Northamptonshire County Council

Northamptonshire Archaeology

An archaeological evaluation

on land off Storeys Bar Road

Peterborough, Cambridgeshire

October 2007

Ian Meadows *et al*

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Report 07/ 159

Northamptonshire Archaeology
2 Bolton House
Wootton Hall Park
Northampton NN4 8BE
t. 01604 700493 f. 01604 702822
e. sparry@northamptonshire.gov.uk
w. www.northantsarchaeology.co.uk

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NORTHAMPTONSHIRE ARCHAEOLOGY

NORTHAMPTONSHIRE COUNTY COUNCIL

JULY 2007

ARCHAEOLOGICAL EVALUATION
OF LAND OFF
STOREY'S BAR ROAD
PETERBOROUGH, CAMBRIDGESHIRE

STAFF

Project Manager	**Ian Meadows BA**
Fieldwork	**Chris Jones, Leon Field BA**
Text	**Ian Meadows**
Illustrations	**Jacqueline Harding BA HND**

QUALITY CONTROL

	Print name	Signed	Date
Checked by	Pat Chapman		
Verified by	Andy Chapman		
Approved by	Steve Parry		

OASIS REPORT FORM

PROJECT DETAILS	
Project title	Archaeological evaluation of land off Storey's Bar Road Peterborough, Cambridgeshire
Short description (250 words maximum)	This evaluation comprising a programme of trial trenches was to assess the archaeological potential. In total 2300m of trenches were excavated. No cut features and only a few pieces of possibly worked wood were recovered. The majority of the evidence was horizontally bedded fen deposits in a sequence that was common across the assessed area. It was clear this area had, apart from limited evidence for coppicing, not been a focus for human activity in the past. The environmental history of this part of the fen edge was recovered using the preserved organic indicators of pollen, diatoms and macro plant remains.
Project type (eg desk-based, field evaluation etc)	Evaluation
Previous work (reference to organisation or SMR numbers etc)	N/A
Current land use	Arable
Future work (yes, no, unknown)	Unknown
Monument type and period	N/A
Significant finds (artefact type and period)	N/A
PROJECT LOCATION	
County	Cambridgeshire
Site address (including postcode)	Land off Storey's Bar Road Peterborough
Easting Northing (use 2-letter 100km grid square no.)	TL 221 994
Area (sq m/ha)	10.05ha
Height OD	2m aOD
PROJECT CREATORS	
Organisation	Northamptonshire Archaeology
Project brief originator	Peterborough City Archaeological Officer
Project Design originator	Northamptonshire Archaeology
Director/Supervisor	Ian Meadows
Project Manager	Ian Meadows
Sponsor or funding body	Peterborough Renewable Energy Limited
PROJECT DATE	
Start date	10 4 2007
End date	

ARCHIVES	**Location (Accession no.)**	**Content (eg pottery, animal bone etc)**
Physical		
Paper		
Digital		

BIBLIOGRAPHY	Journal/monograph, published or forthcoming, or unpublished client report (NA report)
Title	
Serial title & volume	07/154
Author(s)	
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Contributors

I D Meadows, Senior Project Officer, Northamptonshire Archaeology, Northampton

Dr C A I French, Head of McBurney Geoarchaeology Laboratory, University of Cambridge

Dr P P Allen, Palaeoenvironmnetal Manager, Archaeological Research Services Ltd, Newcastle,

B Johnson, Archaeological Research Services Ltd, Newcastle

Dr J Jordan, Lecturer in Physical Geography, Coventry University

M Bamforth, L-P Archaeology, London

I Panter, Principal Conservator, York Archaeological Trust

Dr S Boreham, Laboratory Manager, Quaternary Palaeoenvironments Group, Department of Geography, University of Cambridge

ARCHAEOLOGICAL EVALUATION ON LAND OFF STOREY'S BAR ROAD, PETERBOROUGH CAMBRIDGESHIRE

Abstract

This evaluation, comprising a programme of trial trenches, was to assess the archaeological potential of land off Storey's Bar Road adjacent to the Flag Fen Archaeological site. Because of the high potential for associated remains and the depth of overburden, trenches were the only way to assess the presence or absence of remains.

In total 2300m of linear trenches were excavated, but no cut features and only a few pieces of possibly worked wood were recovered. The majority of the evidence was for horizontally bedded fen deposits in a sequence that was common across the assessed area. It was clear this area had, apart from limited evidence for coppicing, not been a focus for human activity in the past. The environmental history of this part of the fen edge was recovered using the preserved organic indicators of pollen, diatoms and macro plant remains.

The prevalent low water table and other factors placed all the organic remains in a hostile environment, which would lead to their ultimate deterioration. The ambient water level was found to lie 1m below any formerly waterlogged levels even after a wet spring.

At the time of writing this report the results of three of six radiocarbon dates had not yet been received. The samples had been taken from the top and the bottom of the three key horizons and will provide an absolute framework in which to place the environmental data. The three dates so far received indicate the upper peat dates to the Iron Age and the lower peat to the Bronze Age, indicating that, apart from a small amount of the third-century clay directly under the topsoil/ploughsoil, most post Roman horizons were missing..

PART 1 ARCHAEOLOGICAL REPORT

By I D Meadows

1 INTRODUCTION

Northamptonshire Archaeology carried out archaeological evaluation, comprising trial excavation, in April-May 2007.

The work was undertaken in order to provide information on the potential archaeology of an area proposed for the construction of a recycling and power generation unit (NGR TL 221 994, Fig 1). The evaluation followed the requirements of a brief issued previously by the Peterborough City Archaeological Officer.

The purpose of the evaluation was to identify any continuation of the Flag Fen ceremonial landscape identified to the south and east (Pryor 2001). It was also to identify the stratigraphic sequence of the Fen Edge and any evidence for the exploitation of this part of the fen edge.

The Peterborough fen edge has long been known for its extensive crop mark complexes (RCHM 1969) and excavation in advance of previous developments from the 1970s onwards have recovered much valuable data. This evaluation was carried out on behalf of Peterborough Renewable Energy Limited (PREL).

2 BACKGROUND

2.1 Geology and field reconnaissance

The proposed development affects three individual fields off Storeys Bar Road, two to its south and a small part of one to the north. For clarity the fields are numbered 1-3.

The local geology consists of glacial gravels over Oxford Clay capped by a series of fen peat and clay deposits. The lower peat seemed well preserved but the upper peat appeared on simple visual inspection to be wasted and desiccated. No clear subdivisions could be discerned within the two peat units, which were separated by clay of alluvial character, and believed to be of late Roman to medieval in date.

The study area had produced only limited cropmark evidence that was interpreted as two possible courses of the Roman Fen Causeway. The depth of the soil sequence and the nature of the deep soil sequence meant that cropmarks were unlikely and waterlogged wooden features would not produce them. The depth of soil cover also precluded the use of non-destructive techniques such as magnetometry or resistivity to prospect for buried features.

The land use was grass in one field, set aside in the second and oil seed rape in the third. No surface scatters of material were observed but with such extensive vegetation coverage it is unlikely that one would have been identified.

2.2 State of knowledge

The development site is located within an area of high archaeological interest. The fen edge has been the subject of archaeological excavation intermittently since the early twentieth century and since the 1970s large-scale projects have exposed substantial tracts of this interface between the dry ground and wet ground. This intense fieldwork has resulted in a good understanding of the context of the present development area and some of the archaeological potential.

A number of archaeological features are known through cropmark evidence to lie close but outside the development area. These include a track-way and enclosure to the north-west (Sites and Monuments Record No: 2326), two concentric ditches to the south-west (SMR No: 3031a/10151), and a ring ditch to the east (SMR No: 8188).

Some 600m to the southeast is located the internationally known Bronze Age site of Flag Fen (SMR No: 8782), the boundary of the protected site abuts the present development area, although the extent and scale of any continuation of archaeological remains into the study area remains as yet unclear. The site is of national importance and comprises a post alignment and platform along with conditions that have produced scatters of prehistoric timbers and evidence for extensive activities (Pryor 2001).

In the last few years other archaeological works have been carried out which demonstrate the extensive nature of occupation on and near the fen edge. Work about 600m to the north-west of the present study area produced evidence for Neolithic and early Bronze Age pits along with elements of a middle Bronze Age paddock and droveway system (Beardsmore 2005). At 800m south-west of the current site excavation produced further evidence for the droves and field systems of middle Bronze Age date and evidence for a later Bronze Age house (Beardsmore 2006).

Two archaeological monuments have also been identified within the Sites and Monuments Record as possibly extending into the southernmost part of the development area. These comprise, Cat's Water Drain (SMR No: 10032), which contains the upstanding earthwork remains of the Roman watercourse, and one possible line of the Fen Causeway Roman road (SMR No: 50710).

3 THE TRIALTRENCH EXCAVATION

3.1 Methodology

In order to better characterise the remains and recover information about the date and quality of preservation a 5% excavation sample was requested by PCCAS. This strategy resulted in the excavation of 46 trenches each measuring 50m long by 2m wide. The fields were examined in April and May 2007. The trench locations were previously agreed and were accurately located on the ground using GPS (Fig 2).

The results of the trenches will be described field by field in order to retain coherence. The location of the individual fields are summarised below:

Field 1: This field lay along the southern side of the Padholme Drain adjacent to the balancing pool for the power station. It was under grass, which preserved slight surface irregularities of uncertain origin. At the time of the evaluation it was grazed by travellers' horses. It has been suggested that crop marks in the southwest corner of the field may indicate a possible course of the Fen Causeway. A pair of high-pressure gas pipes ran across the south-east corner of the field and ran across Field 2. A total of 20 trenches up to 50m long were excavated in this field.

Field 2: This field also lay alongside the southern edge of the Padholme Drain, it was set-aside at the time of the fieldwork. Quantities of rubbish had also been fly tipped in the north-west corner. Slight surface undulations were apparent with the ground surface appearing to rise slightly to the south. A total of 19 trenches up to 50m long were excavated in this field.

Field 3: This field lay to the north of the Storey Bar Road in a bend in the road. The area to be assessed only formed a small part of the total land unit. The field was under cultivation at the time of the fieldwork. A total of 6 trenches up to 50m long were excavated in this field.

3.2 Field 1

The individual trenches within field one contained, or appeared to contain the same extensive horizons of material with only slight local variations or trench distinct contexts. Because of this parity the trench infill sequence will be presented in a tabular form with discussion of only salient points.

Trench 1 was located to test a cropmark identified by Rog Palmer as a possible alternate course for the Fen causeway (Fig 2). No substantial evidence of a route was discovered although a thin spread of brashy limestone [109] within the topsoil [101] could have caused the crop mark. This scatter was a loose dump of stone, within which post-medieval glass was observed, possibly to facilitate access into the field in the post-medieval period in wet conditions. The high position within the soil column would have placed it in a position where it might create a parchmark in dry conditions, no other deposit was encountered which might have been responsible for the cropmark.

Sealed by the topsoil was a thick deposit of alluvial clay up to 0.4m thick, it contained very few pebbles or other inclusions and was presumably largely derived through extensive flooding of this area from the third century AD (French 2001, 403). This deposit in turn sealed a friable desiccated peat with generally poor organic preservation, which overlay a silty clay possibly related to the extensive exploitation of the uplands producing increased run off. This clay overlay an organic rich peat within which wood survived in a few trenches (See wood report below). This peat showed less indication of drying out perhaps due to a combination of closer proximity to the watertable (at the time of the excavation in April it lay at about 0mAoD) and the 'blanketing' effect of the overlying clay soils to prevent moisture loss through any evaporation or capillary action. Below the rich peat a largely dehumified palaeosol was present, sometimes surviving as two thin deposits of silty clay, it generally incorporated small fragments of waterlogged organics and pebbles. This in turn sealed natural clays that in their turn overlay natural gravels.

In this field a few small irregularities were observed in the surface of the palaeosol, for example [1111]. On excavation these were found to possibly represent tree throw holes. No ancient anthropogenic features were observed. A further irregular feature [812] was observed in the surface of the organic rich peat [805] which was probably also a tree throw

The stratigraphy of each trench is tabulated with the average thickness of each context and the height in metres against Ordnance datum of the upper surface.

Table 1: Stratigraphic sequence within trenches 1-23, Field 1

Tr/context no	Description	Average thickness	Height of upper surface AoD	Suggested date
Trench 1				
101	Dark brown topsoil	0.15	2.03	Recent
102	Light-mid brown alluvial clay	0.33	1.85	Post-third century
103	A wasted peat deposit	0.12	1.6	Iron Age
104	A silty clay	0.35	1.45	Later Bronze Age to Iron Age
105	Organic rich peat	0.22	1.2	Bronze Age
106	A dehumified clay palaeosol	0.26	0.95	Prehistoric
107	Dark grey silty clay filling surface irregularities below the palaeosol. Possibly infilling earlier tree holes.			Post-glacial
108	Light brown clay and orange sands		0.65	Glacial
109	Dump of limestone probably source of crop mark.			Post-medieval
Trench 2				
201	Dark brown topsoil	0.15	2.16	Recent
202	Light brown alluvial clay	0.4	2.11	Post-third century
203	A wasted peat	Up to 0.4	1.80	Iron Age
204	A silty clay	Up to 0.35	1.4	Later Bronze Age to Iron Age
205	Organic rich peat	0.2	1.15	Bronze Age
206	A dehumified palaeosol		0.95	Prehistoric
207	A mottled clay layer. Possible lower palaeosol	0.2		
208	Upper natural clay only present at E end of trench			Post-glacial
209	Mixed clay natural		0.1	Post-glacial
Trench 3				
301	Dark brown topsoil	0.1	2.4	Recent
302	Mid brown alluvial clay	0.3	2.3	Post-third century
303	Peat containing wood fragments.	0.4	2.0	Iron Age

304	Silty clay	0.3	1.6	Later Bronze Age to Iron Age
305	Silty clay	0.25	1.35	Later Bronze Age to Iron Age
306	Organic rich peat	0.22	1.13	Bronze Age
307	Light grey brown silty clay palaeosol	0.13	1.02	Prehistoric
308	Dark grey silty clay. Possible lower palaeosol.	0.25	0.89	Prehistoric
309	Natural clay		0.63	Post-glacial
Trench 4				
401	Mid brown topsoil	0.1	2.2	Recent
402	Mid brown alluvial clay	0.3	2.13	Post-third century
403	Friable peat	0.35	1.95	Iron Age
404	Alluvial clay	0.51	1.84	Later Bronze Age to Iron Age
405	Wood rich peat	0.34	1.63	Bronze Age
406	Blue clay (palaeosol?)	0.28	1.6	Prehistoric
407	Natural		1.35	Post-glacial
Trench 5				
501	Mid brown loam topsoil	0.1	2.05	Recent
502	Mid brown alluvial clay	0.24	1.9	Post-third century
503	Friable peat	0.27	1.68	Iron Age
504	Light yellow clay at interface of peat and lower clay. Probably a local variation in the alluvial clay	0.15	1.35	Later Bronze Age to Iron Age
505	Mid grey brown alluvial clay	0.16	1.3	Later Bronze Age to Iron Age
506	Mid grey brown alluvial clay	0.14	1.15	Later Bronze Age to Iron Age
507	Organic rich peat	0.3	1.02	Bronze Age
508	Mid grey brown silty clay upper portion of the palaeosol	0.18	0.72	Prehistoric
509	Mid to dark brown silty clay palaeosol	0.16	0.56	Prehistoric
510	Natural clay and gravel		0.4	Post-glacial
Trench 6				
601	Mid brown topsoil	0.09	2.35	Recent
602	Light brown alluvial clay	0.23	2.3	Post-third century
603	Mid brown peat with inorganic content		1.95	Iron Age
604	Friable peat	0.1	1.8	Iron Age
605	Grey clay silt	0.52	1.70	Later Bronze Age to Iron Age
606	Organic rich peat	0.25	1.2	Bronze Age
607	Mid grey brown clay possibly dehumified palaeosol	0.08	1.0	Prehistoric
608	Light grey mottled silty clay possible lower buried mineral soil	0.22	0.95	Prehistoric
609	Orange and light grey clay and gravel naturals		0.87	Post-glacial
Trench 7				
	NOT USED			
Trench 8				
801	Mid brown topsoil	0.3	2.29	Recent
802	Mid brown alluvial clay	0.2	2.1	Post-third century

803	Friable peat		1.85	Iron Age
804	Dark grey brown alluvial clay		1.60	Later Bronze Age to Iron Age
805	Organic rich peat		1.1	Bronze Age
806	Mid grey sand clay palaeosol	0.2	0.95	Prehistoric
807	Yellow and brown sandy clay natural		0.8	
809	Sandy lens associated with 812	0.05		
810	Mid brown silty clay fill of 812	0.2		
811	Light grey clay	0.2		
812	Shallow pit type feature. Probably a tree throw pit into the peat 805.			
Trench 9				
	NOT USED			
Trench 10				
1001	Mid light brown topsoil	0.26	1.98	Recent
1002	Friable peat with mineral soil	0.26	1.7	Iron Age
1003	Dark grey alluvial clay	0.32	1.45	Later Bronze Age to Iron Age
1004	Organic rich peat	0.28	1.22	Bronze Age
1005	Mid to light grey clay palaeosol	0.22	0.93	Prehistoric
1006	Dark grey clay, local variant of 1005 palaeosol.	0.2	0.75	Prehistoric
1007	Natural clay		0.53	
Trench 11				
1101	Dark brown topsoil	0.1	2.2	Recent
1102	Mid brown alluvial clay	0.28	2.1	Post-third century
1103	Friable peat	0.18	1.7	Iron Age
1104	Mid brown alluvial clay	0.22	1.55	Later Bronze Age to Iron Age
1105	Mid brown silty alluvial clay	0.2	1.35	Later Bronze Age to Iron Age
1106	Organic rich peat	0.26	1.15	Bronze Age
1107	Mid grey brown silty clay upper palaeosol	0.2	0.95	Prehistoric
1108	Mid-dark brown slity clay palaeosol	0.22	0.75	Prehistoric
1109	Natural sandy clay		0.6	
1110	Dark grey black silty clay fill of 1111			
1111	Cut of small pit, possibly natural			
1112	Reddy brown silt fill of small hollow 1113, possibly natural	0.05		
1113	Cut of small sub circular shallow depression or pit			
1114	Remains of a tree in palaeosol			
Trench 12				
1201	Mid brown topsoil		2.2	Recent
1202	Mid brown alluvial clay		1.95	Post-third Century
1203	Friable peat		1.8	Iron Age
1204	Mid grey brown alluvial clay		1.45	Later Bronze Age to Iron Age
1205	Mid grey brown silty alluvial clay		1.13	Later Bronze Age to Iron Age
1206	Organic rich peat		0.95	Bronze Age
1207	Light grey to yellow silty clay palaeosol		0.85	Prehistoric
1208	Light grey sandy clay natural		0.6	
Trench 13				

1301	Mid brown topsoil		2.25	Recent
1302	Mid brown alluvial clay	0.18	2.0	Post-third century
1303	Friable peat	0.27	1.85	Iron Age
1304	Light brown ferruginous clay, perhaps panning at upper surface of alluvium.	0.06	1.55	Later Bronze Age to Iron Age
1305	Mid brown silty alluvial clay	0.24	1.50	Later Bronze Age to Iron Age
1306	Organic rich peat	0.24	1.15	Bronze Age
1307	Mid grey brown silty clay palaeosol	0.22	0.95	Prehistoric
1308	Natural orange-yellow sandy clay		0.75	
Trench 14				
1401	Dark brown topsoil	0.3	2.05	Recent
1402	Mid brown alluvial clay	0.14	1.7	Post-third Century
1403	Friable peat	0.1	1.65	Iron Age
1404	Dark grey silty alluvial clay	0.2	1.55	Later Bronze Age to Iron Age
1405	Organic rich peat	0.18	1.4	Bronze Age
1406	Blue grey clay, possible palaeosol	0.26	1.1	Prehistoric
1407	Natural clay and gravel		0.85	
1408	Yellow brown sandy gravel fill of 1409			
1409	Modern service trench			
Trench 15				
1501	Mid brown topsoil	0.12	2.2	Recent
1502	Mid brown alluvial clay	0.1	2.0	Post-third Century
1503	Friable peat	0.56	1.9	Iron Age
1504	Mid grey brown alluvial clay	0.2	1.4	Later Bronze Age to Iron Age
1505	Organic rich peat	0.2	1.15	Bronze Age
1506	Light grey silty clay possible upper palaeosol	0.2	0.95	Prehistoric
1507	Dark brown silty clay possible lower palaeosol	0.12	0.7	Prehistoric
1508	Orange and grey natural clays		0.6	
Trench 16				
1601	Mid brown topsoil	0.12	2.2	Recent
1602	Mid brown alluvial clay	0.16	2.05	Post-third century
1603	Friable peat	0.4	1.9	Iron Age
1604	Mid grey brown alluvial clay	0.26	1.5	Later Bronze Age to Iron Age
1605	Mid brown silty clay lower alluvial horizon	0.3	1.35	Later Bronze Age to Iron Age
1606	Organic rich peat	0.2	1.2	Bronze Age
1607	Light yellow brown clay	0.1	1.0	Prehistoric
1608	Mid grey brown silty clay possible palaeosol	0.38	0.90	Prehistoric
1609	Natural orange clay		0.5	
Trench 17				
1701	Mid brown topsoil	0.46	2.15	Recent
1702	Friable peat	0.32	1.65	Iron Age
1703	Mid grey silty alluvial clay	0.28	1.45	Later Bronze Age to Iron Age
1704	Organic rich peat	0.24	1.1	Bronze Age
1705	Light grey clay possible palaeosol	0.27	0.95	Prehistoric
1706	Natural orange and yellow clays		0.6	

Trench 18				
1801	Mid brown topsoil	0.18	2.05	
1802	Mid – light brown alluvial clay	0.18	1.8	Post-third Century
1803	Friable peat	0.2	1.7	Iron Age
1804	Mid grey brown alluvial clay	0.2	1.5	Later Bronze Age to Iron Age
1805	Silty mid grey brown alluvial clay	0.18	1.3	Later Bronze Age to Iron Age
1806	Organic rich peat	0.16	1.1	Bronze Age
1807	Light grey/yellowy brown clay possible palaeosol	0.22	0.9	Prehistoric
1808	Mottled grey brown silty clay possible palaeosol	0.18	0.7	Prehistoric
1809	Grey and orange sandy natural clay		0.5	
Trench 19				
1901	Mid brown topsoil	0.4	2.4	Recent
1902	Light orange/yellow gravelly sand possible make-up.	0.18	2.0	Recent
1903	Mid-dark brown possible lens of buried topsoil	0.1	1.8	Recent
1904	Mid brown alluvial clay	0.2	1.8	Post-third century
1905	Friable peat	0.28	1.65	Iron Age
1906	Mid grey brown alluvial clay	0.2	1.4	Later Bronze Age to Iron Age
1907	Organic rich peat	0.4	1.2	Bronze Age
1908	Mid brown-grey silty clay possible palaeosol	0.25	0.85	Prehistoric
1909	Dark grey brown silty clay possible palaeosol	0.25	0.6	Prehistoric
1910	Mid grey natural clay		0.4	
Trench 20				
2001	Mid brown topsoil	0.32	2.15	Recent
2002	Friable peat	0.25	1.75	Iron Age
2003	Mid grey silty alluvial clay	0.31	1.5	Later Bronze Age to Iron Age
2004	Organic rich peat	0.23	1.0	Bronze Age
2005	Light grey clay possible palaeosol	0.16	0.8	Prehistoric
2006	Locally surviving peaty deposit amongst palaeosols	0.2	0.7	Prehistoric
2007	Grey clay possible palaeosol	0.15	0.56	Prehistoric
2008	Dark grey clay possible palaeosol	0.31	0.65	Prehistoric
2009	Blue grey natural clay		0.5	
Trench 21				
2101	Mid to dark brown topsoil	0.22	2.1	Recent
2102	Light brown clay and gravel possible levelling layer	0.2	1.9	Recent
2103	Mid brown silty clay	0.17	1.85	Post-third Century
2104	Friable peat	0.22	1.6	Iron Age
2105	Mid grey silty alluvial clay		1.45	Later Bronze Age to Iron Age
2106	Organic rich peat	0.2	1.3	Bronze Age
2107	Light grey clay possible palaeosol	0.24	0.9	Prehistoric
2108	Dark grey clay possible palaeosol	0.23	0.6	Prehistoric
2109	Natural clay		0.4	
2110	Small lens of peaty material within	0.2		Prehistoric

	palaeosol 2108			
Trench 22				
2201	Mid brown topsoil	0.25	2.1	Recent
2202	Mid-light brown alluvial clay	0.15	1.9	Post-third Century
2203	Friable peat	0.18	1.8	Iron Age
2204	Dark grey alluvial clay	0.3	1.6	Later Bronze Age to Iron Age
2205	Organic rich peat	0.24	1.25	Bronze Age
2206	Light grey brown silty clay	0.22	1.0	Prehistoric
2207	Dark brown clay loam possible palaeosol	0.32	0.7	Prehistoric
2208	Natural orange and grey clay		0.45	
Trench 23				
2301	Mid brown topsoil	0.18	1.85	Recent
2302	Mid brown alluvial clay	0.12	1.72	Post-third century
2303	Friable peat	0.18	1.6	Iron Age
2304	Mid grey brown alluvial clay	0.2	1.45	Later Bronze Age to Iron Age
2305	Mid grey brown alluvial clay	0.24	1.35	Later Bronze Age to Iron Age
2306	Organic rich peat	0.26	1.1	Bronze Age
2307	Light grey-yellow clay	0.23	0.9	Prehistoric
2308	Dark brown silty clay possible palaeosol	0.23	0.7	Prehistoric
2309	Orange and grey natural sandy clay		0.5	

3.3 Field 2

As with Field 1 the individual trenches within Field Two contained, or appeared to contain the same extensive horizons of material with only slight local variations or trench distinct contexts. Because of this parity the trench infill sequence will be presented in a tabular form below with discussion of only salient points.

No cropmarks or other indications of past activity were known in this field although the southern margin lay along the edge of the Cats Water Drain which was dry and overgrown at the time of excavation. This suggested ancient watercourse (Hall 1987, 36-7) was not, however, cut by any of the assessment trenches.

The sequence of layers in this field was similar to that of Field 1 and again no anthropogenic features were identified. Several areas of wood were recorded (see wood report below) but all were felt to represent detritus either in the form of drifted wood or as trees that had been growing but which due to decreasing cohesiveness, owing to waterlogging, of the horizon they were rooted in they either fell or simply died.

The uppermost horizon had been under cultivation, although at the time of the excavation it was set aside, and as a result displayed evidence of ploughing extending into uppermost of the underlying horizons.

As in Field 1 there was an upper friable peat and lower more organic rich and better preserved peat, and the majority of observed wood came from this horizon [3105]. Below the lower peat a possible palaeosol was observed and in a number of trenches an intermediate clay horizon was present (trenches 24, 25, 29, 39, 41, 42, 49, 50, 52). This intermediate clay might be similar to the first/second millennium BC silts observed overlying the buried soil underneath the fen causeway a few hundred metres to the south of field one (French 2001, 53). The palaeosol was often observed to have two discrete horizons, whilst on occasions this might be a reflection in some trenches of the misassignment of the intermediate clay elsewhere it may be more suggestive of a differentiated soil profile.

