Fig. 1: locations of the two sites STX06 and SWQ06

The Battersea Channel: a former course of the River Thames?

Mike Morley, with contributions by AOC Archaeology Group and MOLA

It has been known for some years that there are significant buried channels beneath the Middle and Lower Thames floodplain, long silted up and interred beneath the modern London landscape.[1] They are the legacy of periods in the past when the Thames Valley accommodated not just a single channel, as is seen today, but multiple channels traversing the Thames floodplain. It is difficult to imagine a floodplain topography which differs so greatly from the familiar panorama of the Thames today, but it is important to try to reconstruct these environments, as they once influenced the behaviour of people inhabiting the floodplain and its hinterland.

The palaeo-topography (buried landforms and surfaces) of the Thames floodplain in the Battersea area of south-west London has scarcely been investigated geoarchaeologically, though some recent work has attempted to address this shortfall.[2] This paucity of research is at odds with the landscape features known to have existed in this area in the prehistoric and later periods.[3] Islands of high ground (eyots) surrounded by water-filled channels fed by the Thames fluvial system have been shown to have existed in the area, and their study can reveal much about the evolving landscape in which prehistoric populations lived.

The sites

Two sites are investigated in this study; both are in the Battersea/Nine Elms area of south-west London (Fig. 1). Kilmartin London Ltd commissioned Museum of London Archaeology (MOLA) to undertake a geoarchaeological auger-hole survey on the site of 102–104 Stewarts Road, SW8 (site code STX06),[4] as part of an archaeological evaluation. An adjacent site, investigated by AOC Archaeology Group and commissioned by RGP Architects, at 120–146 Stewarts Road (site code SWQ06),[5] was the subject of a MOLA geoarchaeological auger-hole study for the purposes of detailed palaeoenvironmental reconstruction.

At STX06, two trenches were excavated, one of which yielded a flint scatter of probable Bronze Age origin. Two auger-holes (AH1 and AH2) were drilled in the base of these trenches in order to prove the depth of the basal gravel and nature of the alluvial sequence (Fig. 1). At SWQ06, six trenches were excavated. Two auger-holes (AH1 and AH2) were drilled in the base of two of them (Trenches 2 and 4), to ascertain the nature of the sub-surface stratigraphic succession. One of the auger-holes (AH2) was selected for more detailed palaeo-environmental analysis, and sub-samples were taken for the pollen and diatom studies, as well as for radiocarbon dating of carbon-rich peat samples.

Work at these sites did not generate a significant quantity of archaeological material. However, they presented a unique opportunity to examine two closely-spaced locales which exhibit very different sedimentary sequences, suggesting marked changes in palaeo-topography over a relatively short distance. STX06, to the west, is situated on an area of high ground associated with the Battersea eyot. The sequence at SWQ06 revealed that the surface of the basal gravels was *c.* 2 m lower, and was overlain by a thick sequence of silts and clays indicating a significant channel here. These sites gave an opportunity to revise and refine our knowledge of the geomorphological features mentioned above, enabling future archaeological work in the area

