Visualising archaeological potential: a deposit-modelling case study from Beam Park Riverside, Dagenham

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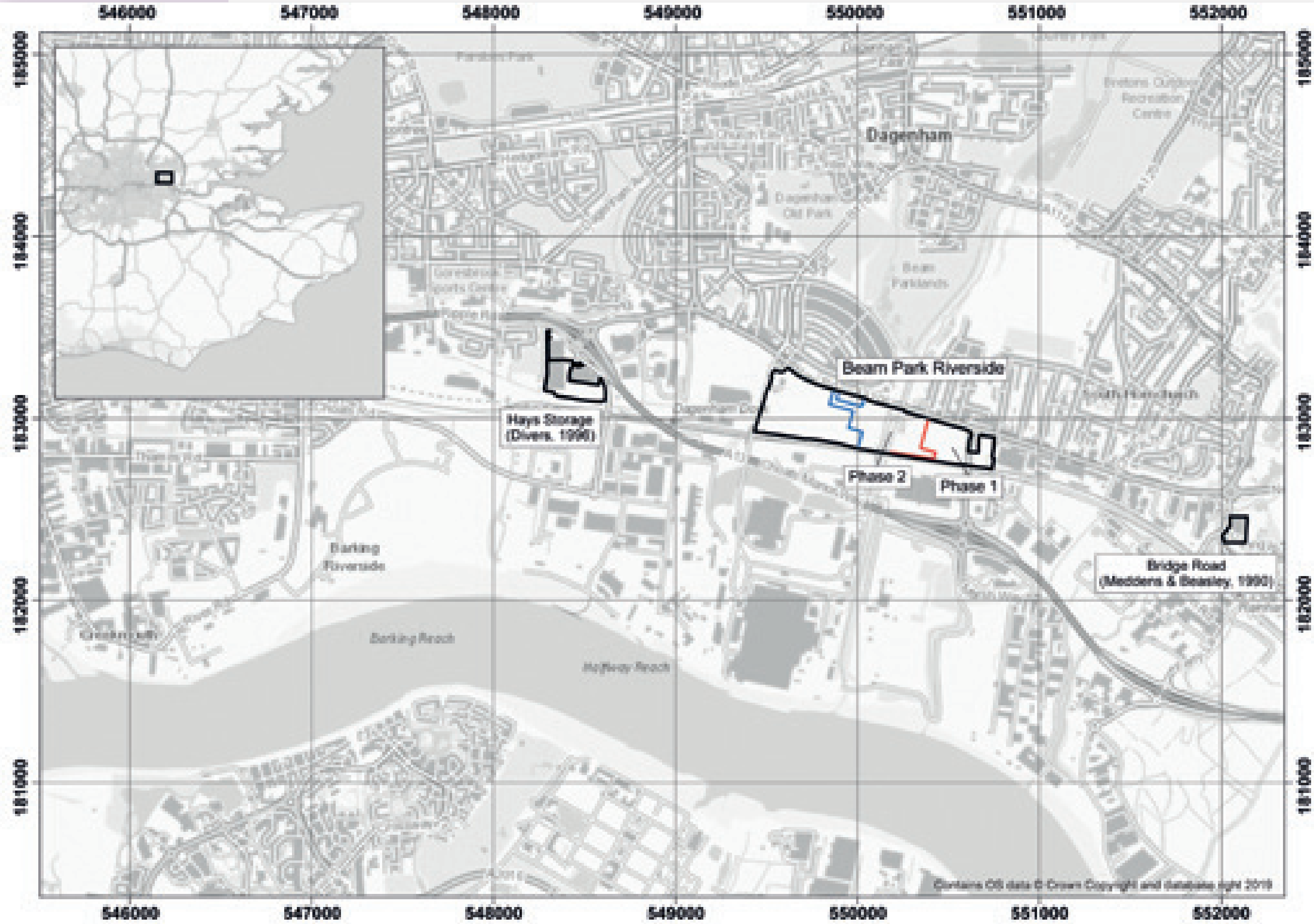

