Rymes Reed Beds, Holme Fen (Great Fen Project)

Archaeological Watching Brief Report

oxfordarchaeology east

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Archaeological Watching Brief Report

Monitoring of the excavation of ponds and channels at Rhymes Reed Beds, Holme Fen, as part of the Great Fen Project

Archaeological Monitoring

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Summary

Archaeological monitoring during works associated with the excavation of new ponds and channels was carried out by Oxford Archaeology East at Rhymes Reed Beds, Holme Fen (TL 2060 9040 centred) during Arpil to September 2013. Work was carried for the Bedfordshire, Cambridgeshire and Northamptonshire Wildlife Trust as part of the Great Fen Project.

No archaeological features were found but the works, which included sampling for palaeoenvironmental remains and additional borehole survey, have added to the understanding of the peat formation and deposits within the region and further defined the locations of deposits associated with Whittlesey and Trundel Meres and associated medieval channels that fed into the Whittlesey Mere that were identified in the borehole survey. Palaeoenvironmental samples identified plants typically associated with wetland Alder Carr woods.

In addition, the putative location of the crash site of Spitfire X4593 was also metal detected and aluminium debris probably associated with the plane was recovered.

1 INTRODUCTION

1.1 Location and scope of work

1.1.1 Archaeological monitoring was conducted by Oxford Archaeology East (OA East) at Holme Fen during the excavation of ponds and channels associated with the Great Fen Project. The Great Fen is a 50-year project to create a huge wetland area. One of the largest restoration projects of its type in Europe, the landscape of the fens between Peterborough and Huntingdon is being transformed for the benefit both of wildlife and of people (http://www.greatfen.org.uk).

1.1.2 The Site is located in the north-west corner of the Great Fen area designation, west of Whittlesey Mere, north and east of Holme Fen and immediately adjacent/on top of Ugg Mere (TL 2060 9040 centred; Fig. 1).

1.1.3 This archaeological monitoring was undertaken in accordance with a Brief issued by Kasia Gdaniec (2012) of Cambridgeshire County Council (CCC; Planning Application 1200/729/FUL), supplemented by a Specification prepared by OA East (Macaulay 2012).

1.1.4 The work was designed to assist in defining the character and extent of any archaeological remains within the proposed redevelopment area, in accordance with the guidelines set out in *National Planning Policy Framework* (Department for Communities and Local Government March 2012).

1.1.5 The site archive is currently held by OA East and will be deposited with the appropriate county stores in due course.

1.2 Geology and topography

1.2.1 The Holocene organic deposits ('peat') overlie a complex of Late Glacial minerogenic sediments lying on top of the Jurassic Oxford Clay bedrock. Some of these sediments cap islands and ridges whilst in the north-east they are sealed by Holocene deposits and are therefore assumed to be of Late Glacial date (Begg *et al* 2008, 18). Godwin and Vishnu-Mittre (1975) carried out a number of studies within the region and show that an extensive forest had formed over the Oxford Clay prior to a localised flooding in a basin or channel with the earliest 'peat' formation starting in 6794±120 BP (Waller 1994, 195)). At this time an open water lake had formed at Trundel Mere with surrounding dry land areas composed of a mixed deciduous woodland of Lime, Elm and Oak trees (Hall 1992; Waller 1994, 195). Acidic peat in the area of Trundel Mere is assumed to have started forming in wet pools as floating mats of vegetation that eventually sunk and established as they grew larger and the level of the water table changed (Godwin and Vishnu-Mittre 1975; Waller 1994,195; Begg *et al.* 2008, 28).

1.2.2 The lower wood peat was formed by a wet woodland (carr) with a mix of species including alder, ash, oak, birch, yew, buckthorn and alder buckthorn (Waller 1994) as fresh water started to flood the area (Hall 1992). Frequent bog oaks have been recorded from within the lower peat (Begg *et al.* 2008,18; Hall 1992). It has been suggested that this peat formation represents a damp woodland setting in the Mesolithic or Neolithic (Begg *et al.* 2008, 18).

1.2.3 The wood peat development stops at approximately the same time as that of the Bronze Age marine incursion in the north-eastern areas of the Great Fen Project, associated with the 'Barroway Drove Beds' deposits (Waller 1994, 196; Begg *et al* 2008, 28-29). However, in the area of Whittlesey Mere it can be seen that the environment changes to an acidic raised bog in the Late Neolithic with a mixture of *Sphagnum*, *Calluna* and *Eriophorum* plant remains.

1.2.4 Studies within the area of Holme Fen suggest that the 'Barroway Drove Beds', and therefore the margin of the Bronze Age marine inundation, ends around the eastern side of Whittlesey Mere. However, two thin clay deposits identified by Godwin and Vishnu-Mittre (1975) as erosion formed due to deforestation within Holme Fen have been re-interpreted by Waller (2004, 65) as the extreme limit of the fen clays, while further work by Begg *et al.* (2008, 28) suggests that they represent inundations caused by storm surges in the southern North Sea. It is likely that the known 'Fen Clay' in this area initially formed in the creeks and channels and then spread out over the wider area at high tides (French 2003). The current site, being located at the extreme edge of this zone, would therefore have flooded at only the very highest tides.

1.2.5 Godwin and Vishnu-Mittre (1975) and Waller (1994) demonstrated high frequencies of Chenopodiaceae and Gramineae pollen at this time, which suggest salt-marsh development and brackish conditions in the region at the edge of a broad mud-flat represented by the Fen Clay. Diatom and forminifera studies undertaken by Brockmann and Macfadyen, respectively, to the south of the current site at Green Dyke (Godwin and Clifford 1938; Waller 1994), where a thick layer of Fen Clay was available to study, show that the Fen Clay was deposited in brackish waters with a transition through to freshwater conditions as the upper peat started to form.

1.2.6 At Holme Fen the limit of the Bronze Age inundation was reached and the Fen Clay has not been identified across the entire site. It seems that in at least part of the area, growth of acid peat bog continued unabated throughout the Bronze Age. It is therefore highly likely that the western side of Whittlesey Mere and Trundle Mere, where the current site is located, was likely to have been a mosaic of acid heathland and raised bog (hummock and hollow topography) until drainage works started in *c.*1800 (Godwin and Vishnu-Mittre 1975, 346). This acidic bog would have formed with small pools and raised platforms, with a mix of acidophiles species present throughout, such as those identified by Godwin and Vishnu-Mittre (1975, 346) from the county flora list produced by Druce in 1926.