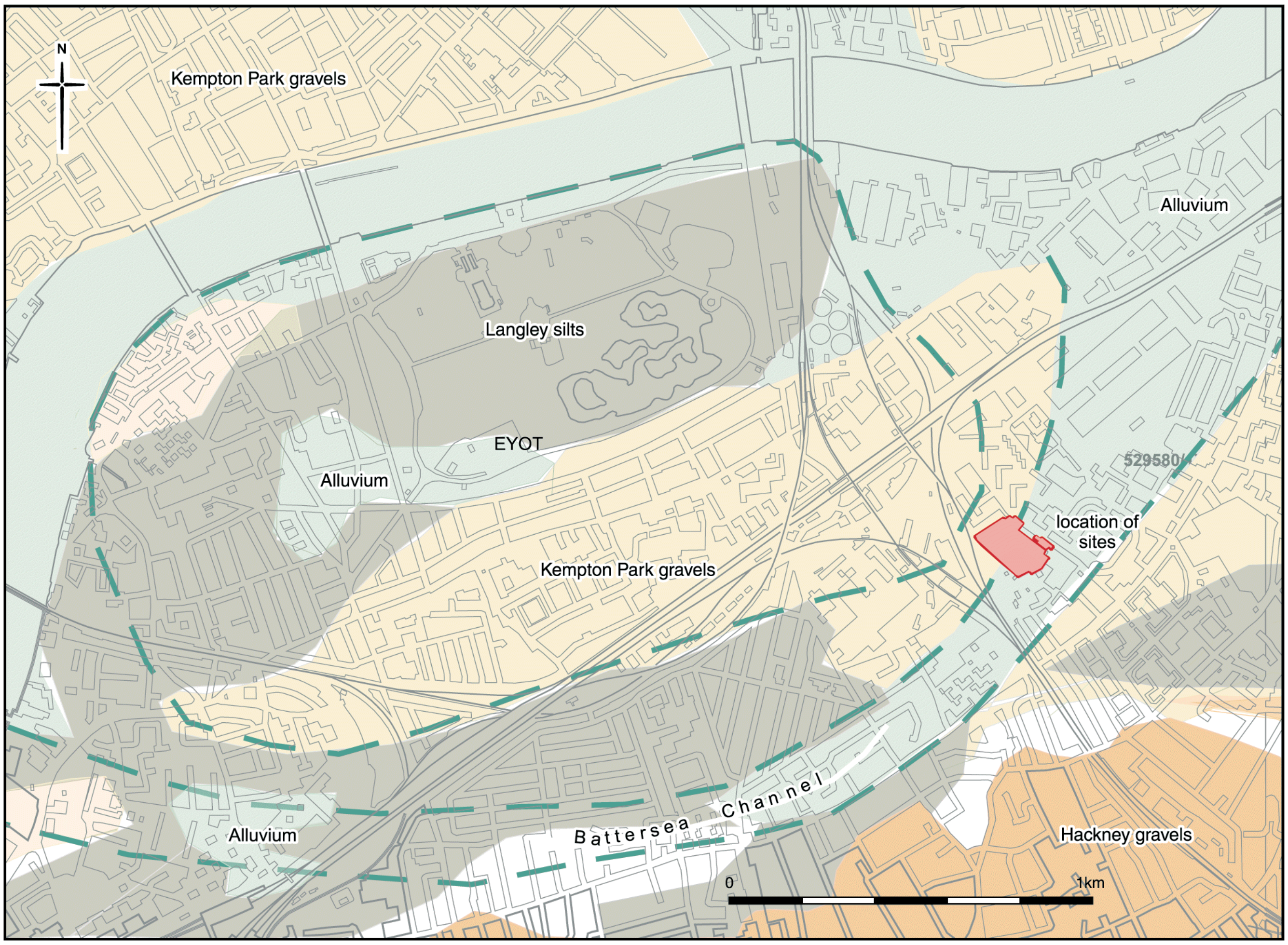

Fig. 2: location of the study area in relation to BGS mapped geological features

to be better informed in terms of the dynamics of the local landscape.

The significance of the Battersea Channel in the evolving Quaternary landscape

The Battersea area is of special geoarchaeological interest, especially in terms of its palaeotopography. Two landscape features, although now only subtly discernible in the modern urban sprawl, were once prominent features of the prehistoric countryside. First, an island (eyot) is known to have existed in an area broadly located beneath modern-day Battersea Park and the ground immediately to the south and the west (Fig. 2). It has been mapped by the British Geological Survey (BGS), and comprises a stubborn remnant of a former gravel floodplain (both older and higher in elevation than the modern floodplain of the Thames), thought to have been deposited *c.* 30,000 – 150,000 years ago (Kempton Park Gravel). Similar eyots are found in other areas of the Thames floodplain, such as Thorney (Thornea) Island in the Westminster area.[6] These areas of high ground are important landscape features, as they remained as dry land during much of prehistory, and would therefore have attracted people exploiting the margins of the Thames. Though the eyot is bounded by the modern Thames on two sides, BGS mapping shows that the eastern side, and at least part of the southern boundary, is bounded by a tongue of Holocene alluvium which fills a substantial buried channel. This silted-up channel, the second important palaeotopographical feature of the area, is the primary focus of this report.

A significant buried channel (about 200 m wide and over 5 km long) runs roughly parallel to the River Thames in the Battersea area.[7] This broad in-filled channel, referred to here as the Battersea Channel, attains a maximum depth down to -3 m OD in the study area, with a maximum modern ground surface elevation in the area of *c.* 3 m OD. Such channels have been reported from various locations in the Middle and Lower Thames, such as the Bankside Channel, Southwark.[8] Interestingly, these channels are almost invariably on the southern side of the present Thames channel, suggesting that there has been a general northwards migration of the Thames during the Holocene.[9] A key question in the study of buried channels in the Thames floodplain is whether these ancient watercourses relate to a part of the Pleistocene/Early Holocene braided Thames, or whether they originally formed a section of a single-thread meandering Thames. Patrick Nunn favours the latter interpretation.[10]

