

HILLVIEW HOUSE, WEST STREET, NEWBURY, WEST BERKSHIRE (SITE CODE: HVH13): GEOARCHAEOLOGICAL ASSESSMENT REPORT

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INTRODUCTION

This report summarises the findings arising out of the geoarchaeological assessment undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development at Hillview House, West Street, Newbury, West Berkshire (Quest site code: HVH13; National Grid Reference: SU 4700 6740; Figure 1 & 2). The site is located on the floodplain of the Kennet Valley approximately 200m to the north of the current course of the Kennet and Avon Canal.

The British Geological Survey (1:50,000) shows the site underlain by Peat deposits, resting on Chalk bedrock, and that it lies <150m to the south of the floodplain gravel terrace edge. Recent geoarchaeological (Batchelor, 2013) and archaeological (Pine & Weale, 2010) investigations at the Hillview House site indicate the presence of a complex sequence of Holocene sediments resting on a Gravel surface that slopes downwards from west to east (potentially representing the slope of a former channel). These sediments include Peat (representative of a semi-terrestrial landscape), Tufa-rich sediments, Alluvium and possibly Marl (all representative of differing types of fluvial environment). These findings broadly correlate with other investigations in Newbury (e.g. Ellis *et al.*, 2003; Ford, 2002; Hammond, 2007; Weaver, 1996; Hull & Hall, 1997; Froom, 2012) and further along the Kennet Valley at Thatcham (e.g. Churchill, 1962; Healy *et al.*, 1992; Barnett, 2009), Ufton Nervet (Bell, pers. comm.) and Reading (e.g. Batchelor *et al.*, 2013; Young & Batchelor, 2013). Radiocarbon dating at sites such as Greenham Dairy Farm / Faraday Road in Newbury (Ellis *et al.*, 2003) and Thatcham reedbeds (Barnett, 2009) indicate these sediments accumulated during the early Mesolithic, whilst early Mesolithic to Neolithic dates have just been derived at Kenavon Road in Reading (Young & Batchelor, 2013).

Previous archaeological and geoarchaeological investigations in Newbury, Thatcham, Ufton Nervet and Reading have demonstrated the high potential of these sediments for providing significant evidence of environmental changes and human activity in the Kennet Valley during the Mesolithic and Neolithic cultural periods. The cultural remains have included: (1) a small number of worked flints at Victoria Park, ca. 350m to the southeast of the site (Froom, 2012);

(2) abundant worked flint directly associated with animal bone, together with charcoal and possible evidence for hearths at Greenham Dairy Farm / Faraday Road ca. 600m to the east of the site (Ellis *et al.*, 2003); (3) two distinct concentrations of worked flint suggestive of two episodes of activity at Newbury Sewage Works on the outskirts of Thatcham (Healy *et al.*, 1992); (4) charcoal and pollen evidence suggestive of early Mesolithic burning at Thatcham Reedbeds (Barnett, 2009), and (5) a Maglemosian flint industry in Thatcham (Wymer, 1962).

Archaeological evaluation at Hillview House did not record any evidence of prehistoric activity (Pine & Weale, 2010). However, the floodplain deposits recorded have good potential to provide a reconstruction of environmental changes, and possibly evidence of human activity via geoarchaeological investigation (i.e. detailed investigation of the sediment, plant and animal remains). Indeed, the potential of such investigations is clearly demonstrated by similar work carried out at Greenham Dairy Farm / Faraday Road (Ellis *et al.*, 2003) and Thatcham Reedbeds (Barnett, 2009).

As a consequence of these investigations, it was strongly recommended that a geoarchaeological assessment was carried out on the newly collected sequences from Hillview House. The aims of this assessment were to provide a provisional reconstruction of the environmental history of the site and its environs, and in particular: (1) to enable comparison of the age and palaeobotanical composition of the sequences in boreholes BH1 and BH2, which lie in differing topographic settings and have Peat horizons at different elevations (QBH2 also contains the charcoal); (2) to provide a provisional reconstruction of the environmental history of the site, (3) to highlight evidence of human activity, and (4) to make recommendations for further analysis (if required). In order to achieve this aim, the following methods were proposed: (1) rangefinder radiocarbon dating, to provide an age for the onset and cessation of peat formation; (2) organic matter determinations to aid identification of the sedimentary units, and (3) assessment of the palaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history.



Figure 1: Location of (1) Hillview House, West Street and selected nearby sites: (2) Former Kerridge Computers, Northcroft Lane (Ford, 2002); (3) Former Feltham Tyres, Park Way (Hammond, 2007); (4) Cinema Site, Park Way (Weaver, 1996); (5) 6-12 Northbrook Street (Hull & Hall, 1997); (6) Victoria Park (Froom, 2012) & (7) Greenham Dairy Farm / Faraday Road (Ellis et al., 2003). *Contains Ordnance Survey data © Crown copyright and database right [2013]*