Table 2: Sratigraphis sequence within trenches 24-53, Field 2

Tr/context no	Description	Average thickness	Height of upper surface AoD	Suggested date
Trench 24				
2401	Mid brown ploughsoil	0.2	2.1	Recent
2402	Mid brown alluvial clay	0.3	1.9	Post-third century
2403	Friable peat	0.3	1.65	Iron Age
2404	Mid grey brown alluvial clay	0.14	1.45	Later Bronze Age to Iron Age
2405	Organic rich peat	0.3	1.2	Bronze Age
2406	Light yellowy grey clay	0.2	0.95	Prehistoric
2407	Dark brown silty clay palaeosol	0.24	0.85	Prehistoric
2408	Natural yellow and grey sandy clay		0.65	
Trench 25				
2501	Mid brown ploughsoil	0.34	1.9	Recent
2502	Mid brown alluvial clay	0.16	1.65	Post-third century
2503	Friable peat	0.1	1.45	Iron Age
2504	Mid grey brown alluvial clay	0.2	1.3	Later Bronze Age to Iron Age
2505	Organic rich peat	0.36	1.15	Bronze Age
2506	Light yellow brown clay	0.25	0.78	
2507	Dark brown silty sandy clay palaeosol	0.3	0.64	Prehistoric
2508	Light grey sandy silty clay probably ‘dirty’ natural	0.1	0.4	
2509	Natural sandy clay		0.3	
Trench 26	Not used			
Trench 27				
2701	Mid brown ploughsoil		1.94	Recent
2702	Mid brown alluvial clay		1.75	Post-third century
2703	Friable peat		1.6	Iron Age
2704	Mid grey brown alluvial clay	0.2	1.4	Later Bronze Age to Iron Age
2705	Dark grey brown silty alluvial clay	0.2	1.23	Later Bronze Age to Iron Age
2706	Organic rich peat	0.3	1.05	Bronze Age
2707	Mid reddy brown silty clay palaeosol	0.17	0.7	Prehistoric
2708	Dark grey silty clay palaeosol	0.16	0.58	Prehistoric
2709	Natural orange and grey sandy clay		0.42	
Trench 28	Not used			
Trench 29				
2901	Mid brown ploughsoil	0.3	1.9	Recent
2902	Mid brown alluvial clay	0.2	1.8	Post-third century
2903	Friable peat	0.25	1.5	Iron Age
2904	Mid grey brown alluvial clay	0.15	1.2	Later Bronze Age to Iron Age
2905	Mid brown alluvial clay	0.15	1.05	Later Bronze Age to Iron Age
2906	Organic rich peat containing wood [2913-2923]	0.35	0.9	Bronze Age
2907	Light yellow-grey clay	0.1	0.6	Prehistoric
2908	Dark brown silty clay palaeosol	0.15	0.47	Prehistoric
2909	Natural light grey sandy clay		0.4	

Trench 30				
3001	Mid brown ploughsoil	0.4	1.8	Recent
3002	Friable peat	0.25	1.4	Iron Age
3003	Dark brown alluvial clay	0.24	1.15	Later Bronze Age to Iron Age
3004	Organic rich peat containing wood [3008-3016]	0.34	1.0	Bronze Age
3005	Light grey clay, possible palaeosol	0.15	0.6	Prehistoric
3006	Dark grey clay, possible palaeosol	0.19	0.45	Prehistoric
3007	Natural light brown clay with gravel		0.23	
Trench 31				
3101	Mid brown ploughsoil	0.2	1.8	Recent
3102	Mid brown alluvial clay	0.2	1.65	Post-third century
3103	Friable peat	0.25	1.45	Iron Age
3104	Mid-dark brown alluvial clay	0.22	1.3	Later Bronze Age to Iron Age
3105	Organic rich peat containing wood [3008-3009]	0.28	1.05	Bronze Age
3106	Dark grey clay possible palaeosol	0.32	0.65	Prehistoric
3107	Natural blue and grey clays overlying gravel		0.4	
3110	Light grey clay fill of tree bowl associated with 3109			
Trench 32	Not used			
Trench 33				
3301	Mid-dark brown ploughsoil	0.25	1.85	Recent
3302	Mid-dark brown alluvial clay	0.15	1.65	Post-third century
3303	Friable peat	0.25	1.55	Iron Age
3304	Mid brown alluvial clay	0.25	1.3	Later Bronze Age to Iron Age
3305	Organic rich peat		1.1	Bronze Age
3306	Light grey brown clay palaeosol	0.2	0.8	Prehistoric
3307	Dark grey clay palaeosol	0.25	0.6	Prehistoric
3308	Natural Light grey clays and gravels		0.45	
3309	Peat filled feature extending into the palaeosol. Possible animal burrow			
3310	Local deposit of yellow sand at top of palaeosol [306]	0.05		
Trench 34	Not used			
Trench 35				
3501	Mid brown ploughsoil	0.2	1.9	Recent
3502	Mid brown alluvial clay	0.25	1.75	Post-third century
3503	Friable peat	0.2	1.6	Iron Age
3504	Mid – dark brown alluvial clay	0.3	1.4	Later Bronze Age to Iron Age
3505	Organic rich peat containing wood [3509 & 3510]	0.3	1.05	Bronze Age
3506	Light brown clay palaeosol	0.1	0.75	Prehistoric
3507	Dark grey clay palaeosol	0.3	0.6	Prehistoric
3508	Natural light brown clay with gravel		0.3	
Trench 36				
3601	Mid brown ploughsoil	0.24	2.0	Recent
3602	Mid brown alluvial clay	0.14	1.8	Post-third century
3603	Friable peat	0.2	1.65	Iron Age
3604	Light-mid brown alluvial clay	0.3	1.45	Later Bronze Age to Iron Age
3605	Organic rich peat	0.3	1.15	Bronze Age
3606	Light grey brown clay palaeosol	0.2	0.85	Prehistoric

3607	Dark grey clay palaeosol	0.3	0.75	Prehistoric
3608	Natural grey and brown clay and gravel		0.55	
Trench 37	Not used			
Trench 38				
3801	Mid brown ploughsoil	0.3	2.08	Recent
3802	Mid brown alluvial clay	0.2	1.8	Post-third century
3803	Friable peat	0.2	1.65	Iron Age
3804	Mid grey brown alluvial clay	0.26	1.45	Later Bronze Age to Iron Age
3805	Organic rich peat	0.3	1.2	Bronze Age
3806	Mid yellow –grey clay palaeosol	0.15	0.95	Prehistoric
3807	Dark grey brown silty clay palaeosol	0.28	0.8	Prehistoric
3808	Natural grey and orange sandy clay		0.6	
Trench 39				
3901	Mid-dark brown ploughsoil	0.25	2.2	Recent
3902	Mid brown alluvial clay	0.15	1.85	Post-third century
3903	Friable peat	0.25	1.75	Iron Age
3904	Mid brown alluvial clay	0.35	1.55	Later Bronze Age to Iron Age
3905	Organic rich peat	0.3	1.3	Bronze Age
3906	Light grey brown clay	0.2	1.0	Prehistoric
3907	Dark grey clay palaeosol	0.2	0.8	Prehistoric
3908	Natural yellow and grey clay		0.6	
Trench 40				
4001	Dark brown ploughsoil	0.25	2.1	Recent
4002	Mid brown alluvial clay	0.15	1.85	Post-third century
4003	Friable peat	0.25	1.75	Iron Age
4004	Mid brown alluvial clay	0.3	1.55	Later Bronze Age to Iron Age
4005	Organic rich peat	0.3	1.3	Bronze Age
4006	Light grey brown clay palaeosol	0.2	0.95	Prehistoric
4007	Dark grey clay palaeosol	0.2	0.75	Prehistoric
4008	Natural light brown and grey clays		0.6	
Trench 41				
4101	Mid brown ploughsoil	0.2	2.13	Recent
4102	Mid brown alluvial clay	0.23	1.93	Post-third century
4103	Friable peat	0.25	1.70	Iron Age
4104	Mid grey brown alluvial clay	0.35	1.35	Later Bronze Age to Iron Age
4105	Organic rich peat	0.35	1.0	Bronze Age
4106	Mid grey brown clay	0.25	0.75	Prehistoric
4107	Dark brown-grey clay palaeosol	0.15	0.6	Prehistoric
4108	Mid grey brown silty sandy clay, probably a dirty natural	0.2	0.4	
4109	Natural light grey and orange clays		0.3	
Trench 42				
4201	Mid brown ploughsoil	0.28	2.1	Recent
4202	Mid brown alluvial clay	0.14	1.85	Post-third century
4203	Friable peat	0.3	1.7	Iron Age
4204	Mid grey brown alluvial clay	0.25	1.45	Later Bronze Age to Iron Age
4205	Organic rich peat	0.34	1.2	Bronze Age
4206	Mid-light brown clay		0.95	Prehistoric
4207	Dark brown clay palaeosol	0.3	0.8	Prehistoric
4208	Natural grey and orange clay		0.6	
Trench 49				
4901	Mid brown ploughsoil	0.2	2.25	Recent

4902	Mid brown alluvial clay	0.2	2.0	Post-third century
4903	Friable peat	0.36	1.8	Iron Age
4904	Mid grey brown alluvial clay	0.36	1.55	Later Bronze Age to Iron Age
4905	Organic rich peat	0.5	1.2	Bronze Age
4906	Mid yellow brown clay	0.2	0.95	Prehistoric
4907	Dark brown silty clay possible palaeosol	0.25	0.8	Prehistoric
4908	Natural Grey and orange sandy clays		0.6	
Trench 50				
5001	Mid brown ploughsoil	0.2	2.1	Recent
5002	Mid brown alluvial clay	0.2	1.9	Post-third century
5003	Friable peat	0.3	1.7	Iron Age
5004	Mid grey brown alluvial clay	0.15	1.4	Later Bronze Age to Iron Age
5005	Organic rich peat	0.2	1.2	Bronze Age
5006	Organic rich peat of slighty darker hue	0.08	1.05	Bronze Age
5007	Mid yellow brown clay	0.18	0.95	Prehistoric
5008	Dark brown grey silty clay possible palaeosol	0.2	0.8	Prehistoric
5009	Dark brown grey silty clay possible palaeosol	0.1	0.7	Prehistoric
5010	Natural Grey and orange sandy clays		0.6	
Trench 51				
5101	Dark brown ploughsoil	0.25	2.3	Recent
5102	Mid to dark brown alluvial clay	0.2	2.1	Post-third century
5103	Friable peat	0.3	1.9	Iron Age
5104	Mid brown alluvial clay	0.3	1.75	Later Bronze Age to Iron Age
5105	Organic rich peat	0.3	1.5	Bronze Age
5106	Light grey brown clay palaeosol	0.2	1.15	Prehistoric
5107	Dark grey clay palaeosol	0.2	1.0	Prehistoric
5108	Natural grey and orange clays		0.85	
Trench 52				
5201	Mid brown ploughsoil	0.2	1.9	Recent
5202	Mid brown alluvial clay	0.2	1.7	Post-third century
5203	Friable peat	0.18	1.5	Iron Age
5204	Mid grey brown alluvial clay	0.25	1.3	Later Bronze Age to Iron Age
5205	Organic rich peat containing wood [5209]	0.3	1.1	Bronze Age
5206	Mid yellow brown clay	0.15	0.75	Prehistoric
5207	Dark grey brown silty clay palaeosol	0.15	0.6	Prehistoric
5208	Natural grey and orange clays		0.45	
Trench 53				
5301	Dark brown ploughsoil	0.3	2.5	Recent
5302	Mid brown alluvial clay	0.2	2.3	Post-third century
5303	Friable peat containing wood [5310]	0.3	2.1	Iron Age
5304	Mid brown alluvial clay	0.1	1.9	Later Bronze Age to Iron Age
5305	Organic rich peat containing wood [5309, 5311 & 5312]	0.35	1.8	Bronze Age
5306	Light grey brown clay palaeosol	0.2	1.4	Prehistoric
5307	Dark grey clay palaeosol	0.2	1.2	Prehistoric
5308	Natural orange and grey clays		1.0	

3.4 Field 3

As with Fields 1 and 2 the individual trenches within Field 3 contained, or appeared to contain the same extensive horizons of material with only slight local variations or trench distinct contexts. Because of this parity the trench infill sequence will be presented in a tabular form below with discussion of only salient points.

At the time of the excavation the field was under cultivation with a crop of oilseed rape. The surface of this field was visibly lower than the other two, it proved to be on average about 0.3m lower, this was, however, not a consequence of the complete loss of any of the soil horizons but more a reflection of the general fall of the ground as can be seen from the heights against OD.

As with the other fields no anthropogenic features were observed. Some wood was observed at the base of the palaeosol [4609], further wood was observed within the lower peat in trench 47 [4709-13] and additional wood occurred at a high level in trench 48.

Table 3: Stratigraphic sequence within trenches 43-48, Field 3

Tr/context no	Description	Average thickness	Height of upper surface AoD	Suggested date
Trench 43				
4301	Mid brown ploughsoil	0.2	1.75	Recent
4302	Mid brown alluvial clay	0.24	1.55	Post-third century
4303	Friable peat	0.2	1.3	Iron Age
4304	Mid-dark grey brown alluvial clay	0.18	1.15	Later Bronze Age to Iron Age
4305	Organic rich peat	0.24	1.05	Bronze Age
4306	Mid yellow brown clay	0.2	0.8	Prehistoric
4307	Dark grey silty clay possible palaeosol	0.24	0.6	Prehistoric
4308	Mid grey brown silty sandy clay possible palaeosol	0.12	0.5	Prehistoric
4309	Natural grey and orange clays		0.45	
Trench 44				
4401	Mid brown ploughsoil	0.2	2.2	Recent
4402	Grey clay loam	0.2	2.0	Post-third century
4403	Loamy peat	0.2	1.8	Iron Age
4404	Grey alluvial clay	02	1.6	Later Bronze Age to Iron Age
4405	Peat	0.4	1.4	Bronze Age
4406	Grey clay	0.2	1.3	Bronze Age
4407	Organic rich peat	0.3	1.0	Bronze Age
4408	Light grey silty clay palaeosol	0.1	0.8	Prehistoric
4409	Natural blue grey clay		0.7	
Trench 45				
4501	Mid brown ploughsoil		1.75	Recent
4502	Mid brown alluvial clay		1.55	Post-third century
4503	Friable peat		1.4	Iron Age
4504	Peat		1.2	Bronze Age
4505	Grey brown silty clay		0.9	Prehistoric
4506	Dark grey brown silty clay possible palaeosol		0.65	Prehistoric
4507	Natural grey and orange sandy clay		0.45	
Trench 46				
4601	Dark brown ploughsoil	0.3	2.0	Recent
4602	Mid brown alluvial clay	0.2	1.75	Post-third century
4603	Friable peat	0.3	1.65	Iron Age

4604	Mid brown alluvial clay	0.2	1.45	Later Bronze Age to Iron Age
4605	Organic rich peat	0.3	1.3	Bronze Age
4606	Light grey clay	0.15	0.9	Prehistoric
4607	Dark grey clay palaeosol	0.3	0.7	Prehistoric
4608	Natural grey and orange clays		0.45	
4609	Natural wood at interface of 4607 / 4608			
Trench 47				
4701	Mid brown ploughsoil	0.2	1.6	Recent
4702	Mid brown alluvial clay	0.2	1.4	Post-third century
4703	Friable peat	0.2	1.2	Iron Age
4704	Mid-dark brown alluvial clay	0.12	1.0	Later Bronze Age to Iron Age
4705	Organic rich peat containing wood [4709-4713]	0.24	0.9	Bronze Age
4706	Mid brown clay	0.12	0.7	Prehistoric
4707	Dark grey brown silty clay palaeosol	0.3	0.6	Prehistoric
4708	Natural light grey clay		0.35	
Trench 48				
4801	Mid brown ploughsoil	0.2	1.9	Recent
4802	Mid brown alluvial clay	0.24	1.7	Post-third century
4803	Friable peat	0.2	1.4	Iron Age
4804	Mid grey brown alluvial clay	0.18	1.3	Later Bronze Age to Iron Age
4805	Organic rich peat	0.26	1.15	Bronze Age
4806	Mid grey brown silty clay	0.12	0.9	Prehistoric
4807	Dark grey silty clay palaeosol	0.2	0.7	Prehistoric
4808	Mid grey sandy clay palaeosol	0.12	0.55	Prehistoric
4809	Natural grey and orange clay		0.45	

3.5 Discussion of the key units of soil

The excavation of so many trenches across the study area has allowed the modelling of the various soil units that make up the study area. It is apparent that there is a general topographic fall to the north that is reflected in all the key soil units.

The surface of the natural in the southern part of the study area was generally around 0.6-0.8m aOD but in the northern part it had fallen to around 0.4m aOD (Fig 3). The upper surface of the prehistoric palaeosol similarly showed a general drop to the north from around 1m aOD to about 0.6m aOD (Fig 4). The top of the lower peat had a lesser range as might be expected with a marshy stratum, it however still displayed an irregular level ranging from about 1.2m aOD in the south to heights around 1.1-1.0m in the eastern part and as low as 0.9m in a couple of locations in the west and north (Fig 5). The Later Bronze Age to Iron Age clay horizon displayed an enormous variation in height ranging from occasional 1.7-1.8m aOD at the southern margin to a general level of around 1.4-1.5 and as low as 1.1-1.2 in a few instances along the northern edge of the study area (Fig 6).

It was clear that whilst the horizons appeared flat there were irregular and generally slight variations across the site. These variations may be the result of a variety of features including surface erosion by shallow, perhaps seasonal, channels, but no discrete evidence for a channel was observed, or perhaps differential compaction/settlement of the organic horizons.

3.6 Water level

It was recognised from the start of the project that the relationship between the watertable and preservation both present and long term would be crucial to our understanding. As a result a number of sondages were dug in the evaluation trenches to ensure the ground water level could be recorded. The exposures were allowed to level out after their initial machining so that they were a true reflection of the broader water level (Fig 7).

The site lies in an area of active water level management with the fenland dykes and drains artificially lowering the water table in such a way that agriculture can utilise land that otherwise would be marshy and prone to flooding. As a marker level the height of the water in the Padholme Drain was also recorded, at the time of the excavation in April this was at –0.18m aOD even after a wet winter and very wet March. In proposals for the re-profiling of the drain a 'normal water level' of –0.35m aOD is envisaged.

The water level was recorded in 16 trenches and ranged from +0.67m aOD to – 0.11m aOD. This range was similar to the range recorded in the short piezometer survey conducted by the Wetland Archaeology and Environments research centre at the University of Hull in 2002. In their survey (Brittain and Ruffano 2005) a range of water table fluctuations at Flag Fen of between –0.2 and +1.2 was recorded. They also observe that 2002 was a particularly wet year. Additionally they refer to the apparent degeneration of timbers owing to de watering between 1999 and 2003.

It is clear that these levels of observed ground water and drain water are substantially below the surviving wood, in the case of the present study area the groundwater level lay around 0.8m lower than any surviving large wood suggesting that the preservation was the result of residual water from ancient waterlogging maintained by a capilliary flow of water up through the soil column. The capilliary action and any residual waterlogging has not however managed to maintain the upper peat level which was consistently deflated and friable. Because the waterlogging is not total it is likely that the present wet conditions will ultimately exacerbate microbial decay of any surviving wood.

It is unclear what impact the interception of the rainwater would be to the present water levels within the study area but they are clearly already below the levels at which long-term preservation is likely.

4 FINDS

No stratified ancient artefacts were recovered but occasional small fragments of post-medieval pottery were recovered from the topsoil/ploughsoil horizons and from the upper alluvial clay deposits suggesting agricultural activity in that period. These were discarded. A single damaged and unstratified flint core of Neolithic or Bronze Age date was recovered from trench 12 and a cattle tibia from trench 8 in the palaeosol [806].

During the course of the excavation a strategy was adopted to maximise the potential recovery of finds:

1. All up cast was inspected with the naked eye to see if finds were present and swept with a metal detector.
2. Two machine buckets of the buried soil were spread out in order to maximise the chance for recovery of artefacts.
3. 8 20 litre samples of the buried soil were taken and washed through a 5mm sieve to try to recover flint, pottery or bone. None was recovered.

5 RADIOCARBON DATES

Of the six submitted samples only three were found to be viable for processing. Additional material has been submitted for two of these and a further separate sample has been sent. The three dates received were for samples SBR2, 4 and 5, which were from the lower part of the upper peat [2303], the lower part of the lower peat [2306] and the upper part of the palaeosol [2308] respectively.

Table 4: Radiocarbon dates

Sample Data	Sample	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age (*)	2 Sigma calibration
Beta-233373	SBR2	2510 +/- 60BP	-29.1 o/oo	2440 +/- 60BP	Cal BC 780-390 (cal BP 2730-2340)
Beta 233375	SBR 4	2890 +/- 40BP	-27.2 o/oo	2850 +/- 40BP	Cal BC 1120-910 (Cal BP 3070 to 2860)
Beta 233376	SBR5	3430 +/- 40 BP	-29.9 o/oo	3350 +/-40BP	Cal BC 1740 to 1520 (Cal BP 3690 to 3470)

When considered against the sequence of horizons encountered within the trenches it is apparent that the topsoil/ploughsoil overlies the post third century clay which forms a marker horizon along much of this part of the fen edge. This means any later horizons have been lost. A similar sequence of was noted at the Peterborough Power station site by Dr French (French in Pryor 2001, 57).

6 DISCUSSION

The trench evaluation demonstrated that the study area did not contain an extension of the activity identified either at Flag Fen or during the excavations in advance of the construction of the power station (Pryor 2002). The isolated patches of surviving waterlogged wood had a natural character suggestive of either drifting in water or collapsing trees in an increasingly wet environment (Figs 8 and 9). The nearly complete absence of charcoal from the processed samples suggests there was little domestic activity either within or in close proximity to the study area. Similar inferences can be drawn from the almost complete lack of artefacts from the study, the residual core excepted, suggest that any activity in this part of the fen edge was not of an intensive nature and was separated from any domestic sites.

The substantial posts that were recognised to the south forming both the alignment and also the platform clearly occurred in a discrete area identified as to some extent specific and separate from other parts of the fen edge. The reason for this separateness is unclear at this stage although many constructions are placed so that they are emphasised by their isolation and thereby given greater impact.

The occurrence of coppice stools suggests a degree of prehistoric management of the woodland, but unfortunately these stools are not closely dated. Other than that there was little evidence for any activity in the area studied although it is reasonable to presume that it represented areas of seasonal grazing during drier episodes in the fen development.

All the horizons examined in the evaluation were part of broader more extensive deposits, which can reasonably be presumed to extend beyond the present study area. The preservation of wood at even small sizes suggests that had any substantial remains been present they would have survived to be recognised but the low watertable and the redox conditions suggest that the process of decay is now well advanced and may be irreversible. This was reflected by the quality of the wood examined both visually and scientifically.

The nature of the site with its near horizontal stratigraphy and its uniform sequence will have an impact upon the conditions for preservation (Figs 10 and 11). The lowest levels, in particular the buried soils, will remain damp and may well be under water on a seasonal basis, the dampness extends up to the lower peat by means of capillary action and is likely to have a seasonal aspect reflecting the amount of water in the ground water table but it is unlikely this level is ever fully saturated. The lower clay will limit vertical movement of the ground water and may itself have helped in the maintenance of the lower peat by reducing upward capillary action. This same clay may form a largely impermeable horizon through which substantial rainwater barely passes. The upper peat was visibly wasted and friable and had clearly not been waterlogged for a very long time; this may in some part reflect the low level of precipitation but also the distance above the permanent water table. The dewatering that can be seen on this site is as a consequence of broader fen drainage as a result of which the watertable at the time of this study was below all the archaeological horizons despite it having been a very wet spring.

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PART 2 ASSESSMENT OF THE SOIL/SEDIMENT PROFILES

by C A I French (15/06/2007)

1 INTRODUCTION

The evaluation trenches revealed a relatively deep (<1.7m maximum) fen-edge soil/sediment profile. This comprised a reasonable depth of palaeosol preserved *in situ*, but thinning and disappearing southwards, overlain by freshwater peat and alluvial deposits (Figs 3 to 6). The profile was more or less similar to those observed at the eastern edges of the Fengate Power Station site and southwards between Fourth Drove and Third Droves along the Cat's Water Drain (French 1997a & b, 2001; French and Lewis 2001; Evans and Pryor 2001), and within the Flag Fen basin itself (Scaife 2001). Essentially the proposed development area is occupying the northwestern margin of the Flag Fen basin, the full stratigraphic and palaeo-vegetational record of which is described by Scaife and French in Pryor (2001).

1.1 Observations

Four profiles were described from Trenches 14, 23, 27 and 53 (Appendix 1), as follows:

Trench 14

The buried soil exhibited two horizons beneath a mixed desiccated peat and brown silty clay alluvial material. The upper horizon of the palaeosol was a brown/mottled orange, silt loam, probably indicative of a former A horizon that had received fine (silt, clay and organic matter) alluvial additions. This overlay a thin, pale grey/brown mottled silt loam or B horizon of the buried soil. This soil profile appears to be of brown earth type (after Avery 1980).

Trench 23

Desiccated peat and an organic, dark brown, silty clay loam alluvium overlay a dark brown/orange mottled silt loam buried soil.

Trench 27

This profile was similar to that in Trench 23.

Trench 53

This profile exhibited alternating lenses of desiccated peat and brown alluvial silty clay had accumulated on the buried soil, which had also been influenced by the addition of alluvial derived fines (silt and clay).

All of these profiles suggest that there is a well developed buried soil present beneath the peat/alluvium/peat sequence. The weathered B horizon beneath the organic A horizon suggests that this soil had developed under former well drained and dryland conditions. Subsequently this soil became much influenced by the addition of silt and clay resulting in the gradual aggradation of this soil prior to full submergence by a fen basin sequence. This profile has probably derived from intermittent freshwater flooding of a meadow soil/vegetation type environment, which with the rise of sub-regional groundwater base levels this wet/dry margin became fully affected by freshwater fen or reed marsh type of environment.

1.2 Comparative Fengate and Flag Fen basin stratigraphies and palaeo-environmental sequences

The Edgerley Drain site profiles are essentially similar to the Third/Fourth Drove and Power Station stratigraphic sequences. These profiles exhibited thin, poorly developed brown earths preserved beneath desiccated peats and alluvial silty clays. This palaeosol had been subject to some disturbance and the addition of fines (silt and clay) subsequent to deforestation and prior to the onset of peat formation (French 1992, 2001). By analogy with the Flag Fen and Fengate Power Station sequences (French 2001), peat formation was thought to have begun in the later Bronze Age or earlier first millennium BC, with the main deposition of freshwater alluvium occurring in later Roman/post-Roman times.

The Fourth Drove/Power Station site produced a much thicker and more variable fen-edge profile (French 1992, 2001). The buried soil associated with the second millennium BC field system gradually changed from a brown earth to an immature, water meadow soil as the fen-edge dipped downslope. At the break of contour there was a seasonal, shallow stream channel. There followed a period of peat encroachment, broken intermittently by the deposition of minerogenic sands. The latter were indicative of river-borne seasonal flooding associated with the stream channel and natural water meadow, with shallow reed marsh conditions pertaining at other times. From Scaife's pollen analyses (in Pryor 2001), it is known that conditions gradually became wetter throughout the first half of the first millennium BC, with this whole area below the 3m (10') contour becoming affected by freshwater fen conditions, and freshwater alluvium being deposited by later Roman/post-Roman times. Radiocarbon assay of the peat horizon at the Power Station site has given a date of 800-400 cal BC (GU-5620; 2840+/-50 BP) for the inception of peat growth (Scaife 2001, 369).

The profile at the Third Drove site recently assessed is quite similar to that observed at the Fourth Drove/Power Station site (French 1997b, 2001). Here, the *c* 1.4m profile exhibits a well preserved buried soil capped by an horizon of more minerogenic, pale greyish yellow, sand/silts indicative of freshwater flooding, peat mixed with silty clay alluvium and then two further horizons of alluvial deposition above. The upper part of the buried soil in places exhibits some peat development prior to the freshwater flooding.

In contrast, the profile associated with the timber platform and avenue at Flag Fen itself exhibited a very poorly developed or incipient soil beneath the second millennium BC and later peat and alluvial sediments (French 2001). This must reflect the much wetter situation at the centre and lowest part of the basin.

1.3 Assessment of potential

For comparative purposes, the buried soil and peat/alluviual horizons of the profile were column sampled for future micromorphological and palynological analysis. Given the strong similarities to the other profiles already investigated from the Fengate and Flag Fen basin area by this author, and in particular the nature of the palaeosol, no further soil analytical work is suggested at this stage.

But for comparative and complementary purposes, it would be advantageous to conduct a palynological analysis of the buried soil and overlying peaty horizons with appropriate radiocarbon dating. This would add to the detailed picture of land-use and vegetational change that already exists for the Fengate/Flag Fen area, especially in an area that seems to be a relative archaeological blank.

This new development site extends the area of the Fengate fen-edge investigated northwards, complementing the earlier work done in the Flag Fen basin (Pryor 2001), and along the western fen-edge going inland between Fourth and Second Droves (Evans 1992; Evans and Pryor 2001; French 2001; French and Lewis 2001; Pryor 2001; Scaife 1997, 2001), thus plugging a small gap in our knowledge of the development of this landscape. Moreover, this is one of the few areas in lowland England to have received such attention, and this is in itself a reason for some further palaeo-environmental work.

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APPENDIX 1: SOIL COLUMN SAMPLE DESCRIPTIONS (TOP TO BOTTOM OF MONOLITH)

Trench 14, sample 5

0-11cm: homogeneous mixture of brown desiccated peat and silty clay alluvium [1405]
11-27cm: brown with orange mottling silt loam; probably a former organic A horizon with alluvial additions [1406]
27-31cm: pale greyish brown to brown, organic silt loam; B horizon of buried soil [1407]

Trench 23, 2306-2308, sample 16

0-4cm: brown, desiccated peat [2306]
4-32cm: dark brown organic silty clay alluvium [2307]
32-50cm: very dark brown with orange mottles, silt loam buried soil [2308]

Trench 27, 2706-2709, sample 15

0-11cm: desiccated dark brown peat [2706]
11-26cm: dark greyish brown with orange mottling clay alluvium [2707]
26-35cm: heterogeneous mixture of black peat and dark greyish brown clay alluvium [2708]
35-50cm: dark to pale greyish brown organic silt loam buried soil [2709]

Trench 53, sample 17

0-4cm: desiccated black peat [5305]
4-8cm: lens of silty clay alluvium [5305]
8-35cm: desiccated black peat [5305]
35-44cm: brown organic silty clay alluvium [5306]
44-50cm: brown organic silt loam buried soil; probably a former organic A horizon with alluvial additions [5307]

PART 3 PALAEOECOLOGICAL ASSESSMENT

Pollen by Dr P P Allen (ARS Ltd),
Plant Macros by B Johnson (ARS Ltd),
Diatoms by Dr J Jordan (Coventry University)

1 INTRODUCTION

1.1 Location and scope of work

Archaeological Research Services Ltd was commissioned by Northamptonshire Archaeology undertake pollen analysis at the Storey's Bar Road development site (SBR), Cambridgeshire. In May 2007 twenty ones locations were sampled for loose "grab" samples and seven contiguous monolith sections from three locations were removed totaling 3.5m of undisturbed sediment. Pollen, diatom and plant macrofossil assessment was undertaken during June 2007.

1.2 Geology

The underlying geology is a Jurassic sedimentary sequence overlain by extensive undifferentiated Devensian lacustrine sands and gravels. Overlying the lacustrine deposits are intercalated organic and inorganic deposits. The organic deposits include a well humified peat, a palaeosol and a dehydrated desiccated peat that were deposited during the Holocene. The sediment used for this assessment was sub-sampled from the Holocene alluvium deposits.

1.3 Methodology

Twenty locations throughout the Storey's Bar Road site were sub sampled for sediment to provide organic material for environmental analysis; the locations are shown in Figure 12. Three sites were chosen for sediment collection via 50cm aluminium monolith tins. The sediment from the remaining seventeen locations was collected as loose "grab" samples. The grab samples were taken from distinct sedimentary horizons that could be traced across the whole site and characterised the Storey's Bar Road stratigraphy. From the twenty locations ten sampled sites were selected for pollen, plant macrofossil and diatom assessment. The location of the ten sites was chosen to provide as much spatial coverage of the site as possible. Monolith one was relatively central to the entire site and appeared to be representative of the whole Storey's Bar Road site stratigraphy. Monolith two and three were positioned in sections representative of the extremities of the site. Monolith three was positioned close to the assumed former fen edge and an additional ten samples were collected for diatom analysis to examine the fen/basin transition history. The monoliths were cleaned and digitally photographed by ARS Ltd under clean laboratory conditions. The full stratigraphic descriptions were recorded in the field by Northamptonshire Archaeology and will not be presented in this report.