Previous geoarchaeological work in the Thames valley has shown that throughout the Holocene, as the Thames evolved to adopt a single-channel form, the network of smaller channels gradually filled with fine-grained sediments and accumulations of peat. This process of channel activation and abandonment was driven by a complex interplay between climatic fluctuations (and associated changes in geomorphological processes), changes in relative sea level

(RSL), and, certainly from the Neolithic onwards, human manipulation of the environment such as deforestation and changes in land-use patterns.[11] The gradual filling of these abandoned channels with fine-grained sediments deposited in largely low-energy environments has made them important repositories of palaeoenvironmental information, providing important environmental context to human activity in the Thames floodplain region.

Documentary evidence: the Falcon Brook and other watercourses of the Battersea area

Rising in two locations in the Tooting and Balham areas of south-west London, the Falcon Brook flows north, converging into a single channel in the Clapham Common area.[12] This now buried watercourse flows in a still discernible minor valley towards Clapham Junction station. However, from this point on there is a question over the exact course and configuration of the channel. Though it undoubtedly continued westwards to a confluence with the Thames somewhere in Battersea (a small creek still exists on this route), the brook may actually have forked, with one course flowing eastwards to meet another channel in the Nine Elms area, some 2 km to the east.[13]

It is possible that the Falcon Brook once flowed to the east, exploiting the natural depression left in the landscape by the silted-up Battersea Channel. This route is supported by the presence of a sewer shown on the 1862 Stanford's library map (Fig. 3). Possible further support for an inferred eastward arm of the Falcon Brook lies in the position of the boundary between the boroughs of Wandsworth and Lambeth. It appears to respect the course of the sewer marked on the Stanford's map, and both of these features fall within the proposed corridor of the Battersea Channel. This eastwards extension of the Falcon Brook appears to exploit roughly the line of the Battersea Channel which has been identified at SWQ06.

Reconstructing the past environment

In recent years there has been a gradual realisation that a sound knowledge of the nature of the sub-surface stratigraphy at a site is critical in answering two key questions: (1) where are the most likely locations for the discovery of archaeological material and human settlement?, and (2) what are the dynamics of the landscape in which our ancestors lived?

The first question can be addressed through predictive modelling of the sub-surface sediments. This is usually done in the preliminary stages of an archaeological investigation, when an overall idea of the changing dynamics of the Quaternary landscape is assessed in terms of its archaeological potential. Geoarchaeologists examine sub-surface stratigraphic successions in advance of excavation to determine the sequence of sediments present beneath the surface. By laterally linking groups of sediments which represent discrete environments and/or periods of time, a picture can be generated of the past topography of the landscape, and how this environment changed through time.