Figure 1: Location of Beam Park Riverside, showing the Phase 1 and 2 areas of investigation and sites of prehistoric archaeological finds at the floodplain edge

Geoarchaeological investigations at Beam Park Riverside, Dagenham (Figure 1), show how deposit modelling can be a useful tool for visualising and interpreting archaeological and palaeoenvironmental potential. Geoarchaeological deposit models are particularly useful where sediments have accumulated over a long period, and where archaeological deposits may be deeply buried. Such deposits are difficult to detect using geophysical survey and archaeological trial trenching. However, if sediment logs from engineering boreholes exist, or are commissioned, they can be used by a geoarchaeologist to determine the nature of the buried sediments, the type of environment in which they accumulated, their likely age, and their archaeological and palaeoenvironmental potential.

Used at the early stages of a development-led project, the models can cost-effectively guide the selection of appropriate archaeological evaluation and excavation strategies, and contribute to our understanding of the wider landscape context and any associated archaeological finds. The benefits of geoarchaeological deposit modelling are discussed further, with case studies and guidelines, by Historic England (2020).

Deposit models are valuable for identifying and visualising former land surfaces. Such land surfaces are significant, because they represent a type of environment, existing for a known period, which may provide evidence for human interaction with the environment in the form of archaeological finds and features. The potential of a buried land surface will usually be determined by the geoarchaeologist, working with an archaeological team with knowledge of previous archaeological finds in the wider area. A significant buried land surface for assessing archaeological potential in the Lower Thames Valley (and other lowland rivers) is the river terrace gravel, which underlies the historic floodplain and forms a 'staircase' of former gravel terraces on either side of the river. At Beam Park Riverside, Quaternary Scientific (QUEST), University of Reading was commissioned by RPS Group (on behalf of Countryside Properties) to undertake geoarchaeological deposit modelling in advance of development. The work formed part of a series of geoarchaeological and archaeological investigations, including an initial phase of desk-based geoarchaeological deposit modelling, archaeological evaluation (including geoarchaeological borehole survey) and excavation, each stage followed by an updated deposit model.

CASE STUDY: VISUALISING ARCHAEOLOGICAL POTENTIAL AT BEAM PARK RIVERSIDE

The Beam Park Riverside site covers an area of approximately 29 hectares, formerly occupied by the Ford car assembly factory. The existing geological maps, based on scattered archive borehole data, show that it lies at the interface between the historic River Thames floodplain and higher, drier ground to the north. The site has been levelled, so that the former floodplain and its relief is now buried below variable thicknesses of made ground. On the former floodplain, the British Geological Survey (BGS) shows that several metres of Holocene (the present interglacial period) floodplain deposits (alluvium) have accumulated, most likely of Mesolithic through to modern date. Underlying this alluvium are river terrace gravels, known as the Shepperton Gravel, deposited at the end of the last ice age around 10,000–15,000 years ago (during the Upper Palaeolithic) in a high energy, braided river environment. Rising above the level of the floodplain to the north the superficial geology is shown by the BGS as the Taplow Gravel, from a similar depositional environment to the Shepperton Gravel but much earlier (around 130,000–350,000 years ago). Combined, these gravel deposits form the template upon which other sediments have accumulated.

The existing geological maps therefore show that Beam Park Riverside sits at a location of high potential for prehistoric remains: the interface between the floodplain and higher, drier ground is an environment that would have been attractive to prehistoric human societies. Other prehistoric features have been identified in this type of environment nearby, including a possible Bronze Age trackway and causeway.

At Beam Park Riverside the surface of the river terrace gravel was modelled in two