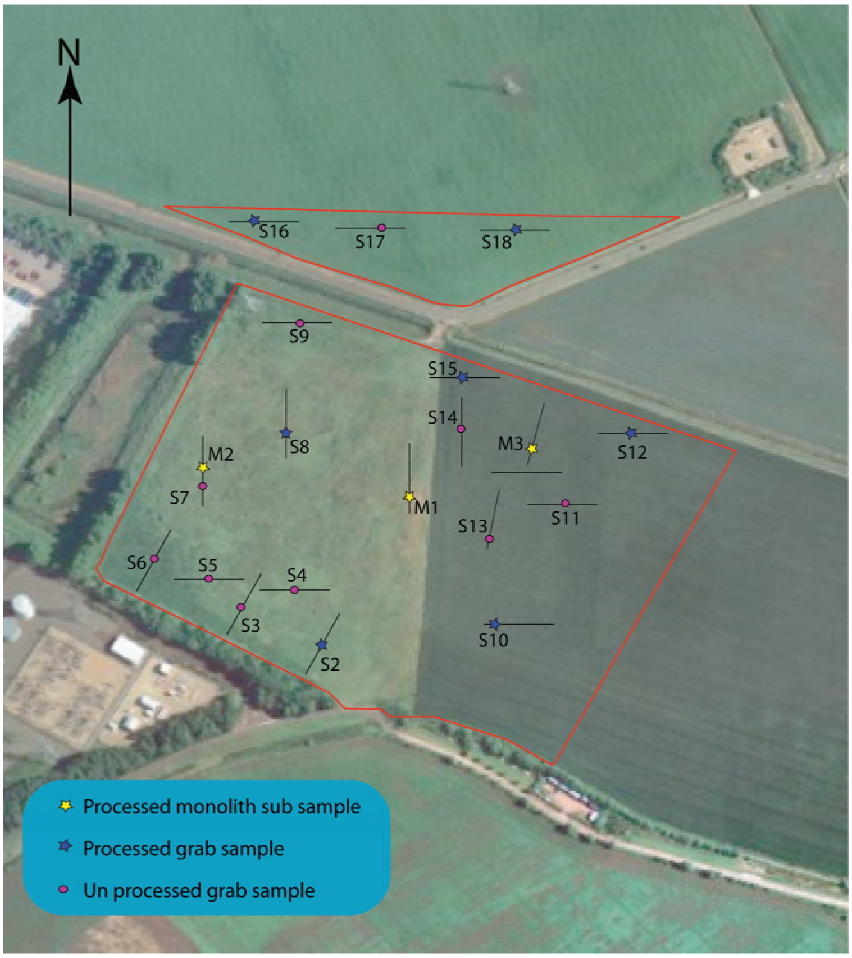

Fig 12 Sample site locations at the Storey's Bar Road development site

Sediment from monoliths one, two, three and sites two, eight, ten, twelve, fifteen, sixteen and eighteen was prepared for pollen, plant macrofossil and diatom assessment. The sample number and depth of the sample can be seen in Table 5.

Table 5: Levels selected for analysis at the Storey's Bar Road development site

Sample	Trench	Context	Depth (cm)
Monolith **1a**	23	2303	3-3.5
	23	2303	12-12.5
	23	2304	30.5-31
	23	2304	39-39.5
Monolith **1b**	23	2305	16.5-17
	23	2306	35.5-36
Monolith **1c**	23	2308	4-4.5
	23	2308	19.5-20
	23	2308	35.5-36
	23	2309	46.5-47
Monolith **2a**	14	1404	39-39.5
Monolith **2b**	14	1405	20-20.5
	14	1406	40.5-41
Monolith **3a**	27	2704	26-26.5
Monolith **3b**	27	2706	20-20.5
	27	2707	41.5-42
S2	4	403	28-53
	4	404	53-63
	4	405	63-84
S8	16	1606	39-53
	16	1608	53-70
	16	1609	73-104
S10	42	4205	18-50
	42	4206	50-57
	42	4207	67-99
S12	29	2906	43-65
	29	2907	65-80
	29	2908	80-92
	29	2909	92-101
S15	24	2403	30-40
	24	2405	40-61
	24	2406	61-82
	24	2407	82-102
S16	43	4305	20-57
	43	4306	57-71
	43	4307	71-97
S18	47	4705	28-59
	47	4706	59-74
	47	4707	74-91
Monolith **3a** Diatoms	27	2704	3.5-4
	27	2704	7-7.5
	27	2704	14.5-15
	27	2704	16.5-17
	27	2704	17-17.5
	27	2705	37-37.5
Monolith **3b** Diatoms	27	2705	6-6.5
	27	2706	26-26.5
	27	2706	34-34.5
	27	2706	41.5-42
	27	2707	47-47.5

1.4 Pollen preparation

The sampling interval for material removed from the monoliths was not uniform but varied throughout the sedimentary sequence with a sample thickness of 5mm employed. The material removed from the "grab" samples was based on weight and not 5mm resolution. At each selected level 2g of sediment was used per sample. Two *Lycopodium* tablet (batch number 483216) were added to each sample prior to chemical preparation for the purposes of calculating pollen concentrations as described by Stockmarr (1971). The chemical preparation of the samples followed the acid digestion based on the procedure as described by Barber (1976). Further details of the laboratory procedure are contained in Appendix B. All counts were undertaken using a Leica DME compound microscope at a magnification of x400. A standard assessment count of the area of one 22x22 mm cover slip of pollen and non-pollen-palynomorphs was employed. The count included exotic grains (*Lycopodium)*, spores and aquatics to give an indication of pollen concentrations, identification of pollen grains and spores was aided by the use of published identification keys, including Faegri & Iversen (1989), Moore *et al* (1991), van Geel *et al* (1998), Hans-Jürgen Beug (2004) and by comparison with pollen reference material (type slides) held by ARS Ltd.

1.5 Diatom preparation

Following the same sampling interval procedure as for the pollen, the sediment samples were prepared according to standard laboratory techniques (Barber and Haworth, 1981). This involved distillation on a hotplate with Hydrogen peroxide to remove any organic matter and then a series of washes with distilled water to concentrate the diatoms and reduce the amount of clay and silt particulate matter. A pipette of the suspension was then placed onto a glass cover-slip and mounted onto microscope slides with Naphrax, a high refractive index, to illustrate the possible species preserved. Diatom species were identified with reference to Hartley *et al* (1996), Hendey (1964) and Van der Werf and Huls (1957-74). Diatom nomenclature follows Hartley (1996) and salinity and lifeform classification is based upon Van Dam *et al*. (1994), Vos and de Wolf (1993) and Denys (1991/2).

The sediments were examined for their diatom preservation potential and the major species contained within each sample. This would give a broad indication of the depositional environment in conjunction with other microfossil analyses and any other lithostratigraphy/sedimentary analysis that has been carried out.

1.6 Plant macrofossil preparation

Following the same sampling interval procedure as for the pollen and diatoms, the samples were prepared according to a generic laboratory technique. This involved extracting organic remains from samples of *c*. 50ml, using flotation and the residue being passed through nested sieves at 1mm, 500µm and 300µm. The retained material, which was never more than 5ml, was examined using a BSMV zoom stereomicroscope at up to x50 magnification. Notes on the matrix, and scores for organic material such as cereals, chaff, weeds and other botanical residues were made.

1.7 Photography

The cleaned cores were placed underneath a fixed position digital SLR camera. The cores were methodically advanced in regular intervals beneath the camera, with high-resolution digital images being taken every 5cm. The images were then combined using ArcSoft Panorama 3.0 software, producing a continuous digital image of each core.

2 RADIOCARBON DATING

A total of six levels were chosen from monolith 1(a-c) for radiocarbon dating. Two samples from the uppermost and basal sedimentary units were removed to establish a min/max age range for the monolith (SBR 1) and (SBR 6) respectively. The remaining four samples were chosen from positions within the monolith based on notable changes in the stratigraphy. The samples were sent to Beta Analytic Inc, Florida USA (For results see above in Archaeological Report, section 6). The sample information is shown in Table 6 below.

Table 6: Depth of Radiocarbon samples taken from SBR Monolith 1

Sample ID/Lab Code	**Monolith and depth (cm)**	**Context**	**Material sent for radiocarbon dating**
SBR1	M1a 4-5	2303 top	Indeterminate twig
SBR2	M1a 21.1-22.1	2303 bottom	*Calluna vulgaris* sapwood
SBR3	M1b 6-7	2706 top	Indeterminate twig
SBR4	M1b 20.5-21.5	2706 bottom	Indeterminate twig
SBR5	M1c 17-18	2308 top	*Salix/Populus* twig
SBR6	M1c 43-44	2308 bottom	Poaceae culm

3 RESULTS

Each assessed level from the monolith and grab samples are described in turn below. An interpretation follows in section 4

3.1 Pollen

The assessed pollen has not been placed into a zoned pollen diagram because the total number of grains identified at assessment level is too low for statistical significance and the graphed curves would have been misleading. The count data used and presented (Appendix C) includes all identified pollen irrespective of the preservation state ("good", "crumpled", "corroded" and "ruptured"). However, preservation condition is a key feature for determining potential for full analysis of palaeobotanical remains as part of the assessment stage (English Heritage 1991, Jones *et al* 2007). Therefore a percentage break down for pollen preservation at each site is presented

3.1.1 Monolith 1

Ten levels were counted from monolith 1 although the slides contained a large amount of degraded organic material; this did not impede identification of the pollen and non-pollen palynomorphs (NPPs). The range of arboreal pollen identified were relatively assorted and included *Quercus*, *Alnus glutinosa*, *Betula Fagus*, *Fraxinus*, *Pinus Salix* and *Ulmus.* The most frequently recorded were *Alnus glutinosa* and *Quercus* respectively. *Corylus avellana*-type, *Hedera helix* and *Lonicera* represented the shrub communities. *Avena*-type, *Hordeum*-type together with *Plantago lanceolata*, *Rumex acetosa/acetosella* and Ranunculaceae prove a reasonable representation of human indicator and disturbed ground types. The number of other herbaceous types was relatively well represented and includes types such as Apiaceae, Asteraceae, *Galium*-type and *Papaver rhoeas*. Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Typha latifolia, Sparganium erectum, Filipendula* and Cyperaceae. The spores and non-pollen palynomorphs were comparatively abundant and included *Filicales*, *Polypodium* and spore type such as T114 and T143 that are frequently associated with arboreal communities.

The preservation values for pollen from monolith 1 are primarily in a "good" state as shown in Figure 13 however there is evidence of both physical and biological damage to a number of individual grains with seven percent being so badly preserved that no confident identification could be made.

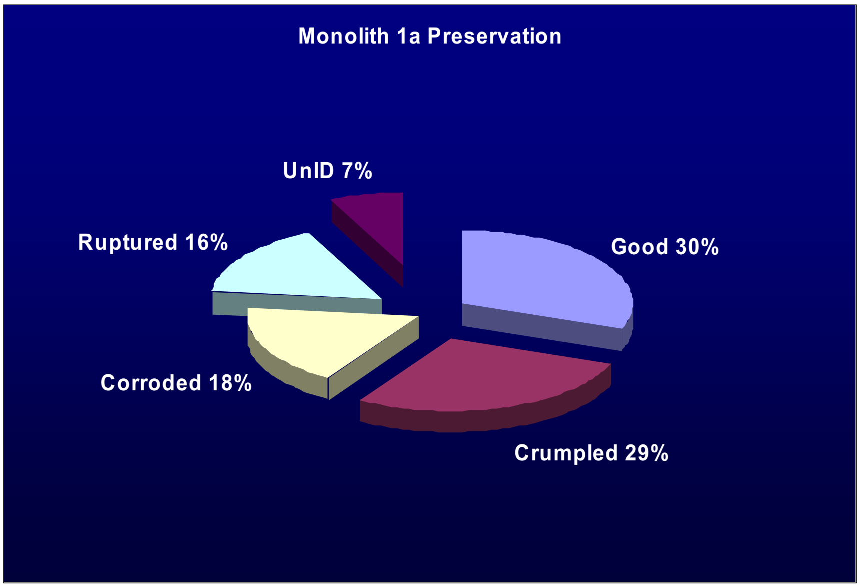

Fig 13 Percentage preservation data for pollen of monolith 1

3.1.2 Monolith 2

Four levels were counted from monolith 2 and the slides contained a large amount of unidentifiable degraded organic material. However, this did not impede identification of pollen and non-pollen palynomorphs.

Overall the variety of pollen and NPP's was rather limited. The arboreal pollen types included *Quercus*, *Alnus glutinosa*, *Fraxinus*, *Pinus* and *Tilia.* The most frequently recorded were *Quercus* and *Alnus glutinosa* respectively. *Corylus avellana*-type represented the shrub communities. *Hordeum*-type together with *Plantago lanceolata*, Ranunculaceae and *Urtica* present a limited representation of human indicator and disturbed ground types. The range of herbaceous types was also relatively limited but included types such as Apiaceae, Asteraceae, *Cirsium*-type and Rosaceae. Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included S*parganium erectum* and Cyperaceae. The spores and non-pollen palynomorphs were comparatively abundant and included *Filicales*, *Polypodium*, and *Pteridium* and spore type such as T114, T315 and T83.

The preservation values for pollen from monolith 2, shown in Figure 14 are primarily in a "crumpled" state. Followed by thirty-three percent of grains being attributed a "good" preservation condition. However, there were ten percent of the recognised grains that recorded biological "corroded" damage, whilst a further ten percent were so badly degraded a confident identification could not be achieved.

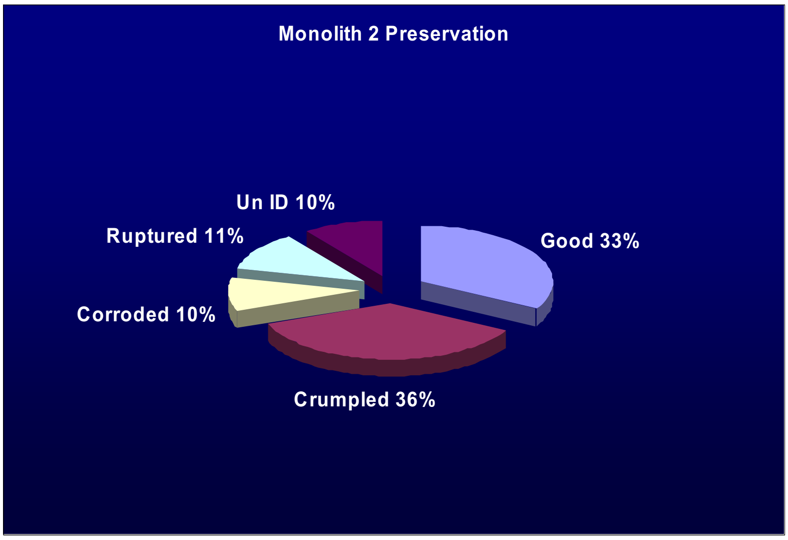

Fig 14 Percentage preservation data for pollen of monolith 2

3.1.3 Monolith 3

Three levels were counted from monolith 3, the slides contained a large amount of degraded organic material; this did not impede identification of pollen and non-pollen palynomorphs. The range of arboreal pollen identified was relatively mixed and included *Quercus*, *Alnus glutinosa*, *Fagus*; *Pinus* (damaged) *Salix* and *Ulmus*. The most frequently recorded were *Quercus* and *Alnus glutinosa* respectively. *Corylus avellana*-type, *Hedera helix* and *Calluna vulgaris* represented the shrub communities. *Avena*-type, *Hordeum*-type together with *Rumex acetosa/acetosella* and Ranunculaceae present a confident representation of human indicator and disturbed ground types. The number of other herbaceous types was relatively limited and included types such as Apiaceae, *Galium*-type and Rosaceae, *Anthemis*, whilst Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Typha latifolia*, *Hottonia*-type, *Myriophyllum alterniflorum* and Cyperaceae. *Taraxacum officinale* was present in all three levels and was particularly frequent in the upper most level (26-26.5cm). The spores and non-pollen palynomorphs were comparatively limited and included *Filicales*, *Polypodium*, *Pteridium* and spore type such as T114 and T143 that are frequently associated with arboreal communities.

The preservation values for pollen from monolith 3, shown in Figure 15 are primarily in a "crumpled" state. Followed by forty-two percent of grains being attributed a "good" preservation condition. However, there were twenty-four percent of the identified grains that recorded biological "corroded" damage, whilst a further seven percent were so badly degraded a confident identification could not be achieved.

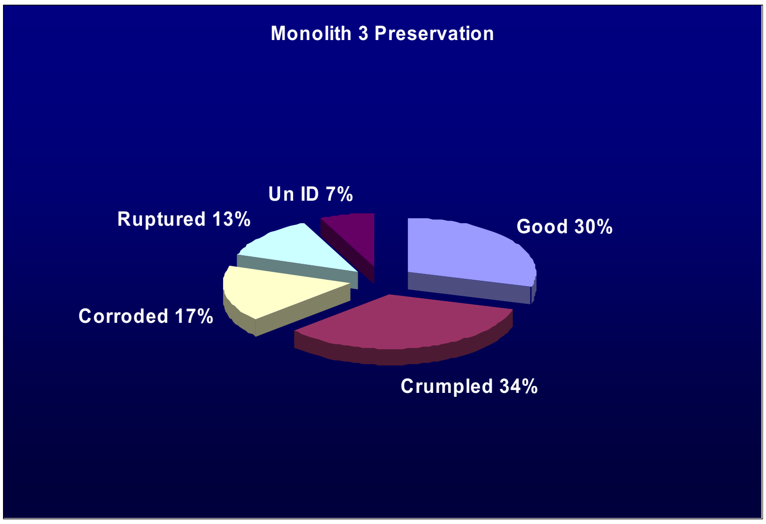

Fig 15 Percentage preservation data for pollen of monolith 3

3.1.4 Grab sample SBR S2

Three levels were counted from SBR S2, the slides contained degraded organic material; however, this did not impede identification of pollen and non-pollen palynomorphs. The range of arboreal pollen identified was relatively mixed and included *Quercus*, *Alnus glutinosa*, *Fagus*, *Pinus* and *Ulmus*. The most frequently recorded was *Quercus*. *Corylus avellana*-type and *Hedera helix* represented the shrub communities. *Avena*-type, *Hordeum*-type together with Ranunculaceae and *Artemisia* represent human indicator and disturbed ground types. The numbers of other herbaceous types were limited but included types such as Asteraceae and Caryophyllaceae whilst Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Sparganium erectum* and Cyperaceae. The spores and non-pollen palynomorphs were comparatively limited and included *Filicales*, *Polypodium*, and spore type such as T114 and T143 that are frequently associated with arboreal communities.

The preservation values for pollen from SBR S2, shown in Figure 16 are primarily in a "good" state. Followed by grains describing mechanical damage, "crumpled" thirty-five percent, whilst biological damage "corroded" was particularly low at five percent. However, seven percent of the identified grains were so badly degraded a confident identification could not be achieved

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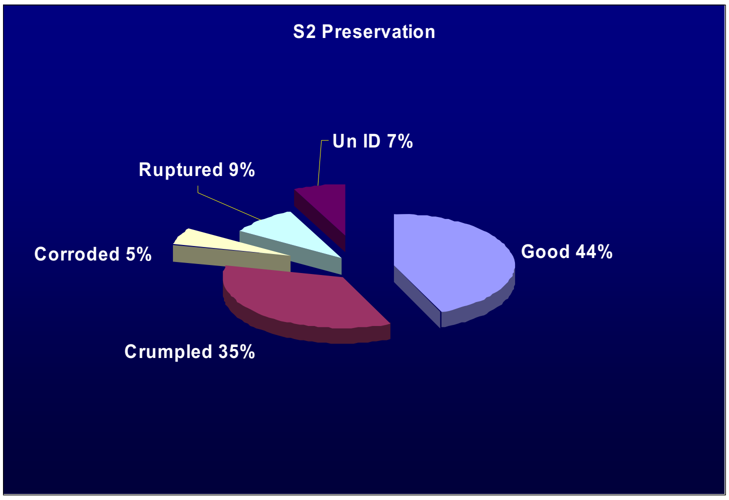

Fig 16 Percentage preservation data for pollen of SBR S2

3.1.5 Grab sample SBR S8

Three levels were counted from SBR S8, the slides contained degraded organic material, but this did not impede identification of pollen and non-pollen palynomorphs. The range of arboreal pollen identified was relatively varied and included *Quercus*, *Alnus glutinosa*, *Fagus*, *Pinus* and *Salix*. *Alnus glutinosa* followed by *Quercus* were the most frequently recorded. The shrub communities were represented by *Corylus avellana*-type. *Hordeum*-type together with *Plantago lanceolata* and *Utica*-type present a limited representation of human indicator and disturbed ground types. The range of herbaceous types was limited but included types such as Asteraceae, *Serratula*-type and Caryophyllaceae, whilst Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Myriophyllum alterniflorum*, *Sparganium erectum*, *Empetrum nigrum*, *Myriophyllum verticillatum* and Cyperaceae. *Taraxacum officinale* was present in two levels. The spores and non-pollen palynomorphs were comparatively limited and included *Filicales*, *Polypodium*, *Pteridium*, *Osmunda regalis* and spore type such as T114 and T314 and T207.

The preservation of the pollen from SBR S8 is principally in a "crumpled" state as shown in Figure 17. Twenty-seven percent of the grains were "good" and described no visible damage, whilst biological damage "corroded" was particularly low at five percent. However, seven percent of the identified grains were so badly degraded a confident identification could not be achieved

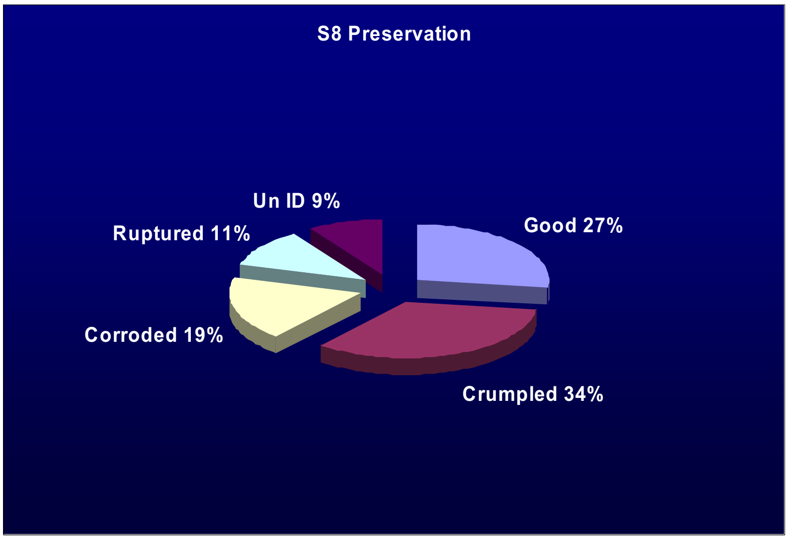

Fig 17 Percentage preservation data for pollen of SBR S8

3.1.6 Grab sample SBR S10

Three levels were counted and the degraded organic material did not impede identification of pollen and non-pollen palynomorphs. The arboreal pollen identified was relatively assorted and included *Quercus*, *Alnus glutinosa*, *Betula*, *Salix*, *Pinus* and *Ulmus*. The most frequently recorded were *Salix* and *Pinus* respectively. The shrub communities were characterised by *Corylus avellana*-type and *Hedera helix*. *Avena*-type, *Hordeum*-type together with *Plantago lanceolata* and Ranunculaceae present a reasonable depiction of human indicator and disturbed ground types. Additional herbaceous types included Apiaceae, Rosaceae and Poaceae, which was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Typha latifolia*, *Filipendula* and Cyperaceae. The spores and non-pollen palynomorphs were comparatively abundant and included *Filicales*, *Polypodium* and *Pteridium* and spore type such as T114, T315 and T88.

The preservation values for pollen from SBR S10 are mainly in a "crumpled" state as shown in Figure 18; however grains in a "good" condition are almost as equally abundant. There is further evidence of both physical and biological damage with fifteen percent of identified grains being "ruptured" whilst six percent of recorded grains were so badly preserved that not confident identification could be made.

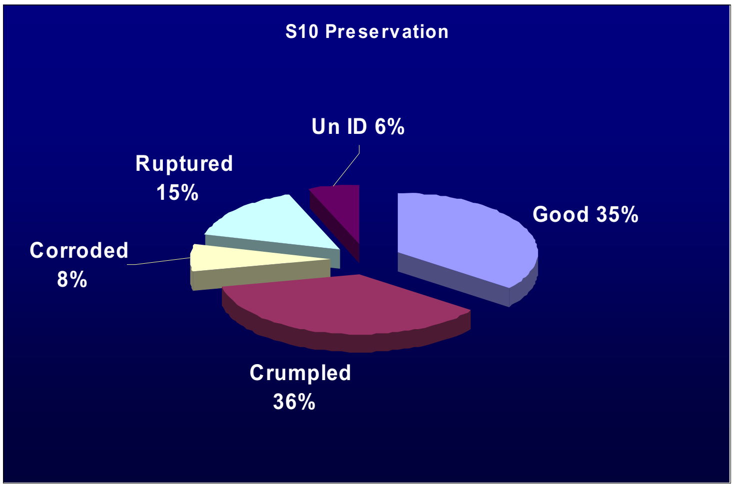

Fig 18 Percentage preservation data for pollen of SBR S10

3.1.7 Grab sample SBR S12

Four levels were counted from SBR S12, the slides contained degraded organic material; however, this did not obstruct identification of pollen and non-pollen palynomorphs. The range of arboreal pollen identified was relatively mixed and included *Quercus*, *Alnus glutinosa*, *Fagus*, *Pinus* and *Salix*. The most frequently recorded was *Quercus*. *Corylus avellana*-type, *Calluna vulgaris* and *Hedera helix* represented the shrub communities. Human indicator and disturbed ground types were recorded by the presence of *Plantago lanceolata*, Ranunculaceae, Chenopodiaceae and *Artemisia*. The range of other herbaceous types was limited but included types such as Asteraceae, *Galium*-type, *Serratula*-type and Rosaceae whilst Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Myriophyllum verticillatum*, *Typha latifolia*, *Filipendula* and Cyperaceae. The spores and non-pollen palynomorphs were comparatively well represented and included *Filicales*, *Polypodium*, *Pteridium* and *Osmunda regalis* and spore type such as T114, T207, T92 and T143.

The pollen from SBR S12, shown in Figure 19 and are for the most part in a "good" state of preservation. However, thirty-five percent of the recorded grains displayed characteristics of mechanical damage; "crumpled" whilst biological damage "corroded" was slightly lower at fourteen percent. Sixteen percent of identified grains were "ruptured" whilst, five percent of the identified grains were so badly degraded a confident identification could not be achieved.

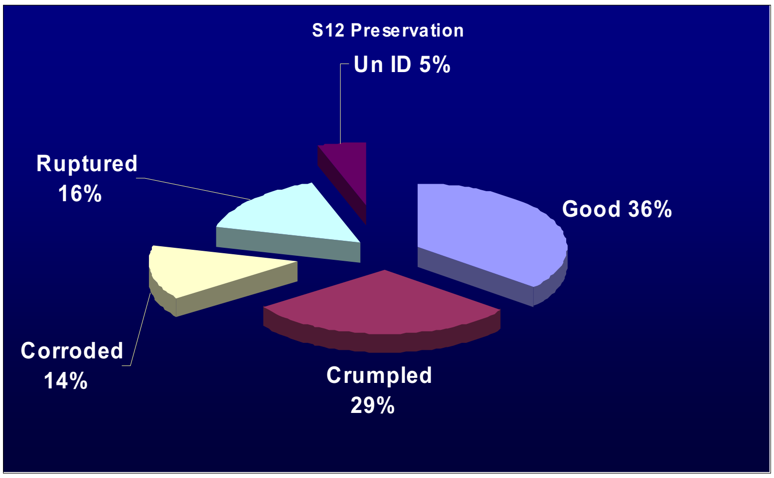

Fig 19 Percentage preservation data for pollen of SBR S12

3.1.8 Grab sample SBR S15

Four levels were counted from SBR S15, when viewed the slides contained degraded organic material. However, the degraded material did not obstruct identification of pollen and non-pollen palynomorphs. The variety of arboreal pollen identified was relatively wide-ranging and included *Quercus*, *Alnus glutinosa*, *Betula*, *Fagus*, *Pinus*, *Salix*, Fraxinus and two levels contained a number of damaged *Pinus* grains. *Quercus* and *Pinus* respectively were the most frequently recorded arboreal types. *Corylus avellana*-type and *Hedera helix* characterise the shrub communities. *Plantago lanceolata*, Ranunculaceae and Chenopodiaceae present a narrow representation of human indicator and disturbed ground types. Poaceae was the most frequently recorded herb whilst additional herbaceous types were limited and included types such as Asteraceae, *Galium*-type and Caryophyllaceae. Indicators of wet/damp ground conditions included *Potamogeton*-type, *Empetrum nigrum*, *Typha latifolia* and Cyperaceae. *Taraxacum officinale* was present in three levels. The spores and non-pollen palynomorphs were comparatively varied and included *Filicales*, *Polypodium*, *Pteridium*, *Sphagnum* and spore type such as T114 and T314 and T207.

The pollen preservation of SBR S15, shown in Figure 20 described a dominantly “good” state. However, thirty-five percent of the recorded grains displayed characteristics of mechanical damage “crumpled”; whilst biological damage “corroded” was slightly lower at twelve percent. Ten percent of identified grains were “ruptured” whilst, three percent of the identified grains were so badly preserved a confident identification could not be achieved.

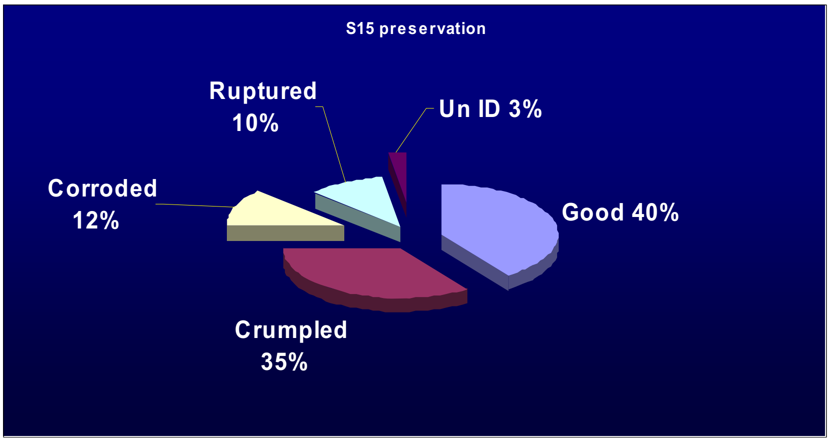

Fig 20 Percentage preservation data for pollen of SBR S15

3.1.9 Grab sample SBR16

Three levels were counted and the degraded organic material did not hinder identification of pollen and non-pollen palynomorphs. The arboreal pollen identified was relatively assorted and included *Quercus*, *Alnus glutinosa*, *Betula, Salix*, *Pinus* and *Ulmus*. The most frequently recorded were *Alnus glutinosa* and *Quercus* respectively. The shrub communities were characterised by *Corylus avellana*-type, *Lonicera* and *Hedera helix*. *Avena*-type along with *Plantago lanceolata*, *Artemisia* and Ranunculaceae present a restricted depiction of human indicator and disturbed ground types. Additional herbaceous types include Apiaceae, Asteraceae and Caryophyllaceae whilst Poaceae was the most frequently recorded herb. Indicators of wet/damp ground conditions included *Typha latifolia*, *Filipendula Myriophyllum alterniflorum* and Cyperaceae. The spores and non-pollen palynomorphs were relatively abundant and included *Filicales*, *Polypodium* and spore type such as T114, T315 and T88.