The second question pertains to the generation of a stand-alone record of

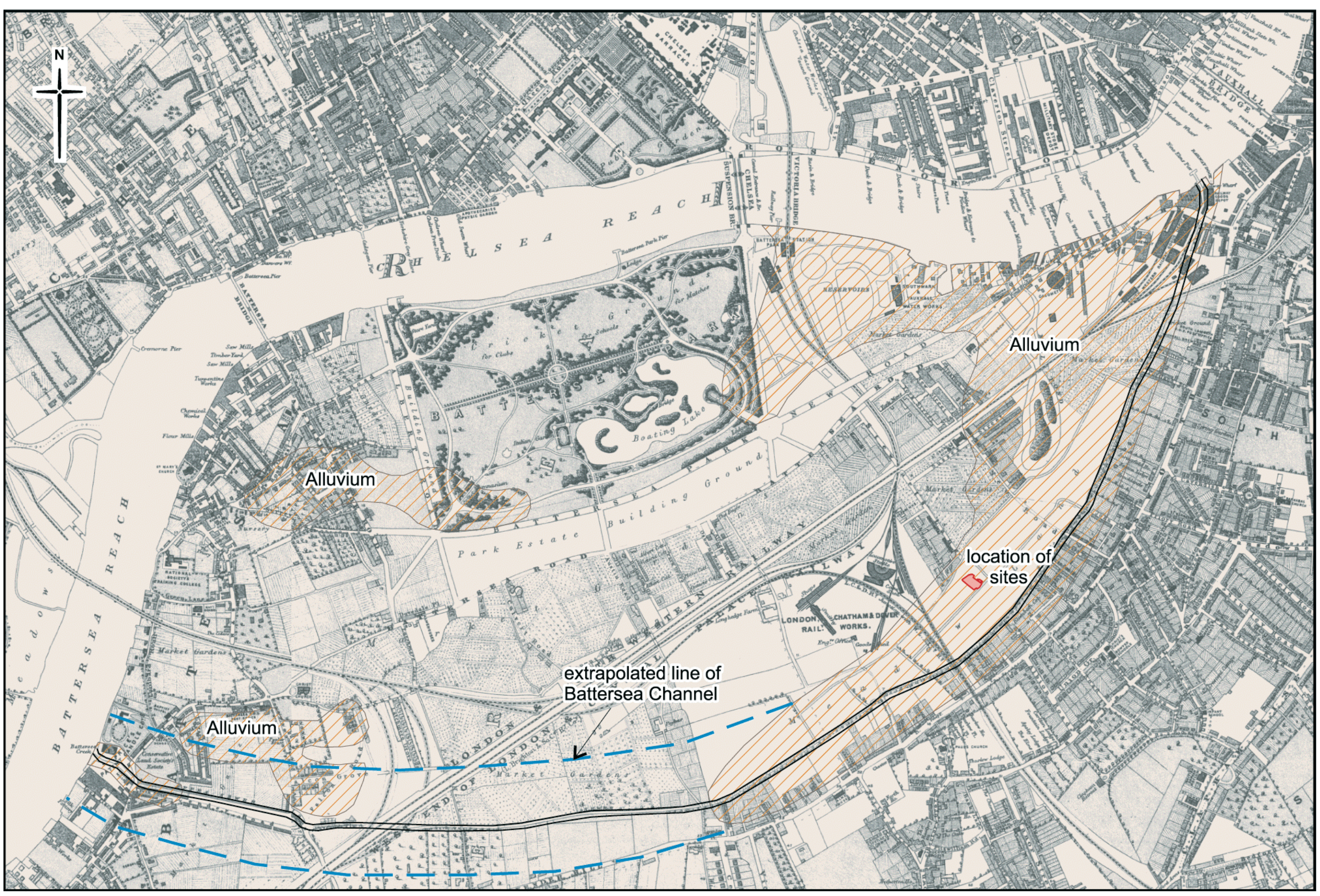

Fig. 3: extract from Stanford's 1862 map showing route of the 'sewer' which is now borough boundary between Wandsworth and Lambeth. Also shown is BGS mapped alluvium, and extrapolated possible course of the Battersea Channel