1.2.7 During the Iron Age Whittlesey Mere began to form as water that was rich in calcium carbonate from the River Nene and other sources that entered the area. The shell marls in the Trundel-Whittlesey-Ugg Mere complex formed from the biogenic deposition of calcium carbonate in these extensive but relatively shallow water bodies. By the medieval period Whittlesey Mere had become a major fishing resource (Begg *et al.* 2008, 29).

1.2.8 The Victoria County History for Huntingdonshire (Page 1974) specifies a large range of plants and animals that inhabited the region within and along the edge of the Mere. From studies undertaken it is suggested that the habitat prior to the draining of the Mere had remained largely unchanged since the formation of the acidic bog peat, although the species diversity is said to have decreased as drainage within the area started in 18th century. Once the drainage had begun the documented size of Whittlesey Mere decreased and it was recorded as being visibly diminished in 1786 and temporarily dry in 1826.

1.2.9 Drainage of Whittlesey Mere itself began in 1849 (Page *et al.* 1974) and was completed in 1853. After the drainage of the Mere had finished shell marls composed of fresh water *Chara* and mollusca had formed at the top of the peat sequence. The well-documented shrinkage and collapse of the peat around Holme Fen started and has continued to this day. Hutchinson's (1980) study of the peat 'wastage' around Holme Fen post demonstrates the initially rapid and then ongoing lowering of the local ground surface, amounting to almost 4m in 130 years. Waller (2004) has stated that the pollen analysis carried out previously for the Fenland Project would now no longer be possible due to the degradation of the deposits, while Boreham in Begg *et al.* (2008) states that the on-going destruction of the fenland sequences by the Holme Post is visible in the work he has carried out in the last 10 years of using the site to teach students.

1.2.10 The current study site extends across an area of largely flat grassland at *c*. -2m to -3mOD below sea level.

1.3 Archaeological and historical background

1.3.1 A desk-based assessment was undertaken in 2002 which outlined the known archaeological and historical background for the Great Fen Project area at that time (Casa Hatton 2002). In-depth investigations of the Cambridgeshire Fenland by borehole survey have been carried out since the 1930s and have been summarised by Waller (1994 and 2004). In addition, volumes 1 and 3 of the Victoria County History of Huntingdonshire (Page 1974 and Page *et al.* 1974) give a good but rather general background to the ecology, archaeology and history of the area. A brief synthesis is given below.

1.3.2 As already stated, the current study area has been fen alder carr and then acidic raised bogs, surrounded by areas of dry marginal land, since the Neolithic. Borehole surveys and more recent reinterpretation (Godwin and Clifford 1938; Godwin and Vishnu-Mittre 1975; Hutchinson 1980; Waller 1994 and Begg *et al.* 2008) have largely tracked the environmental changes within the area. These have been discussed in general terms as part of the Geological background (see above), however it has clearly been suggested by Godwin and Vishnu-Mittre (1975) that forest clearance of the area occurred during the Neolithic prior to the inundation events as shown by two Clay layers. However, Waller (2004) counters that these deposits may have been the result of flooding as the Clay layers - attributed to forest clearance - are dated to 3400 and 3415±120BP. Waller suggests that these are believed to be flooding events of either brackish water or the backing up of freshwater due to rising sea levels.

1.3.3 Little other evidence of early prehistoric activity is known from the study area although a Neolithic or Bronze Age flint scatter has been identified in the nature reserve to the south-west of the area (Casa Hatton 2002). Further evidence of Bronze Age activity in the area of Whittlesey Mere has been demonstrated by the presence of a small number of Bronze Age axe and spearheads found in the area of Whittlesey Mere as far back as 1866 (Page 1974).

1.3.4 Trundel and Whittlesey Meres were both extant by the Iron Age, although as already alluded to Trundel Mere dates back to the Mesolithic, 6186±62 BP (Begg *et al.* 2008, 23-25) and had started to become major resources for fish and wild fowl.

1.3.5 Roman material is known from the area of Whittlesey Mere (Hall 1992, 30) but the provenance is unclear and the material may well have been deposited in the medieval period. The parts of the study area that were not in the known extent of both Trundel and Whittlesey Meres at this time are composed of raised acidic bog and therefore would have been unsuitable for habitation.

1.3.6 By the medieval period, Whittlesey, Trundel, Ugg, Dray and Ramsey Meres had become major fisheries primarily controlled by the nearby religious houses of Peterborough, Thorney, Ramsey, Sawtry and through estate ownership by Ely (Page *et* *al.* 1974); evidence of some of these fisheries, to the east of the development, has been preserved (*i.e* ECB657).

1.3.7 Previous archaeological work was carried out in January 2013 to evaluate the area of Fenland that was to be flooded (Clover and Clarke 2013). Two trenches and a series of test pits and boreholes were excavated to identify the previous course of Yaxley Lode and to look at the sequence of deposit formation. Two of the boreholes located the Lode and further environmental modelling of the area was carried out.

1.4 Acknowledgements

1.4.1 The author would like to thank Bedfordshire, Cambridgeshire and Northamptonshire Wildlife Trust who commissioned and funded the archaeological work and in particular Lorna Parker and Kate Carver. The project was managed by Stephen Macaulay

1.4.2 The brief for archaeological works was written by Kasia Gdaniec, who visited the site and monitored the watching brief.

1.4.3 The author would also like to thank Fen Ditching for their assistance during the works and Graeme Clarke and Pat Moan for their work during the monitoring. Thanks are also due to Steve Boreham (boreholes), Rachel Fosberry (environmental samples) and Dave Brown (illustration).

2 Aims and Methodology

2.1 Aims

2.1.1 The objective of this archaeological monitoring was to determine as far as reasonably possible the presence/absence, location, nature, extent, date, quality, condition and significance of any surviving archaeological deposits within the development area.

2.1.2 The project was also aimed at attempting to augment or improve the environmental models already devised for Holme Fen, as well as identifying the limit of the Bronze Age marine ingression.

2.2 Methodology

2.2.1 The Brief required constant archaeological monitoring of the excavation of channels and ponds excavated by Fen Ditching, supplemented by the taking of environmental samples of any significant deposits.