The preservation of pollen from SBR S16 is largely "good" as illustrated in Figure 21. However, evidence of both physical and biological damage was characterised by twenty-six percent and twenty percent of identified grains being "crumpled" and "corroded" respectively. Eight percent of the recorded grains were "ruptured" and two percent were so badly degraded no confident identification could be achieved.

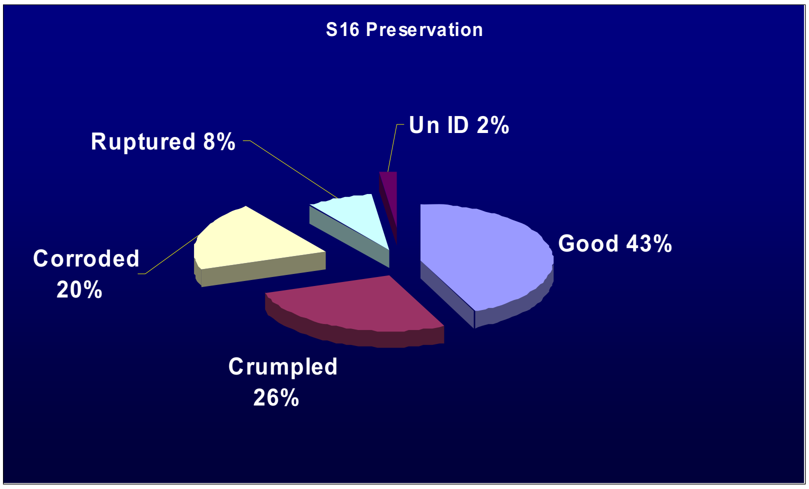

Fig 21 Percentage preservation data for pollen of SBR S16

3.1.10 Grab sample SBR S18

Three levels were counted from SBR S18, when viewed the slides contained degraded organic material. However, the degraded material did not hinder identification of pollen and non-pollen palynomorphs. The range of arboreal pollen identified was quite limited and included *Quercus*, *Alnus glutinosa*, *Pinus*. Ericaceae and *Corylus avellana*-type characterise the shrub communities. Human indicator and disturbed ground types were recorded by the presence of *Avena*-type, *Hordeum*-type, *Plantago lanceolata*, Ranunculaceae, and Chenopodiaceae. Poaceae was the most frequently recorded herb whilst additional herbaceous types were limited and included types such as Apiaceae, *Cirsium*-type and Rosaceae. Indicators of wet/damp ground conditions included *Empetrum nigrum*, *Typha latifolia*, *Myriophyllum verticillatum* and Cyperaceae. Lactuceae and *Taraxacum officinale* was present. The spores and non-pollen palynomorphs were comparatively varied and included *Filicales*, *Polypodium*, and spore type such as T114, T92, T18, T314 and T207.

The pollen preservation percentages of SBR S18 with thirty-seven percent describing a "good" state are shown in Figure 22. However, thirty-two percent of the recorded grains displayed characteristics of mechanical damage; "crumpled" whilst biological damage "corroded" was somewhat lower at seventeen percent. Ten percent of identified grains were "ruptured" whilst, three percent of the identified grains were so badly degraded a confident identification could not be achieved.

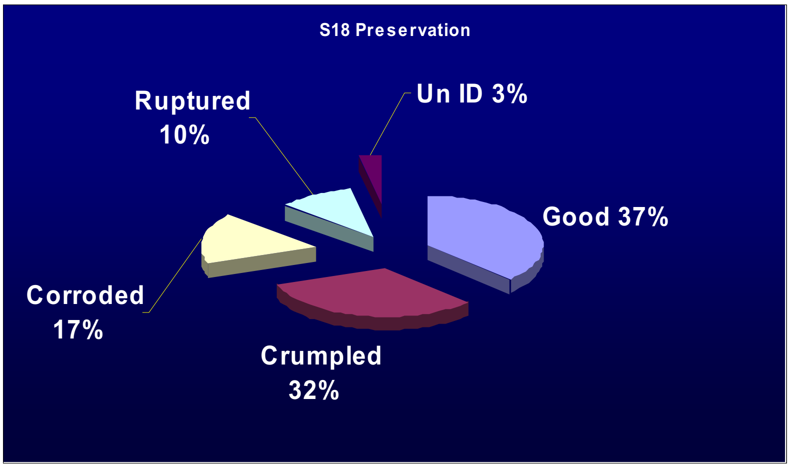

Fig 22 Percentage preservation data for pollen of SBR S18

3.2 Diatoms

Table 7: Diatom preservation and assemblage habitat

Site and depth (cm)	Context	Preservation condition	Number of key species identified	Assemblage habitat
S2 28-53	403	Excellent	16	Freshwater
53-63	404	Meagre	No diatoms present	NA
63-84	405	Very poor	1 (fragments)	NA
S8 39-53	1606	Excellent	12	Freshwater
53-70	1608	Very poor	3	Freshwater
73-104	1609	Excellent	12	Freshwater
S10 18-50	4205	Excellent	10	Freshwater
50-57	4206	Fair	6	Predominantly Freshwater
57-99	4207	Excellent	6	Freshwater
S12 43-65	2906	Poor	3	Freshwater
65-80	2907	Meagre	No diatoms present	NA
80-92	2908	Meagre	No diatoms present	NA
92-101	2909	Meagre	No diatoms present	NA
S15 30-40	2403	Good	8	Freshwater
40-61	2404	Poor	3	Freshwater
61-82	2405	Excellent	11	Freshwater
S16 20-57	4305	Fair	6	Freshwater with Brackish component
57-71	4306	Exceptional	5	Freshwater
71-91	4307	Excellent	8	Predominantly Freshwater with minor Brackish component
S18 28-59	4704	Poor	2	Freshwater
59-74	4705	Excellent	8	Freshwater
74-91	4706	Poor	3	Freshwater
M1a 12-12.5	2303	Excellent	13	Freshwater
30.5-31	2304	Excellent	18	Freshwater
39-39.5	2304	Excellent	7	Freshwater
M1b 16.5-7	2305	Poor	4	Freshwater
35.5-36	2306	Excellent	8	Freshwater
M1c 4-4.5	2308	Very good	8	Freshwater
19.5-20	2308	Very good	10	Freshwater
35.5-36	2308	Ok	6	Freshwater
46.5-47	2309	Meagre	No diatoms present	NA
M2a 39-39.5	1404	Very good	10	Freshwater
M2b 20-20.5	1405	Good	9	Freshwater
40.5-41	1406	Ok	4	Freshwater
M3 a 3.5-4	2704	Excellent	9	Freshwater
7-7.5	2704	Excellent	10	Freshwater
14.5-15	2704	Poor	3	Freshwater
16.5-17	2704	Very good	11	Freshwater
17-17.5	2704	Very good	14	Freshwater
26-26.5	2704	Extremely poor	Few fractured fragments of 1	NA
37-37.5	2705	Meagre	No diatoms present	NA
M3b 6-6.5	2705	Extremely poor	Few fractured fragments of 1	NA
20-20.5	2706	Extremely poor	Few fractured fragments of 1	NA
26-26.5	2706	Extremely poor	Few fractured fragments of 1	NA
34-34.5	2706	Extremely poor	Few fractured fragments of 2	NA
41.5-42	2706	Extremely poor	Few fractured fragments of 1	NA
47-47.5	2707	Meagre	No diatoms present	NA

The assessed diatoms have not been placed into a zoned diatom diagram because the total of grains identified at assessment level is too low for statistical significance and the graphed curves would have been misleading. The full counts of diatoms for each level are presented in appendix E. A summary of the number of key diatom species, preservation condition and assemblage habitat from each location is presented in Table 6.

3.3 Plant macrofossils.

The results from the plant macrofossil assessment have not been placed into a diagram because the total of seeds/remains identified at assessment level is too low for statistical significance and the graphed curves would have been misleading. Instead a summary table for each location is presented in Table 8.

Table 8: Plant macrofossil data

Sample no	Context	Total bulk volume (ml)	Flot. sample (ml)	Matrix and notes	Cereal	Chaff	Weed	Other	Action required
M1a 3 – 3.5		50	<1	No organic material	-	-	-	-	None
M1a 12 – 12.5	2303	50	<1	No organic material	-	-	-	-	None
M1a 30.5 – 31	2304	50	<5	Very small quantities of degraded wood	-	-	-	-	None
M1a 39 – 39.5	2304	50	<1	Unidentifiable organic material	-	-	-	-	None
M1b 16.5 – 17	2305	50	<1	No organic material	-	-	-	-	None
M1b 35 – 35.5	2306	50	0	No organic material	-	-	-	-	None
M1c 4 – 4.5	2308	50	<5	Very small quantities of degraded wood	-	-	-	-	None
M1c 19.5 20	2308	50	<5	Very small quantities of degraded wood	-	-	-	Grass/sedge culm fragment	None
M1c 35.5 – 36	2308	50	<5	Very small quantities of degraded wood	-	-	-	-	None
M1c 46.5 – 47	2309	50	<5	Very small quantities of degraded wood	-	-	-	-	None
M2a 39 – 39.5	1404	50	<5	Very small quantities of degraded wood	-	-	-	Possible very occasional seed casing	None
M2b 20 – 20.5	1405	50	<5	Small quantities of degraded wood	-	-	-	-	None
M2b 40.5 – 41	1406	50	<5	Small quantities of degraded wood	-	-	-	-	None
M3a 26 – 26.5	2704	50	<1	Unidentifiable organic material	-	-	-	-	None
M3b 20 – 20.5	2706	50	<5	Very small quantities of degraded wood	-	-	-	-	None
M3b 41.5 – 42	2707	50	<1	No organic material	-	-	-	-	None
S2 28 – 53	403	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S2 53 -62	404	50	<5	Small quantities of degraded wood	-	-	-	Very occasional fragments of leaf and seed casing	None
S2 63 -84	405	50	<1	Very small quantities of	-	-	-	-	None

Sample no	Context	Total bulk volume (ml)	Flot. sample (ml)	Matrix and notes	Cereal	Chaff	Weed	Other	Action required
				degraded wood					
S8 39 – 53	1606	50	<5	Small quantities of degraded wood	-	-	-	-	None
S8 53 – 70	1608	50	0	No organic material	-	-	-	-	None
S8 73 – 104	1609	50	<1	Very small quantities of degraded wood	-	-	-	-	None
S10 18 – 50	4205	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S10 50 – 57	4206	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S10 67 – 99	4207	50	<5	Small quantities of degraded wood	-	-	-	-	None
S12 43 – 65	2906	50	<5	Small quantities of degraded wood	-	-	1 Poly.	-	None
S12 65 – 80	2907	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S12 80 – 92	2908	50	<5	Small quantities of degraded wood	-	-	-	-	None
S12 92 – 101	2909	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S15 41 – 61	2403	50	<5	Small quantities of degraded wood	-	-	-	-	None
S15 61 – 82	2404	50	<1	Very small quantities of degraded wood	-	-	-	-	None
S15 82 – 102	2405	50	<5	Small quantities of degraded wood	-	-	1 Poa.	-	None
S16 20 – 57	4305	50	<5	Small quantities of degraded wood	-	-	-	-	None
S16 57 – 71	4306	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S16 71 – 79	4307	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S18 28 – 59	4704	50	<5	Small quantities of degraded wood	-	-	-	-	None
S18 59 – 74	4705	50	<5	Very small quantities of degraded wood	-	-	-	-	None
S18 74 – 91	4706	50	<5	Small quantities of degraded wood	-	-	-	-	None

4 INTERPRETATION

The range of pollen and non-pollen palynomorphs (NPP) types from the Storey's Bar Road development site was relatively diverse and the preservation condition was mainly "good" suggesting many grains had not been damaged during transportation, deposition and in the post-deposition environment. However, damaged grains were recurrently recorded from every level analysed, and cumulatively the preservation percentages indicate a relatively high degree of mechanical and biological damage to the pollen preserved in the sediment at Storey's Bar Road. An example of the different preservation conditions is shown in Figure 23. The percentage and cumulative damaged values for each monolith/site are displayed in Table 9.

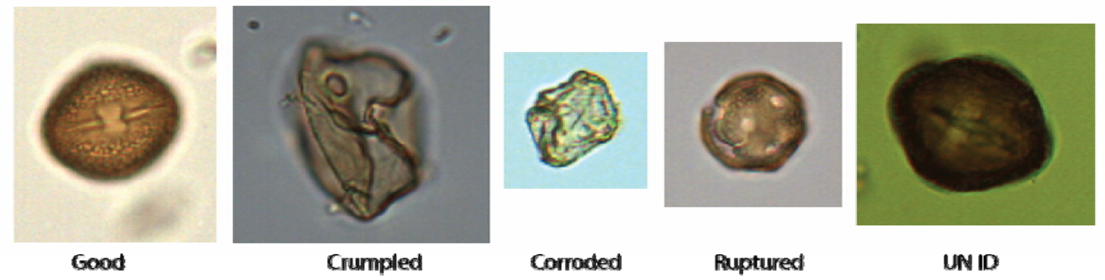

Fig 23 Examples of the preservation conditions recorded at Storey's Bar Road

Table 9: Pollen preservation percentage values for Storey's Bar Road Development site

Monolith/Site	Good	Crumpled	Corroded	Ruptured	Un ID	% Cumulative Damaged
M1	30	29	18	16	7	70
M2	33	36	10	11	10	67
M3	30	34	17	13	7	70
S2	44	35	5	9	7	56
S8	27	34	19	11	9	73
S10	35	36	8	15	6	65
S12	36	29	14	16	5	64
S15	40	35	12	10	3	60
S16	43	26	20	8	2	57
S18	37	32	17	10	3	63

The preservation condition of the pollen varied throughout the SBR site with cumulative "damaged" pollen values ranging from 73% to 56%. The degree of preservation is an important indicator value (Jones 2007) that most likely reflects the differential deposition and post deposition conditions across the site. It is worth considering that when the preservation condition is poor some pollen types may be completely absent from the preserved record and this could produced a biased vegetation reconstruction.

The range of arboreal types was fairly varied although *Quercus* (oak), *Alnus glutinosa* (alder), *Pinus* (pine), *Fagus* (beech), *Betula* (birch) and *Salix* (willow) were commonly occurring at each site. *Quercus* (oak) and *Alnus glutinosa* (alder) were the most frequently recorded arboreal types and were present at every location investigated. However, the consistent presence of oak and alder within a Fen edge context is not unusual as their presence most likely represents the damp or wet ground conditions. Frequencies of *Alnus glutinosa* (alder) are notably elevated in a number of levels from Monolith 1 and sites 16 and 18 and may indicate a change in local hydrology manifest as increased ground wetness leading to expansion and possibly short lived riparian woodland. The potential presence of damp ground is further suggested by increased frequencies in *Quercus* (oak) concurrent with the increased frequencies of alder. Higher frequencies of oak would not be abnormal as oak can tolerate damp conditions but not waterlogged ground.

The arboreal pollen describes an area of mixed deciduous woodland, or localised woodland stands. *Filicales* and *Polypodium* palynomorphs provide additional evidence for areas of shaded woodland cover within the sample site. These ferns frequently form part of the understory component to the woodland. *Betula* (birch) values were not very prevalent, and can also be indicative of the damp ground conditions, as the birch populations would be more likely to be inhabiting the dryer and quicker draining locations of the surrounding areas (Mitchell 1990).

The range of shrub and woody climber types was relatively limited, although *Corylus avellana*-type (hazel) was present at every site. Additional types were *Hedera helix* (ivy), *Lonicera* (honeysuckle) and *Calluna vulgaris* (heather) all indicating open or cleared areas within/around woodland. Human landuse management, such as pastoral and arable agriculture may be a likely cause of the open areas, although natural openings cannot be entirely dismissed. Hazel frequently represents the scrub component of woodland, however; it may also represent an expansion of scrub into open areas. There is also the possibility that the hazel expansion was encouraged by people utilising hazel as a managed resource. Ivy and honeysuckle are climbers native to woodland and scrub environments but their presence could also indicate hedges. If hedges were present this would provide additional evidence of agricultural practises and human induced clearances conditioning the landscape on and around the SBR site. The low frequency of all the recorded shrub species may be in response to the local ground conditions as these types are common on all but very acidic, very dry or very water logged soils (Clapham *et al* 1957; Stace 1997).

The herbaceous pollens were the most widely represented types recorded during the assessment. Poaceae (grasses) followed by Cyperaceae (sedges) were present at every level and were the most dominant herbaceous types. Both types indicate open areas throughout the study site. Minor increases and decreases are apparent between the different sites and reflect either changes in the vegetation composition and/or changes in the local hydrology. Other herbaceous pollen such as *Artemisia* (daisy family) could be indicative of natural disturbance but it may also reflect pastoralism at the site. Rosaceae (including raspberry and blackberries) could have been available as a gathered food source for humans close by. However, the Rosaceae family is extensive (3000+ species) and includes many non-edible plant types; therefore it is not certain that the identified Rosaceae types are associated with human activity. Apiaceae (carrot family) was also present and again may be further indication of an edible resources associated to human activity. Although as with Rosaceae, Apiaceae is a huge family and may represent non edible species that are naturally occurrences in the vegetation composition of the SBR site. Caryophyllaceae (pink family) are recorded frequently from almost all locations throughout the study site adding further weight to the interpretation of open, damp and rough ground environments.

The assortment of aquatic types recorded indicate a range of wet environmental conditions have been present throughout the study site. *Myriophyllum verticillatum* (whorled water-milfoil) and *M. alterniflorum* (alternate-flowered water-milfoil) and *Sparganium rectum* (bur-reed) are present intermittently and these types indicate slow moving streams, ditches or still open bodies of water such as pools, lakes, ponds,. An additional indicator of standing water was the occurrence of *Typha latifolia* (reedmace – more commonly known as "bulrush") which is in indicative of fens and swampy environments. Further damp ground indicators included *Empetrum nigrum* (crowberry) common on moors and bogs, *Filipendula* (meadow sweet) and Cyperaceae (sedges) indicative of damp open and/or wet marshy ground. There was associated evidence for pastoral activity *Rumex acetosa/acetosella* (sheep and common sorrel) (Behre 1981) near to these settings that could suggest that these areas were being utilised by live stock

The pollen types associated with human activity were present but not particularly varied. However, pollen types such as *Plantago lanceolata* (ribwort plantain), Lactuceae (dandelions) and Ranunculaceae (buttercup family) often indicate ground disturbance as a result of human landuse practices. These indicator types were frequently recorded from all sites during the assessment and suggest almost continuous human activity throughout the time period represented by the SBR site sediments. The presence of these pollen types may suggest that the human impact was long term and extensive across the area possibly indicating a fairly intensive use of the landscape**.** *Plantago lanceolata* (ribwort plantain), Lactuceae (dandelions) and Ranunculaceae (buttercup family) can indicate pastoral activity. Further evidence of pastoral activity is indicated by the presence of *Rumex acetosa/acetosella* (sheep and common sorrel) (Behre 1981) recorded from a number of levels during the assessment. In addition to pastoral activity there is also strong evidence for the cultivation of cereals. Arable agricultural indicators such as *Avena*-type (oats) and *Hordeum*-type (barley) were identified in seven out of ten sites during the assessment. The cereal production is in keeping with damp environmental conditions as *Avena*-types (oats) are tolerant of damp conditions. The damp ground conditions may explain the lack of *Triticum*-type (wheat) which prefers dryer conditions. Monolith 1 contained a mixture of pollen such as *Rumex acetosa/acetosella* (sheep and common sorrel), Ranunculaceae (buttercup family), *Avena*-type (oats) and *Hordeum*-type (barley) and this may well indicate mixed landuse practices were present throughout the site. The arable grains identified displayed mechanical damage “crumpling” (see fig 23) but the condition of the grains was generally “good” which suggests a short transport distance and rapid deposition in anoxic conditions, and indicates arable cultivation close to the site.

The non-pollen palynomorphs recorded throughout the assessment were comparatively well represented and support the interpretation produced from the pollen identifications. *Filicales* and *Polypodium* (ferns) are both common components of woodland environments and were frequently recorded. The presence of NPP types 114, 30, and 140 reinforce the suggestion of damp to wet/waterlogged ground conditions. T114 occurred frequently and is interesting as it is restricted in its occurrence to the clay deposited under marine conditions (van Geel 1998). Type 143 (fig 24) is a notable occurrence and has been attributed with soil samples dated to the Roman period (van Geel 2003), which adds further weight to a post Late Neolithic date for many of the sediments from Storey’s Bar Road site.

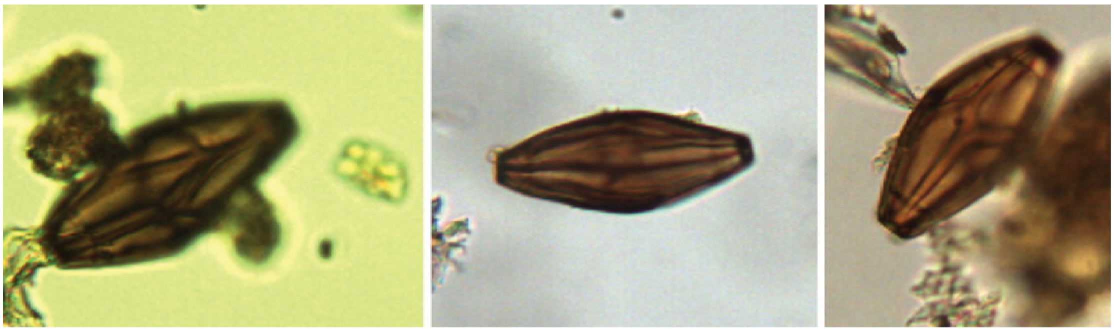

Fig 24 Non-pollen palynomorphs Type 143

Although suggesting a chronological period from palynological analysis alone is hazardous, the sequence represented here most likely post dates the Late Neolithic *c* 3000 Cal BC. This is based on evidence such as *Ulmus* (elm) that briefly records a presence in the monolith, but is in affect absent from the site. This combined with almost continuous human indicators suggests a post primary elm decline date *c* 3100 Cal BC. However, it must be stressed that this is a tentative suggestion that is subject to change upon the return of the associated radiocarbon assay. Type 88 records a number of mandibles that attest to the presence of various invertebrates throughout the site as shown in Figure 25. The frequency of concentrations of microscopic charcoal (both <50 µm and >50 µm) are low throughout the assessment and suggests fire was not a major influence at the site.

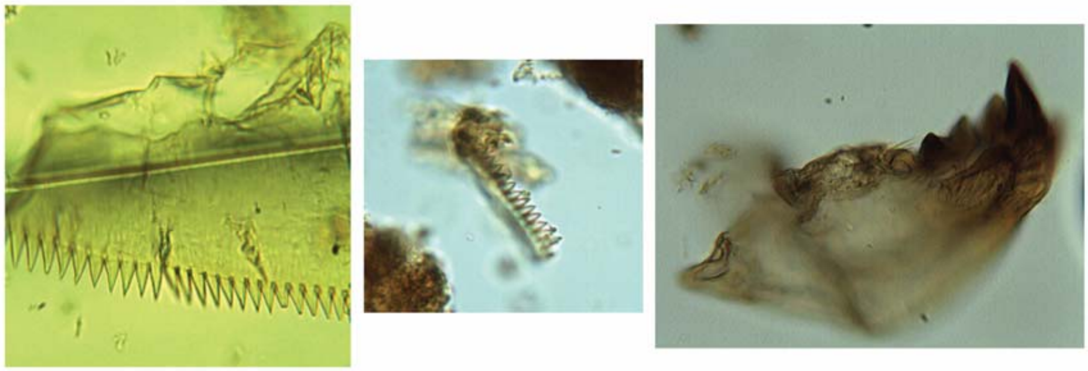

Fig 25 Examples of the non-pollen palynomorph Type 88

4.1 Comparison with other pollen studies in the region

The reasonable preservation condition and moderate diversity of the pollen and non-pollen palynomorphs identified during this assessment indicates an area that has undergone a number of landuse and vegetation composition changes. However, due to the lack of high-resolution sampling (every 5 mm) and because the counts are not statistically robust or testable (total land pollen must be no less than 500 grains) this makes the site difficult to interpret with statistical confidence. The low arboreal frequencies, herbaceous and aquatic pollen and repeated presence of disturbed ground with cereal types suggests some woodland or woodland stands within an open environment interspersed with areas of standing water and marshy ground. The potential presence of hedges may indicate the area was purposely divided for different land uses including grazing whilst the “good” preservation condition of the cereal types indicates some arable cultivation may have been close by.

The recorded pollen from this assessment has been compared to pollen data from the Flag Fen platform and Fengate excavations, both of which are less than 2 km distance from the current site of investigation. The pollen and non-pollen palynomorph data from these sites records types such as *Alnus glutinosa* (alder), *Quercus* (oak), *Betula* (birch), *Pinus* (pine), *Corylus avellana*-type (hazel), Poaceae (grasses), Cyperaceae (sedges), *Plantago lanceolata* (ribwort plantain), cereal types, *Rumex acetosa/acetosella* (common and sheep sorrel), *Filicales*, *Polypodium* (ferns) and *Pteridium* (brackens) signifying the pollen recorded in this analysis are consistent with the findings of Scaife (1992 and 2001).

The interpretation of the Flag Fen and Fengate pollen (see Scaife 1992 and 2001) describes an almost complete sequence of vegetation changes for the Flag Fen area. Parts of the pollen sequence have been radiocarbon dated constructing a chronology that shows the sequence incorporating the Neolithic palaeosol that developed in the Devensian sand and gravel deposits. The pollen types recorded at Flag Fen and Fengate were dominated by *Alnus glutinosa* (alder), *Quercus* (oak), *Corylus avellana*-type (hazel), Poaceae (grasses) and Cyperaceae (sedges). The Flag Fen pollen suggested an alder dominated landscape, with prevalent grasses and sedges and areas of fringing mixed deciduous woodland were in relatively close by. The ranges of herbaceous and aquatic types recorded were appreciably more abundant than the current pollen assessment, but this is due to a higher pollen sum being employed.

The Flag Fen pollen sequences also records the changes in the local hydrology with waterlogging of the deeper areas of the basin occurring around 2030-1680 Cal BC (Pryor 2001). At this time arboreal and herbaceous types that initially dominated the vegetation composition declined, and an expansion of aquatic types such as *Myriophyllum* spp and *Sparganium*-type occurred.

Anthropogenic indicator types such as *Plantago lanceolata* (ribwort plantain), *Rumex acetosa/acetosella* (common and sheep sorrels) and cereal types were frequently recorded at Flag

Fen and Fengate, indicating almost constant human activity. *Rumex acetosa/acetosella* and the cereal types suggest exploitation of an open landscape for pastoral and arable agriculture. The cereal type pollen provided additional evidence to enhance the chronology as cereal cultivation and low values of *Ulmus* (elm) were recorded, and this suggests a post primary *Ulmus* decline with a date of *c* 4500-3100 Cal BC. Following the increased wetness within the Flag Fen basin enhanced peat formation followed. The expansion of peat was eventually capped by an alluvial deposit that represents the wide scale alluvation of the basin during the Iron Age/Roman period 400-900 Cal BC (Scaife 2001).

4.2 Interpretation of diatoms

The assessment revealed that fourteen levels were not fossiliferous and no significant records of diatom assemblages were preserved. However, the remaining assemblages indicate areas of freshwater/marshy environment, with slow to almost still standing bodies of water. This correlates well with the pollen evidence with sedges and aquatics from samples mono 1, 3, SBR S8, 12, 15, 16 and 18. These bodies of water could range from shallow pools to slow moving ditches but were not indicative of larger bodies of water such as a lake. There are some minor occurrences of species that inhabit brackish environments, but these may reflect either dilution of soluble minerals produced *in situ* via leaching during a period of drying across the site, and/or aerial deposition of saltspray brought inland from the wash region.

Diatom taphonomy is quite well understood and in marsh environments it is likely that either extreme acidity or extreme alkalinity are usually the cause for the loss of biogenic silica from the deposited sediment. Diatoms can survive in fairly harsh conditions but the mobility of biogenic silica controls their fossilisation. It would appear that the Storey's Bar Road site has a quite variable preservation potential for diatom silica, something which is to be expected from a marsh/fen location. The changes in pH associated with vegetation growth and decay in this type of environment mean that diatom preservation is dependent on very localised conditions, pre and post deposition. The differential preservation conditions indicated by the variable diatom record, is not gradational. Within one site there could be high specie abundance in one level whereas the next level could have very low abundance. Where diatoms are present, the preservation was often excellent, whilst the levels with poor preservation preserved almost no diatoms. The ecological tolerances of each of the species including pH, salinity, trophic status and moisture tolerance can be seen in Table 10.