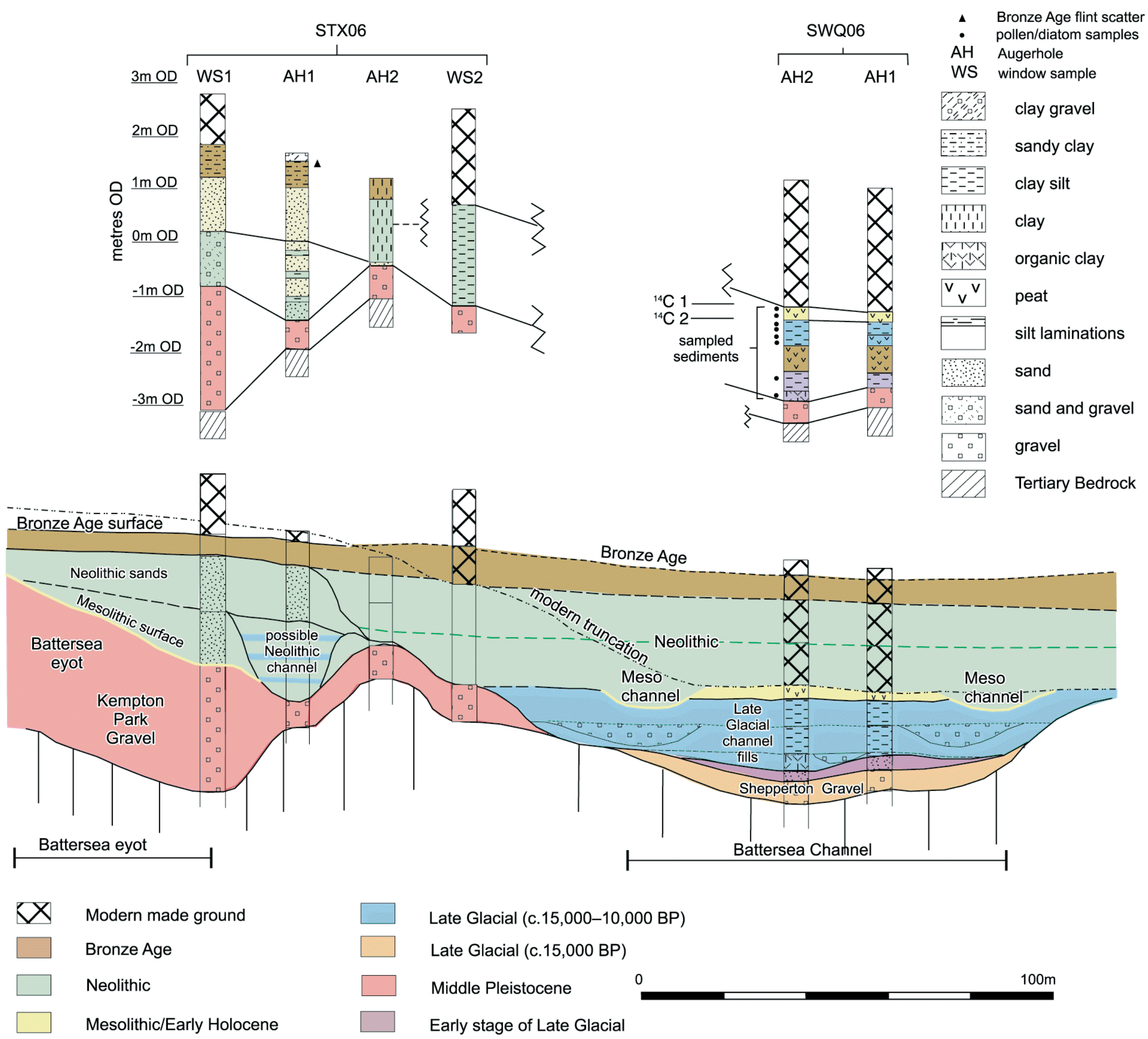

Fig. 4: transect through the sub-surface stratigraphy at the two sites, with a schematic representation of the changing palaeoenvironments

Quaternary environmental change, which provides environmental context for evidence of past human activity. This can be answered in part by using the modelling procedures outlined above, as geomorphological processes are often inextricably linked to fluctuations in climate. However, to generate robust palaeoenvironmental and palaeoclimatic data, the sediments need to be analysed in a more scientifically rigorous manner. Sediment samples are examined for micro- and macro- biological inclusions such as pollen, diatoms (unicellular algae), ostracods (microscopic to mm-size crustacea), insect remains, molluscs and plant macrofossils. Species data from these analyses can be used to generate palaeoenvironmental reconstructions, using modern data from similar assemblages and their climatic and environmental envelopes.

It is of little use, however, to reconstruct the dynamics of the Thames floodplain without a robust geochronological framework to firmly anchor these changes in time. The routine use of accelerator mass spectrometer radiocarbon dating, which enables the dating of very small quantities of organic material, makes securing a chronology on stratigraphic sequences relatively simple and cost-effective. In Thames alluvial sediments, organic material such as woody peat, twigs, reed stems, seeds and nuts can be dated using this method. As the upper limit of the functional use of radiocarbon dating is about 40,000 years, dating sediments from older contexts must be undertaken using other techniques, such as optically stimulated luminescence.

The evolving Thames and the origins of the Battersea Channel

Full Glacial (Devensian)

Immediately after the coldest part of the last glaciation (Devensian) around 18,000 to 15,000 years ago, coarse sands and gravels (Shepperton Gravels; derived from the physical breakdown of bedrock lithologies through periglacial activity) were deposited on the Thames floodplain as bed-load in a fast-flowing braided river, as would be seen in the modern-day Arctic for example. High sedimentation rates would have reflected the lack of significant vegetation cover in the periglacial landscape.

At this time STX06 was probably situated some distance away from the higher ground of the eyot (Fig. 4). However, gravel most likely built up against the sides of the eyot as the Devensian braided channels flowed around this area of high ground. In AH2 the gravel surface attained a maximum elevation of -0.40 m OD, while in AH1 the surface of the gravel was observed at -1.48 m OD. These changes in elevation of the gravel surface probably reflect the dynamics of this cold-climate braided river, with mid-channel bars separating smaller channels traversing the floodplain.

At SWQ06, the Battersea Channel was at this time a part of the network of braided channels of the Thames flood-plain. This channel would have been depositing coarse material in a high-energy fluvial environment.[14] In the area of the site there would have been a multi-channel, braided river, with many large geomorphological features such as channel and point bars, around which the channels would have flowed (Fig. 5 top). During high-discharge events (e.g. during floods/seasonal melts), these gravel bars would gradually increase in size as more coarse material was spread up and across their surfaces during peak flows.