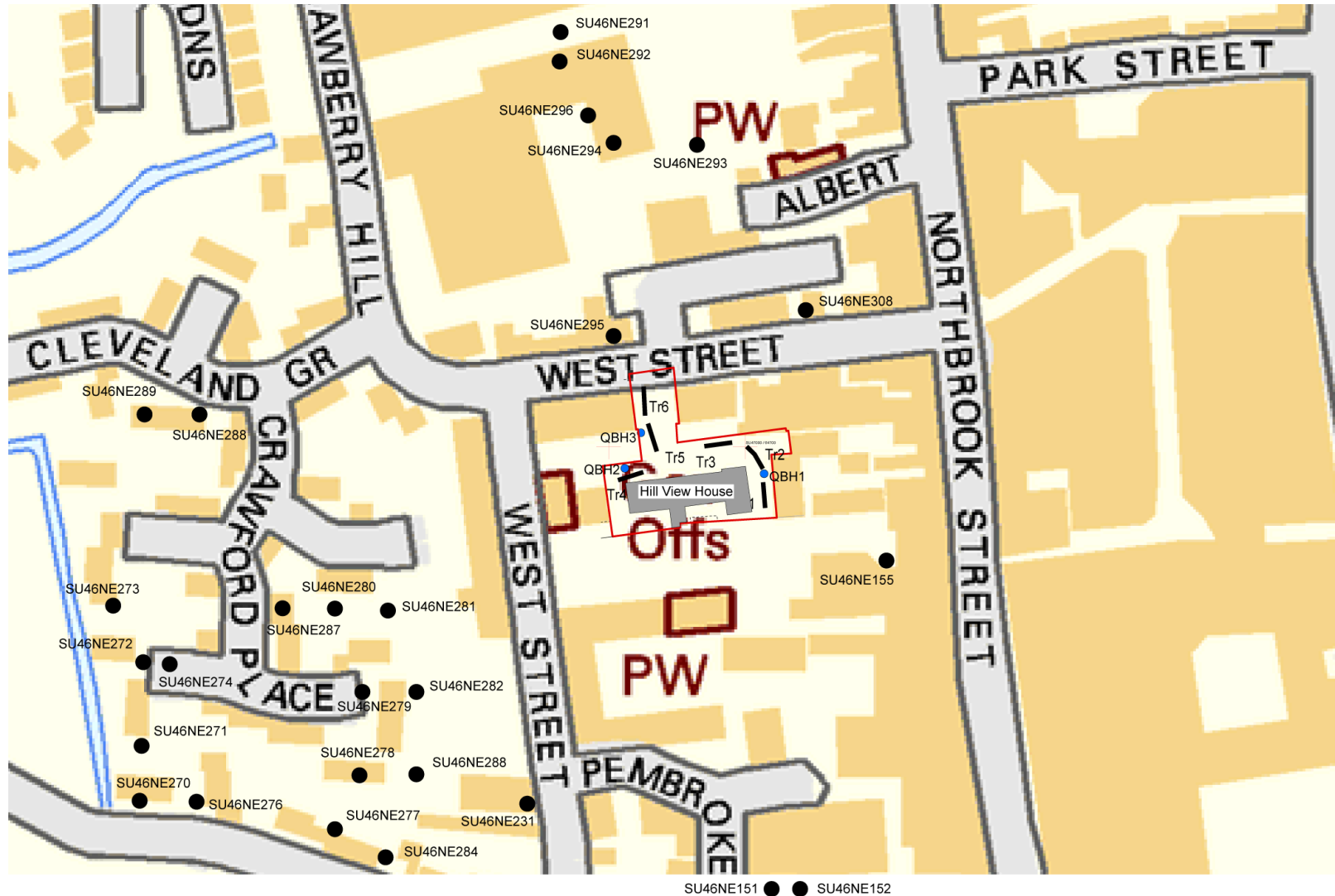


Figure 2: Location of boreholes QBH1 to QBH3 at Hillview House, West Street, Newbury, West Berkshire, and previous geotechnical boreholes/archaeological investigations carried out on/adjacent to the site. Contains Ordnance Survey data © Crown copyright and database right [2013]

METHODS

Field investigations

Three boreholes (boreholes QBH1 and QBH3) were put down at the site in October 2013 (Figure 2). Borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring technique is a suitable method for the recovery of continuous, undisturbed core samples and provides sub-samples suitable for not only sedimentary and microfossil assessment and analysis, but also macrofossil analysis. The recovered core samples were wrapped in clear plastic to prevent moisture loss, labelled with the depth (metres from ground surface) and orientation (top and base) and returned to Quaternary Scientific for storage in a purpose built facility at 2°C. This temperature prevents fungal growth on the core surface, which may lead to anomalous radiocarbon dates, and moisture loss. The spatial attributes of each borehole were recorded using a Leica Differential GPS (Table 1 and Figure 2).

Table 1: Spatial data for the new geoarchaeological boreholes at Hill View House, West Street, Newbury, West Berkshire

Borehole	Easting	Northing	Surface elevation (m OD)
QBH1	447007	167390	76.20
QBH2	446956	167392	76.05
QBH3	446962	167405	76.20

Lithostratigraphic descriptions

The lithostratigraphy of the boreholes was described in the laboratory using standard procedures for recording unconsolidated sediment and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results are displayed in Tables 2 to 4 and Figure 3.

Organic matter and calcium carbonate determinations

Twenty-eight sub-samples from borehole QBH1 and twenty-two from borehole QBH2 were taken for determination of the organic matter content (Table 5; Figure 3). These records were important as they can identify increases in organic matter possibly associated with more terrestrial conditions. The organic matter content was determined by standard procedures

involving: (1) drying the sub-sample at 110°C for 12 hours to remove excess moisture; (2) placing the sub-sample in a muffle furnace at 550°C for 2 hours to remove organic matter (thermal oxidation), and (3) re-weighing the sub-sample obtain the 'loss-on-ignition' value. The calcium carbonate content was determined by placing the ashed samples back in the muffle furnace at 950°C for a further 2 hours prior to re-weighing (see Bengtsson and Enell, 1986).

Radiocarbon dating

Sub-samples of twig wood were extracted for radiocarbon dating from the top and base of the peat, and top of the tufa in borehole QBH1, and base of the peat in QBH2. All samples were submitted for AMS radiocarbon dating to the Scottish Universities Environmental Research Centre (SUERC). The results have been calibrated using OxCal v4.2 Bronk Ramsey (1995, 2001) and IntCal04 atmospheric curve (Reimer *et al.*, 2013). The results are displayed in Table 6 and Figure 3.

Pollen assessment

Eight sub-samples were extracted from borehole QBH1 and four from borehole QBH2 for an assessment of pollen content. The pollen was extracted as follows: (1) sampling a standard volume of sediment (1ml); (2) adding two tablets of the exotic clubmoss *Lycopodium clavatum* to provide a measure of pollen concentration in each sample; (3) deflocculation of the sample in 1% Sodium pyrophosphate; (4) sieving of the sample to remove coarse mineral and organic fractions (>125µ); (5) acetolysis; (6) removal of finer minerogenic fraction using Sodium polytungstate (specific gravity of 2.0g/cm³); (7) mounting of the sample in glycerol jelly. Each stage of the procedure was preceded and followed by thorough sample cleaning in filtered distilled water. Quality control is maintained by periodic checking of residues, and assembling sample batches from various depths to test for systematic laboratory effects. Pollen grains and spores were identified using the University of Reading pollen type collection and the following sources of keys and photographs: Moore *et al* (1991); Reille (1992). The assessment procedure consisted of scanning the prepared slides, and recording the concentration and preservation of pollen grains and spores, and the principal taxa on 4 transects (10% of the slide; Table 7).

Macrofossil assessment

A total of eight small bulk samples from borehole QBH1 and six from borehole QBH2 were extracted for the recovery of macrofossil remains including waterlogged plant macrofossils, waterlogged wood, insects and Mollusca. The extraction process involved the following procedures: (1) removing a sample up to 10cm in thickness; (2) measuring the sample

volume by water displacement, and (3) processing the sample by wet sieving using 300µm and 1mm mesh sizes. Each sample was scanned under a stereozoom microscope at x7-45 magnifications, and sorted into the different macrofossil classes. The concentration and preservation of remains was estimated for each class of macrofossil (Table 8). Preliminary identifications of the waterlogged seeds have been made using modern comparative material and reference atlases (Cappers *et al.* 2006, Schoch *et al.* 2004). Nomenclature used follows Stace (2005) (Table 9).