Table 10: Notes on the Storey's Bar Road diatom ecological tolerances

Specie	pH	salinity	trophic status	moisture
Cocconeis pediculus	alkaliphilous (mainly occuring at pH>7	brackish-fresh	eutraphentic	water body
Cocconeis placentula var *placentula*	alkaliphilous (mainly occuring at pH>7	fresh	eutraphentic	water body and sometimes wet/moist places
Cyclotella striata	alkaliphilous (mainly occuring at pH>7	brackish	N/A	water body and sometimes wet/moist places
Cymbella ehrenbergii	alkalibiontic (exclusively occuring at pH>7	fresh	mesotraphentic	water body
Cymbella laevis	N/A	fresh	N/A	N/A
Cymbella turgida	alkaliphilous (mainly occuring at pH>7	fresh	meso-eutraphentic	water body
Diploneis ovalis	alkaliphilous (mainly occuring at pH>7	fresh	N/A	wet/moist places and temporarily dry places
Epithemia adnata var *porcellus*	alkalibiontic (exclusively occuring at pH>7	fresh	meso-eutraphentic	water body and sometimes wet/moist places
Epithemia zebra	alkalibiontic (exclusively occuring at pH>7	fresh	meso-eutraphentic	water body and sometimes wet/moist places
Eunotia exigua	acidobiontic (optimal occurrence at pH<5.5	fresh	oligo-to eutraphentic (hypereutraphentic)	water body and regularly on wet/moist places
Fragilaria brevistriata	alkaliphilous (mainly occuring at pH>7	fresh	oligo-to eutraphentic (hypereutraphentic)	water body and sometimes wet/moist places
Fragilaria construens var *venter*	alkaliphilous (mainly occuring at pH>7	fresh	meso-eutraphentic	water body
Fragilaria exigua	circumneutral (occuring at pH-values ~7	fresh	oligotraphentic	water body and sometimes wet/moist places
Fragilaria pinnata	alkaliphilous (mainly occuring at pH>7	fresh	oligo-to eutraphentic (hypereutraphentic)	water body and regularly on wet/moist places
Fragilaria ulna	alkaliphilous (mainly occuring at pH>7	fresh	oligo-to eutraphentic (hypereutraphentic)	water body and sometimes wet/moist places
Gomphonema acuminatum	alkaliphilous (mainly occuring at pH>7	fresh	eutraphentic	water body and sometimes wet/moist places
Gyrosigma acuminatum	alkalibiontic (exclusively occuring at pH>7	fresh	eutraphentic	water body and sometimes wet/moist places
Melosira italica	circumneutral (occuring at pH-values ~7	fresh	meso-eutraphentic	water body and regularly on wet/moist places
Meridion circulare	alkaliphilous (mainly occuring at pH>7	fresh	oligo-to eutraphentic (hypereutraphentic)	water body
Navicula digitoradiata	alkaliphilous (mainly occuring at pH>7	brackish	N/A	water body and regularly on wet/moist places
Navicula hennedyi	N/A	brackish	N/A	water body
Navicula radiosa	circumneutral (occuring at pH-values ~7	fresh	meso-eutraphentic	water body and regularly on wet/moist places
Navicula viridula	alkaliphilous (mainly occuring at pH>7	fresh	eutraphentic	water body
Nitzschia archibaldii	circumneutral (occuring at pH-values ~7	fresh	eutraphentic	N/A
Pinnularia lundii	acidophilous (mainly occuring at pH<7	fresh	mesotraphentic	N/A
Pinnularia major	circumneutral (occuring at pH-values ~7	fresh	meso-eutraphentic	water body and sometimes wet/moist places
Pinnularia viridis	circumneutral (occuring at pH-values ~7	fresh	oligo-to eutraphentic (hypereutraphentic)	water body and regularly on wet/moist places
Stauroneis productum	alkaliphilous (mainly occuring at pH>7	brackish-fresh	N/A	water body and regularly on wet/moist places
Surirella biseriata	alkaliphilous (mainly occuring at pH>7	fresh	eutraphentic	water body

4.3 Interpretation of Plant macrofossils

The range of plant macrofossil types was limited, with poor material retention being noted. The matrix of most samples was almost entirely tiny wood fragments with some rootlets. None of the wood examined could be positively identified due to its small size. Only two seeds were noted, a probable *Persicaria lapathfolium* (Pale Persicaria), a member of the knotweed family that inhabits damp lowland areas and a possible Poaceae (grass). Both were very badly degraded, particularly the Poaceae, making their identification tentative. No anthropogenic material, such as domesticated cereal grains were noted.

5 CONCLUSIONS

The pollen from Storey's Bar Road has shown a vegetation sequence potentially dating from the Late Neolithic. It is likely that Storey's Bar Road sediment sequences contain enough preserved pollen and non-pollen palynomorphs to allow further analysis and produce a detailed vegetation history. However, on the basis of this assessment any future vegetation history would most likely compliment the previously published vegetation histories from Flag Fen and Fengate. The possibility of a significantly different vegetation history providing new or alternative data for the area cannot be entirely ruled out. The pollen recorded during this assessment did display a range of preservation conditions, and cumulatively the most frequent preservation condition was "damaged". It was noted that the pollen concentrations varied between levels and sites. This is thought to reflect periods of time where the preservation potential was reduced, most likely by conditions where sediments were exposed to highly oxygenated conditions (indicating lowering of the water table and drying of the sediments).

The diatom evidence from Storey's Bar Road describes an environment that included areas of freshwater/marshy conditions. There are some minor occurrences of species that inhabit brackish environments, but these may reflect either dilution of soluble minerals produced *in situ* via leaching during a period of drying across the site and/or aerial deposition of saltspray brought inland from the wash region. However, the diatom record does corroborate the pollen evidence for periodically wet ground conditions with slow to almost still standing bodies of water. These bodies of water could range from slow moving ditches to relatively shallow pools, although the diatoms assemblages recorded were not indicative of larger bodies of water such as a lake.

The diatom data from the Storey's Bar Road site suggests a relatively variable preservation potential for diatom silica, something which is to be expected from a marsh/fen location. The changes in pH associated with vegetation growth and decay in this type of environment mean that diatom preservation is dependent on very localised conditions both, pre-and post-deposition. Due to the exceptional poor representation of plant macrofossils no environmental interpretation can be offered from this assessment.

The pollen, diatom and plant macrofossil evidence from this assessment is limited when compared to previous work that was produced from full analysis. This difference between assessment and analysis is based on significantly less identifications that mean the assessment sums cannot be shown to be statistically significant or testable. However, the data suggests that open ground, agriculture and interspersed areas of shallow standing water and some woodland was present but most likely in the form of woodland stands within an open periodically wet environment. The areas experienced changes in the hydrology that promoted wet, and in places waterlogged ground with some standing water resulting in an expansion of aquatic types and the eventual formation of peat. The changeable hydrological conditions at the site are most likely responsible for the variable preservation of organic remains. Episodes of wetting and drying most likely promoted conditions that lead to the erosion and degradation of organic remains, especially the larger plant macrofossil remains. Evidence for Human landuse includes pastoral activity, cereal cultivation and perhaps even the manipulation of local species for hedges and gathered food sources. However, natural disturbance of the landscape could account for some of the indicators types presence.

5.1 Potential for further work

The sequence of vegetation change recorded in the Storey's Bar Road sediments is very interesting and complex. If it were possible to conduct high-resolution analysis (every 5 mm) from the contiguous stratigraphic sequence retained in monolith 1 would provide a more detailed insight to the environmental and vegetation history of the area. Monolith 1 has retained a long sedimentary that appears be a good representation of the whole Storey's Bar Road site. The results of the assessment have already demonstrated human activity and suggest arable cultivation and pastoral activity was possibly extensive and time transgressive across the site. A total of six plant macrofossil have been submitted for radiocarbon dating and should provide a robust skeletal chronological framework for the sedimentary sequence. Further high resolution examination of the monolith has the potential to reveal when the environment was first exploited by human activity, as well as documenting landuse change through time. There is pollen in acceptable quantities and suitably well preserved to undertake a detailed high-resolution pollen count of the Storey's Bar Road site. Here, within the counted levels, pollen concentrations varied and this is thought to reflect periods of time where the preservation potential was reduced, most likely by conditions where sediments were exposed to highly oxygenated conditions.

APPENDIX A

Botanical Name	Common English name
Arboreal	**Trees**
Alnus glutinosa	alder
Betula	birch
Quercus	oak
Pinus	pine
Salix	willow
Fraxinus	ash
Tilia	lime
Ulmus	elm
Shrubs	**Shrubs**
Corylus avellana	hazel
Calluna vulgaris	heather
Ericaceae	heath
Hedera helix	ivy
Lonicera	honeysuckle
Herbs	**Herbs**
Anthemis	chamomile
Apiaceae	parsley family
Asteraceae	daisy or sunflower family
Caryophyllaceae	carnation family
Chenopodiaceae	goosefoot family
Cirsium	thistles
Lactuceae	dandelion family
Taraxacum	dandelion
Filipendula	meadowsweet
Galium-type	bedstraw, goosegrass, cleavers and woodruff family
Poaceae	grasses
Cyperaceae	sedges
Polygonaceae	buckwheat family
Potentillia	cinquefoil, barren strawberry
Rosaceae	rose family
Serratula-type	daisy family
Urtica	nettle family
Artemisia	daisy family
Plantago coronopus	buck's horn-plantain

Centaurea scabiosa	Greater knapweed
Aquatics	**Water types**
Typha latifolia	reedmace - bulrush
Myriophyllum verticillatum	whorled leaf water milfoil
Sparganium erectum	Bur-reed
Human indicators	
Avena-type	oat
Hordeum-type	barley
Plantago lanceolata	ribwort plantain
Rumex acetosa/acetosella	common sorrel, sheeps sorrel
Ranunculaceae	buttercup family
Non-Pollen-Palynomorphs	
Filicales	ferns
Sphagnum	peat moss
Osmunda regalis	royal fern
Pteridium	bracken
Polypodium	ferns

APPENDIX B

Pollen Preparation

1. To each boiling tube weigh out 2gm of sample (weight may vary according to expected pollen)
2. Add a small amount of IMS (to stop frothing) and 1ml of conc HCl – wait for effervescence to subside. Can add more IMS if necessary. Repeat until no more effervescence on adding the acid. Give it a good shake.
3. Centrifuge at 2500 rpm for 10 minutes – discard the excess acid. Wash with distilled water to near top of tube and centrifuge at 2500 rpm for 10 minutes – discard the supernatant
4. Boil the centrifuge tubes in a water-bath at 100 ^{0}C for 20 minutes, stirring regularly.

Screening

1. Onto an appropriately numbered funnel a 10µm sieve (nylon cloth) is placed. Check for holes in the nylon cloth. Muslin must be wet. Above this is a 'cut away ' funnel and then a 106 µm brass sieve
2. Pour the contents of the beaker through this, collecting the liquor as waste in a bottle. Wash the 106 µm sieve with distilled water, collecting the <106 µm fraction on the 10µm sieve.
3. When the 106-µm sieve has been thoroughly washed, then stir the liquor on the 10µm sieve and wash this with distilled water until the waste is clear.

4. Wash the residue towards the lip of the sieve, and then using a wash bottle fitted with a jet, wash this entire residue into the 10 ml centrifuge tube.
5. Centrifuge the tubes at 2500 rpm for 10 minutes. Discard the supernatant.
6. Retain the 10 µm sieve as this is used again after the hydrofluoric acid stage

The macro on the 106 µm sieve is washed into a 100 ml bottle and retained for possible analysis

Use the sieve upside down over the sink.

The brass sieves are then placed in an ultrasonic bath for thorough cleaning before being soaked overnight in peroxide.

Acetolysis

The acetolysis mixture reacts **VIOLENTLY** with water and so great care must be exercised, again using a fume cupboard and full personal protection.

The Acetolysis Mixture is 9 parts Acetic Anhydride + 1 part conc. Sulphuric Acid
This should be prepared by a Technician using a fume cupboard

1. About 2 ml of Glacial Acetic Acid (red wash bottle) is added to the residue. The tube is then centrifuged at 2500 rpm for 10 minutes and the supernatant is discarded into a tub of water.
2. Stage 1 is then repeated to ensure that all water is removed
3. About 6 - 8 ml (half way up test tube) of the Acetolysis Mixture is carefully added to the residue
4. After stirring the tubes are heated at 100 ^{0}C for 5 - 10 minutes in a waterbath. This is the absolute maximum or the sample will char.
5. The tubes are then centrifuged at 2500 rpm for 10 minutes
6. The supernatant is then cautiously discarded into a <u>DRY</u> beaker and disposed of by the Technician.
7. If the organic content of the sample is high then repeat stages 3 - 6
8. Ca. 2 ml of glacial acetic acid (red wash bottle) is added to the residue. The tubes are centrifuged at 2500 rpm for 10 minutes and the supernatant discarded.
9. The residue is now washed with distilled water, (near to top of test tube) centrifuged and then the supernatant discarded.
10. Stage 9 is then repeated.
11. Dispose of excess acetolysis mixture into sink with water running.

APPENDIX C

SBR Monolith 1										
Level/Depth (cm)	**M1a 3-3.5**	12-12.5	30.5-31	39-39.5	**M1b 16.5-17**	35.5-36	**M1c 4-4.5**	19.5-20	35.5-36	46.5-47
Trees										**NA**
Acer				1	1					
Alnus	1		2	61	45		6	5	3	
Betula		2		3	1			1		
Fagus	2		4							
Fraxinus	2	1					1			
Pinus	3		4	2	5		1	1	2	
Quercus	16	3	3	12	19	2	4	4	1	
Ulmus				1				1		
Salix					2					
Damaged Pinus		1	2							
Shrubs & Dwarf shrubs										
Corylus avellana-type	4	2	4	4	4	1	2	2	1	NA
Hedera helix	1									
Lonerica			2		3					
Disturbed ground/human activity										
Avena-type		1	1							NA
Hordeum sativum	2		7							
Plantago lanceolata	1	1	1	1			1	1	2	
Chenopodiaceae	2	1	1	1	1					
Rumex acetosa/acetosella		1	1							
Rannunculaceae		4		1	1		2	3	1	
Artemisia		1								
Grass and Herbs										
Poaceae	22	11	17	6	7	6	7	13	8	NA
Apiaceae		1								
Asteraceae		6	4				3	2		
Cirsium	1					1				
Caryophyllaceae		1		1		1		2	1	
Hypericum	1								1	
Serratula-type	1						1			
Papaver rhoeas			1							
Helleborous viridis	1									
Galium			1						2	
Mentha		2	1							
Plantago coronopus	1	1								
Wet/damp ground & Aquatics										
Cyperaceae	6	8	2	6	6	4	1	4	3	NA
Sparganium erectum	1	7	1			5	4	2		
Empetrum nigrum		2			1					
Filipendula				1				1		
Typha latifolia	14	13	3				1			
Decay resistant										
Lactuceae		1	5		2	2		1		NA
Taraxacum	1		3	2	3	5		2	3	
Spores and non Pollen										
Filicales	22	4	4	3	14	3		1	1	NA
Polypodium			3	4	9	1			2	
Sphagnum		2								
Pteridium	1	1	1	1	2	3				
Osmunda regalis					1					
T30									1	
T 207				1					3	
T 82	1									
T314							1	5	2	
T 342	1									
T315			1			2				
T140							1		1	
T114			4	4	1			1	2	
T 143							1	1	1	
T342				1						
T88								2	2	
T126								1		
T92a	1								1	
Spike, Charcoal & Preservation										
Lycopodium	36	82	105	30	50	135	22	40	37	NA
Charcoal G 50	2				1			2	1	
Charcoal L 50		1						1	2	
UN Organics	1	1		3						
U Spores	1		3	5			5	4	5	
Preservation:Good	30	24	21	17	22	7	10	26	17	
Preservation:Crumpled	14	22	27	28	31	12	9	11	9	
Preservation:Corroded	1	13	5	34	32	4	7	1	3	
Preservation:Ruptured	15	14	10	22	17	3	7	3	3	
Preservation:UnID	4	7	7	5	6	6	0	3	2	
Total Pollen	83	71	70	70	101	27	34	45	28	NA
Concentration	85688	32180	24777	86721	75075	7433	57438	41812	28126	NA

SBR Monolith 2				
Level/Depth (cm)	**M2a 39-39.5**	**M2b 20-20.5**	35.5-36	40.5-41
Trees				
Alnus		4		3
Fraxinus				1
Pinus	2	8		1
Quercus	6	13	2	2
Tilia				1
Shrubs & Dwarf shrubs				
Corylus avellana-type	2		1	2
Disturbed ground/human activity				
Avena-type		4		
Hordeum sativum	4			3
Plantago lanceolata				2
Urtica				1
Chenopodiaceae				2
Rannunculaceae	1			2
Artemisia				1
Grass and Herbs				
Poaceae	10	1	6	23
Apiaceae	1			
Asteraceae	1			
Cirsium	1		1	
Caryophyllaceae	1	1	1	1
Rhynchospora alba				1
Rosaceae		1		
Serratula-type		1		
Wet/damp ground & Aquatics				
Cyperaceae	7	7	4	6
Sparganium erectum	1		5	4
Decay resistant				
Lactuceae	4		2	
Taraxacum	5	3	5	1
Spores and non Pollen				
Filicales	9	3	3	2
Polypodium		5	1	
Pteridium		3	3	
T 207				1
T 83	1			
T314				1
T315			2	
T114	4	1		
T88				1
Spike, Charcoal & Preservation				
Lycopodium	128	75	135	65
Charcoal G 50				1
Charcoal L 50				3
UN Organics		1	5	1
U Spores	5	5	6	1
Preservation:Good	9	17	7	25
Preservation:Crumpled	23	12	12	16
Preservation:Corroded	4	4	4	5
Preservation:Ruptured	8	6	3	3
Preservation:UnID	5	3	6	3
Total Pollen	46	43	27	57
Concentration	13357	21309	7433	32592

SBR Monolith3			
Level/Depth (cm)	**M3a 326-26.5**	**M3b 20-20.5**	41.5-42
Trees			
Alnus	2		2
Fagus			1
Pinus	3		5
Quercus	3	8	4
Ulmus	1	1	1
Salix	1	2	
Damaged Pinus	1	1	
Shrubs & Dwarf shrubs			
Corylus avellana-type	1	2	
Hedera helix	1		
Calluna vulgaris		1	
Disturbed ground/human activity			
Avena-type	1		
Hordeum sativum	1		
Chenopodiaceae	1		1
Rumex acetosa/acetosella		1	
Rannunculaceae		2	
Grass and Herbs			
Poaceae	6	18	6
Antemis	1		
Apiaceae	1	1	
Caryophyllaceae	1		
Rhynchospora alba	1		
Rosaceae	1		
Galium			1
Wet/damp ground & Aquatics			
Mirophyllum alterniflorum			
Cyperaceae	1	17	
Callitriche-type		2	
Hottonia-type		4	
Typha latifolia		3	
Decay resistant			
Taraxacum	21	2	2
Spores and non Pollen			
Filicales	45	5	1
Polypodium			1
Pteridium	1		
T 207	1	3	3
T114	1	2	1
T 143			1
Spike, Charcoal & Preservation			
Lycopodium	48	71	18
Charcoal G 50	1		
Charcoal L 50		1	3
UN Organics	3	2	1
U Spores	1	10	3
Preservation:Good	19	15	8
Preservation:Crumpled	17	27	4
Preservation:Corroded	10	8	6
Preservation:Ruptured	3	11	4
Preservation:UnID	3	4	3
Total Pollen	49	65	23
Concentration	37940	34025	47490

SBR S2			
Level/Depth (cm)	28-53	53-63	63-85
Trees			
Alnus		1	1
Betula			1
Fagus	1		
Fraxinus			2
Pinus	6	4	
Quercus	6		9
Ulmus			
Shrubs & Dwarf shrubs			
Corylus avellana -type			1
Hedera helix			1
Disturbed ground/human activity			
Avena -type			1
Hordeum sativum	2		
Rannunculaceae			2
Artemisia			1
Grass and Herbs			
Poaceae	14	4	18
Asteraceae	1		2
Rhynchospora alba	1		8
Caryophyllaceae	2		
Wet/damp ground & Aquatics			
Cyperaceae	2	1	6
Sparganium erectum			6
Decay resistant			
Taraxacum	4		3
Spores and non Pollen			
Filicales			1
Polypodium	4	4	
T 207	6		
T314	3		
T114	10	5	
T 143	1		
T88	1		6
Spike, Charcoal & Preservation			
Lycopodium	48	37	6
Charcoal G 50	2		3
Charcoal L 50	1	1	1
UN Organics	+		
U Spores	3	3	8
Preservation:Good	20	3	28
Preservation:Crumpled	15	4	22
Preservation:Corroded	2	2	2
Preservation:Ruptured	3	2	6
Preservation:UnID	1	0	7
Total Pollen	39	10	62
Concentration	30197	10045	384049

SBR S8			
Level/Depth (cm)	39-53	53-70	73-104
Trees			
Alnus	9		2
Betula	1		
Fagus		3	
Fraxinus		1	2
Pinus	1		1
Quercus	4	4	1
Salix	1		
Shrubs & Dwarf shrubs			
Corylus avellana-type	2	1	
Disturbed ground/human activity			
Hordeum sativum	1	1	3
Plantago lanceolata			2
Urtica	1		
Grass and Herbs			
Poaceae	3	7	11
Asteraceae	4		1
Rhynchospora alba			4
Caryophyllaceae	2	1	
Serratula-type	1		
Wet/damp ground & Aquatics			
Mirophyllum alternaforium			1
Mirophyllum verticillium		1	
Cyperaceae	6	5	2
Sparganium erectum		1	
Empetrum nigrum		1	
Decay resistant			
Taraxacum	2		1
Spores and non Pollen			
Filicales	7		2
Polypodium	3		
Pteridium		2	
Osmunda regalis	1		
T 207			3
T314			1
T114	2		
Spike, Charcoal & Preservation			
Lycopodium	38	24	44
Charcoal G 50		2	3
Charcoal L 50		1	8
UN Organics	3		1
U Spores	3	3	2
Preservation:Good	14	6	9
Preservation:Crumpled	13	11	13
Preservation:Corroded	9	7	4
Preservation:Ruptured	5	2	5
Preservation:UnID	2	6	2
Total Pollen	38	26	31
Concentration	37166	40263	26185

SBR S10			
Level/Depth (cm)	**18-50**	**50-57**	**67-99**
Trees			
Alnus	2	13	
Betula		1	
Fagus	1	1	1
Pinus	8	7	3
Quercus	3	4	3
Ulmus		1	1
Salix		37	
Damaged Pinus			1
Shrubs & Dwarf shrubs			
Corylus avellana-type	1	3	1
Hedera helix	1		
Disturbed ground/human activity			
Avena-type		1	
Hordeum sativum	6	2	
Plantago lanceolata	1	2	
Chenopodiaceae	1		1
Rannunculaceae	1	1	
Grass and Herbs			
Poaceae	11	7	9
Rhynchospora alba	2	3	2
Asteraceae	1	1	5
Rosaceae		1	
Wet/damp ground & Aquatics			
Cyperaceae	6	1	2
Filipendula		1	
Typha latifolia		1	
Decay resistant			
Lactuceae	1		
Taraxacum	2	2	1
Spores and non Pollen			
Filicales	8	6	2
Polypodium	2	2	1
Pteridium			2
T 207			1
T314		1	6
T315			1
T114			114
T88	1		2
T77			1
T729	1		1
Spike, Charcoal & Preservation			
Lycopodium	8	17	53
Charcoal G 50	3	3	2
Charcoal L 50	3	5	4
UN Organics			
U Spores	5	3	7
Preservation:Good	20	29	12
Preservation:Crumpled	17	32	14
Preservation:Corroded	2	9	2
Preservation:Ruptured	10	15	1
Preservation:UnID	2	4	4
Total Pollen	48	90	30
Concentration	222996	196761	21037

SBR S12				
Level/Depth (cm)	**43-65**	**65-80**	**80-92**	**92-101**
Trees				
Alnus	4	3		2
Fagus		1		
Fraxinus	1	1		
Pinus	5		2	5
Quercus	16	6	2	
Salix	1	8	1	
Damaged Pinus				1
Shrubs & Dwarf shrubs				
Corylus avellana -type	1	1	1	2
Hedera helix		1		
Calluna vulgaris		1		
Disturbed ground/human activity				
Plantago lanceolata		1		
Chenopodiaceae			1	
Rannunculaceae				4
Artemisia		1		
Grass and Herbs				
Poaceae	6	7	4	14
Asteraceae			2	2
Rosaceae				1
Rhynchospora alba		11	5	1
Serratula -type	1			
Galium		1		
Wet/damp ground & Aquatics				
Mirophyllum verticillium		1		1
Cyperaceae	4	4	15	
Filipendula			1	
Typha latifolia		5	1	1
Decay resistant				
Taraxacum	2			3
Spores and non Pollen				
Filicales	4	3	17	
Polypodium	6	1		3
Pteridium			1	
Osmunda regalis	3			
T 207			6	18
T315				1
T114	5	1		5
T 143				1
T88		1	1	
T721				1
T92a			5	
Spike, Charcoal & Preservation				
Lycopodium	19	12	12	28
Charcoal G 50		2	2	6
Charcoal L 50	1	1	1	4
UN Organics	2			2
U Spores	1	2	6	8
Preservation:Good	18	23	14	12
Preservation:Crumpled	14	19	13	9
Preservation:Corroded	8	3	8	7
Preservation:Ruptured	7	8	5	9
Preservation:UnID	3	3	2	2
Total Pollen	41	53	35	37
Concentration	80200	164150	108401	49112.21

SBR S15				
Level/Depth (cm)	30-40	41-61	61-82	82-101
Trees				
Alnus	2	2		4
Betula			1	
Fagus		1	2	
Fraxinus		3	3	4
Pinus	1	6	1	5
Quercus	1	8		10
Salix		1		
Damaged Pinus		2		1
Shrubs & Dwarf shrubs				
Corylus avellana-type		2	2	3
Hedera helix				1
Disturbed ground/human activity				
Plantago lanceolata				1
Chenopodiaceae		1		
Potentilla			1	1
Rannunculaceae		1		3
Grass and Herbs				
Poaceae	1	9	12	18
Asteraceae			1	1
Rhynchospora alba		7	3	1
Caryophyllaceae			1	
Rosaceae		1	2	1
Galium				1
Wet/damp ground & Aquatics				
Potamogeton-type			1	
Cyperaceae	1	30	3	7
Empetrum nigrum			1	
Typha latifolia		1	1	4
Decay resistant				
Taraxacum		2	3	3
Spores and non Pollen				
Filicales	1	9		
Polypodium	4	4		5
Sphagnum				
Pteridium		2		1
T 207			1	6
T314		1		4
T315			2	
T114		1	1	3
T 143				4
T88		1	2	
T729			1	
T92a			1	7
Spike, Charcoal & Preservation				
Lycopodium	20	30	33	79
Charcoal G 50		7	1	5
Charcoal L 50		1	1	3
UN Organics	3	2		1
U Spores	2	4	2	9
Preservation:Good	1	19	25	32
Preservation:Crumpled	3	40	6	17
Preservation:Corroded	3	9	5	6
Preservation:Ruptured	0	6	4	10
Preservation:UnID	1	2	0	2
Total Pollen	6	77	38	69
Concentration	11150	95393	42797	32461

SBR S16			
Level/Depth (cm)	**20-57**	**57-71**	**71-79**
Trees			
Alnus	66	2	1
Betula	5		
Fagus	2		
Pinus	3	2	
Quercus	18	3	14
Ulmus	1		1
Salix	3		
Damaged Pinus	1	1	
Shrubs & Dwarf shrubs			
Corylus avellana-type	5	1	1
Hedera helix	1		
Lonerica	1	1	
Disturbed ground/human activity			
Avena-type	1		
Plantago lanceolata		2	
Urtica			1
Rannunculaceae		1	
Artemisia		1	
Grass and Herbs			
Poaceae	8	9	11
Apiaceae	1		
Rhynchospora alba	5	2	1
Asteraceae	1	5	1
Centaureae cynas	1		
Caryophyllaceae		1	
Wet/damp ground & Aquatics			
Mirophyllum alternaforium	1		
Mirophyllum verticillium	3		1
Cyperaceae	1	4	1
Sparganium erectum		6	1
Filipendula	1		
Typha latifolia		2	
Decay resistant			
Taraxacum	3	2	
Spores and non Pollen			
Filicales	3	3	2
Polypodium	4		1
T 207			1
T314		1	
T114	1	2	3
T88		3	1
T92a		1	1
Spike, Charcoal & Preservation			
Lycopodium	22	15	8
Charcoal G 50	2	1	2
Charcoal L 50	1	2	2
UN Organics	1		
U Spores	4	6	3
Preservation:Good	57	21	15
Preservation:Crumpled	30	11	15
Preservation:Corroded	35	3	5
Preservation:Ruptured	11	6	0
Preservation:UnID	2	1	2
Total Pollen	132	45	34
Concentration	222996	111498	157956

SBR S18			
Level/Depth (cm)	**28-58**	**59-74**	**74-91**
Trees			
Alnus	170	1	1
Pinus	5	1	1
Quercus	18	5	
Shrubs & Dwarf shrubs			
Corylus avellana-type	6		1
Ericaceae	1		
Disturbed ground/human activity			
Avena-type			
Hordeum sativum		1	
Plantago lanceolata	2		
Chenopodiaceae	1	1	
Potentilla	1		
Rannunculaceae		1	1
Grass and Herbs			
Poaceae	5	3	2
Antemis	2		2
Rhynchospora alba		25	
Apiaceae		1	
Cirsium			1
Rosaceae	1		
Wet/damp ground & Aquatics			
Mirophyllum verticillium	4		
Cyperaceae	2	8	1
Empetrum nigrum	1		
Filipendula		1	
Typha latifolia		1	
Decay resistant			
Lactuceae	1		
Taraxacum	2	1	
Spores and non Pollen			
Filicales	1	1	
Polypodium	5	1	2
T115			1
T 207	1	1	1
T314		2	1
T 342	1		
T114	11		5
T341		2	
T132	1		
T18			1
T88		3	
T229			1
T729		1	
T92a		4	
Spike, Charcoal & Preservation			
Lycopodium	91	9	15
Charcoal G 50			1
Charcoal L 50			1
UN Organics	7		
U Spores	10	6	7
Preservation:Good	95	6	7
Preservation:Crumpled	55	34	5
Preservation:Corroded	39	5	4
Preservation:Ruptured	26	2	2
Preservation:UnID	3	4	3
Total Pollen	222	50	10
Concentration	90669	206478	24777

APPENDIX D

S8 39-53
Excellent preservation
Key species:
Eunotia exigua
Pinnularia viridis
Fragilaria construens var *venter* (dominate the assemblage)
Fragilaria brevistriata
Fragilaria exigua
Diploneis ovalis
Cocconeis placentula var *placentula*
Epithemia adnata var *porcellus*
Fragilaria ulna
Navicula radiosa
Nitzschia archibaldii
Navicula digitoradiata (brackish species)
Freshwater assemblage