Late Devensian

Towards the end of the last glacial period a series of climatic fluctuations heralded the beginning of the Holocene interglacial. A warming event known as the Windermere Interstadial (*c.* 15,000 – 13,000 Cal BP), was followed by a final climatic downturn at around 13,000 – 11,500 Cal BP, termed the Loch Lomond Stadial, or Younger Dryas.[15] The end of the Loch Lomond Stadial marked the beginning of the Holocene and the start of rapid amelioration of the climate, which had a marked effect on the fluvial geomorphology of the Thames Valley.

At STX06, the high ground of the eyot margins would have remained as higher, drier ground around which the late glacial channel would have flowed. The auger-hole AH2 at SWQ06, which contained the deepest sequence of fine-grained alluvium, was examined for biological evidence of environmental change (Fig. 4). Pollen analysis revealed that much of the lower part of the sequence was deposited when the site was primarily an open environment dominated by herbaceous vegetation, comprising predominantly grasses with small additions of herbs such as buttercup and stitchwort, indicating a cold-climate environment.[16] This places most of the lower sediments observed at SWQ06 firmly in the late Devensian, and possibly very early Holocene. This pollen-based reconstruction is supported by a radiocarbon age from the top of these inferred cold climate sediments of 10,510 – 10,230 Cal BP.[17] This appears to indicate that the Battersea Channel was active until at least the beginning of the Holocene.

At this time the main channel probably accommodated a series of smaller channels, migrating back and forth across the channel bed. The channel, where it is delineated by the sub-surface alluvium mapped by the BGS, is broader than the present Thames channel, suggesting that there was enough space to accommodate a network of smaller channels.

Early Holocene (Mesolithic)

The Holocene (the current temperate period) marks the beginning of the Mesolithic period, when hunter-gatherer-fisher groups exploited the Thames floodplain and its environs as a place of settlement (on higher ground, most likely on the adjacent terraces, but also possibly on gravel eyots), and an area for carrying out subsistence activities such as hunting, food procurement and tool manufacture.

At SWQ06, the onset of peat formation has been dated to the earliest part of the Holocene/Mesolithic, and peat overlies the late glacial sediments at between -1.25 and -1.75 m OD. Pollen analysis of this peat has shown that it contains an assemblage indicative of formation during the middle Holocene (mid-Mesolithic), around 7,500 BP. At this time oak, elm and lime dominated the woodland species (probably growing on the high terrace ground), with a marshy carr-dominated landscape predominating in lower-lying areas by the channel. This is supported by a radiocarbon date of 7670 – 7510 Cal BP from the upper part of the peat.

The environment at SWQ06 in the early Holocene comprised swampy marshland traversed by slow-moving channels, and probably attracted human occupants of the floodplain to exploit the freshwater food resources. The story at STX06 was very different, with the high ground of the eyot providing a dry land surface which remained above the slowly rising waters of the Thames and its tributaries. Such areas of high ground would have facilitated access into the interior of the floodplain which may otherwise have remained relatively impenetrable owing to the boggy ground and network of channels crossing it.

Later prehistoric and historic periods

At STX06 thick units of sand were deposited, banked-up against the margins of the gravel eyot (Fig. 4). Based on the occurrence of similar sand units observed at other sites in west London at a similar elevation,[18] it is possible that these sand beds are Neolithic in age. This sand deposition has been attributed to a fall in peak discharge rates.[19] However, there is probably also an anthropogenic mechanism involved, as landscape management and deforestation would have promoted a higher sediment flux to the Thames fluvial system. It is possible that these sands could be dated directly through the use of optically stimulated luminescence.

In AH1 the sediments directly overlying the basal gravels comprise sand beds with lenses of finer-grained silts and clays. This may suggest that there was a subsidiary channel (possibly a flood channel) flowing here at this time. However, it is also possible that these sediments reflect sedimentation via over-bank flooding at the margins of the channel to the south. AH2 and WS2, further east away from the edge of the eyot, do not contain these bedded sands and fine-grained sediments, suggesting that they are further into the low-lying channel – seen more clearly in the auger-holes from SWQ06 (Fig. 4).

The Bronze Age flint scatter seen in Trench 1 (AH1) is likely to relate to a period of stabilisation of the land adjacent to the Battersea Channel, possibly with ephemeral soil forming at the edge of the eyot in an environment of gradually accreting floodplain landscape, periodically inundated by the now tidal river.

