River Thames Scheme

Protecting our communities
Securing our economy
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# Preliminary Environmental Information Report

# Volume 4
# Appendix 9.6

Bed Lowering Downstream of Desborough Cut: Geoarchaeological Borehole Survey, Watching Brief on Site Investigation and Grab Sampling of Geophysical Anomalies

# River Thames Scheme – Bed Lowering Downstream of Desborough Cut

Geoarchaeological Borehole Survey, Watching Brief on Site Investigation and Grab-Sampling of Geophysical Anomalies

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## Summary

Wessex Archaeology was commissioned to undertake purposive geoarchaeological boreholes, grab-sampling of geophysical anomalies and monitoring during SI works prior to bed lowering activities as part of the River Thames Scheme, in a section of the River Thames just east of Desborough Island, Surrey. The work was undertaken to provide further information on the archaeological and geoarchaeological resource that may be impacted by the proposed bed lowering, anticipated to reach a maximum of 0.75m below river bed level, and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological and geoarchaeological investigations.

A sequence of deposits comprising bedrock London Clay, fluvial sand and gravel (the Shepperton Gravel), Holocene floodplain alluvium and modern riverbed sediments was recorded in six vibrocores undertaken during the purposive borehole survey, and in samples arising from recording of 30 cable percussion boreholes undertaken during the SI works.

The Shepperton Gravel, comprising sand and gravel deposited within a high energy braided channel during the Late Devensian (c. 17-11.7 Ka), was widespread across the Study Area, present in thicknesses of up to 2.7m at elevations between c. 6.5 and 8.8m OD. No fine-grained or organic-rich units were identified within the Shepperton Gravel in any of the boreholes across the Study Area, and it is considered to be of low geoarchaeological potential. Holocene alluvium was rare, recorded in only two sequences (BH10 and BH25), and no organic-rich or peat deposits were recorded within the alluvium. The sequence was capped by modern riverbed sediments comprising reworked gravel or fine-grained alluvium with modern inclusions.

No finds of archaeological relevance were recovered or identified during the grab sampling of geophysical anomalies; however there remains the possibility that previously identified material has been moved by water flow either deeper into the channel, or away from its recorded position, or that the geophysics targets are deeper in the riverbed than the grab could reach and may therefore still be *in-situ*.

On the basis of the anticipated depth of the bed lowering (0.75m below riverbed level), the proposed development is likely to impact on deposits of both Holocene alluvium and Late Devensian Shepperton Gravel. However, no organic-rich or peat deposits were recorded within the alluvium, and similarly, no fine-grained or organic-rich units were identified within the Shepperton Gravel. On this basis, the geoarchaeological potential of these deposits is considered to be low, and no further geoarchaeological investigations are recommended.

In line with methodology set out within the WSI (Wessex Archaeology 2022), it is recommended that the Protocol for Archaeological Discoveries is fully implemented via a watching brief during the bed lowering phase of the project, in order to mitigate against chance finds.

## Acknowledgements

Wessex Archaeology thanks Kristina Krawiec at York Archaeology, acting on behalf of Binnies and the Environment Agency (EA), for commissioning the work detailed in this report. The fieldwork was managed on site by Dr Daniel Young, Richard Payne, Hayley Hawkins and Alistair Byford-Bates. Deposit modelling was undertaken by Dr Daniel Young. The report was compiled by Dr Daniel Young and Alistair Byford-Bates and reviewed by Dr Alex Brown. Figures were produced by Amy Wright. The project was managed on behalf of Wessex Archaeology by Dr Daniel Young.

# River Thames Scheme – Bed Lowering Downstream of Desborough Cut

## Geoarchaeological Borehole Survey, Watching Brief and Grab-Sampling of Geophysical Anomalies

## 1 INTRODUCTION

### 1.1 Project and planning background

1.1.1 Wessex Archaeology has been commissioned by York Archaeology (YA), a division of York Archaeological Trust, on behalf of Binnies and the Environment Agency (EA), to undertake purposive geoarchaeological boreholes, grab-sampling and monitoring during Site Investigation (SI) works prior to bed lowering activities as part of the River Thames Scheme, in a section of the River Thames just east of Desborough Island, Surrey (hereafter the 'Study Area').