S8 53-70
Very poor preservation – few species present, they include:
Cocconeis placentula var *placentula*
Fragilaria ulna
Fragilaria construens var *venter*
Species present are freshwater forms

S8 73-104
Excellent preservation
Key species:
Fragilaria ulna (dominate the assemblage, mostly broken – to be expected as they are extremely long pennate forms that are fragile)
Fragilaria construens var *venter*
Fragilaria brevistriata
Fragilaria Pinnata
Epithemia zebra
Epithemia adnata var *porcellus* (50% broken)
Gomphonema acuminatum
Cocconeis placentula var *placentula*
Cymbella turgida
Nitzschia archibaldii
Navicula radiosa
Freshwater assemblage

S10 18-50
Excellent preservation
Key species:
Fragilaria pinnata (dominate the assemblage)
Fragilaria brevistriata
Fragilaria construens var venter
Fragilaria ulna (mostly broken)
Pinnularia lundii
Epithemia zebra
Nitzschia archibaldii
Cocconeis placentula var *placentula*

Fragilaria exigua
Pinnularia major
Freshwater assemblage

S10 50-57
Fair preservation – diatoms present although the fragmentation level is high
Key species:
Nitzschia archibaldii
Cymbella turgida
Pinnularia major
Navicula hennedyi (brackish species)
Fragilaria ulna (mostly broken)
Fragilaria construens var *venter*
Predominantly a freshwater assemblage

S10 67-99
Excellent preservation
Key species:
Fragilaria pinnata (dominate the assemblage)
Fragilaria brevistriata
Fragilaria construens var venter
Fragilaria ulna (mostly broken)
Gomphonema acuminatum
Fragilaria exigua
Freshwater assemblage

S18 28-59
Poor preservation – very few diatoms present
Species visible include:
Fragilaria construens var venter
Fragilaria pinnata
Freshwater species (but very few)

S18 59-74
Excellent species preservation
Key species:
Fragilaria pinnata
Fragilaria brevistriata
Fragilaria construens var venter
Fragilaria ulna (mostly broken – dominate the assemblage)
Pinnularia major (broken)
Epithemia zebra
Epithemia adnata var *porcellus*
Cocconeis placentula var *placentula*
Freshwater assemblage

S18 74-91
Poor preservation – very few diatoms present
Species include:
Fragilaria construens var venter
Fragilaria pinnata
Fragilaria exigua
Species present are freshwater forms

S16 20-57
Fair preservation
Key species:
Epithemia adnata var *porcellus*
Cyclotella striata (centric form – brackish species)
Pinnularia major (broken)
Fragilaria construens var venter
Fragilaria ulna (mostly broken)
Cymbella laevis
Freshwater assemblage – brackish component with the occurrence of *Cyclotella striata*

S16 57-71
Exceptional preservation
Key species:
Fragilaria pinnata
Fragilaria brevistriata
Fragilaria construens var venter
Fragilaria ulna (mostly broken)
Fragilaria exigua (dominate the assemblage)
Freshwater assemblage

S16 71-97
Excellent preservation
Key species:
Fragilaria pinnata
Fragilaria brevistriata
Fragilaria construens var venter
Fragilaria ulna (mostly broken)
Fragilaria exigua
Gomphonema acuminatum
Navicula digitoradiata (brackish species)
Navicula hennedyi (brackish species)
Predominantly a freshwater assemblage with a minor brackish/marine occurrence

S15 30-40
Good preservation
Key species:
Cocconeis placentula var *placentula*
Fragilaria exigua
Fragilaria ulna (mostly broken)
Pinnularia major (broken)
Fragilaria construens var venter
Navicula radiosa
Pinnularia lundii
Eunotia exigua
Freshwater assemblage

S15 41-61
Poor preservation – high degree of fragmentation of the species that are present, including:
Eunotia exigua
Fragilaria ulna (broken)
Fragilaria construens var venter
Freshwater species only

S15 61-82
Excellent preservation – high clay content
Species include:
Fragilaria ulna (some broken – dominate the assemblage)
Gomphonema acuminatum
Epithemia adnata var *porcellus*
Cymbella laevis
Nitzschia archibaldii
Fragilaria construens var venter
Fragilaria exigua
Fragilaria pinnata
Fragilaria brevistriata
Navicula radiosa
Pinnularia major (whole specimens – low energy?)
Freshwater assemblage

S15 82-102
Very poor preservation – species present include highly fractured and broken specimens of:
Pinnularia major
Fragilaria construens var venter
Fragilaria exigua
Freshwater species only

S12 43-65
Poor preservation – species present include:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (broken)
Many sponge spicules present – freshwater species only

S12 65-80
No diatoms present

S12 80-92
No diatoms present

S12 93-101
No diatoms present

S2 28-53
Excellent preservation.
Key species include:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (broken)
Fragilaria construens var venter
Eunotia exigua
Cymbella laevis
Navicula radiosa
Navicula digitoradiata (brackish species)
Pinnularia major (broken)
Diploneis ovalis
Nitzschia archibaldii
Surirella biseriata

Epithemia adnata var *porcellus*
Epithemia zebra
Gyrosigma acuminatum
Gomphonema acuminatum
Freshwater assemblage.

S2 53-63
No diatoms present but some sponge spicules

S2 63-84
Very poor preservation – only a few fragments of *Pinnularia major* are present

Monolith M1 (a) 3-3.5
Very poor preservation, species present:
Fragilaria pinnata
Navicula digitoradiata (brackish species)
Far too few diatoms present to make an assessment of the depositional environment

Monolith M1 (a) 12-12.5
Excellent preservation
Species include:
Cymbella ehrenbergii (dominate the count)
Pinnularia major
Pinnularia viridis
Epithemia adnata var *porcellus*
Epithemia zebra
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (broken)
Fragilaria construens var venter
Cymbella laevis
Cocconeis placentula var *placentula*
Gyrosigma acuminatum
Navicula viridula
Freshwater assemblage

Monolith M1 (a) 30.5-31
Excellent preservation
Species include:
Pinnularia major
Pinnularia viridis
Epithemia adnata var *porcellus*
Epithemia zebra
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (broken)
Fragilaria construens var venter
Cymbella laevis
Cocconeis placentula var *placentula*
Navicula digitoradiata (brackish species)
Gomphonema acuminatum
Gyrosigma acuminatum
Meridion circulare
Melosira italica

Diploneis ovalis
Fragilaria pinnata
Navicula viridula
Freshwater assemblage

Monolith M1 (a) 39-39.5
Excellent preservation
Species include:
Pinnularia major
Pinnularia viridis
Epithemia adnata var *porcellus*
Epithemia zebra
Cymbella laevis
Cymbella ehrenbergii
Fragilaria pinnata
Count is dominated by fractured *Pinnularia* valves. Freshwater assemblage

Monolith M1 (b) 16.5-17
Poor preservation – diatoms that are present are highly fractured/broken:
Pinnularia major
Pinnularia viridis
Navicula viridula
Fragilaria construens var venter
The few fractured forms are freshwater in origin.

Monolith M1 (b) 35.5-36
Excellent preservation – dominated by *Fragilaria* forms:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Cymbella laevis
Cymbella ehrenbergii
Navicula hennedyi (brackish species)
Pinnularia major
Freshwater forms on the whole – a single occurrence of *N. hennedyi*

Monolith M1 (c) 4-4.5
Very good preservation
Species include:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Diploneis ovalis
Epithemia adnata var *porcellus*
Cocconeis pediculus (brackish-freshwater species)
Navicula digitoradiata (brackish species)
Freshwater assemblage – dominated by small *Fragilaria* forms

Monolith M1 (c) 19.5-20
Very good preservation
Species include:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Diploneis ovalis
Epithemia adnata var *porcellus*
Cocconeis placentula var *placentula*
Navicula digitoradiata (brackish species)
Pinnularia viridis
Cymbella laevis
Freshwater assemblage.

Monolith M1 (c) 35.5-36
Ok preservation. Species that do occur include:
Epithemia adnata var *porcellus* (dominates the assemblage)
Fragilaria pinnata
Gomphonema acuminatum
Navicula hennedyi (brackish species)
Nitzschia archibaldii
Fragilaria construens var venter
Freshwater assemblage

Monolith M1 (c) 46.5-47
No diatoms present.

Monolith M2 (a) 39-39.5
Very good preservation
Species include:
Fragilaria exigua
Fragilaria brevistriata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Fragilaria pinnata
Navicula digitoradiata (brackish species)
Pinnularia lundii
Epithemia adnata var *porcellus*
Stauroneis productum (brackish-freshwater species)
Cocconeis placentula var *placentula*
Freshwater assemblage.

Monolith M2 (b) 20-20.5
Good diatom occurrence – but, species are highly fragmented (higher energy environment?)
Species include:
Cymbella laevis
Fragilaria pinnata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Epithemia adnata var *porcellus*
Cocconeis placentula var *placentula*
Gomphonema acuminatum
Pinnularia major (broken)

Eunotia exigua
Freshwater assemblage

Monolith M2 (b) 40.5-41
Ok preservation – high clay content
Species include:
Fragilaria pinnata
Fragilaria ulna (mostly broken – dominates the assemblage)
Fragilaria construens var venter
Epithemia adnata var *porcellus*
Freshwater assemblage.

Monolith 3 M3 (a) 3.5-4
Excellent preservation
Species include:
Fragilaria pinnata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Fragilaria exigua
Fragilaria brevistriata
Gyrosigma acuminatum
Epithemia adnata var *porcellus*
Cymbella laevis
Eunotia exigua
Freshwater assemblage – dominated by *Fragilaria* sp.

Monolith 3 M3 (a) 7-7.5
Excellent preservation
Species include:
Fragilaria pinnata
Fragilaria ulna (mostly broken)
Fragilaria construens var venter
Fragilaria exigua
Fragilaria brevistriata
Cymbella laevis
Eunotia exigua
Pinnularia lundii
Epithemia adnata var *porcellus*
Gomphonema acuminatum
Freshwater assemblage – dominated by *Fragilaria* sp.

Monolith 3 M3 (a) 14.5-15
Poor preservation – assemblage is dominated by *Fragilaria* sp. That are highly fragmented
Species that are clear include:
Fragilaria construens var venter
Fragilaria pinnata
Fragilaria ulna (all broken)
Freshwater assemblage (but not many valves present)

Monolith 3 M3 (a) 16.5-17
Very good preservation
Species include:
Fragilaria construens var venter
Fragilaria pinnata
Fragilaria ulna (mostly broken)
Fragilaria brevistriata
Pinnularia major (broken)
Pinnularia viridis (broken)
Epithemia zebra
Epithemia adnata var *porcellus*
Cymbella laevis
Cymbella ehrenbergii
Eunotia exigua
Freshwater assemblage

Monolith 3 M3 (a) 17-17.5
Very good preservation
Species include:
Fragilaria construens var venter
Fragilaria pinnata
Fragilaria ulna (mostly broken)
Fragilaria brevistriata
Pinnularia major (broken)
Pinnularia viridis (broken)
Epithemia zebra
Epithemia adnata var *porcellus*
Cymbella laevis
Cymbella ehrenbergii
Eunotia exigua
Navicula digitoradiata (brackish species)
Pinnularia lundii
Gyrosigma acuminatum
Freshwater assemblage

Monolith 3 M3 (a) 26-26.5
Extremely poor preservation – only a few fractured fragments of *Pinnularia* sp.

Monolith 3 M3 (a) 37-37.5
No diatoms present – sponge spicules dominate though

Monolith M3 (b) 6-6.5
Extremely poor preservation – only a few fractured fragments of *Pinnularia* sp.

Monolith M3 (b) 20-20.5
Extremely poor preservation – only a few fractured fragments of *Pinnularia* sp.

Monolith M3 (b) 26-26.5
Extremely poor preservation – only a few fractured fragments of *Pinnularia* sp.

Monolith M3 (b) 34-34.5
Extremely poor preservation – only a few fractured fragments of *Pinnularia* sp. and *Fragilaria ulna* (broken).

Monolith M3 (b) 41.5-42
Extremely poor preservation – only a few fractured fragments of *Fragilaria* sp. and *Cocconeis placentula*.

Monolith M3 (b) 47-47.5
No diatoms present

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PART 4 WATERLOGGED WOOD ASSESSMENT REPORT

by M Bamforth (L-P Archaeology)

1 QUANTITY OF MATERIAL

A total of 53 wood records were completed on site over several visits during April and May 2007.

2 PROVENANCE

All the material was recovered from evaluation trenches on land adjacent to Storey's Bar Road, Peterborough between 0.39m and 2.13m aOD.

The majority of the material was recovered from within two distinct bands of peat that extended throughout the area of investigation. The upper layer of peat is thought to date to the Iron Age period, while the lower peat is thought to have started forming in the early Bronze Age, continuing through to the third century AD

3 RANGE AND VARIATION

The methods of timber classification set out by Taylor (2001) have been adopted in this report.

Table 11: Frequency of wood categories

Wood type	Frequency	% of assemblage
Peat	1	1.9
Too decayed	1	1.9
Bark	1	1.9
Root	10	18.7
Natural debris	1	1.9
Roundwood / root	7	13.2
Roundwood	25	47.3
Roundwood debris	4	7.5
Timber debris	1	1.9
Tree stump	1	1.9
Coppice stool	1	1.9
Total	53	100

One item submitted for study was found to be a piece of peat whilst another was too degraded for analysis.

The majority of the material, including the bark, natural debris, roots, roundwood and tree stump displayed no evidence of woodworking. Together these 48 items represent 90.6% of the assemblage.

There is a notable paucity of worked material. The only converted material present is represented by the roundwood debris, timber debris and the coppice stool. Together these 5 items represent 9.4% of the assemblage

4 CONDITION OF MATERIAL

Table 12: Condition scale used in this report

	Museum conservation	Technology analysis	Woodland management	Dendro-chronology	Species identification
5	+	+	+	+	+
4	-	+	+	+	+
3	-	+/-	+	+	+
2	-	+/-	+/-	+/-	+
1	-	-	-	-	+/-
0	-	-	-	-	-

Using the condition scale developed by the Humber Wetlands Project (Van de Noort, Ellis, Taylor & Weir 1995 Table 15.1), the majority of the material scored a '2' or a '3'.

The material recovered from the upper level of post medieval peat remained noticeably more fibrous than that recovered from the lower peat. This result is probably due to the wide difference in age between the material.

4.1 Condition of material

Table 13: Condition of material

Preservation code	Frequency	% of assemblage
1	13	24.5
2	22	41.4
3	18	34.1

This condition score reflects a moderately preserved assemblage. Technological analysis and assessment of possible woodland management practices are possible on some of the assemblage. The material scoring a '1' was too degraded to allow species identification.

4.2 Decay analysis

In addition to the condition score assigned to items via a visual inspection, seven sub-samples recovered from six items from five trenches were submitted to York Archaeological Trust for decay analysis. The samples aimed to represent a range of different species across the spectrum of preservation seen within the assemblage. The results of this work are included as Appendix 3.

Although little worked material was recovered during the recent works, the collection of baseline data may prove a valuable comparison for future use and interpretation.

A range of tests were applied to the material to assess their condition, including density, maximum water content, loss of wood substance and ash content. The results of these tests were used to score the material based upon the system devised by De Jong (1977).

COPPICE STOOLS

Wood No	Context	Species	Bark / Sapwood / Heartwood	Condition Code	Length (mm)	Diameter Long axis	Diamter Short axis	Coppicing notes	Wood type
W1114/	Nat / BS	*Quercus* sp.	BSH	3	60	310	250	Possibly a coppice stool, is fairly 'open' at the top.	STUMP
W3012/	(3004)	*Alnus glutinosa*	BSH	3	400	500	300	Coppice stool.	STOOL

Wood No	Context	Species	Bark / Sapwood / Heartwood	Condition Code	Length (mm)	Diameter Long axis	Diamter Short axis	Dia (not distorted)	Wood type
W0808	(805)		SH	3	610	140	80		ROOT
W1209	Nat (1208)	*Quercus* sp.	SH	3	700			120	ROOT
W1210	Nat (1208)	*Quercus* sp.	BSH	3		60	40		ROOT
W1211	Nat (1208)	*Quercus* sp.	BSH	3		80	55		ROOT
W2923	(2906)		SH	2	240	60	45		ROOT
W2924	(2906)		BSH	2					ROOT
W3010	(3004)	*Quercus* sp.	SH	2	1400	60	50		ROOT
W3013	(3004)		BSH	2	895	95	55		ROOT
W4710	(4705)		BSH	1	3630	170			ROOT
W4712	(4705)	*Quercus* sp.	BSH	2					ROOT
W0408	(405)		BSH	3	250				RW/ROOT
W0409	(405)		SH	3	1880	90	50		RW/ROOT
W0410	(405)		SH	2	1160	100			RW/ROOT
W2914	(2906)		BSH	2	1195	110	48		RW/ROOT
W2915	(2906)		BSH	3	1320	140	88		RW/ROOT
W2920	(2906)		BSH	2	1940	220	170		RW/ROOT
W3015	(3004)		BSH	2	655	48	25		RW/ROOT

ROOTS AND POSSIBLE ROOTS

Wood No	Context	Species	Bark / Sapwood / Heartwood	Condition Code	Split type	Length (mm)	Max breadth	Max thickness	Wood type
W0416	(405)		B	3		500	40	6	BARK
W2919	(2906)			1		500	350	30	NATDEB
W2926	(2906)	*Alnus glutinosa*	H	3	Tan (mod)	410	91	25	TIMDEB
W0412	(405)	*Quercus* sp.	BSH	2	Rad 1/2	3300			RWDEB
W0414	(405)	Unidentifiable	SH	3	Rad 1/2	290	38	9	RWDEB
W0415	(405)	*Alnus glutinosa*	SH	3	Rad 1/2	300	35	6	RWDEB
W4714	(4705)	*Quercus* sp.	SH	2	Tan	452	45	21	RWDEB

DEBRIS

Wood No	Context	Species	Bark / Sapwood / Heartwood	Condition Code	Length (mm)	Diameter Long axis	Diamter Short axis	Dia (not distorted)	Coppicing notes
W0411	(405)	*Alnus glutinosa*	SH	2	400	45	8		
W0413	(405)	*Salix* sp. / *Populus* sp.	SH	3	1010	80	30		
W0418	(405)		SH	1	400				
W0510	(509)	*Quercus* sp.	BSH	3	190	62	55		Possibly. It is straight and even
W2913	(2906)	*Alnus glutinosa*	SH	1	300	140	30		
W2916	(2906)	*Alnus glutinosa*	BSH	2	900				
W2917	(2906)		BSH	1	540	100	60		
W2918	(2906)		SH	1	500	55	46		
W2921	(2906)	*Alnus glutinosa*	BSH	2	925	65	39		
W2922	(2906)	*Corylus avellana*	BSH	2	1085	40	35		
W2925	(2906)	*Alnus glutinosa*	BSH	2	550	48	35		
W3009	(3004)		BSH	3	3333				
W3014	(3004)	*Alnus glutinosa*	BSH	2	1160	59	45		
W3016	(3004)	*Salix* sp. / *Populus* sp.	BSH	2	1400	36	30		Straight and even
W3108	(3105)		BSH	1	1420	110	70		
W3109	(3110)	*Quercus* sp.	BSH	3	2100	390			
W4609	(4607)	*Quercus* sp.	BSH	1	840	300			
W4709	(4705)	*Fraxinus excelsior*	BSH	1	6610	270			
W4711	(4705)	*Alnus glutinosa*	BSH	2	990	140			
W4713	(4705)	*Quercus* sp.	BSH	2	2380	56	45		Straight and even.
W4810	(4805)		BSH	1	1550	100	93		
W4811	(4805)	*Quercus* sp.	BSH	1	1910	230			
W5209	(5205)		BSH	3	1200			280	
W5309	(5303)	*Quercus* sp.	BSH	2	1260			180	
W5310	(5303)	*Quercus* sp.	BSH	2	2300			190	

ROUNDWOOD

4.3 Class of material

Table 14: Class of material

Timber	Class	Species
W0412	2	Oak
W0510	2-3	Oak
W1114	2	Oak
W2922	1	Hazel
W2926	2-1	Alder
W4713	2	Oak
W4713	1	Oak (sapwood)

- Class 1 - Severely decayed with isolated pockets of harder wood.
- Class 2 - Moderately decayed with a well-preserved inner core but softer decayed outer zones.
- Class 3 – Well preserved with much of the wood substance still present.

The alder, hazel and oak sapwood were the most heavily decayed items. This is to be expected as sapwood will generally decay at a faster rate than heartwood. Similarly, non-oak timber tends to be subject to a higher rate of decay due to its internal structure.

The sub samples seem to represent a fairly typical situation across the site, where the wood has undergone heterogeneous decay with areas of soft, decayed wood intermingled with zones of less decayed wood.

Longitudinal radial drying cracks noted on (W2922) and (W4713) indicate that the water table across the site has dropped low enough at some point to allow partial desiccation of the deposits. Unfortunately it is not possible to determine the timing of this event.

Although microbial attack was visible within the sub samples it is not clear whether this occurred before or after the material became buried.

Further observations

During the investigations visual inspections of the natural wood material present within the peaty deposits were carried out.

Woody material, predominantly in the form of small to medium size roots and small diameter natural roundwood was present in both the upper and lower peat deposits throughout the area of investigation.

This collection of material varied from a ‘1’ to a ‘3’, a similar score to the larger material that was formally recorded. The presence of small diameter natural roundwood throughout the peaty deposits shows a good survival rate of this small, delicate material.

By measuring the deformed, ovoid cross sections of the small diameter roundwood it was possible to see that the material had been subjected to a moderate degree of compaction. This will be related in part to dewatering of the surrounding area via modern drainage practices.

4.4 Categories of Material

As the material recovered from within the upper and lower peat horizons are widely temporally separated, they will be considered as separate assemblages.

A full catalogue of the recorded material can be found in Appendix 2 of this document.

Table 15: Species identification table:

Species		Frequency	% of assemblage
Alnus glutinosa	Alder	10	18.8
Corylus avellana	Hazel	1	1.9
Fraxinus excelsior	Ash	1	1.9
Quercus sp.	Oak	15	28.4
Salix sp./Populus sp.	Willow / poplar	2	3.6
Unidentifiable		10	18.8
Not Identified		14	26.5

Species identification was carried out in accordance with English Heritage guidelines (Brunning 1996). Items assigned as oak or ash were identified in the field, relying on gross morphology visible to the naked eye. All other items were sub sampled and submitted for microscopic analysis.

All worked, possibly worked and roundwood items of a suitable condition were submitted for species identification. Species identification was not carried out on the root.

Item (W2922) is referred to as alder in the attached decay analysis report (Appendix 3) however, this item was later identified as hazel.

Material from the upper peat
Two items from the upper peat (5303) in trench 53. This stratigraphic unit has been assigned to the post medieval period. The two items (W5309) and (W5310) were both large bog oak logs, likely to represent the trunks of fallen trees. Both of these remained very fibrous, despite being in a poor condition.

Material from the lower peat
Material recovered from the lower peat has been considered in conjunction with material recovered from the buried soil and natural deposits which the peat directly overlies.

Bark
A single item of bark (W0416) was submitted for analysis. This bore no evidence of woodworking and is likely to have detached naturally from its woody material in antiquity.

Root
A total of 10 items were identified as roots which were growing *in situ* in antiquity. These items were identified as roots due to a variety of morphological traits, including a pinkish internal hue, twisted or gnarly grain and orientation of side branches.

Roots were noted across the area of investigation and were recorded with a minimum diameter of 35mm and a maximum diameter of 170mm. Five items were identified as oak.

Natural debris
A single item of natural debris (W2919) was recorded (Fig 8). This item was too decayed for analysis.

Roundwood/Root

Seven items were recorded in this category. In all cases, it remains unclear from gross morphology whether these items represent root or roundwood. The maximum diameter for this category of material was 220mm, the minimum was 25mm.

Roundwood

A total of 25 items classed as roundwood were recorded. Of the 25 items, 3 (12%) showed some form of coppicing evidence.

Morphological traits associated with coppicing include:

- Straight items. An unusually straight item with no side branches or knots can often be indicative of coppiced wood.
- Even items, displaying no variation along the length can also be indicative of coppiced material.
- Curve. Where a coppice rod emerges horizontally from the coppice stool, a pronounced and distinctive curve is often present where the rod has changed trajectory through ninety degrees to grow approximately vertically.
- Flare. Where a coppice rod displays a curve at its junction with the stool, a pronounced flare will often also be present.

Of the three items with morphological traits associated with coppiced material, two were identified as oak and the third as willow/poplar.

One of the oak coppice rods(W0510) was possibly a stake. This item was set nearly vertically, pushed through the buried soil horizon into the gravel below. Unfortunately, machine damage precluded any chance to ascertain if the lower tip had been worked.

Eight of the roundwood items are identified as fallen trees, with five of these identified as oak, one as ash and the two remaining unknown. One of the trunks was torn on the underside, suggesting damage sustained falling over. Of the remaining 14 items, seven were identified as alder, one as willow/poplar and one as hazel. Five items remain unidentified.

Roundwood debris

A total of four items were assigned to this category, with two identified as oak and one as alder. It was not possible to identify the final item, due to its poor state of preservation.

Three of the items, all radial half splits, were recovered from Trench 4. These items were in a relatively poor condition, appearing to have degraded somewhat prior to becoming waterlogged. It seems likely that these are the result of deliberate woodworking, although due to the poor degree of preservation it is not possible to rule out the role of natural agency in their conversion.

A single item (W4714) which had been tangentially split from the outside of a round, was recovered from Trench 47. This item represents debris from woodworking activity in the vicinity.

Timber debris
A single item (W2926) was assigned to this category (Fig 8). This piece of alder heartwood was tangentially split. The conversion was noted as being particularly uneven, raising the possibility that this item may be the result of either human or natural agency.

Tree stump
Due to the 'open' nature of the top of this oak stump (W1114) it is possible that this is a coppice stool. Although much of the root system remains intact, machine damage to the upper portion has precluded a definitive interpretation.

Coppice stool
This particularly good example of a coppice stool (W3012) was identified as alder (Fig 8). An extensive spread of roots radiated out from the stool, the centre of which had rotted out. The centre of a coppice stool will often rot if the stool is allowed to become derelict (Harmer 2004).

5 DISCUSSION

5.1 Preservation of material

The scoring of material for condition and the scientific analysis of a series of sub-samples both point towards a moderately preserved assemblage. There is evidence for episodes of dewatering and desiccation as well as a moderate level of compression within the peat. However, fragile items such as small diameter roundwood have been shown to survive across the area of investigation within both peat horizons. This suggests that in terms of the waterlogged wood there has not been a major loss of material between the burial assemblage and the archaeological assemblage.

The decay analysis has provided baseline data that will be valuable during any further works carried out on the site.

Species present include Oak, Alder, Hazel, Ash and Willow/Poplar.

During the Bronze Age the lower layer of peat would have been forming against a background of rising water tables, leading to a progressively wetter environment. As the fen margins became gradually wetter, locally growing alder would have formed into fen carrs along the margin (Scaife 2001, 380). This is certainly evident within the assemblage, with a high prevalence (18.8%) of alder.

Hazel and oak, possibly representing managed woodland, appear consistently in the pollen series during the Bronze Age. There are also sporadic occurrences of pollen from a range of deciduous trees surrounding the basin, including ash, beech and lime (Scaife 2001, 381). This scenario would account for the remainder of the species identified within the assemblage.

Slightly surprisingly, of the 16 items that were either growing in situ (roots, tree stumps and coppice stools) or had been growing in situ (fallen trees), eight were Oak, one ash and one alder. Five of these items remained unidentified. Although it must be remembered that the non-oak roots were not submitted for species identification, oak represents half of the material growing in situ, with a particularly strong showing in terms of fallen trees.

It remains possible that oak and ash growing in situ represent the species of a drier period, later being replaced by alder carr as the fen edge became wetter. However, the relatively homogeneous nature of the peat unit precludes any real understanding of this issue.

5.2 Woodland management

There is evidence for woodland management practices on the site, in the form of a definite (W3012, Fig 8)) and a possible coppice stool (W1114). Both items were derived from the early Bronze Age lower peat deposit. The presence of a coppice stool on the site shows that this form of management was being undertaken in at least a limited fashion. The morphology of the stool, with a rotted centre, suggests the stool had been subjected to several cycles of coppicing over an unknown period, and then fallen into neglect (Harmer 2004).

In addition to the alder coppice stool, the roundwood assemblage also provides us with two oak items and as ingle willow/polar item that are likely to have been the result of coppicing.

It seems likely that these limited remains suggest that coppicing is being undertaken in the area, probably in a fairly haphazard manner, simply applying this method to trees growing naturally in the area rather than in a regimented, intensive manner.

5.3 Woodworking technology

Only a single piece of timber debris was identified as being definitely worked. A further three items of roundwood debris had possibly been worked. Little can be said regarding such a limited assemblage.

6 RECOMMENDATIONS

None of the material is of sufficient interest to warrant conservation.

No further work is advised for this assemblage.

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PART 5 ASSESSMENT OF THE STATE OF PRESERVATION OF WATERLOGGED WOOD FROM STOREY'S BAR ROAD PETERBOROUGH

by Ian Panter, 13th August, York Archaeological Trust Conservation Report 2007/40

1 INTRODUCTION

Excavations at Storey's Bar Road, Peterborough by Northamptonshire Archaeology revealed the presence of waterlogged wood scattered across much of the site. The wood assemblage appears to be a natural accumulation rather than the result of anthropogenic activity (M. Bamforth, pers comm) but due to the proximity of the location of the site to the prehistoric causeway structure at Flag Fen, and paucity of data on degree of preservation of material from the area, it was decided to submit a number of samples of the wood for condition assessment in order to obtain "baseline data" for future use and interpretation.