2.2.2 Machine excavation was carried out under constant archaeological supervision with a 360° excavator using a toothless ditching bucket for the ponds and a V-shaped bucket for the channel

2.2.3 The site survey was carried out using a hand held GPS.

2.2.4 Spoil, exposed surfaces and features were scanned with a metal detector. All metal-detected and hand-collected finds were retained for inspection, other than those which were obviously modern.

2.2.5 All archaeological features and deposits were recorded using OA East's *pro-forma* sheets. Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits.

2.2.6 Environmental samples were taken of deposits that may have been of archaeological interest such as areas around potentially *in-situ* bog oaks.

2.2.7 Site conditions were variable with extremely good sunny weather interspersed with rain, sleet, snow and high winds.

3 Results

3.1 Introduction

3.1.1 The results of the archaeological monitoring are presented below in relation to the areas/features monitored (channels and ponds), supplemented by trench/context information given in Appendix A, and environmental reports in Appendix B.

3.2 Channels (Fig. 1; Fig. 2 sections 1 and 4-6, Plates 1-4)

3.2.1 The Main Channel (shown in pale blue of Fig. 1) was c.1.5km long and excavated from the northern end of the site towards the mid point, and then from the southern end to meet up with the already excavated northern section. At its deepest point it was a maximum of 2m in depth. The deposit sequence at the northern end matches that recorded in previous boreholes in this area.

3.2.2 A single medieval to post-medieval ditch was identified within this stretch, which is first shown on the 1889 Ordnance Survey map of the area and is not visible on Google Earth; it was backfilled between 1984 and 1999.

3.2.3 As the channel cut progressed southwards it moved into deposits of shell marls and gyttjas below sphagnum peat and overlying the deeper wood peats. These layers were located at various levels within the sequence but represent the freshwater lake sediments deposited by Trundel Mere. It is clear that the sequence seen during the works matches the known deposits identified in previous borehole surveys.

3.2.4 The bulk samples taken from the main channel seem to indicate a mix of Alder Carr woodland, reed swamp and sphagnum peat existed during the formation of the peat.

3.2.5 Between the known location of Trundle and Whittlesey Meres, deposits indicating hummock and hollow peat formation were uncovered. The excavated deposits revealed within the channel as it travelled further south progressed into a mix of freshwater silts and lake sediments associated with the edge of Whittlesey Mere and the known river channels flowing into it, such as Holme River, which was identified within the excavation of the channel to the south of Pond D and also in Boreholes 3 and 4 (Boreham this report; Plate 4).

3.2.6 A second smaller channel (Plates 5 and 6) measuring 1.2m deep was excavated on the southern side of the road running alongside Holme Lode. At the base of the cut this channel revealed 0.3m of moss peat, overlain by 0.25m of dark grey peat, a thin layer of light grey clay or silt 0.07m thick, a layer of degraded dark peat 0.25m thick and a 0.4m-thick topsoil.

3.2.7 Further smaller channels were found on the southern side of the road near the suspected location of the Spitfire crash site, and are likely to represent the medieval channels and lodes running into Whittlesey Mere, as identified by Boreham (Borehole 5, this report).

3.2.8 A small side channel was also excavated off the Main Channel towards the East Coast Mainline railway. This uncovered a sequence of peat formation similar to that already described, with evidence for further tussock and hollow formation.

3.3 **Ponds** (Figs 1 and 2; Plates 7-9)

Ponds A (Plate 7) and B

3.3.1 Minimal groundworks were carried out at the area designated for Pond A (c. 20,000 sq. m). The pond has been designed to be built using the clay bund created in the 20th century around Pond B (formerly an agricultural reservoir). To facilitate this, a 'key trench', measuring 0.45m wide and 2.5m deep, was excavated around the exterior edge of Pond A. The trench cut through a sequence of deposits similar to that found during the earlier works (Clover and Clarke 2013). This comprised the pre-Flandrian deposits overlying the Oxford Clay and overlain by a lower wood peat, a thin silt band and a degraded friable peat that was sealed by topsoil. The base of the trench towards the eastern side of the pond revealed a light blue-grey to grey-white fine alluvial sand whilst the remaining area exposed the upper surface of the Oxford Clay or did not penetrate below the base of the lower peat.

3.3.2 Nothing of archaeological interest was exposed during this phase of the works.

Pond C

3.3.3 Pond C (c. 11,250 sq. m) was excavated to a maximum depth of 0.8m. As such the excavation did not penetrate below the degraded friable peat and as a result no deposits of interest were identified.

Pond D (Fig. 1; Fig. 2 Section 2; Plate 8)

3.3.4 This was the largest pond excavated (c. 20,000 sq. m), with a maximum depth of 1.4m.

3.3.5 The sequence of deposits is given below:-

- 0.3m of black friable degraded peat topsoil
- 0.42m of black degraded peat
- a thin 0.04m wide band of brown grey silt
- a detrital yellow brown reed peat, 0.26m thick
- a 0.46m-thick layer of mid red-brown peat with wood and phragmites
- a layer of gyttja, 0.02-0.04m thick

3.3.6 A number of bog oak fragments were found within these deposits. Of these, three were situated in an upright position with root systems surviving at their bases; it is possible that these were the remains of *in-situ* trees. Bulk samples (1-8) were taken from the base of these trees.

3.3.7 Interestingly, a large bog oak fragment had been heavily charred and burnt. It was not clear whether this was caused by man or natural events, but the lack of anthropogenic material and the form/extent of the burning would suggest the latter.

3.3.8 The bulk environmental samples taken from Pond D (1-8) identify plant species typical of a mix of reed swamp and Alder Carr woodland.

Pond E (Fig. 1; Fig. 2 Section 3; Plate 9)

3.3.9 This was one of the smaller ponds (c. 7500 sq. m) and the sequence uncovered was related to Whittlesey Mere. The sequence of deposits was as follows:-

- 0.2m of black firable degraded peat topsoil
- 0.41m of dark degraded friable peat
- 0.08m of moss peat

- 0.24m of shell-rich marl
- 0.04m of reed peat

3.3.10 The eastern end of the pond contained a shell-rich marl, suggesting that the edge of Whittlesey Mere lay to the west of the trench/Pond. Fine deposits of silt were identified in small bands at varying depths and may represent flooding by the mere.