RESULTS, INTERPRETATION AND DISCUSSION OF THE FIELD INVESTIGATIONS, ORGANIC MATTER / CALCIUM CARBONATE DETERMINATIONS AND RADIOCARBON DATING

The results of the lithostratigraphic descriptions, organic matter / calcium carbonate determinations are displayed in Figure 3 and Tables 2 to 6.

The lowermost sediments recorded at the site were coarse flint gravels, which were laid down on the valley floor within a high energy riverine environment, probably at the end of the Late Glacial period (Marine Isotope Stage 2, Late Devensian, ca. 16,000-11,500 cal BP). The surface of the Gravel was recorded on the western side of the site at 73.20m OD (3m bgs) in QBH3, and at approximately 72.20m OD (4m bgs) in QBH1 on the eastern side of the site. No boreholes were put down towards the south of the site due to likely truncation of the sedimentary sequence by the former Hillview House building (see Figure 2). During the course of the archaeological excavations, the Gravel surface was only recorded on the western side of the site in Trenches 4 (73.67 to 73.36m OD; 2.41-2.72m bgs), 5 (73.36m OD; 2.78m bgs) and 6 (73.28 to 72.94m OD; 2.86-3.20m bgs). Towards the centre of the site, the gravel surface had still not been reached by 71.88m OD (4.2m bgs). In addition, BGS borehole SU46NE155 from the south-eastern corner of the site records the gravel below 4.70m bgs (ca. 71.40m OD; Figure 2). Previous BGS borehole investigations to the west, south and north indicate that the gravel surface lies at between 2 and 4m bgs (Figure 2).

Combined, these results indicate a gravel surface that slopes downwards from west to east across the site. This depression in the Gravel surface might represent the position of a former channel. However, since none of the BGS investigations carried out beyond the margins of the site were measured relative to ordnance datum, it is not possible to directly compare them with the findings from Hillview House and thus speculate further.

The Gravel surface is overlain by a complex sequence of Peats, Tufa, Alluvium and possibly Marl, overlain by Made Ground. As would be expected, these deposits are generally thickest

where the Gravel surface is lowest (i.e. on the eastern side of the site). The transitions between Peat, Tufa, Alluvium and potentially Marl are indicative of multiple changes in the environment and hydrology of the floodplain.

The first sediments recorded overlying the Gravel surface were a thin horizon of stiff mineral-rich silty clay (potentially marl), suggesting the deposition of a moderately calcareous-rich (<20%) mud within a very low energy aquatic environment. These sediments were only recorded in boreholes QBH2 and QBH3 towards the west of the site, where the Gravel surface is higher. Whether the same sediments are present towards the east of the site is uncertain due to a void in the sedimentary sequence in QBH1.

The first sediments recorded on the eastern side of the site, were thick organic-rich (70-80%) highly-humified unidentifiable and wood Peats. Such deposits are indicative of the formation of a semi-terrestrial land surface supporting woodland, which may or may not also have been utilised by prehistoric people. The thickest horizons were recorded towards the base of the sequence in Trench 3 (>3.30m thick) and QBH1 (1m thick); thinner horizons of Peat were recorded in Trenches 4, 5, 6, QBH2 and QBH1 (<50cm thick). It is considered likely that the Peat migrated upwards and outwards from areas of low topography. Thus it is likely that the Peat recorded in QBH1 predates that from QBH2/QBH3. A program of radiocarbon dating was therefore carried out on both QBH1 and QBH2 in an attempt to elucidate the age of the Peat in different areas of the site. Radiocarbon determinations targeted on twigs from the base (72.30 to 73.25m OD) and top (73.15 to 73.00m OD) of the Peat in QBH1 indicate that accumulation took place between 11,050-10,580 and 7430-7320 cal BP. Unfortunately, the radiocarbon date targeted on the base of the Peat from QBH2 contained insufficient carbon to produce a determination. Nevertheless, the results indicate accumulation from the early Mesolithic until at least the late Mesolithic, which correlates with one of the very few other radiocarbon-dated sites in Newbury (Greenham Dairy Farm / Faraday Road; Ellis *et al.*, 2003), and to others elsewhere in the Kennet Valley (e.g. Thatcham Reedbeds (Barnett, 2009) and Kenavon Road in Reading (Young & Batchelor, 2013)).

Thick horizons of Tufa-rich deposits overlie the Peat in all areas of the site. The Tufa is of varying grain size (silt to gravel) and includes Tufa tubes, varying quantities of Mollusca (whole and fragments), and wood remains. Alluvial silts, sands and gravels were also a frequent and important component. The presence of Tufa is indicative of the accumulation of calcareous sediment in a low energy and probably shallow aquatic environment. Periods of more organic, almost peaty sediment were recorded within the Tufa, suggestive of transitions towards more marginal semi-aquatic/semi-terrestrial environments. The identification of

charcoal within these deposits between 74.03 and 74.33m OD in borehole <QBH2>, is significant as it suggests nearby/*in situ* natural or anthropogenic burning. The identification of a probable hazelnut within these deposits between 73.69 and 73.20m OD in QBH3 is also of interest. A radiocarbon date targeted on twig wood towards the centre of the Tufa-rich deposits (74.10 to 74.00) with the lowest calcium carbonate content (30%) provided an age of 7440-7320 cal BP. This late Mesolithic date indicates that the deposits were either laid down very rapidly, or represents reworked material.

Towards the top of the sequence, (above ca. 74.50m OD in all boreholes), the Tufa-rich deposits were overlain by mineral-rich alluvium with various coarse grained and anthropogenic inclusions, prior to Made Ground.