Six samples were selected from five trenches and their descriptions are provided below:

Table 16: Wood samples

Context	Trench	Description	Species
412	4	Very eroded wedge shaped fragment, no sapwood or bark, no visible iron staining	Oak
510	5	Half roundwood, no bark, iron stained. No clear distinction between sap and heartwood. Described as a possible stake.	Oak
1114	11	Fragment of wood, described as a possible coppice stool. Iron stained.	Oak
2922	29	Roundwood with bark present but detached. Longitudinal splits present, iron stained.	Alder
2926	29	Fragment, no visible iron staining	Alder
4713	47	Roundwood, longitudinal splits present, and iron staining particularly to sapwood.	Oak

2 METHODOLOGY

Standard condition assessment tests were applied to the wood samples to assess their condition (Panter and Spriggs 1996). These included density and maximum water content assays, loss of wood substance and ash content. Unfortunately, due to the size of the samples it was not possible to undertake decay profiling using the Sibert Decay Drill.

2.1 Density and maximum water content determination

The density of a sample of wood is determined by the amount of "wood substance" (cellulose, lignin, short chain sugars etc.) present per unit volume (Dinwoodie 1989). It follows therefore that a reduction in the amount of wood substance resulting from decay will be reflected in a reduction in the density of the wood sample. By comparing the sample density with that of undecayed wood of the same species (termed the "normal" density) it is possible to quantify the amount of decay of the sample.

Decay and breakdown of the cellular structure of the wood gives rise to an increase in the porosity of the wood as more and more voids are created, thereby leading to an increase in the amount of water retained by the wood. In effect, increasing water content equates to increasing decay of the wood.

To determine density, each whole wood sample was initially fully water saturated by degassing under vacuum following standard techniques (Hoffman 1981). The samples were then weighed in air and then submerged underwater and density was calculated using the following formula (Cook and Grattan 1990):

Rg = 3x Wsub/(Wair - Wsub)

Where Rg = density of sample Wsub = weight of wood submerged under water Wair = weight of wood in air Density is expressed as g/cc.

The sample density can be compared with the "normal" density of undeteriorated wood of the same species and the amount of material lost calculated using the formula:

%LWS = [(Rgn – Rg) / Rgn] x 100

Where %LWS = percent loss in wood substance Rg = sample density Rgn = normal density of undeteriorated wood. For English oak, the normal density is taken as 0.56g/cc and for Alder the density is 0.42g/cc.

The maximum water content was determined by oven drying approximately a 2g sub-sample from each timber at 100ºC ± 5ºC until a constant dry weight was obtained. However, as timber 4713 showed clear distinction between sap and heartwood then a sample from each area was processed too.

The maximum water content was then calculated using the following formula:

μmax = [(Wet weight – Oven dry weight) / Oven dry weight] x100

The maximum water content is therefore expressed as a percentage of the oven dry weight, and values can exceed 100%, depending upon the level of decay of the wood.

The density of each sub-sample was also calculated from the maximum water content using the following formula:

Rg = 100/(μmax + 66.7)

Where Rg = density of sample, μmax = maximum water content of sample.

2.2 Ash Content

Incinerating a sample of wood at 600ºC results in the loss of the organic fraction and the residue represents the inorganic mineral component. This method is used to determine whether the wood has been impregnated with contaminants such as iron that may influence both density determinations as well as have a potential impact upon long-term preservation. As the ash content is expressed as a percentage of the oven dried sample, elevated levels are invariably observed in decayed waterlogged archaeological samples. For example, undecayed oak has ash values of between 0.27% - 1.0% (Fengel and Grosser 1975).

Determination of ash content involved incinerating the previously dried samples based on standard techniques (Hoffman 1981).

3 RESULTS

Table 17: Density and maximum water content

Context	Species	Whole Sample			Sub-sample		
		µmax %	Density g/cc	% LWS	µmax %	Density g/cc	%LWS
412	Oak	266	0.3	46	205	0.368	34
510	Oak	172	0.418	25	273	0.294	48
1114	Oak	224	0.344	39	251	0.315	44
2922	Alder	566	0.158	62	679	0.134	68
2926	Alder	310	0.265	37	402	0.213	49
4713	Oak	296	0.276	51	455*	0.192*	66*
4713	Oak				324^	0.256^	54^

Key
* = sapwood sample ^ = heartwood sample

Table 18: Ash content

Context	Ash Content %	Iron Staining
412	4	+
510	26	+++
1114	17	+++
2922	12	+
2926	15	+
4713 - sapwood	25	+++
4713 - heartwood	8	++

Key:
+ = slight iron staining ++ = moderate iron staining +++ = severe iron staining

4 DISCUSSION OF RESULTS

All wood samples have undergone deterioration with percentage Loss in Wood Substance (%LWS) values ranging from 25% (for timber 510) to a maximum of 68% (for the sub-sample from timber 2922). Maximum water contents range from a minimum of 172% (timber 510) to a maximum of 679% (timber 2922).

A number of classification systems have been developed in an attempt to group wood according to decay. One early system (de Jong 1977) grouped oak wood into three Classes depending upon the maximum water content values:

Class 1 – the wood has a µmax value greater than 400% and is considered severely decayed with isolated pockets of harder wood.
Class 2 – the wood has µmax values between 185% - 400% and the wood is considered to be moderately decayed with a well preserved inner core, but softer decayed outer zones.
Class 3 – the wood has a µmax value of less than 185% and the wood is considered to be well preserved with much of the wood substance still present.

Using this system the wood from Storeys Bar Road can be grouped as:

TIMBER	CLASS
412	2
510	2-3
1114	2
2922	1
2926	2-1
4713	2
4713 Sapwood	1

A more recent system (Smit *et al* 2006) broadly classifies wood decay into two groups, again depending upon maximum water content:

-healthy water-saturated wood has a maximum moisture content of between 60140% -highly degraded wood has a maximum moisture content of between 600-900%

Using this system, most of the samples fall between the two broad categories of "healthy water saturated" and "highly degraded" wood although a sub-sample from one of the alder fragments could be considered as having areas of highly degraded wood.

The most heavily decayed pieces of timber are the two samples of alder and the sapwood component of timber 4713. Sapwood invariably decays at a greater rate than heartwood due to its composition - the sapwood is the "living" component of the wood and is prone to greater microbial activity. Non-oaks such as alder can also exhibit a greater level of decay again due to their structure and composition.

In broad terms, considering the results from the density assays and water content determinations for both whole and sub-samples the results suggest that the wood has undergone typical heterogeneous decay with zones of soft decayed wood intermingling with zones of less decayed wood.

The ash contents are all elevated. Fresh oak usually contains less than 1% ash whilst "ancient waterlogged oak" often contains up to 10% or more ash especially if highly degraded (Hedges 1990, 137). The high values obtained here can be attributed to the presence of iron derived from the burial environment and deposited in the wood. These elevated ash levels are likely to influence the density determinations and therefore, in real terms, the actual density values are likely to be lower than the calculated density values recorded above. The presence of iron will have a detrimental impact upon the wood if conditions within the burial environment become oxic – the ferrous ions will oxidise to ferric ions causing dissolution of the remaining cellulose within the wood cell structure.

Longitudinal cracks visible on timbers 2922 and 4713 indicate that at some point the water table had dropped sufficiently giving rise to partial desiccation of the deposits and the timber. Whether this was a recent occurrence or an event that happened sometime in the past is impossible to gauge. Evidence for microbial attack was also discernible when viewing thin sections of the wood under a stereo-microscope using transmitted light; this is indicative of conditions of low water saturation and appropriate oxygen concentrations conducive to support aerobic microbes. Again, it is impossible to identify at what point this decay occurred – it could have occurred before the wood was buried.

The condition assessment has identified the degree of preservation of timber recovered during recent excavations at Storey's Bar Road near Peterborough and the data now serves as “baseline” information from which further comparison may be made during future interventions or ongoing management of the site.

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PART 6 REDOX/pH/ELECTRICAL CONDUCTIVITY TESTS

by I D Meadows based on notes from Dr S Boreham (University of Cambridge)

Samples were taken from six trenches distributed across the study area for REDOX/pH/Electrical Conductivity testing. The tests were carried out by Dr Steve Boreham in the laboratories of the Department of Geography in the University of Cambridge. Within each trench three samples were taken, one from each of the three lowest units of soil, namely the lower peat and the two buried soil horizons.

The high and very high Redox values that these samples produced were surprising, values of +300mV is generally an 'oxidised' sample with poor preservation potential but many of the values here were significantly above that, suggesting a large degree of oxidation of the material (Table 19).

The pH and EC measurements were carried out at the same time as the Redox. They show rather high nutrient content (salinity?) in many of the samples. It was also interesting that many of the samples appeared to be acid or very acid (pH3). Again, the pH/EC probe was calibrated before, during and after the analyses to check for stability.

There is a clear relationship between the pH and nutrient status (EC), with the more acid samples having the higher nutrient status.

Trench 23 stood out as the only one being slightly alkaline and having modest eutrophication, compared to the rest.

In the context of the archaeological samples that Dr Boreham generally deals with, these samples are certainly out of the ordinary by virtue of their highly oxidised nature, high nutrient status and high acidity.

Table 19: Storeys Bar Road - pH, Elelctrical Conductivity & Redox Potential

					Interpretation		
sample	**pH**	**EC (µS/cm)**	**EC x3**	**Redox (mV)**	pH	EC x3	Redox Potential
TR14. bot. 1407	6.65	520	1560	251	Slighly acid	Eutrophic	High redox
TR14. mid. 1406	6.02	372	1116	319	Slighly acid	Eutrophic	High redox
TR14. top. 1405 <6>	4.19	503	1509	319	Strongly acid	Eutrophic	High redox
TR19. bot. 1910	6.59	1142	3426	396	Slighly acid	Strongly eutrophic	Very high redox
TR19. mid. 1909	6.45	834	2502	302	Slighly acid	Strongly eutrophic	High redox
TR19. top. 1907 <8>	4.36	1254	3762	453	Strongly acid	Strongly eutrophic	Very high redox
TR23. bot. 2308 <10>	7.81	205	615	476	Slightly alkaline	Mesotrophic	Very high redox
TR23. mid. 2307 <25>	7.68	300	900	326	Slightly alkaline	Eutrophic	High redox
TR23. top. 2306 <10>	7.26	444	1332	333	Slightly alkaline	Eutrophic	High redox
TR27. bot. 2709	3.95	1681	5043	302	Strongly acid	V. Strongly eutrophic	High redox
TR27. mid. 2708	3.29	1818	5454	416	Strongly acid	V. Strongly eutrophic	Very high redox
TR27. top. 2707 <12>	5.81	782	2346	476	Slighly acid	Strongly eutrophic	Very high redox
TR47. bot. 4707	3.09	1756	5268	418	Strongly acid	V. Strongly eutrophic	Very high redox
TR47. mid. 4706	4.50	925	2775	435	Strongly acid	Strongly eutrophic	Very high redox
TR47. top. 4705 <18>	4.07	700	2100	451	Strongly acid	Strongly eutrophic	Very high redox
TR47. top. 4705 <18> Rep	4.30	684	2052	463	Strongly acid	Strongly eutrophic	Very high redox
TR53. bot. 5307	4.56	2087	6261	335	Strongly acid	V. Strongly eutrophic	High redox
TR53. bot. 5307 Rep	4.19	2328	6984	352	Strongly acid	V. Strongly eutrophic	High redox
TR53. mid. 5306	4.61	1665	4995	302	Strongly acid	V. Strongly eutrophic	High redox
TR53. top. 5305 <14>	4.35	875	2625	490	Strongly acid	Strongly eutrophic	Very high redox

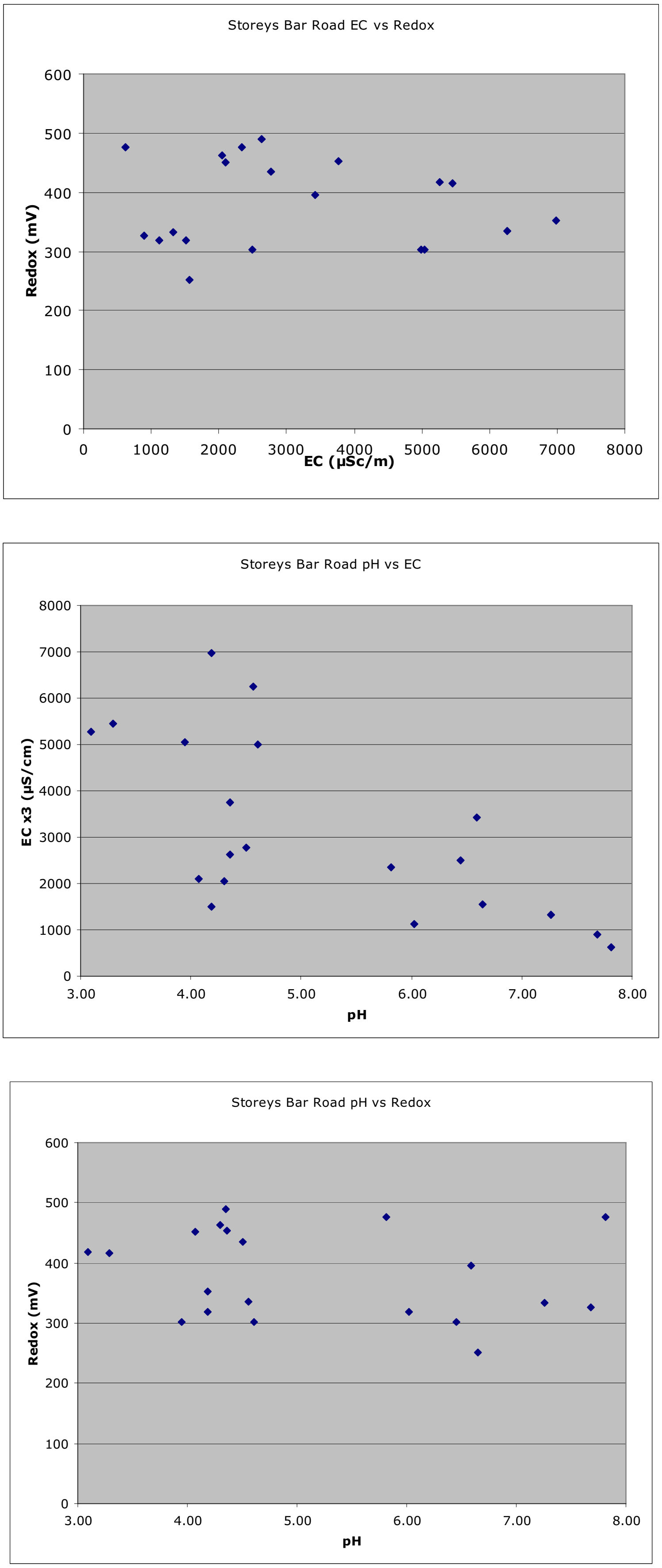


Fig 26 Storey's Bar Road: EC vs Redox; pH vs EC; pH vs Redox

PART 7 CONCLUSIONS
by I D Meadows

This archaeological assessment demonstrated the non-continuation of the ritual activity identified at and around Flag Fen. No ancient anthropogenic features were identified, instead the trenches exposed a series of horizontal or near horizontal bedded strata representative of the fen edge. The lowest archaeological horizon comprised a buried soil that is likely to extend beyond the present study area, as do the overlying horizons. This buried soil was sampled but no further work on its micro morphology was felt necessary at this stage. The lower peat contained waterlogged material, but lay above the watertable and was therefore maintained in a wet state by capillary action.

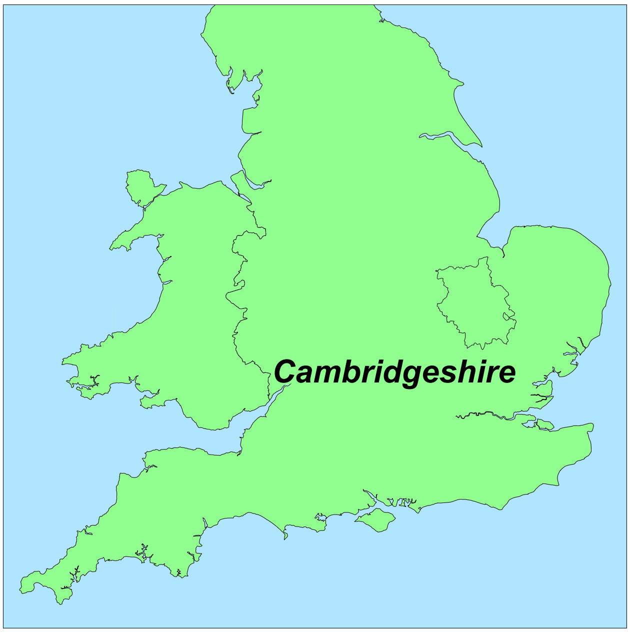
The soil sequence was sampled for pollen as an indicator of the vegetation history and, whilst not examined by close interval counting, a series of levels were subjected to assessment. The results of this work identified the variable preservation of the pollen in the soil. Some horizons, as with those examined during the excavation of the power station site, proved to have little or no preserved pollen.

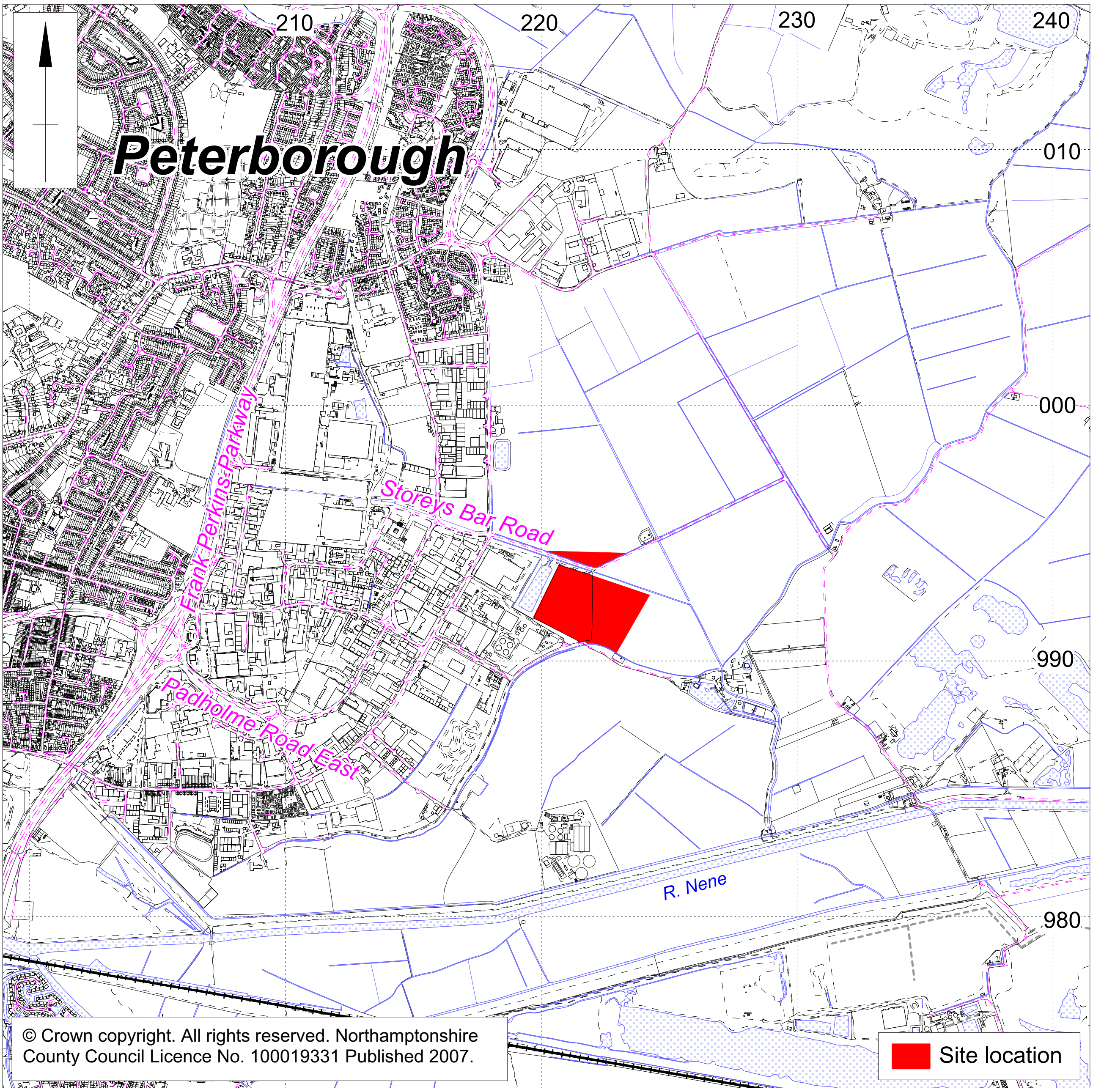
The plant macros included only two seeds, a probable *Persicaria lapathfolium* (Pale Persicaria), a member of the knotweed family that inhabits damp lowland areas and a possible Poaceae (grass). Both were very badly degraded, particularly the Poaceae, making their identification tentative. No anthropogenic material, such as domesticated cereal grains were noted and charcoal was sparse suggesting habitation activity was at some distance from the study area.

The diatoms indicate areas of freshwater/marshy environment, with slow to almost still standing bodies of water. This correlates well with the pollen evidence with sedges and aquatics from samples mono 1, 3, SBR S8, 12, 15, 16 and 18. These bodies of water could range from shallow pools to slow moving ditches but were not indicative of larger bodies of water such as a lake. There are some minor occurrences of species that inhabit brackish environments, but these may reflect either dilution of soluble minerals produced *in situ* via leaching during a period of drying across the site, and/or aerial deposition of saltspray brought inland from the wash region.

The waterlogged wood comprised predominantly natural fragments. There was limited evidence for woodland management in the form of coppicing but it appeared to be utilisation of already growing trees. The quality of preservation of the wood is neither particularly good nor particularly poor, however it is unlikely to improve and the tests provide a baseline for future studies in preservation.

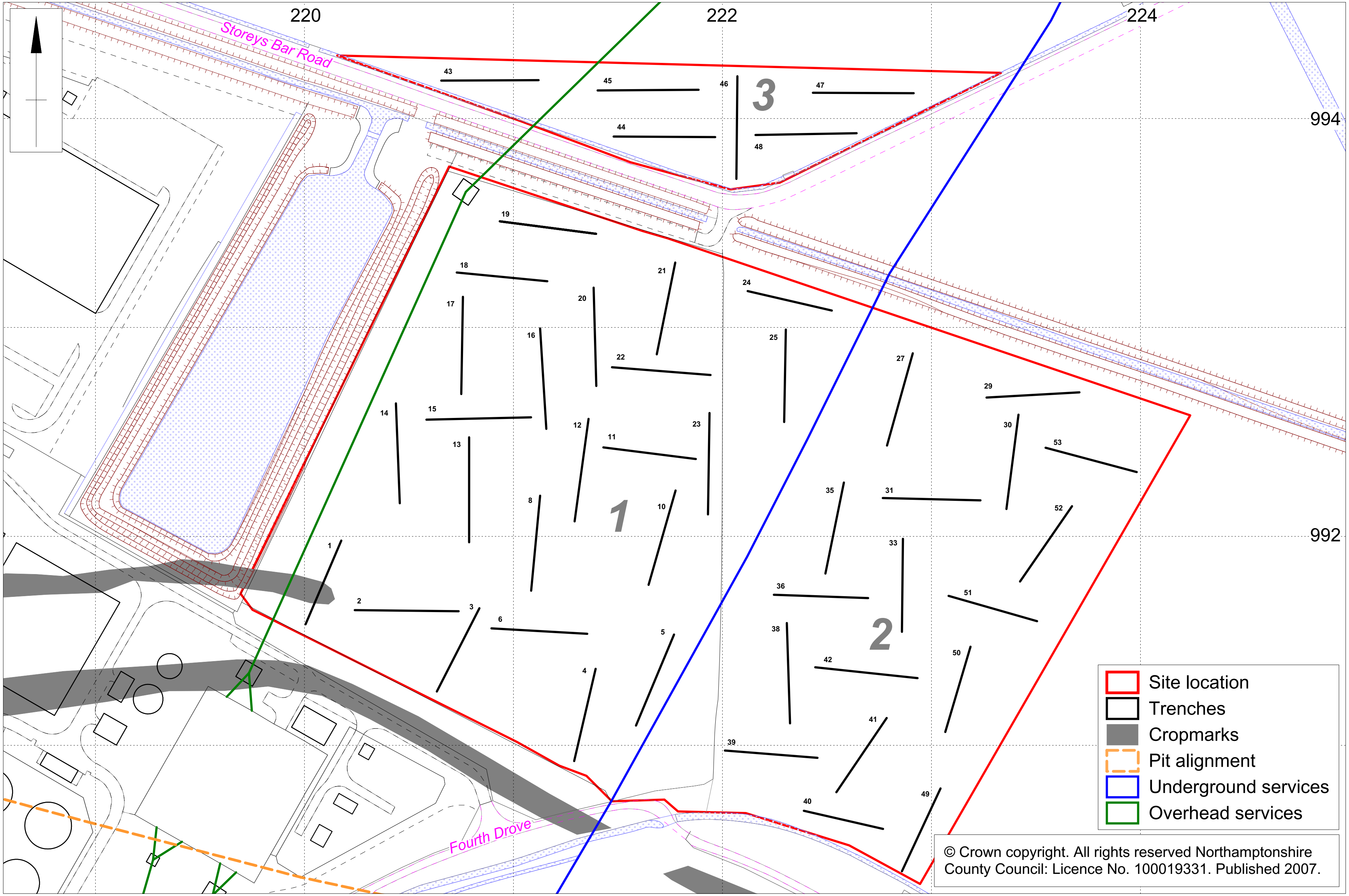
The ground water level at the time of the evaluation, which followed a wet winter and wet spring, ranged from +0.67mAoD to – 0.11m AoD. The water level of the Padholme Drain was at –0.18m AoD at the time of evaluation and it is reasonable to presume this will draw water from the surrounding ground. The planned re-profiling of the drain suggests a 'normal' water level of –0.35m AoD, which would be about 0.7m below the upper surface of the natural horizons encountered in the evaluation.