1.1.2 The Study Area covers an approximately 1 km stretch of the River Thames within the county of Surrey, centred on National Grid Reference (NGR) TQ 09199 66344 (**Figure 1**). This section of the River Thames is known as Sunbury Reach and is located between Desborough Island and the eastern side of Walton Bridge.

1.1.3 The work reported on here follows on from a Historic Environment Desk-Based Assessment (DBA) compiled by YA (2020b) and a report on the geophysical survey of the Study Area (Wessex Archaeology 2021). The DBA was subsequently updated with the results of the geophysical survey where recommendations were made for purposive works, after which a Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology (2022) for purposive geoarchaeological boreholes, geoarchaeological monitoring during Site Investigation (SI) works and grab-sampling of geophysical anomalies identified during the geophysical survey.

1.1.4 The work will provide further information on the archaeological and geoarchaeological resource that may be impacted by the proposed bed lowering, and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological and geoarchaeological work that may be required; or the formation of a mitigation or management strategy to offset the impact of the development on the archaeological resource.

### 1.2 Planning conditions

1.2.1 In line with national planning policy, a Desk-Based Assessment (DBA) was undertaken to identify heritage assets and provide an initial baseline assessment of the archaeological potential of the Study Area (YA 2020b). In addition, a dredging review was also carried out to determine the nature of previous river management practices and their effects on the sediments and deposits within the channel (YA 2020a). This in conjunction with the DBA, and in consultation with Environment Agency NEAS Archaeologist Catherine Charman, Surrey County Council Archaeological Officer Nigel Randall and Historic England Science Advisor Jane Corcoran, determined the requirement for a geophysical survey of the dredge area and subsequent purposive geoarchaeological boreholes, grab-sampling and monitoring during geotechnical SI works.

1.2.2 The proposed Scheme consists of a program of bed lowering within the Study Area to lower the riverbed and improve flood capacity in the river as part of the River Thames Scheme: Capacity Improvements and Flood Channel Project. Bed lowering is anticipated to reach down to a maximum of 0.75 m into the current riverbed sediment.

1.2.3 Bed lowering operations will likely be undertaken utilising a long reach backhoe excavator working from a pontoon. The excavator will be guided by Global Positioning System (GPS) to excavate to the correct depth and will move the spoil onto 150 tonne barges. Barges will be tugged to Sunbury Depot where spoil will be re-handled by a second excavator to eight wheeled wagons for disposal to landfill.

1.2.4 Backhoe excavator bed lowering with an open bucket would remove quantities of sediment and any associated buried archaeological material using an excavator arm on the stern of a specially adapted pontoon and transfer the sediment to a lighter or barge nearby. In open bucket excavation this would allow investigation of the sediment of each bucket by an archaeologist and offers a level of control that is not available in dispersal bed lowering.

## 1.3 Scope of document

1.3.1 In format and content, the work follows the methodology set out within the approved WSI (Wessex Archaeology 2022), and conforms to current best practice, including the guidance in *Management of Research Projects in the Historic Environment* (MoRPHE, Historic England 2015a), the Chartered Institute for Archaeologists' (CIfA) *Standard and guidance for archaeological field evaluation* (CIfA 2014a), Historic England's technical guide to Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015b) and Deposit Modelling and Archaeology (Historic England 2020).

## 1.4 Site location, topography and geology

1.4.1 A full description of the site location and topography was provided in a Historic Environment Desk-Based Assessment (DBA) compiled by YA (2020b), a summary of which was presented in the WSI (Wessex Archaeology 2022).