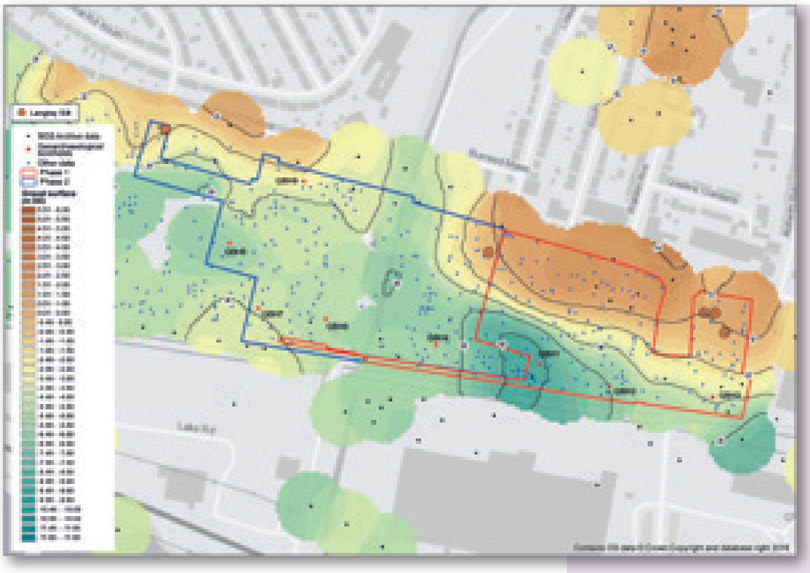

Figure 2: Surface of the river terrace gravel (m OD) in the area of Beam Park Riverside, showing the location of the geotechnical, geoarchaeological and archaeological data used in the deposit model

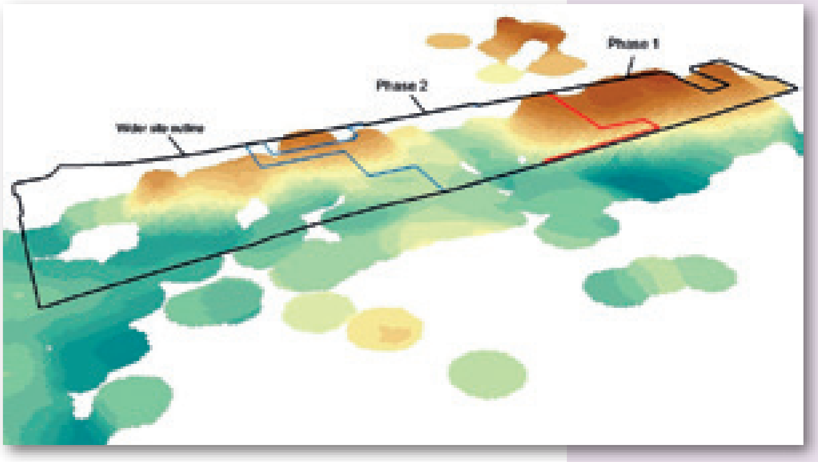

Figure 3: Surface of the river terrace gravel in the area of Beam Park Riverside (three-dimensional visualisation)

(Figure 2) and three dimensions (Figure 3), to visualise this former land surface, to define its archaeological potential, and to establish the depth and impact of the proposed development on these deposits. The most recent iteration of the model combines data from seven geoarchaeological boreholes, 500 engineering boreholes and more than 100 British Geological Survey (BGS) archive logs. The models were generated using RockWorks 17 geological utilities software, following the Historic England (2020) guidelines.

Important variations are apparent in the surface of the river terrace gravel at Beam Park Riverside. It can be considered the early Holocene land surface, and would have had a significant impact on the way Mesolithic, Neolithic and potentially Bronze Age human societies interacted with the floodplain environment. An interpretation of the prehistoric landscape zones represented by the model is

Figure 4: Visualisation of the prehistoric landscape zones (based on the modelled gravel surface), showing the location of archaeological mitigation Areas 1 to 3 excavated by PCA and the palaeoenvironmental boreholes investigation by QUEST