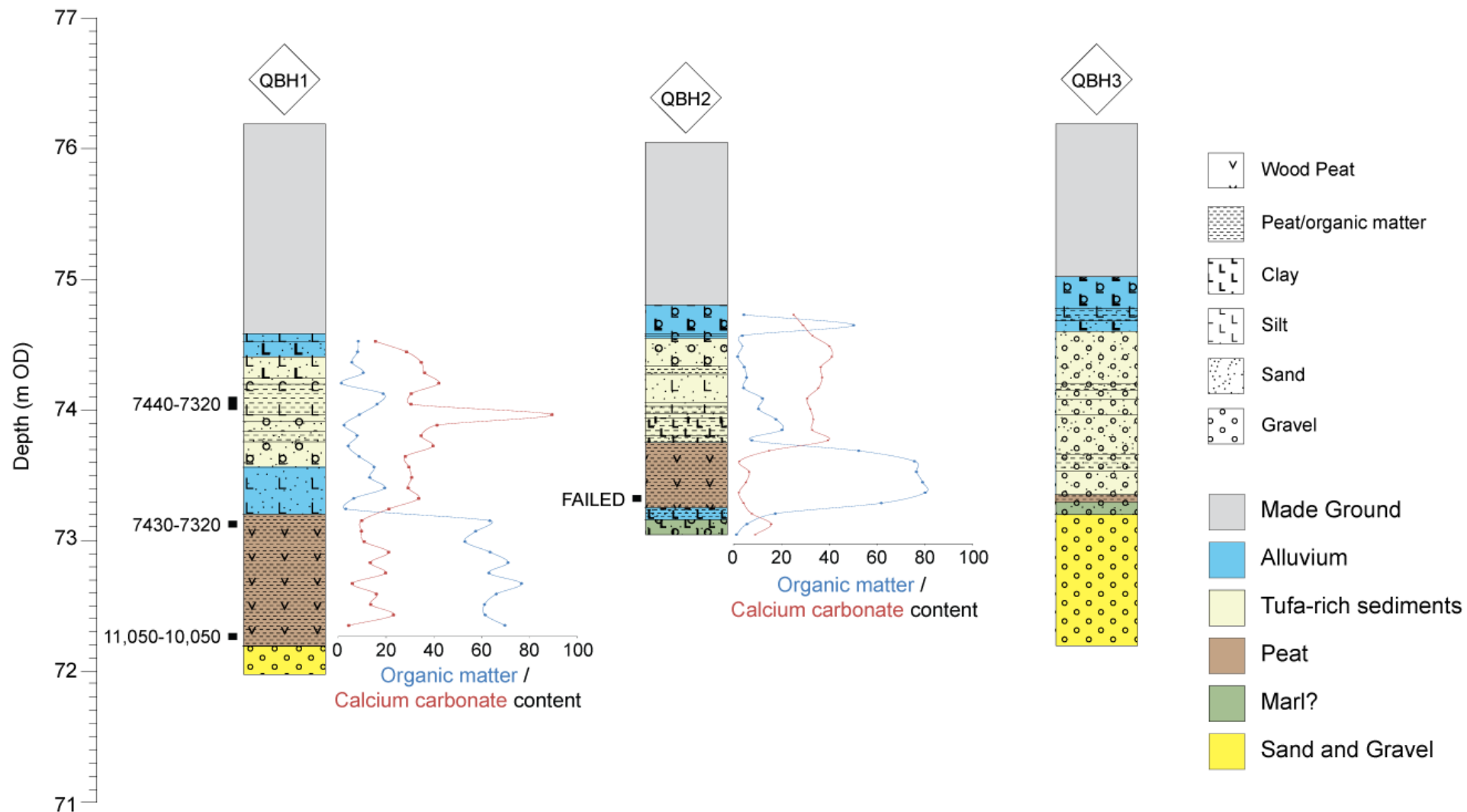


Figure 3: Lithostratigraphy of boreholes QBH1 to QBH3, Hillview House, West Street, Newbury

Table 2: Lithostratigraphic description of borehole QBH1, Hillview House, West Street, Newbury

Depth (m OD)	Depth (m bgs)	Description
76.20 to 74.58	0 to 1.62	Made Ground dominated by Red Brick
74.58 to 74.52	1.62 to 1.68	10YR 5/1; Ag2, As1, Ga1, charcoal+, Gg+ brick/tile fragments+; Grey silty sandy clay with charcoal, brick/tile and gravel inclusions; diffuse contact into:
74.52 to 74.41	1.68 to 1.79	10YR 6/1; Ag2, As1, Ga1, charcoal+, Gg+; Grey sandy clayey silt with charcoal and gravel inclusions; diffuse contact into:
74.41 to 74.24	1.79 to 1.96	10YR 6/1; Ag2, As1, Ga1, Gg+, charcoal+; Grey clayey silt with tufa sands and gravels and charcoal inclusions; diffuse contact into:
74.24 to 74.20	1.96 to 2.00	10YR 7/2; Ga2, Gg2; Light grey tufa sands and gravels; sharp contact into:
74.20 to 73.97	2.00 to 2.23	10YR 3/1; As2, Sh2, TI+; Very dark grey clayey peat with increasing concentration of tufa sands and gravels downwards; diffuse contact into:
73.97 to 73.91	2.23 to 2.29	10YR 5/1; Ga2, Gg1, Ag1, Sh+; Grey tufa sands and gravels with silty clay of limited organic content; diffuse contact into:
73.91 to 73.84	2.29 to 2.36	10YR 7/2; Ga2, Gg2; Light grey tufa sands and gravels; sharp contact into:
73.84 to 73.77	2.36 to 2.43	10YR 4/2; As1, Ag1, Sh1, Ga1, Gg+; Dark greyish brown organic-rich silty clay with tufa sands and gravels; sharp contact into:
73.77 to 73.69/73.64	2.43 to 2.51/2.56	10YR 6/2; Ga2, Gg1, Ag1; Light brownish grey tufa sands and gravels with silt; sharp and uneven contact into:
73.69/73.64 to 73.20	2.51/2.56 to 3.00	10YR 5/1; Ag2, Ga2, Sh+, TI/DI+, seeds+; Grey silty sand with organic, wood and hazelnut inclusions; unknown contact into:
73.20 to 72.20	3.00 to 4.00	10YR 2/1 to 7.5YR 4/4; Sh3, TI ³ 1; Black to brown very well humified wood peat; unknown contact into:
72.20 to 71.20	4.00 to 5.00	10YR 6/6; Gg4; Brownish yellow coarse gravel.