4 Discussion and Conclusions

4.1 Channels

4.1.1 The sequence identified within the channels has demonstrated that the previous modelling of the deposit sequences (by Godwin and Clifford (1938), Godwin and Vishnu-Mittre (1975), Hucthinson (1980), Waller (1994 and 2004) and Boreham (in Begg *et al.* (2008)) constitute a fairly representative sample of the palaeo-environment around the area of Whittlesey Mere. The excavated deposits that lie underneath the degraded and damaged peat are layers of *sphagnum* and reed peat representing the upper peat formation. The lower peat formation was only excavated within the narrow 'key trench' around Pond A.

4.1.2 The works have demonstrated the presence of a palaeo-environment comprising a mosaic of tussock and hollow topography with areas of Alder Carr woodland, reed swamp and sphagnum peat growth.

4.2 Ponds

4.2.1 In general, and as expected, the excavation of the ponds had little impact on the more archaeologically-sensitive deposits with only the 'key trench' around Pond A actually impacting into the lower peat deposits.

4.2.2 The identification of what are assumed '*in-situ*' bog oaks in Pond D has allowed for some modelling of the environment those oaks grew in; a mix of marginal woodland and wetland species were identified from bulk samples (1-8). However, monitoring of the ponds has failed to uncover any evidence of marine ingress during the Bronze Age.

4.3 Spitfire Mark 1

4.3.1 A metal-detecting survey was carried out by Pat Moan and Steve Critchley in the area believed to be the location for the crash site of a Mark 1 Spitfire, X4593, which crashed on the 22nd November 1940. Four fragments of aluminium, believed to be part of the airframe, were recovered and their locations (see Fig. 1) suggest the position of the crash site.

4.4 Recommendations

4.4.1 Recommendations for any future work based upon this report will be made by the County Archaeology Office.

Appendix A. Trench Descriptions and Context Inventory

Pond A						
General description						
Pond devoid of archaeology. Consists of peat derived topsoil overlying upper peat, a thin silt band, lower peat and natural Oxford clay						
Contexts						
context no	**type**	**Width (m)**	**Depth/ thickness (m)**	**comment**	**finds**	**date**
-	Layer	-	0.3	Topsoil	-	-
-	Layer	-	0.2	Degraded peat	-	-
-	Layer	-	0.5	Upper dark reed and moss peats	-	-
-	Layer	-	0.1	Brownish-grey silt (Gyttja)	-	-
-	Layer	-	0.3	Mid reddish-brown and yellowish-brown reed and moss peat	-	-
-	Layer	-	0.9	Wood peat	-	-
-	Layer	-	-	Pre-flandrian deposit of light grey silty sand	-	-

Pond C						
General description						
Pond excavated through a degraded peat 0.8m thick						
Contexts						
context no	**type**	**Width (m)**	**Depth/ thickness (m)**	**comment**	**finds**	**date**
-	Layer	-	0.8	Degraded peat and topsoil	-	-

Pond D						
General description						
Pond excavated through topsoil, degraded peat, grey-brown silt, detrital yellow brown peat, mid red brown wood and reed peat and onto lake mud (gyttja)						
Contexts						
context no	**type**	**Width (m)**	**Depth/ thickness (m)**	**comment**	**finds**	**date**
-	Layer	-	0.3	Topsoil	-	-
-	Layer	-	0.42	Degraded peat	-	-
-	Layer	-	0.04	Grey brown silt	-	-
-	Layer	-	0.26	Detrital reed peat	-	-
-	Layer	-	0.46	Wood and read peat	-	-
-	Layer	-	0.04	Gyttja	-	-

Pond E						
General description						
Pond excavated through degraded peat into a series of peats and lake marl overlying reed peat						
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
-	Layer	-	.3	Topsoil	-	-
-	Layer	-	.4	Degraded peat	-	-
-	Layer	-	.1	Moss peat	-	-
-	Layer	-	.24	Shell rich marl	-	-
-	Layer	-	0.04	Reed peat	-	-

Channel						
General description						
Channel excavated approximately north to south across Holme Fen. Crossed various deposits but generally consisted of degraded peat topsoil and degraded peat overlying either a series of lake sequences with moss, reed and gyttjas dominating – at north and south ends – or moss, reed and wood peat in the central part near Pond D.						
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
-	Layer			Topsoil	-	-
-	Layer			Degraded peat	-	-
-	Layer			Reed peat	-	-
-	Layer			Moss peat	-	-
-	Layer			Gyttja	-	-
-	Layer			Wood peat	-	-
10	Fill			Ditch	-	Post-medieval
11	Fill			Ditch	-	Post-medieval
12	Fill			Ditch	-	Post-medieval
13	Cut			Cut of ditch	-	Post-medieval
-	Fill			Holme River	-	Medieval
-	Cut			Holme River	-	Medieval
-	Fill			Peak Dyke	-	Medieval
-	Cut			Peak Dyke	-	Medieval

Appendix B. Environmental Reports

B.1 Environmental samples

By Rachel Fosberry

Introduction and methodologies

B.1.1 Bulk samples were taken during archaeological investigations from a sequence of deposits at Holme Fen and Trundle Mere in order to determine whether palaeoenvironmental remains are present, their mode of preservation and whether they are of interpretable value.

Area	Holme Fen					Trundle Mere			
Sample No.	1	2	3	7	8	9.1	9.2	9.3	9.4
Context No.	1	2	3						
Depth of deposit (m OD)	-4.4	-5	-5	4.6	4.4	3.8	4.4	4.7	5

Table 1: Environmental samples from HOMRRC13 (See Fig. 1 for locations)

B.1.2 Information about past environments can be provided from contemporary waterlogged deposits which typically primarily consist of organic remains that have been preserved through anoxic conditions in which oxygen is absent and there is little or no bacterial decay. Preservation can be variable dependent on many factors, including the plant species present and environmental conditions such as acidity. The types of remains preserved can include plants, molluscs and insects, all of which can provide information on the local environment whereas pollen can be useful for wider palaeo-environmental reconstruction. Additionally, organisms such as diatoms, ostracods and foraminifera are useful for determining hydrological conditions in aquatic environments. Plant parts, in particular seeds, are often well preserved with the outer testa and cell-structure visible.