Scale 1:12,500

General site location Fig 1

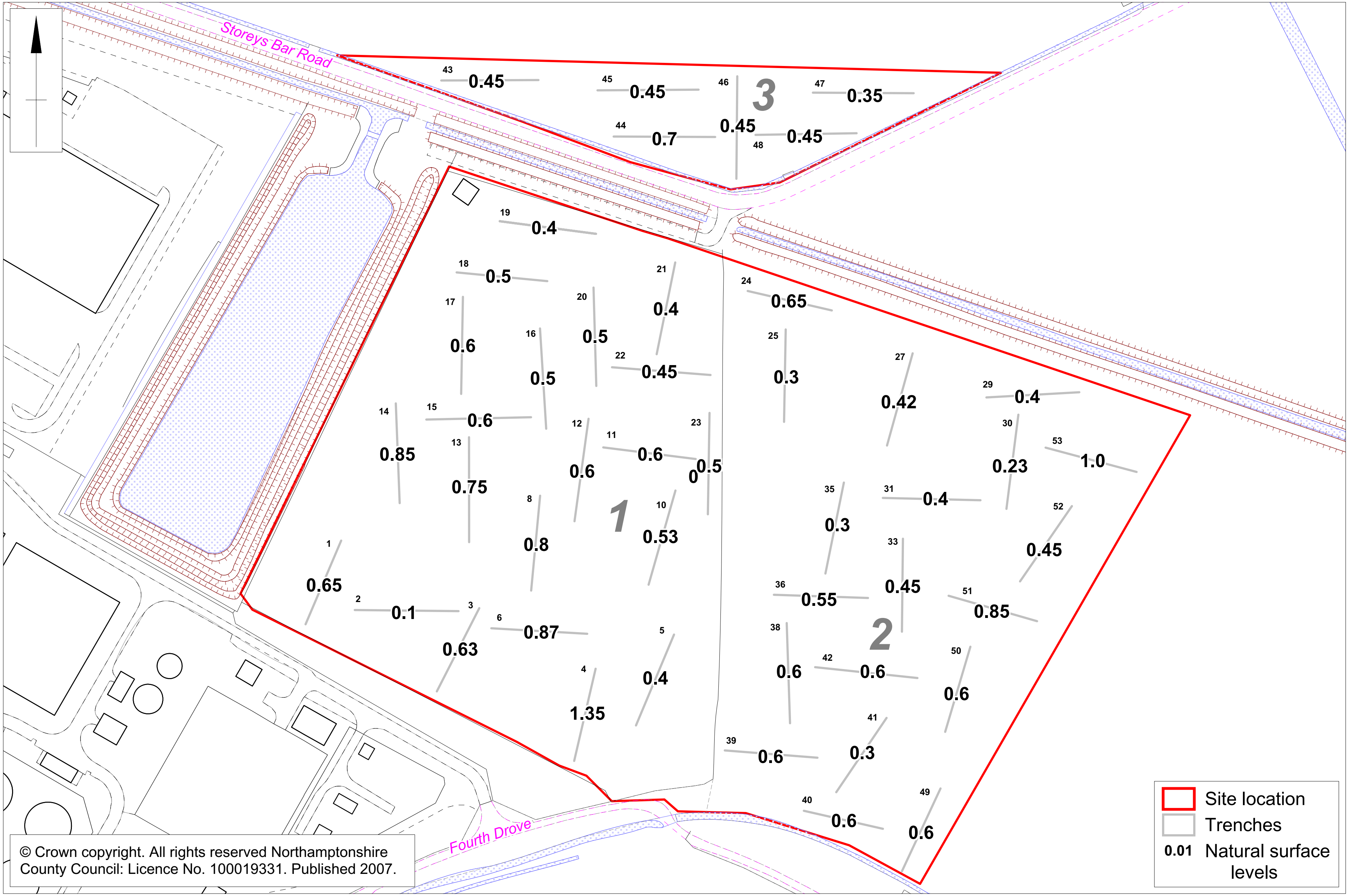


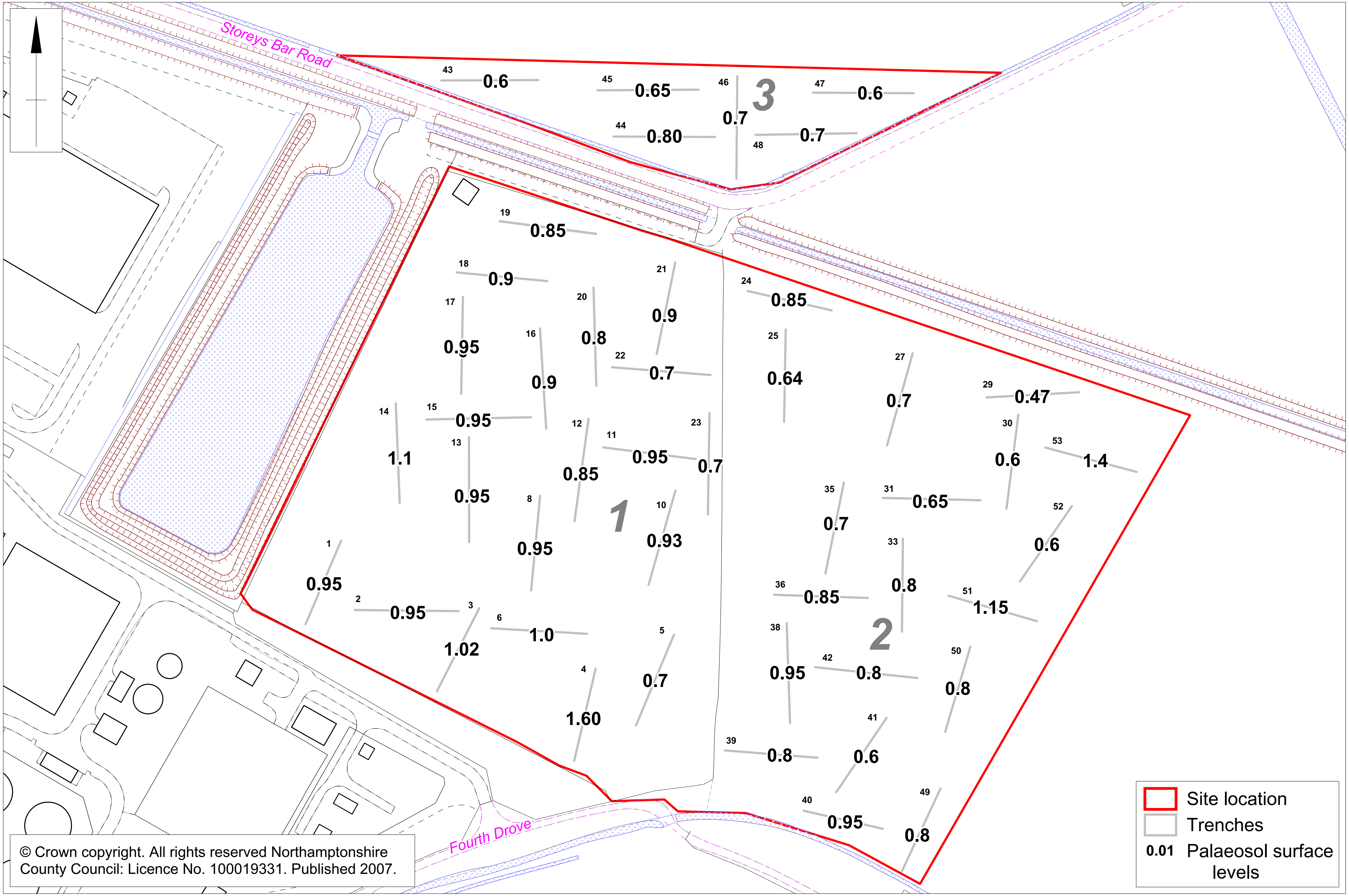
Scale 1:2500

Trench location plan relative to cropmarks Fig 2

Fig 3 Trench locations with level of top of natural

Scale 1:2500



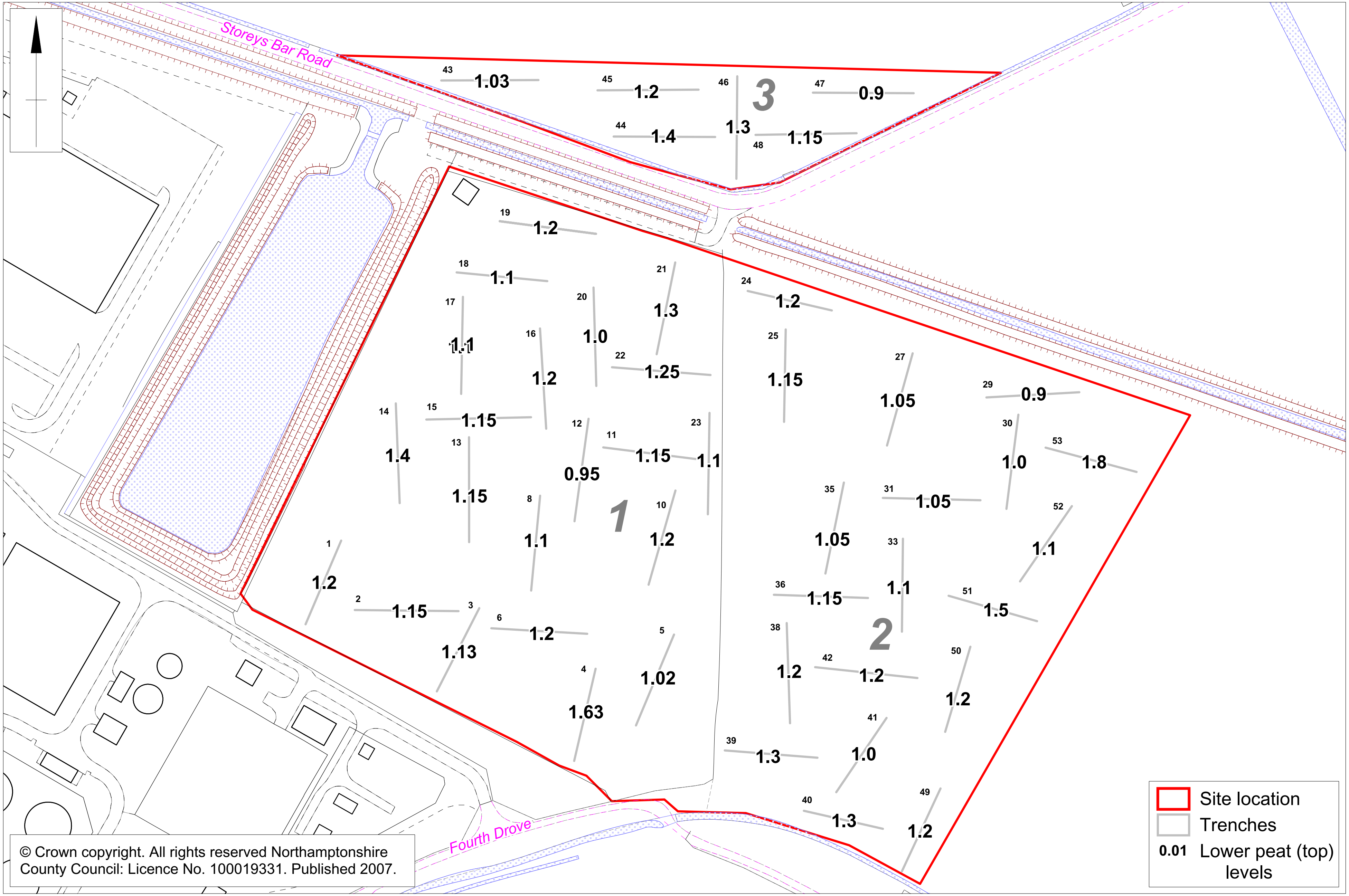


Scale 1:2500

Trench locations with level of top of palaeosol

Fig 4

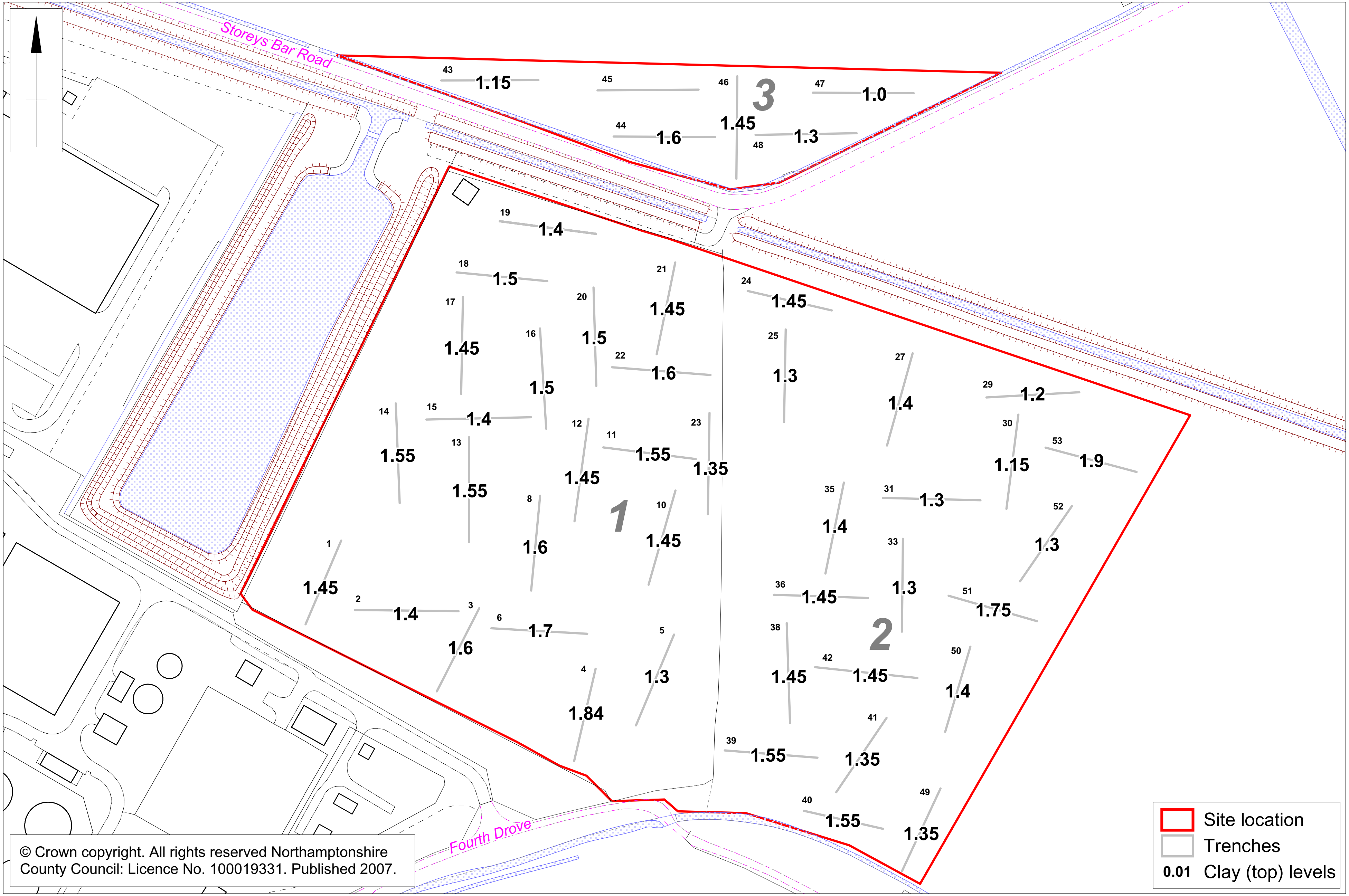
Scale 1:2500

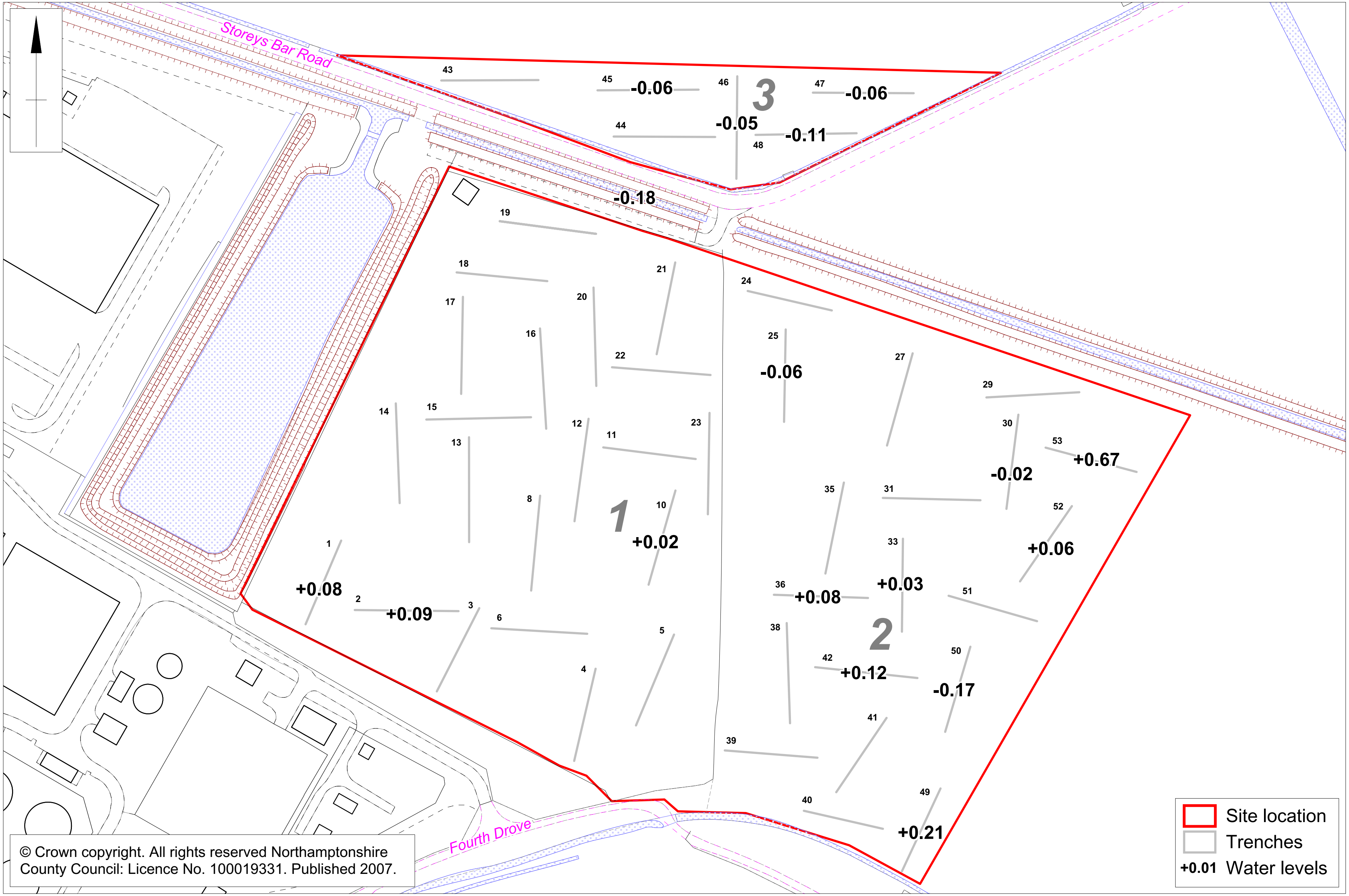


Trench locations with level of top of lower peat

Fig 5

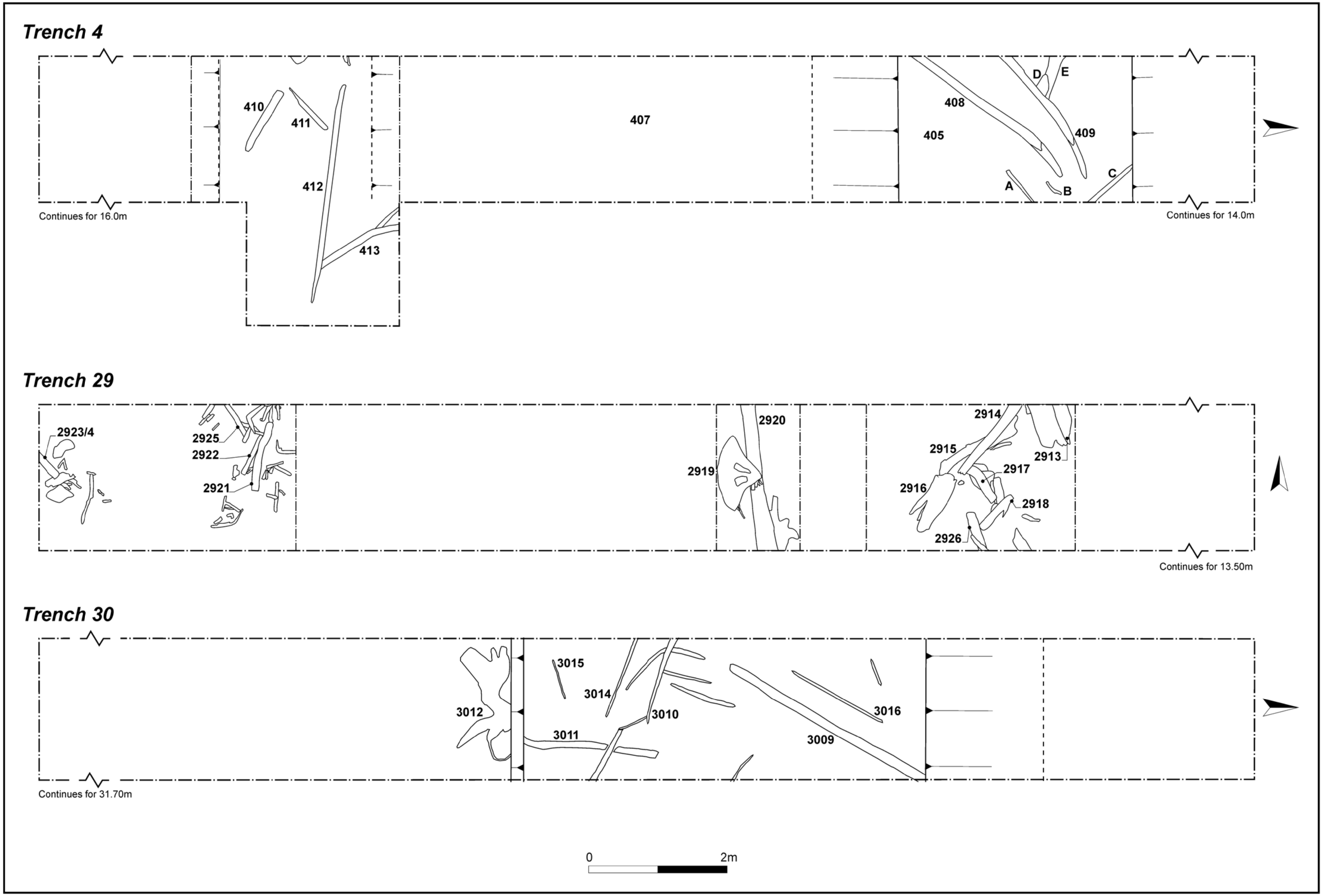
Scale 1:2500 Trench locations with level of top of late Bronze Age/early Iron Age clay Fig 6



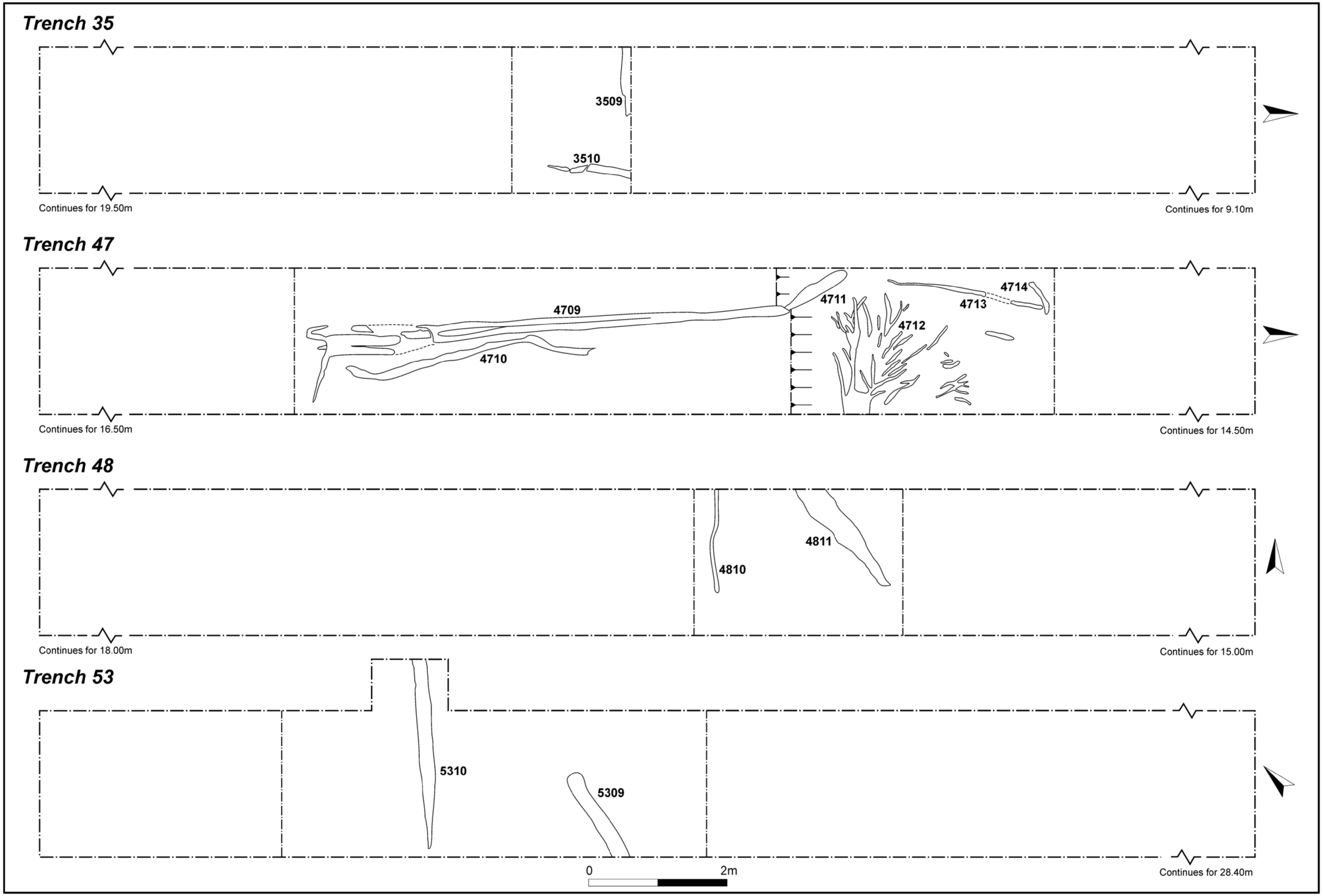


Scale 1:2500

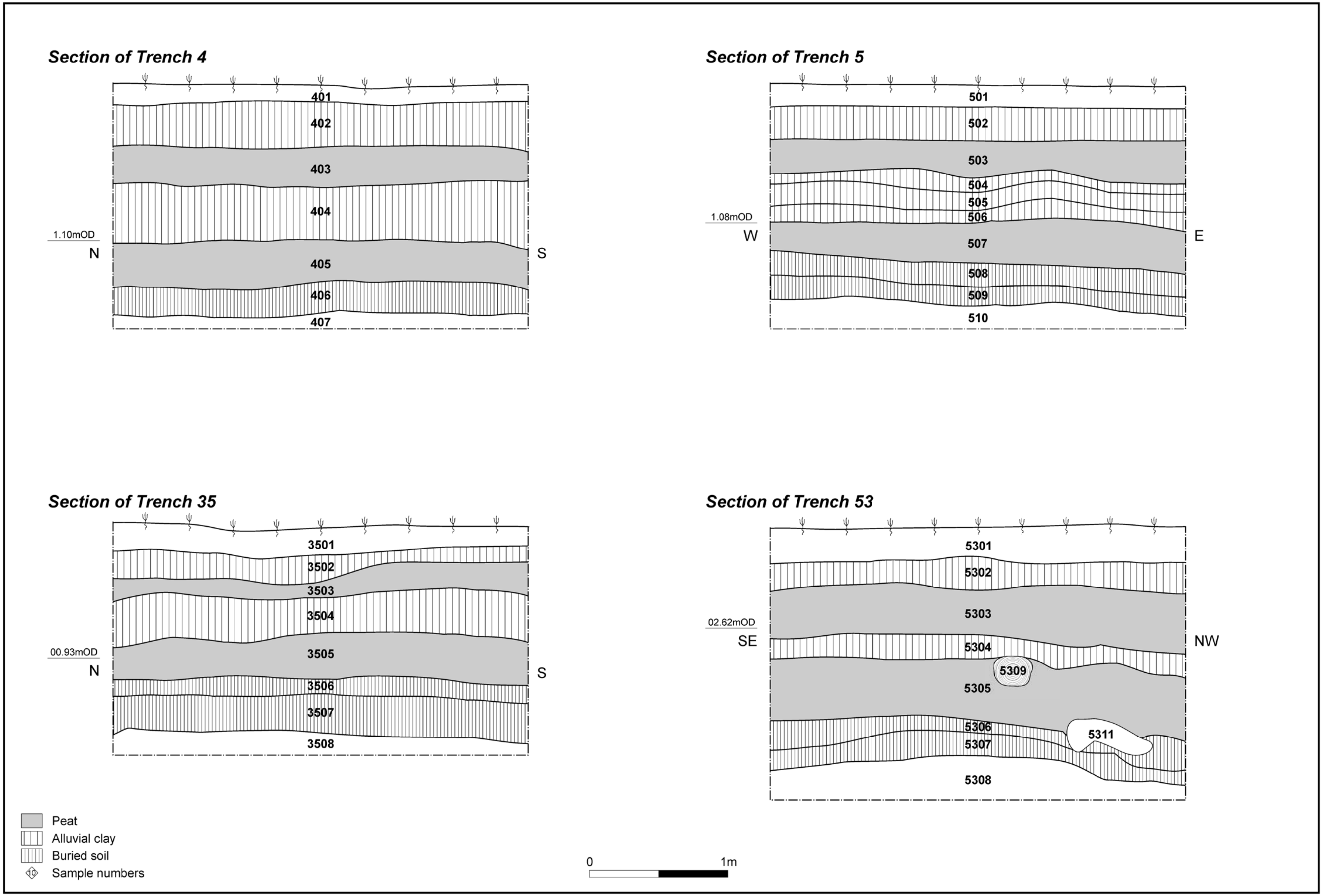
Fig 7 Trench locations with recorded ground water



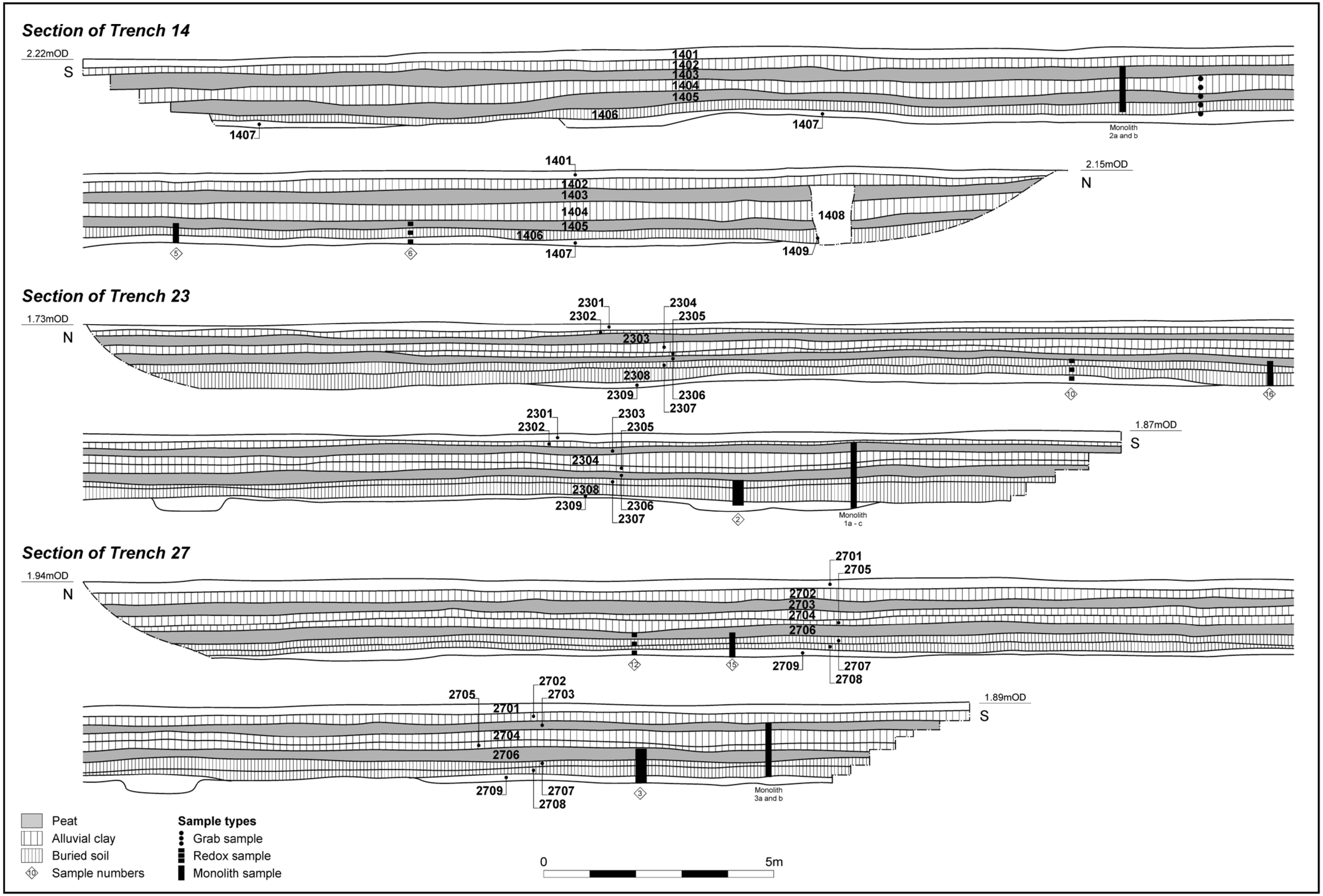
Plans of trenches 4, 29 and 30 Fig 8



Plans of trenches 35, 47, 48 and 53 Fig 9



Detailed sections of Trenches 4, 5, 35 and 53 Fig 10



Sections of Trenches 14, 23 and 27 Fig 11