Table 3: Lithostratigraphic description of borehole QBH2, Hillview House, West Street, Newbury

Depth (m OD)	Depth (m bgs)	Description
76.05 to 74.08	0 to 1.25	Made Ground
74.08 to 74.59	1.25 to 1.46	10YR 5/1; Ag2, As1, Gg1, charcoal+; Grey gravelly clayey silt with charcoal inclusions; sharp contact into:
74.59 to 74.55	1.46 to 1.50	10YR 5/1 to 10YR 7/2; Ag2, Ga1, Gg1; Grey to light tufa sands and gravels with silt; sharp contact into:
74.55 to 74.54	1.50 to 1.51	10YR 4/1; As2, Ag1, Sh1; Dark grey organic-rich silty clay; sharp contact into:
74.54 to 74.33	1.51 to 1.72	10YR 7/2; Ga3, Gg1, Ag1, Sh+; Light grey tufa sands and gravels with organic-rich silt concentrated around 1.58, 1.62 and 1.68cm bgs; very sharp contact into:
74.33 to 74.27	1.72 to 1.78	10YR 4/2; Ag2, Sh1, Ga1; Dark greyish brown organic rich silt and tufa sands with charcoal inclusions; diffuse contact into:
74.27 to 74.05	1.78 to 2.00	10YR 5/2 to 10YR 5/3; Ga3, Ag1, Mollusca+, charcoal+, Sh+; Greyish brown to brown tufa sands and silts with

		organic-rich remains, charcoal and frequent whole/fragmented Mollusca; diffuse contact into:
74.05 to 74.03	2.00 to 2.03	10YR 5/2 to 10YR 5/3; Ga3, Ag1, Sh+; Greyish brown to brown tufa sands and silts with organic-rich remains; sharp contact into:
74.03 to 73.99	2.03 to 2.07	10YR 4/1; Ga2, Sh1, Ag1; Dark grey organic-rich silty sand; sharp contact into:
73.99 to 73.95	2.07 to 2.10	10YR 5/2 to 10YR 5/3; Ga3, Ag1, Sh+, DI/TI+; Greyish brown to brown tufa sands and silts with organic-rich and wood remains; sharp contact into:
73.95 to 73.81	2.10 to 2.24	10YR 4/1; Sh2, As2, Mollusca+ Ga+; Dark grey very organic-rich silty clay with Mollusca and tufa sand inclusions; sharp contact into:
73.81 to 73.75	2.24 to 2.30	10YR 4/1 to 10YR 5/3; Ga1, Gg1, Sh1, As1, Mollusca+; Dark grey to brown tufa sands and silts with organic-rich clay and Mollusca fragment inclusions; sharp contact into:
73.75 to 73.25	2.30 to 2.80	10YR 2/1; Sh3, TI ³ 1; Black highly humified wood peat ; diffuse contact into:
73.25 to 73.16	2.80 to 2.91	10YR 4/1; As2, Sh1, Ga1, TI+; Dark grey organic-rich silty sand with wood peat inclusions; sharp contact into:
73.16 to 73.05	2.91 to 3.00	10YR 5/1 to 10YR 7/1; As2, Ga1, Gg1; Grey becoming light grey, stiff gravelly sandy clay (possible marl?).

Table 4: Lithostratigraphic description of borehole QBH3, Hillview House, West Street, Newbury

Depth (m OD)	Depth (m bgs)	Description
76.20 to 75.02	0 to 1.18	Made Ground dominated by Red Brick
75.02 to 74.78	1.18 to 1.42	10YR 6/2; As2, Ag1, chalk rubble fragments 1, Ga+; Light brownish grey silty clay with fragments of chalk rubble and sand inclusions; sharp contact into:
74.78 to 74.69	1.42 to 1.51	10YR 5/2 to 10YR 4/2; Ag2, Sh1, Ga1, Gg+; Greyish brown to dark greyish brown organic-rich sandy silt with very occasional gravel fragments; gradual contact into:
74.69 to 74.60	1.51 to 1.60	10YR 5/2 to 10YR 5/3; Ag1, As1, Ga2; Greyish brown to brown tufa sands and silty clay sharp contact into:
74.60 to 74.20	1.60 to 2.00	10YR 7/2; Ga2, Gg2; Light grey tufa sands and gravels
74.20 to 74.16	2.00 to 2.04	10YR 2/1 and 10YR 7/2; Sh2, Ga1, Gg1, TI+, Mollusca+; Mixture of black unidentifiable peat and tufa sands and gravels with inclusions of Mollusca fragments and wood; sharp contact into:
74.16 to 74.09	2.04 to 2.11	10YR 6/2; Ga3, Gg1, Mollusca+; Light brownish grey tufa sands and gravels with Mollusca fragment inclusions; diffuse contact into:
74.09 to 73.97	2.11 to 2.23	10YR 5/8; Ga3, Gg1; Yellowish brown tufa sands and gravels; diffuse contact into:
73.97 to 73.66	2.23 to 2.54	10YR 7/2; Gg3, Ga1; Light grey tufa gravels and sand; sharp contact into:
73.66 to 73.54	2.54 to 2.66	10YR 5/1 to 10YR 4/1; Ga2, Gg1, Sh1, Mollusca+; Grey to dark grey tufa sands and gravels with concentrations of unidentifiable peat towards the centre of the unit. Mollusca fragments also noted; sharp contact into:
73.54 to 73.37	2.66 to 2.83	10YR 6/2; Ga3, Gg1, Mollusca+; Light brownish grey tufa sands and gravels with frequent Mollusca

		fragments; sharp contact into:
73.37 to 73.30	2.83 to 2.90	10YR 4/1; Sh2, Tl ³ 1, Gg1; Dark grey unidentifiable and well humified wood peat with gravel; sharp contact into:
73.30 to 73.20	2.90 to 3.00	10YR 7/1; Ga3, Gg1; Light grey stiff sandy gravel (possible marl?); sharp contact into:
73.20 to 72.20	3.00 to 4.00	10YR 6/6; Gg4; Brownish yellow coarse gravel.

Table 5: Results of the organic matter and calcium carbonate determinations, boreholes QBH1 and QBH2, Hillview House, West Street, Newbury

QBH1		
Depth (m OD)	Organic matter content (%)	Calcium carbonate content (%)
74.53	8.35	15.52
74.45	8.09	28.54
74.37	5.67	34.73
74.29	10.45	36.12
74.21	1.30	42.10
74.13	18.76	30.53
74.05	16.25	30.45
73.97	8.84	89.47
73.89	2.44	41.36
73.81	7.87	34.68
73.73	4.18	39.63
73.65	8.76	28.06
73.57	14.96	29.56
73.49	13.17	30.70
73.41	19.44	29.24
73.33	6.47	33.67
73.25	3.13	21.18
73.16	63.47	9.78
73.08	57.57	9.69
73	53.08	10.82
72.92	63.59	21.06
72.84	71.11	13.36
72.76	63.11	19.74
72.68	76.77	5.85
72.6	66.21	15.92
72.52	61.27	13.57
72.44	61.50	23.09
72.36	69.80	4.32