B.1.3 The purpose of this initial assessment is to determine the presence or absence of macroscopic environmental indicators and to assess the level of preservation of plant remains and the diversity of plants present. In order to achieve this a sub-sample of two litres of each of the bulk samples was processed and dried. Samples preserved by waterlogging should really be examined whilst still wet as drying will cause shrinkage of organic components making identification more difficult. Assessment of a dried sample can be performed rapidly and it is easier to ascertain the presence of the aforementioned items. This was considered to be the most practical method for this initial stage in order to ascertain whether further, more detailed, analysis would be appropriate.

B.1.4 Two litres of each bulk sample were processed by water flotation (using a modified Siraff three-tank system). The floating component (flot) of the samples was collected in a 0.3mm nylon mesh and the residue was collected in a 0.5mm mesh sieve. Both flot and residues were allowed to air dry prior to examination using a binocular microscope at magnifications up to x 60.

Quantification

B.1.5 For the purpose of this initial assessment, items such as seeds (including achenes, drupes *etc.*) and other vegetative parts have been scored for abundance

+ = rare, ++ = moderate, +++ = abundant

Results

Sample No.		**1**	**2**	**3**	**7**	**8**	**9.1**	**9.2**	**9.3**	**9.4**
Context No.		1	2	3						
Alnus glutinosa L. seed						+				
Carex sp.seed	sedges	+	+			++				
Cladium mariscus (L.) Pohl nut	Great Fen-sedge	+++						+++	+	+
Cyperaceae seed	sedges	+							++	
Phragmites sp.stem	Common reed	++			++	++			+	
Potamogeton sp. Seed	Pondweed	+								
Rubus subgen. *Rubus* seed	Brambles			++		+				++
BRIOPHTYES	mosses									
Polystichum sp. Stem									+	
Sphagnum sp stem		++					+			
FUNGI										
sclerotia	fungal bodies		++	+++	++					+++
CHAROPHTYES	green algae									
Chara oogonia									+	
Other plant macrofossils										
Charcoal			+	++	+++	++				
small twigs			++	++	++		+			++
Organic plant material		+++	+++	+++	+++	+++	+++	+++	+++	+++
fine roots							++++	++++	++++	
leaf fragments						++				
Other remains										
waterlogged arthropod remains					++	+	+	+	+	+

Table 2: Results of environmental samples from HOMRRC13 (See Fig. 1 for locations)

B.1.6 Each of the bulk samples taken from the sequences at both sites differ in composition. At Holme Fen the uppermost deposit (Sample 1), taken from 1.4m below the strip level, is characterised by the presence of great fen sedge (*Cladium mariscus*) notably the nutlets rather than stem or leaf fragments, along with moss (cf. *Sphagnum* sp.). Stems and culm-nodes of common reed (*Phragmites* cf. *australis*) are also present along with seeds of sedges (Cyperaceae) and pond weed (*Potamogeton* sp.). Sample 8, taken from the same level as Sample 1, 20m to the east was quite different in content. It contains a few reeds but great fen sedge is absent and this deposit also contains seeds of alder (*Alnus glutinosa*) and bramble (*Rubus* sp.) suggesting a drier environment.

B.1.7 Samples 2 and 3 were taken 0.6m from below strip level (2m from ground surface) and are primarily composed of wood peat. Both samples contain numerous fungal sclerotia which are commonly found in soils and peat that has been burnt (Huckerby pers. comm.). Both samples also contain charcoal as further evidence of burning. Sample 7 was taken from the same level and also contains reeds, sclerotia and charcoal.

B.1.8 The three uppermost samples from the sequence at Trundle Mere all contain fine rootlets with the upper sample (9.1) devoid of any other material. The lowest sample (9.4) was thought to be comparable with the uppermost sample (Sample 1) from Holme Fen. However Sample 9.2 is actually the most similar in content with Holme Fen Sample 1 in that it is also characterised by great fen sedge nutlets, although other sedge species are absent. Sample 9.3 contains sedge seeds in addition to occasional great fen sedge nutlets, moss stems and also stonewort (Charophytes) which are obligate aquatic plants (green algae) that inhabit freshwater. Sample 9.4 was taken from the lowest deposit that was sampled and contains fungal sclerotia and bramble seeds most comparable with Samples 3 and 7 from Holme Fen.

Discussion and recommendations

B.1.9 This initial assessment of bulk samples taken from Holme Fen and Trundle Mere has shown the presence of plant remains that characterise the various deposits and also provide an interesting comparison of spatial variation. The species of plants recorded during this assessment are typical of the range of environments including reed swamp (reed peat), alder carr (wood peat) and acidic *Sphagnum* peat (raised bog).

Plant macrofossils

B.1.10 A comprehensive list of the vegetation sequences at both Holme Fen and Trundle Mere has been provided by Godwin and Vishnu-Mittre (1974, 576-585) based on both pollen and macrofossil remains. Plant macrofossils recovered from peat deposits are unlikely to have fallen far from the parent plant whereas many types of pollen spores are wind blown and are derived from a larger area. The initial assessment of environmental bulk samples taken from the current sites at Holme Fen and Trundle Mere have shown that there is potential for further identification of plant remains to species level, should this be required. Sub-samples would be processed using the standard protocol for plant macrofossil analysis of peat deposits as described by Mauquoy *et al.* (2010):

Preparation of each sample = 0.25 day. Full analysis cost per sample = 1 day

Mollusca, Ostracods and Foraminifera

B.1.11 The original landscape would have undoubtedly been inhabited with numerous mollusc species many of which would have been habitat specific. The complete absence of any molluscs in the samples from Holme Fen is likely to be due to the high acidity of the deposits which would dissolve the calcareous shells, thus precluding the potential for further work. Likewise the calcareous shells of ostracods (bivalve crustaceans that inhabit both freshwater and marine environments) would not survive. Foraminifera are marine organisms that would not be present within these deposits as the area is considered to be beyond the marine incursion that occurred during the Bronze Age that resulted in the creation of the Barroway Beds (Nigel Cameron pers comm.).

Diatoms

B.1.12 Diatoms are unicellular aglae that are found in many aquatic environments including marine, fen and raised bogs and are useful indicators for the reconstruction of past water quality (*e.g.* salinity, nutrients, pH) The likelihood of preservation of diatom valves varies in peats of different kinds, and is not always predictable (Nigel Cameron pers. comm.):

Assessment cost per sample is £60 (£45 if there are absolutely no diatoms to report in a sample). Analysis and lab preparation, including reporting and diagram, is £125 per sample.

