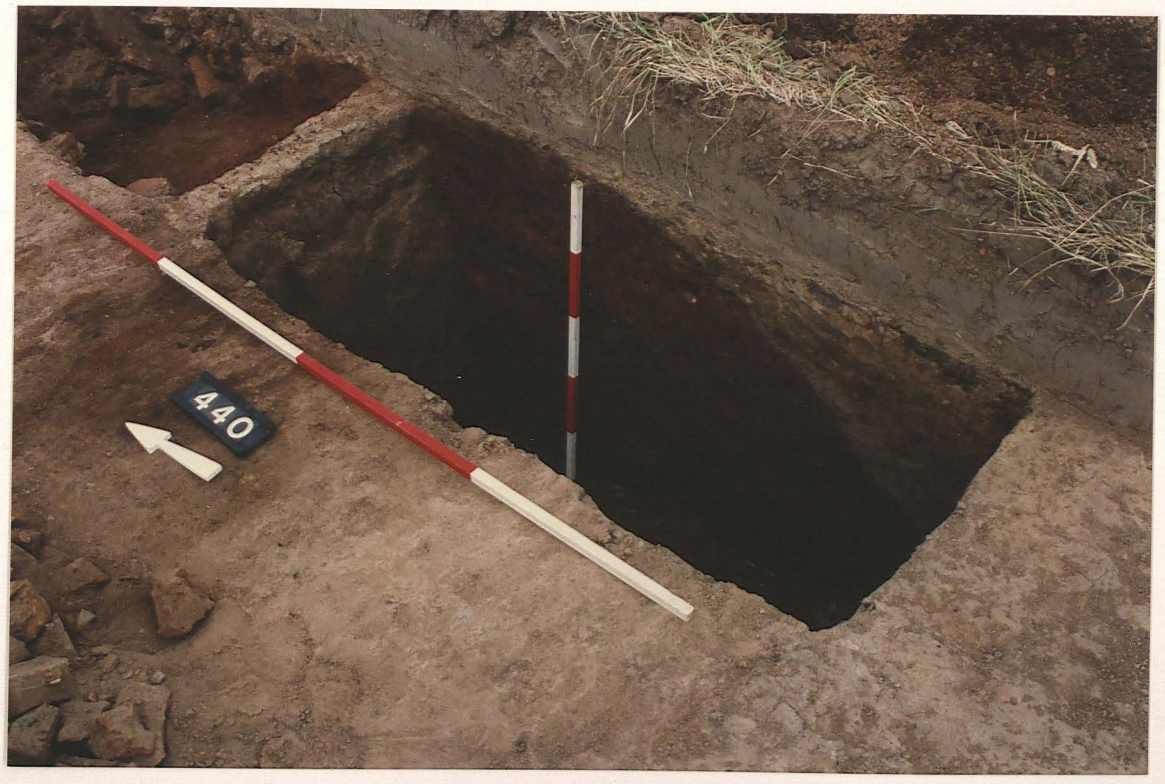


Pl. 17 Section through partially excavated Brickworks Features 428, 431 and 433 in Trench 35, showing grey clay peaks between the pits. (scales: v 2m, h 1m)

Pl. 18 Brick rubble in unexcavated fill of Pit 431, beyond excavated Pit 433. (scale: 1m)

Pl. 19 Upper fills of Pit 444, Trench 35, showing layers of brick rubble, clay and ? furnace ash. (scales: v 1m, h 2m)

Pl. 20 Section of Pit 443 in Trench 35, showing the vertical northern face and the numerous tip-lines of ?furnace ash below the clay fill. The feature was sampled at its northern edge. Pit 444 lies to the north of the clay peak. (scales: v 1m, h 2m)



Pl. 21 Trench 34 after initial cleaning, showing features with brick and ash fills crossing north-south. The dark material in the foreground was the upper fill of Ditch 601. The brick base of the Spalding Bypass is visible in the background. (scales: 1m and 2m)

Pl. 22 Section through the upper fills of Pit 521, Trench 34. (scales: v 1m, h 2m)

Pl. 23 The irregular base of Pit 521, Trench 34, with sectioned geological feature in the background.

Pl. 24 Section across Pit 561, Trench 34, with brick and ash fills. The clay peak separates it from Pit 581 (scales: v 1m, h 2m)

Pl. 25 Furnace ash and bricks in the fill of Pit 581. (scales: v 1m, h 2m)

Pl. 26 Section across post-medieval boundary Ditch 601 at east end of Trench 34. (scales: v 1m, h 2m)

Pl. 27 Ground conditions at the eastern limit of the borrowpit during the watching brief.

Pl. 28 The borrowpit was used to supply clay for consolidating the brick rubble base of the A16 Spalding Bypass.

Pl. 29 Topsoil removal in the borrowpit area left a surface unsuitable for the recognition of archaeological features.

Pl. 30 Panoramic view of Zones 1 and 2 after stripping of topsoil; looking SE.

Pl. 31 Peat fill of post-medieval land drain or backfilled ditch at east edge of Zone 2, looking north.

Pl. 32 Peat fills of post-medieval drains and ditches showing in new ditch at southern edge of Zone 1, looking east.

Pl. 33 Post-medieval ditch or drain marked by deep machine ruts at southern limit of Zone 2.

Pl. 34 The face of the borrowpit was too disturbed to permit identification of any features other than recent land drains.