QBH2		
Depth (m OD)	Organic matter content (%)	Calcium carbonate content (%)
74.74	4.89	25.72
74.66	50.80	29.61
74.58	4.24	33.62
74.5	4.34	40.58
74.42	2.32	41.69
74.34	5.05	37.06
74.26	6.01	37.65
74.18	4.79	36.06
74.1	12.64	31.35
74.02	11.00	32.67
73.94	18.34	34.00
73.86	20.88	33.43
73.78	8.22	40.05
73.7	52.93	15.45
73.62	76.28	3.02
73.54	77.10	7.08
73.46	79.68	5.71
73.38	80.74	2.81
73.3	62.40	4.72
73.22	18.05	8.16
73.14	6.20	16.32
73.06	1.80	9.62

Results of the radiocarbon dating from boreholes QBH1 and QBH2, Hillview House, West Street, Newbury

Laboratory code / Method	Material and location	Depth (m OD)	Uncalibrated radiocarbon years before present (yr BP)	Calibrated age BC/AD (BP) (2-sigma, 95.4% probability)	δ13C (‰)
SUERC-51296 (GU33293) AMS	Twig wood; towards top of tufa in QBH1	74.10 to 74.00	6472 ± 32	5490-5370 cal BC (7440-7320 cal BP)	-29.1
SUERC-51297 (GU33294) AMS	Twig wood; top of peat in QBH1	73.15 to 73.10	6461 ± 32	5480-5370 cal BC (7430-7320 cal BP)	-29.1
SUERC-51298 (GU33295) AMS	Twig wood; top of peat in QBH1	72.30 to 72.25	9462 ± 32	9100-8630 cal BC (11,050-10,580 cal BP)	-28.5
SUERC-51299 (GU33296) AMS	Twig wood; base of peat in QBH2	73.35 to 73.30	FAILED		

RESULTS AND INTERPRETATION OF THE POLLEN ASSESSMENT

The results of the pollen assessment indicate a variable concentration and preservation of remains within the QBH1 sequence, and a generally moderate to high concentration of remains in the QBH2 sequence.

Both sequences are dominated throughout by high numbers of *Pinus* (pine) with *Corylus* type (e.g. hazel) and occasionally *Betula* (birch) and *Salix* (willow). Other tree taxa are recorded but generally higher up the sequence – e.g. *Quercus* (oak), *Ulmus* (elm), *Tilia* (lime) and *Alnus* (alder). The herbaceous assemblage is dominated by Cyperaceae (sedges), Poaceae (grasses) and Asteraceae (daisies) with sporadic occurrences of Lactuceae (dandelions), Apiaceae (carrot family), *Filipendula* type (meadowsweet), *Ranunculus* type (e.g. buttercup), *Galium* type (bedstraw) and Caryophyllaceae (pinks). Spores were only occasionally recorded (*Typha latifolia* – bulrush), and spores were dominated by *Filicales* (ferns). Microcharcoal is recorded in moderate concentrations towards the top of the Peat in borehole QBH2, and throughout QBH1.

The pollen assemblage from both boreholes is diagnostic of an early Holocene environment in southern England, and is similar to records from other sites in the Kennet Valley (e.g. Greenham Dairy Farm / Faraday Road (Ellis et al., 2003) and Thatcham Reedbeds (Barnett, 2009)). The floodplain peat surface appears to have been dominated by grasses and sedges with willow. The dryland was occupied by coniferous woodland dominated by pine with birch and hazel shrubland. The occurrence of dandelions, daisies, pinks and bedstraw is also suggestive of open environments on the dryland. As the peat developed, a small, but

increasing number of deciduous trees (such as oak, alder and elm) colonised the wetland and dryland environments suggestive of a transition towards warmer conditions.

No definitive indicators of human activity are recorded (e.g. cereal pollen), however, these are not anticipated in Mesolithic deposits. Instead, indicators of human activity are likely to be represented by episodes of woodland disturbance (e.g. decreases of tree taxa), occurrences of disturbed ground taxa (e.g. *Chenopodium* type (fat hen), *Plantago lanceolata* (ribwort plantain)) and microcharcoal. Due to the nature of the pollen assessment procedure, decreases in tree taxa are difficult to establish in the Hillview House sequences. However, herbaceous taxa potentially representative of disturbed ground are recorded (e.g. bedstraw, daisies and dandelions), together with moderate values of microcharcoal, which might be suggestive of Mesolithic human activity. Interestingly, the highest concentrations of microcharcoal are recorded in the QBH2 sequence which is located on a higher and therefore most likely drier surface. Detailed analysis of similar sediments at the Thatcham Reedbeds site has revealed several episodes of landscape disturbance in association with raised microcharcoal/charcoal values (Barnett, 2009).

Table 7: Results of the pollen assessment from boreholes QBH1 and QBH2, Hillview House, West Street, Newbury

		QBH1								QBH2			
	Sediment type	Tufa/ Peat	Tufa/ Peat	Peat	Peat	Peat	Peat	Peat	Peat	Tufa/ Peat	Peat	Peat	Peat
	Depth (m OD)	74.12	74.04	73.08	72.92	72.76	72.60	72.44	72.28	73.86	73.62	73.46	73.30
Latin name	Common name												
Trees													
<i>Alnus</i>	alder									8			
<i>Quercus</i>	oak		4		1					21			
<i>Pinus</i>	pine		2	7	21	4	11	8	1	1	6	15	14
<i>Ulmus</i>	elm			1						3			
<i>Tilia</i>	lime									2			
<i>Betula</i>	birch							1					1
Shrubs													
<i>Corylus</i> type	e.g. hazel		2	4	4			2	2	17	2	3	
<i>Salix</i>	willow						1	1					
Herbs													
Cyperaceae	sedge family				4		1	2		2	3	10	
Poaceae	grass family		2	1	2		1			3	1	8	
Asteraceae	daisy family			5	1					1		6	1
Lactuceae	dandelion family			1				1					
Apiaceae	carrot family												1
<i>Filipendula</i> type	meadowsweet												1
<i>Ranunculus</i> type	buttercup									1			
<i>Galium</i> type	bedstraw						1					1	
Caryophyllaceae	pink family							1					
Aquatics													
<i>Typha latifolia</i>	bulrush				1					1			
Spores													