Fish bone

B.1.13 Examination of the Trundle Mere samples has established that there is no evidence of fish remains such as bones or scales that may have been expected in a prehistoric fresh-water lake.

Insects

B.1.14 Waterlogged insect remains are present in most of the samples but with sparse quantity and diversity. None of the samples are considered suitable for insect analysis

B.2 Borehole samples

By Steve Boreham

B.2.1 Seven boreholes were sunk on 29th August, at the locations provided by A Haskins, within the Great Fen Project (See Fig. 1).

B.2.2 Two of these were assessment boreholes (BH1 & 2) located to the north of the road and aligned with a north to south borehole transect terminating in BH15. Also north of the road were two boreholes (BH3 & 4) in the presumed location of the channels of the Holme River. Archive cores were taken from these two adjacent locations.

B.2.3 South of the road a borehole (BH5) was sunk in the presumed location of the Peat (Peak) Dike, and an archive core taken. Also south of the road, two assessment boreholes (BH6 & 7) were sunk. One of these was near the road (BH7) and the other was close to the site of the Spitfire (BH6). BH6 showed peat overlying bedrock clay at 2.06m depth.

B.2.4 The stratigraphy at BH1 & BH2 is remarkably similar to that seen in BH15, being dominated by fine-grained organic detritus, but with layers of Sphagnum peat, reed peat, gyttja lake mud and thin bands of grey silt overlaying bedrock clay at about 2.2m depth.

B.2.5 The two archive cores taken at the presumed channel of the Holme River (BH4 & BH5) were almost identical. In both cases the upper organic material extended down to *c.*0.90m overlying lake marl down to *c.*1.5cm. Wood peat extended down to *c.*2.00m and finer organic detritus ended the sequence overlying bedrock clay at *c.*2.60m depth.

B.2.6 The reason for taking two cores here was that there appeared to be two distinct channel-forms adjacent to one-another. Given that the Holme River was flowing into

Whittlesey Mere in this location is seems reasonable to assume that it had one or more distributary channels. These distributary channels take on a broad and shallow form, and by necessity cannot cut down below the level of the lake marl.

B.2.7 The upper ploughsoil was badly oxidised and desiccated down to *c*.0.40m at BH3 & BH4. Thus the part of the medieval 'channel-fill' sequence cored in both cases was from 0.40m to 0.9cm.

B.2.8 It is possible that the two separate 0.50m cores of sediment might give slightly different radiocarbon ages and pollen assemblages, but it is just as likely that they will be virtually identical.

B.2.9 Moving south of the road, the two assessment boreholes (BH6 & 7) both proved a similar sequence with thin marl to c.50cm overlying mostly fine-grained organic detritus down to the bedrock contact at *c*.2.10m.

B.2.10 The archive core (BH 5) taken from the presumed channel of Peat (Peak) Dike had an almost identical sequence to BH6 & 7. The oxidised and disturbed ploughsoil extended down *c*.040m on to the top of the lake marl so that no core material representing the medieval channel was recovered. The broad and shallow nature of this channel-form is exactly what might be expected from a small channel entering a shallow lake edge.

Appendix C. Bibliography

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Appendix D. OASIS Report Form

Project Details

OASIS Number	oxford-ar3 174801
Project Name	Excavation of ponds and Channels at Rhymes reed beds, Holme Fen as part of the Great Fen Project
Project Dates (fieldwork) Start	04-04-2013
Finish	29-08-2013
Previous Work (by OA East)	Yes
Future Work	Yes

Project Reference Codes

Site Code	HOMRRC 13	Planning App. No.	1200/729/FUL
HER No.	ECB4143	Related HER/OASIS No.	ECB3893

Type of Project/Techniques Used

Prompt	Direction from Local Planning Authority - PPS 5
Development Type	Other

Please select all techniques used:

☐ Aerial Photography - interpretation	☐ Grab-Sampling	☐ Remote Operated Vehicle Survey
☐ Aerial Photography - new	☐ Gravity-Core	☐ Sample Trenches
☐ Annotated Sketch	☐ Laser Scanning	☐ Survey/Recording Of Fabric/Structure
☐ Augering	☐ Measured Survey	☐ Targeted Trenches
☐ Dendrochronological Survey	☐ Metal Detectors	☐ Test Pits
☐ Documentary Search	☐ Phosphate Survey	☐ Topographic Survey
☒ Environmental Sampling	☐ Photogrammetric Survey	☐ Vibro-core
☐ Fieldwalking	☐ Photographic Survey	☒ Visual Inspection (Initial Site Visit)
☐ Geophysical Survey	☐ Rectified Photography	

Monument Types/Significant Finds & Their Periods

List feature types using the NMR Monument Type Thesaurus and significant finds using the MDA Object type Thesaurus together with their respective periods. If no features/finds were found, please state "none".

Monument	Period	Object	Period
channel?	Medieval 1066 to 1540	metal air frame	Modern 1901 to Present
	Select period...		Select period...
	Select period...		Select period...

Project Location

County	Cambridgeshire	Site Address (including postcode if possible)	Rymes Reed Bed, Wetland Creation Project (Great Fen Project)
District	Huntingdon		
Parish	Holme and Yaxley		
HER	Cambs		
Study Area	145 ha	National Grid Reference	TL 2060 9040

Project Originators

Organisation	OA EAST
Project Brief Originator	Kasia Gdaneic
Project Design Originator	Stephen Macaulay
Project Manager	Stephen Macaulay
Supervisor	Anthony Haskins

Project Archives

Physical Archive	Digital Archive	Paper Archive
CCC Stores	CCC Stores	CCC Stores
ECB4143	ECB4143	ECB4143

Archive Contents/Media

	Physical Contents	Digital Contents	Paper Contents
Animal Bones	☐	☐	☐
Ceramics	☐	☐	☐
Environmental	☐	☐	☐
Glass	☐	☐	☐
Human Bones	☐	☐	☐
Industrial	☐	☐	☐
Leather	☐	☐	☐
Metal	☐	☐	☐
Stratigraphic		☐	☐
Survey		☐	☐
Textiles	☐	☐	☐
Wood	☐	☐	☐
Worked Bone	☐	☐	☐
Worked Stone/Lithic	☐	☐	☐
None	☒	☒	☒
Other	☐	☐	☐