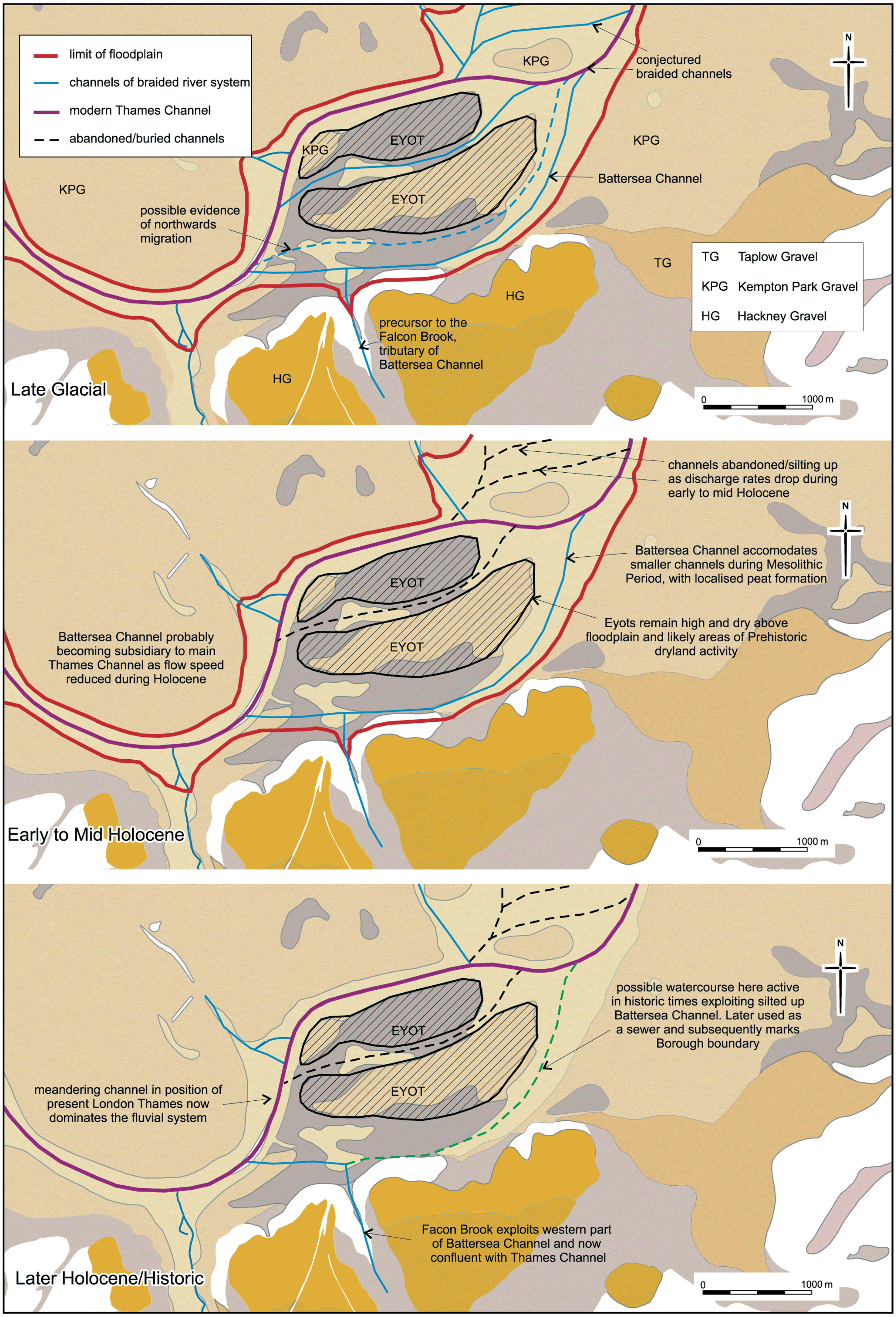

Fig. 5: proposed scheme for the evolution of the Thames and the Battersea Channel through the late glacial and Holocene periods

Discussion

Geoarchaeological work at the two sites has revealed an intriguing picture of an evolving landscape dominated by two geomorphological features, both of which are now largely buried beneath the modern urban landscape. The Battersea Eyot was an area of high ground elevated above the predominantly marshy lowland areas of the prehistoric landscape. During the early Holocene, Mesolithic hunter-fisher-gatherers would have used this area of high ground, as it would have allowed access out into the Thames floodplain. At this time a large channel, the Battersea Channel, flowed to the south and east of the eyot, and was an important part of the early Holocene Thames landscape. Though the river at this time was flowing through more than one channel (Fig. 5 centre), the flow velocity of the Thames was waning and the relative sea level was rising, initiating the head-ward migration of tidal influence. This caused many channels to silt up, becoming filled with fine-grained sediments being deposited in a lower-energy environment.