<i>Filicales</i>	ferns			2	64	3	1				4	130	3
Unknown					1				3				
Total Land Pollen (grains counted)		0	10	19	34	4	15	16	3	59	12	43	18
Concentration*		0	2	3	5	1	3	3	1	5	2	5	3
Preservation**		0	3	3	3	3	4	3	2	4-5	3	4	3
Microcharcoal Concentration***		1	0	3	2	0	0	0	0	1	3	3	3
Suitable for analysis		NO	NO	YES	YES	NO	YES	YES	NO	YES	YES	YES	YES

Key:

*Concentration: 0 = 0 grains; 1 = 1-75 grains, 2 = 76-150 grains, 3 = 151-225 grains, 4 = 226-300, 5 = 300+ grains per slide

**Preservation: 0 = absent; 1 = very poor; 2 = poor; 3 = moderate; 4 = good; 5 = excellent

***Microcharcoal Concentration: 0 = none, 1 = negligible, 2 = occasional, 3 = moderate, 4 = frequent, 5 = abundant

RESULTS AND INTERPRETATION OF THE MACROFOSSIL ASSESSMENT

A total of 14 small bulk samples were extracted (eight from borehole <QBH1> and six from <QBH2>) for the recovery of macrofossil remains including charcoal, waterlogged seeds, waterlogged wood, insects and Mollusca (Tables 8 and 9). The samples were focussed on the Peat and Tufa-rich horizons in each borehole only.

Borehole <QBH1>

The results of the macrofossil rapid assessment indicated that charcoal was present in moderate quantities in two samples from <QBH1> (74.41 to 74.31 and 73.15 to 73.10m OD). In the sample from 74.41 to 74.31m OD these included moderate quantities of identifiable fragments >2mm in diameter. Mollusca, including fragments and small whole specimens, were also present in moderate quantities in the sample from 74.41 to 74.31m OD.

Charred remains were absent in the remainder of the samples. However, waterlogged wood was present in low to moderate quantities in all eight samples. Low quantities of waterlogged seeds were recorded in the three samples from 72.70 to 72.60m OD, including *Rumex/Polygonum* sp. (dock/sorrel/knotweed), *Lycopus europaeus* (gypsywort) and *Carex* sp. (sedge). The seed assemblage is too small to provide a full environmental interpretation; however, the assemblages are consistent with wetland fen vegetation.

Low quantities of insect remains were recorded in the samples from 72.35 to 72.30 and 72.30 to 73.25m OD, with one insect elytron present in the sample from 73.74 to 73.64m OD. No bone was recorded during the assessment of the samples from <QBH1>.

Borehole <QBH2>

Charcoal was recorded in low quantities in two samples from <QBH2> (73.70 to 73.65 and 73.35 to 73.30m OD). In the sample from 73.35 to 73.30m OD this included identifiable fragments greater than 4mm in diameter.

Low quantities of waterlogged wood were recorded in four samples (73.95 to 73.85, 73.55 to 73.46, 73.30 to 73.25 and 73.35 to 73.30m OD). The sample from 73.95 to 73.85m OD also contained low quantities of Mollusca, as fragments and small whole specimens. Low quantities of insect remains were recorded in the sample from 73.35 to 73.30m OD.

No charred seeds or bone were recorded in the samples from <QBH2>.

Table X: Results of the macrofossil assessment of borehole <QBH1>

Depth (m OD)	Volume sampled (l)	Volume processed (l)	Fraction	Charred					Waterlogged		Mollusca		Bone			
				Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Whole	Fragments	Large	Small	Fragments	Insects
74.41 to 74.31	0.025	0.025	>300µm	2	2	3	-	-	1	-	2	3	-	-	-	-
74.10 to 74.00	0.030	0.030	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	-
73.74 to 73.64	0.050	0.050	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	1
73.20 to 73.15	0.020	0.020	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	-
73.15 to 73.10	0.025	0.025	>300µm	-	-	2	-	-	2	-	-	-	-	-	-	-
72.70 to 72.60	0.025	0.025	>300µm	-	-	-	-	-	2	1	-	-	-	-	-	-
72.35 to 72.30	0.025	0.025	>300µm	-	-	-	-	-	1	1	-	-	-	-	-	1
72.30 to 72.25	0.050	0.050	>300µm	-	-	-	-	-	1	1	-	-	-	-	-	1

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

Table X: Results of the macrofossil assessment of borehole <QBH2>

Depth (m OD)	Volume sampled (l)	Volume processed (l)	Fraction	Charred					Waterlogged		Mollusca		Bone			
				Charcoal (>4mm)	Charcoal (2-4mm)	Charcoal (<2mm)	Seeds	Chaff	Wood	Seeds	Whole	Fragments	Large	Small	Fragments	Insects
73.95 to 73.85	0.050	0.050	>300µm	-	-	-	-	-	1	-	1	1	-	-	-	-
73.75 to 73.70	0.025	0.025	>300µm	-	-	-	-	-	-	-	-	-	-	-	-	-
73.70 to 73.65	0.025	0.025	>300µm	-	-	1	-	-	-	-	-	-	-	-	-	-
73.55 to 73.46	0.025	0.025	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	-
73.30 to 73.25	0.025	0.025	>300µm	-	-	-	-	-	1	-	-	-	-	-	-	-
73.35 to 73.30	0.025	0.025	>300µm	1	-	-	-	-	1	-	-	-	-	-	-	1

Key: 0 = Estimated Minimum Number of Specimens (MNS) = 0; 1 = 1 to 25; 2 = 26 to 50; 3 = 51 to 75; 4 = 76 to 100; 5 = 101+

DISCUSSION & CONCLUSIONS

The aims of this assessment were to provide a provisional reconstruction of the environmental history of the site and its environs, and in particular:: (1) to enable comparison of the age and palaeobotanical composition of the sequences in boreholes BH1 and BH2, which lie in differing topographic settings and have Peat horizons at different elevations (QBH2 also contains the charcoal); (2) to provide a provisional reconstruction of the environmental history of the site, (3) to highlight evidence of human activity, and (4) to make recommendations for further analysis (if required).

The Holocene sediments recorded at the Hillview House rest upon a Gravel surface that slopes down from west to east across the site (potentially representing a former channel). These sediments include Peat (representative of a semi-terrestrial landscape), Tufa-rich sediments, Alluvium and possibly Marl (all representative of differing types of fluvial environment).