Digital Media	Paper Media
☐ Database	☐ Aerial Photos
☐ GIS	☐ Context Sheet
☐ Geophysics	☐ Correspondence
☐ Images	☒ Diary
☐ Illustrations	☐ Drawing
☐ Moving Image	☐ Manuscript
☐ Spreadsheets	☐ Map
☐ Survey	☐ Matrices
☒ Text	☐ Microfilm
☐ Virtual Reality	☐ Misc.
	☐ Research/Notes
	☐ Photos
	☐ Plans
	☒ Report
	☒ Sections
	☐ Survey

Notes:

east east east

Proposed Works Key

- = Excavate pool (with low bund at A)
- = Establish reedbed (footdrain type A)
- = Establish wet grassland (footdrain type B)
- = Establish dry grassland (no footdrains)
- = Wet woodland
- = Ensure surface suitable for access
- = Temporary block
- = New control structure (large or small as shown)
- = New culvert
- = Existing culvert
- = Tower hide
- = New slacker
- = Construct low bund (compacted)
- = Remove embankment
- = Spoil disposal area
- = New main channel
- = New side channel
- = Existing channel
- = Re-profile channel
- = Infill drain

Archaeological Monitoring Work Key

- Sample and/or drawn section location
- Sample number
- S.6 Section number
- Former area of The Meres, taken from reconstructions of the Medieval landscape (Fenland Project: Hall 1992)
- BH2 Borehole

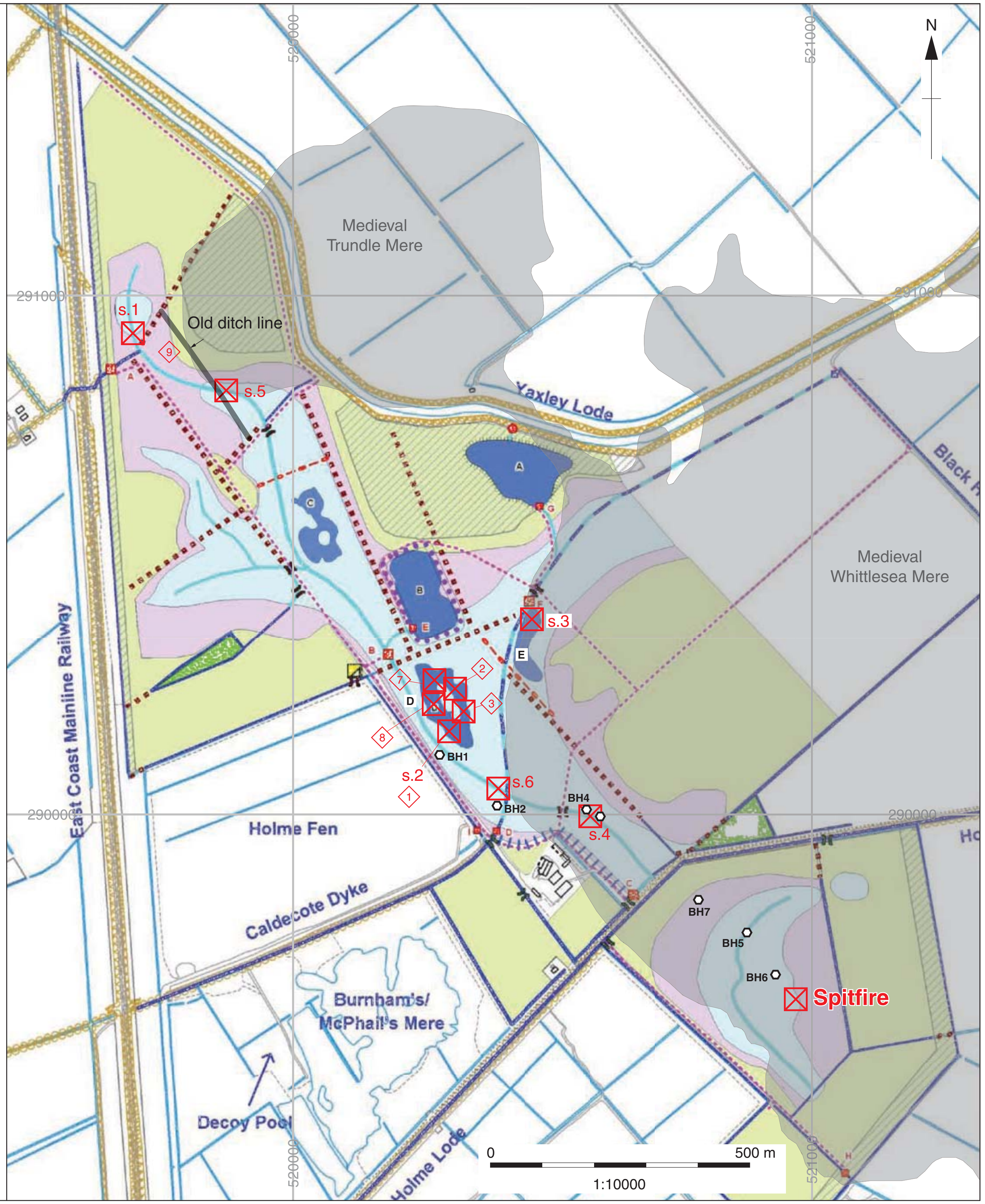

Figure 1: Location of Archaeological Monitoring (based on data supplied by client)