Though the sequence in the channel is heavily truncated by modern disturbance, so that it only takes us forward as far as the Mesolithic, sand-beds observed towards the high ground of the eyot in STX06 are likely to relate to deposition by the Battersea Channel, probably as it slowly migrated northwards. These sand units probably partly relate to the onset of large-scale landscape deforestation and management starting during the Neolithic, when the loss of the stabilising vegetation cover would have increased sediment input to the fluvial system. Much of this sand probably originated as sand units within earlier Pleistocene terrace deposits.

Sometime later in the Holocene, possibly as late as the Roman period, the Battersea Channel almost completely silted up as the Thames adopted the single-thread form which we see today (Fig. 5 bottom). However, a significant depression would still have marked the former course of this important channel, and this low-lying area probably accommodated a small channel or creek right through to recent times. The Falcon Brook, or certainly the well-known westward arm of this channel, later exploited the western part of the Battersea Channel as it flowed north and west to join the Thames. The sewer shown on Stanford's 1862 map is likely to have once been a watercourse flowing to the east, and its alignment fits well with the conjectured course of the Battersea Channel based on the tongue of alluvium mapped by the BGS. The borough boundary also respects this route, giving support to the notion of a channel flowing along this course, exploiting the now buried Battersea Channel. Acknowledging this kind of continuity in the landscape of ancient landscape features may help in archaeological investigation and interpretations of sites relative to their contemporary landscapes.

Conclusions

The study of the sediments preserved beneath two sites in the Battersea area of south-west London has proved the existence of the Battersea Channel, a now buried watercourse which was active from just after the last glacial maximum to at least the Mesolithic period. This channel initially flowed as part of the last glacial/early Holocene braided Thames, when sands and gravels were deposited in a network of braided channels. This channel gradually silted up throughout the Holocene, but may have existed as an important waterway throughout much of the prehistoric period. Examination of the sediments preserved within this channel have provided valuable insight into the nature of the prehistoric topography present in this part of London. Through a good understanding of the processes involved in its evolution in the landscape we are able to place more confidence in our modelling of the Thames floodplain with respect to the human populations who once exploited this ecologically rich prehistoric landscape.

However, this research has been as successful in raising questions as it has in answering them, and it is only with further geoarchaeological investigations in the Thames Valley area that a fuller understanding of the evolution of the floodplain, especially with regard to active channels related to the Thames in a previous form, can be afforded. This information will be crucial in our efforts to comprehend how our ancestors interacted with the dynamics of the evolving Quaternary landscape. The continuity in the landscape of these now mainly extinct landforms is an issue which should be considered in more detail, especially given the propensity of modern channels to exploit paths of least resistance, such as the depressions and hollows left by now buried watercourses.

Acknowledgements

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1. P.D. Nunn 'The development of the River Thames in central London during the Flandrian' *Trans Inst Brit Geog* **8** (1983) 187–213; J. Sidell, K. Wilkinson, R. Scaife and N. Cameron *The Holocene Evolution of the Thames: Archaeological Excavations (1991 – 1998) for the London Underground Limited Jubilee Line Extension Project* MoLAS Monograph 5 (2000).

2. J. Corcoran *Excavations at St Christopher House* (in prep.).

3. Nunn, *op cit* fn 1.

4. C. Menary *102–104 Stewarts Road, Battersea, London, SW8: An Archaeological evaluation report* (2007) MOLA unpub. report.

5. H. Knight *120–146 Stewarts Road, Battersea, SW8: Archaeological Impact Assessment* (2006) MoLAS unpub. report.

6. J. Sidell *et al*, *op cit* fn 1.

7. *Op cit* fn 3.

8. *Op cit* fn 2.

9. Noted by Nunn, *op cit* fn 1.

10. Nunn, *op cit* fn 1.

11. A.G. Brown *Alluvial Geoarchaeology: Floodplain Archaeology and Environmental Change* (1997) Chapter 7.

12. N. Barton *The Lost Rivers of London* (1992).

13. A. Chapman *Exploring the Falcon Brook* (2009). Available at hatmandu.net/writing/exploring-the-falcon-brook/ (accessed 14/11/2009).

14. *Op cit* fn 6.

15. N. Roberts *The Holocene: An Environmental History (*2nd edition, 1998*)*.

16. R. Scaife *Pollen analysis from Stewarts Road SWQ06* (2007) unpublished report.

17. Beta–232320.

18. J. Sidell *et al*, *op cit* fn 1.

19. *Ibid*.