Peat and Tufa-rich sediments form the dominant components of the Holocene sedimentary sequence across the site. Peat began forming within the potential channel (QBH1) during the early Mesolithic (11,050-10,580 cal BP) and continued to the late Mesolithic (7430-7320 cal BP). It is anticipated that the Peat grew upwards and outwards from the former depression onto areas of higher ground. Due to a failed radiocarbon date on the QBH2 sequence, it was not possible to properly test this hypothesis during the assessment stage; however, the pollen record suggests that both sequences contain early Holocene (early-middle Mesolithic) sediments. These results are similar to that recorded at other sites along the Kennet Valley, such as Greenham Dairy Farm / Faraday Road in Newbury (Ellis *et al.*, 2003), the Thatcham Reedbeds (Barnett, 2009) and Kenavon Road in Reading (Young & Batchelor, 2013).

The accumulation of peat is indicative of the formation of a semi-terrestrial land surface. The lithostratigraphic, pollen and plant macrofossil records indicate that this surface was colonised by grasses, sedges and herbs with some woodland, including willow). The dryland was occupied by pine with birch, and hazel shrubland; areas of open ground dominated by herbaceous taxa are also indicated. As the climate warmed during the middle to late Mesolithic, warmth-loving mixed deciduous woodland such as oak, elm and lime invaded the dryland, and alder colonised the peat surface. This assemblage is similar to that recorded in other sequences along the Kennet Valley (e.g. Ellis *et al.*, 2003; Barnett, 2009).

The presence of microcharcoal in the pollen record and charcoal in the macrofossil record, represents persuasive evidence of burning during the Mesolithic. Whilst it is unknown whether these episodes of burning were of anthropogenic or natural origin, it is of note that similar findings have been recorded in the palaeoenvironmental record from Thatcham Reedbeds, correlating with evidence for woodland disturbance (Barnett, 2009). Furthermore, the Kennet Valley contains a number of sites with Mesolithic/Neolithic cultural remains. These are outlined in the introduction and include: (1) a small number of worked flints at Victoria Park, ca. 350m to the southeast of the site (Froom, 2012); (2) abundant worked flint directly associated with animal bone, together with charcoal and possible evidence for hearths at Greenham Dairy Farm / Faraday Road ca. 600m to the east of the site (Ellis *et al.*, 2003); (3) two distinct concentrations of worked flint suggestive of two episodes of activity at Newbury Sewage Works on the outskirts of Thatcham (Healy *et al.*, 1992), and (4) a Maglemosian flint industry in Thatcham (Wymer, 1962). Thus there is a strong possibility that the findings from Hillview House are related to Mesolithic human activity.

The tufa-rich sediments that accumulated above the Peat of both boreholes was radiocarbon dated to 7440-7320 cal BP, indicating they were either laid down very rapidly, or that they represent reworked material. The similar elevation of these sediments in each borehole suggests the deposits were laid down synchronously across the site. The presence of Tufa is indicative of the accumulation of calcareous sediment in a low energy and probably shallow aquatic environment. Periods of more organic, almost peaty sediment were recorded within the Tufa, suggestive of transitions towards more marginal semi-aquatic/semi-terrestrial environments. The identification of microcharcoal and charcoal within these deposits suggests continued nearby/*in situ* natural or anthropogenic burning during the Mesolithic. The identification of a probable hazelnut within these deposits between 73.69 and 73.20m OD in QBH3 is also of interest.

Towards the top of the sequence, (above ca. 74.50m OD in all boreholes), the Tufa-rich deposits were overlain by mineral-rich alluvium with various coarse grained and anthropogenic inclusions, prior to Made Ground.

RECOMMENDATIONS

Due to: (1) the Mesolithic age of the sequences; (2) the often favourable concentration and preservation of pollen and wood remains; (3) evidence for episodes of burning (of anthropogenic or natural origin), and (4) the very limited amount of detailed geoarchaeological investigations previously carried out in Newbury, it is strongly recommended that a programme of analysis is carried out on the QBH1 & QBH2 sequences

from Hillview House. This should incorporate further radiocarbon dates, magnetic susceptibility, pollen, plant macrofossil and wood/charcoal identifications. Such analysis would provide significantly enhance our knowledge and understanding of environmental history of this area of Newbury. It would also provide a detailed record of the fire history of the site, and help elucidate whether it is of natural or anthropogenic origin. The results from such analysis should be compared with existing records and ongoing research in the Kennet Valley.

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APPENDIX 1: OASIS

Project details

Project name	Hillview House, West Street, Newbury: Geoarchaeological Field Investigations
Short description of the project	Three geoarchaeological boreholes were put down at the site following a previous archaeological evaluation carried out by Thames Valley Archaeological Services. The results indicate a gravel surface that slopes downwards from west to east across the site. A complex sequence of Holocene Peat, Tufa, Alluvium and possibly Marl overlies the Gravel capped by Made Ground. Assessment of these sequences indicates that the Peat formed from the early Mesolithic to late Mesolithic; the Tufa deposits formed shortly and after this, and rapidly. Assessment of the pollen and plant remains indicated a vegetation assemblage typical of the early Mesolithic in southern England (pine-birch-hazel woodland on the dryland; grasses, sedges and probably willow on the floodplain). More significant was the occurrence of charcoal and microcharcoal within the peat, indicative of episodes of burning that might be related to Mesolithic human activity.
Project dates	Start: 09-10-2013 End: 15-04-2014
Previous/future work	Yes / Yes
Type of project	Environmental assessment
Site status	None
Current Land use	Industry and Commerce 2 - Offices
Monument type	PEAT Early Prehistoric
Monument type	TUFA Early Prehistoric
Survey techniques	Archaeology

Project location

Country	England
Site location	BERKSHIRE WEST BERKSHIRE NEWBURY Hillview House
Study area	0 Square metres
Site coordinates	SU 4700 6740 51 -1 51 24 11 N 001 19 27 W Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
Project design originator	Dr C.R. Batchelor

Project director/manager C.R. Batchelor
Project supervisor C.R. Batchelor
Type of sponsor/funding body Developer

Project bibliography 1

Publication type Grey literature (unpublished document/manuscript)
Title A REPORT ON THE GEOARCHAEOLOGICAL FIELD INVESTIGATIONS AT HILLVIEW HOUSE, WEST STREET, NEWBURY, WEST BERKSHIRE (SITE CODE: HVH13)
Author(s)/Editor(s) Batchelor, C.R.
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Date 2013
Issuer or publisher Quaternary Scientific
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Project bibliography 2

Publication type Grey literature (unpublished document/manuscript)
Title HILLVIEW HOUSE, WEST STREET, NEWBURY, WEST BERKSHIRE (SITE CODE: HVH13): GEOARCHAEOLOGICAL ASSESSMENT REPORT
Author(s)/Editor(s) Batchelor, C.R.
Author(s)/Editor(s) Young, D.S.
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