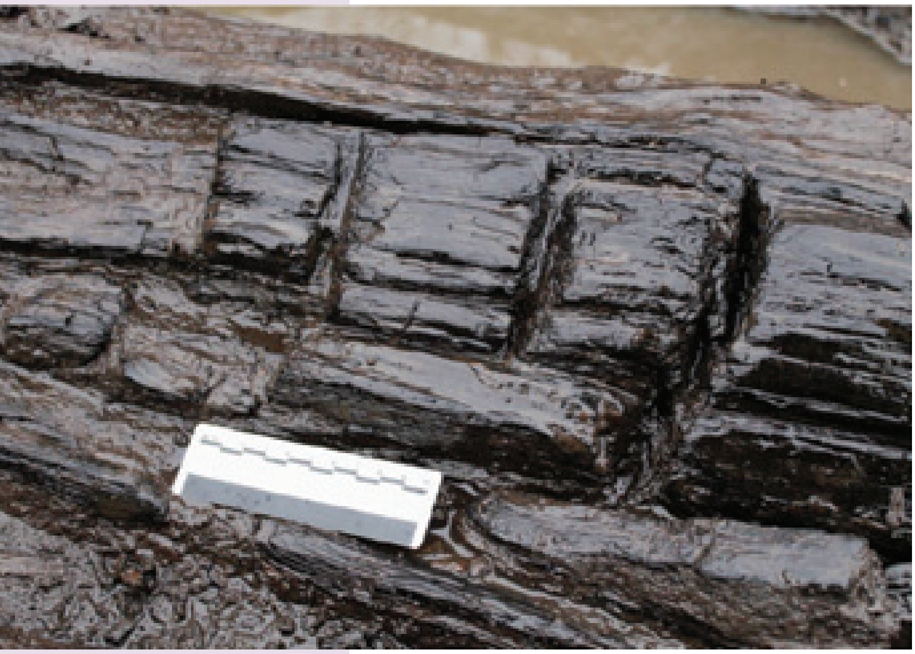

Figure 5: Notched yew timber (Photo: Pre-Construct Archaeology)

shown in Figure 4. The areas of higher gravel presented drier ground above the level of the floodplain during the prehistoric period, and are considered to have greater potential for preserving archaeological evidence associated with occupation or seasonal exploitation of the floodplain resource. The areas of lower gravel are likely to have been permanently or regularly flooded during much of the prehistoric period, and archaeological evidence (other than isolated finds) is less likely.

Some key elements of the prehistoric landscape can be identified in the deposit model; the valley of the River Beam, a now-culverted tributary of the Thames, can be made out towards the centre of the site, cutting through the Taplow Gravel terrace and joining the floodplain of the Thames within the modelled area. A possible former channel, since infilled with a thick sequence of alluvial sediments, flows broadly west to east across much of the site (see Figure 4).

Deposit modelling meant that archaeological investigation could be focused on areas of the site considered to be of greater archaeological interest. Archaeological trial trenching and subsequent excavations were undertaken in the north where the gravel was high, while geoarchaeological boreholes collected thick sequences of alluvium for palaeoenvironmental assessment from the south (see Figure 4). Archaeological investigations (Areas 1, 2 and 3 in Figure 4) found prehistoric pottery and worked flint in two linear features; a Bronze Age pit; a fragment of human tibia and the tibia of a large red deer, both of Bronze Age date; and a partially worked, late Neolithic, large yew timber with a series of narrow V-shaped grooves (Figure 5), likely to have been cut with a chisel driven by a mallet as a means of hollowing it out – to make a dugout boat, large trough, coffin or large drum – but abandoned in the early stages of working. Ongoing palaeoenvironmental investigations focused on the boreholes will shed further light on the sedimentary and vegetation history of this area of the Lower Thames Valley, integrating analysis of the biological remains and novel vegetation modelling techniques of the resultant pollen data.

CONCLUSIONS

The geoarchaeological deposit modelling technique used at Beam Park Riverside can be applied at any site where sediments have accumulated over a long period of time, and where archaeological remains may be deeply buried. Desk-based assessments can often be produced from existing engineering or geotechnical data at the early stages of development-led projects, to model the archaeological and palaeoenvironmental potential of a site, and the impact of a development on the buried deposits and their significance. This enables focused, cost-effective evaluation, involving minimally intrusive fieldwork (eg boreholes, test pits or geophysical survey). It is recommended that such models be constructed by a suitably qualified geoarchaeologist, following the guidelines provided by Historic England (2020).

Reference

Historic England (2020) *Deposit Modelling and Archaeology. Guidance for Mapping Buried Deposits*. Swindon. Historic England