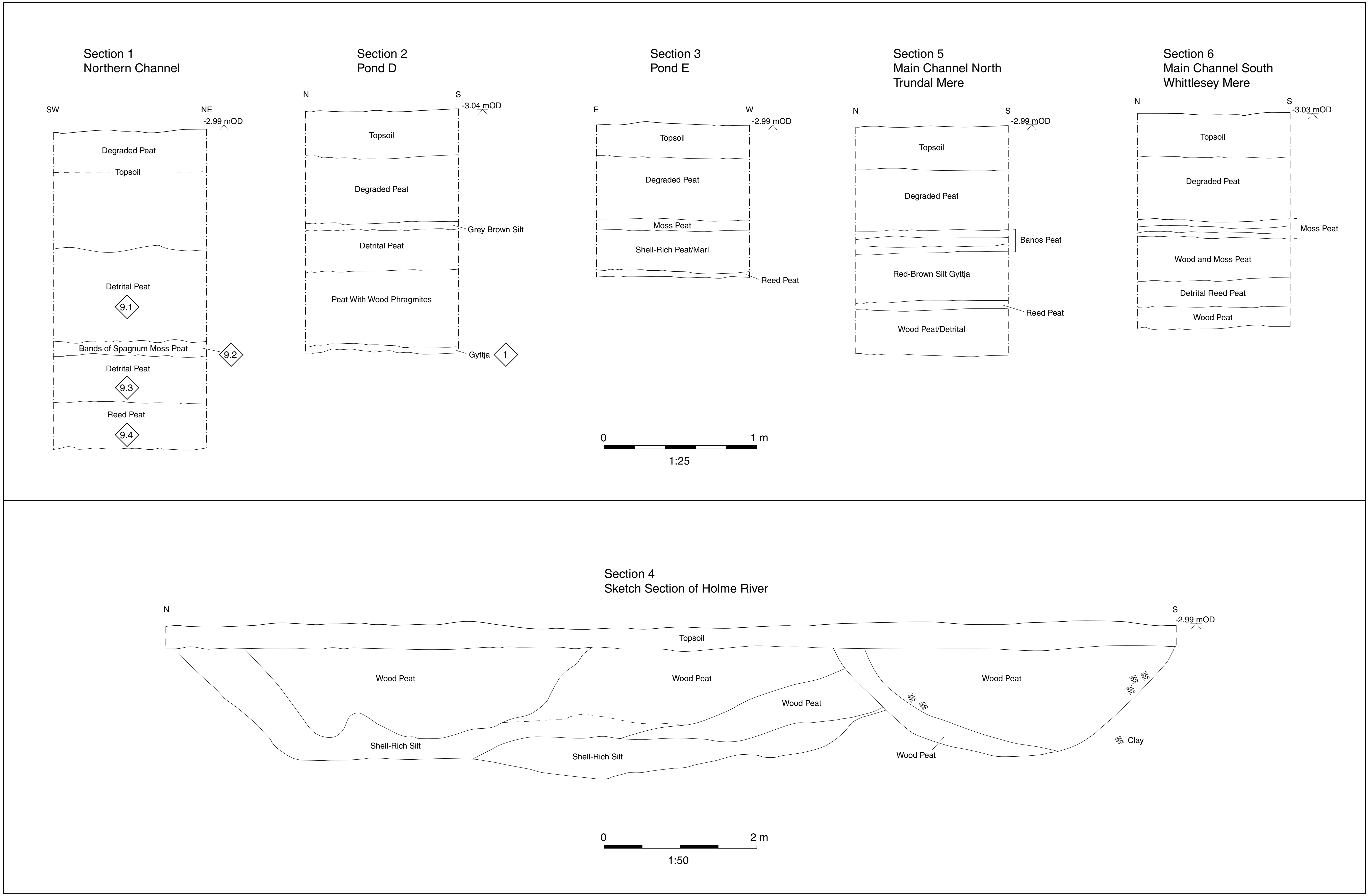

Figure 2: Sections 1 to 6

Plate 1: North end of Main channel (looking north)

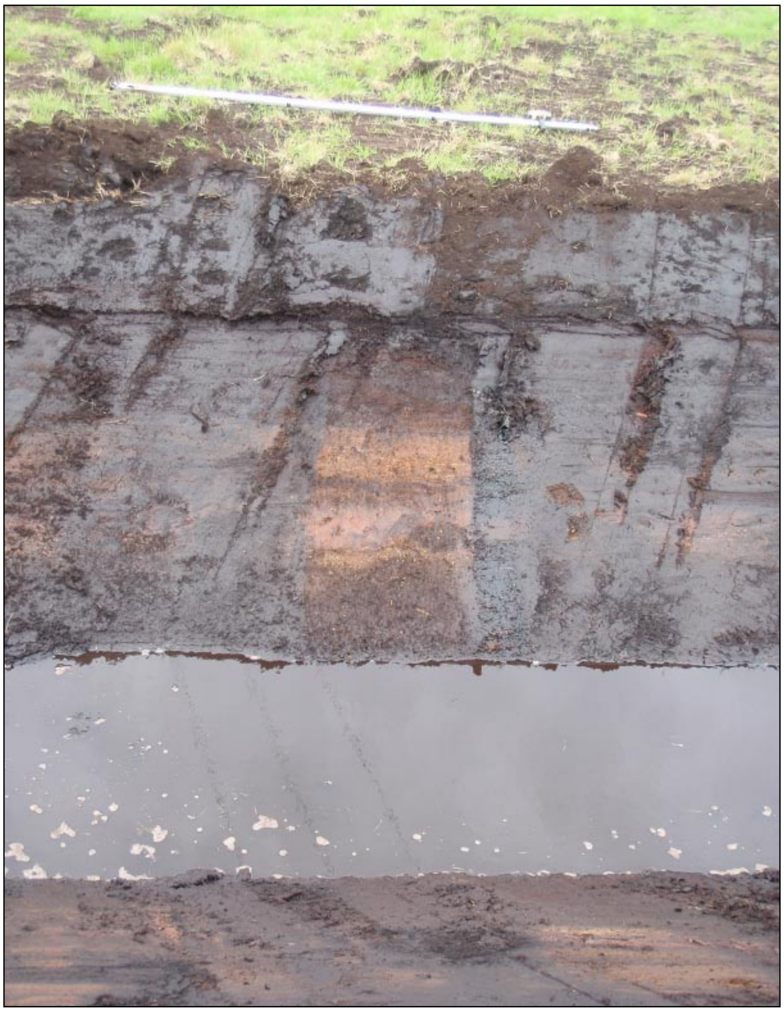

Plate 2: Section of main channel at southern end (looking east)

Plate 3: Post-medieval ditch located in main channel, (looking east)

Plate 4: West-facing section of main channel showing Holme River

Plate 5: Channel south of Holme Lode

Plate 6: Section of channel south of Holme Lode

Plate 7: Pond A ‘key trench’

Plate 8: Pond D section (looking east)


Plate 9: Pond E section (looking north)

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