1.4.2 The Study Area includes the banks and river channel in a section of the River Thames known as Sunbury Reach, located c. 70 m east of Desborough Island, at the point where the Desborough Cut is confluent with the River Thames. Walton Bridge carries the A244 roadway over the River Thames and is situated approximately midway along the Study Area.

1.4.3 Cowey Sale park occupies the southern bank of the River Thames along the majority of the length of the site and at the eastern end Walton Marina lies to the south of the river. Just to the south of Walton Bridge, the northern bank of the River Thames is occupied by a small boat engineer's yard and slipway. The northern riverbank along the remaining length of the site is occupied by private residences and gardens, many of which have associated moorings.

1.4.4 The underlying bedrock geology is mapped by the British Geological Survey (BGS) as the Claygate Member, composed of sand, silt and clay and formed in the Palaeogene Period (approximately 48-56 million years ago) in an environment influenced by shallow seas. The shallow-marine origin of these rocks forms interbedded sequences with grain size which varies from coarse to fine (British Geological Survey 2020).

1.4.5 The superficial deposits overlying the bedrock at the site are mapped by the BGS as Alluvium, described here as 'Clay, Silt, Sand and Gravel'. In fact, the bedrock here is

overlain by an intervening Gravel unit likely to represent the Late Devensian (Marine Isotope Stage (MIS) 2; 17–12 Ka) Shepperton Gravel of Gibbard (1985); this is in turn sealed by Alluvium of clay, silt, sand and gravel deposited on the Holocene (MIS 1; 11.7 Ka to present) floodplain of the River Thames. These sediments are detrital and vary from coarse to fine-grained; they form both a blanket alluvial layer overlying river terrace deposits and infill former courses of the river (British Geological Survey 2020).

# 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

## 2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a prior dredging review and desk-based assessment (YA 2020a; 2020b), which considered the recorded historic environment resource within a 500 m radius of the Study Area and a 5 km length due east and west of the extents of the bed lowering area. A summary of the results is presented below, with relevant entry numbers from the Surrey's Historic Environment Record (HER) included. Additional sources of information are referenced, as appropriate. Table 3 shows the chronology used.

**Table 1** Chronology used in the report

| Prehistoric | | Historic | |
|---|---|---|---|
| Palaeolithic & Mesolithic | 650,000 – 4,000 BC | Iron Age | 700 BC – AD 43 |
| Neolithic | 4000 – 2400 BC | Romano – British | AD 43 - 409 |
| Bronze Age | 2400 – 700 BC | Medieval | AD 410 – 1539 |
| | | Post-medieval and modern | AD 1540 – present day |

*Prehistoric up to Iron Age (650,000 BC – AD 43)*

2.1.2 The Study Area sits on bedrock geology composed of sand, silt and clay that was formed in the Palaeogene Period (c. 48-56 million years ago) in an environment influenced by shallow seas. The superficial deposits overlying the bedrock comprise the Shepperton and Taplow Gravels which is in turn sealed by alluvium of clay, silt, sand and gravel laid down during the Holocene.

2.1.3 Deposits recorded at Desborough Island, located due west of the Study Area, demonstrate in-channel accumulation from the Bronze Age (Suerc-79217, 3769+/-30 Before Present (BP), 2290 to 2051 cal BC) to the Roman period (Suerc-76755, 1852+/-32 BP, 82 to 237 cal AD). Furthermore, trial trench evaluations at Desborough Island identified the remains of a possible late prehistoric barrow, as well as pits, post holes and gullies all prehistoric in date. The assessed deposits demonstrated good preservation of microfossil (pollen, ostracods) and macrofossil (plants, insects and molluscs) remains from deposits dating back as far as the early Mesolithic.

2.1.4 The Surrey HER includes six poorly located heritage assets found within the Study Area; these findspots were extracted from the River Thames:

- Four (**45**) findspots including a Mesolithic Thames pick and a Neolithic greenstone axe; and
- Two (**52** and **54**) Bronze Age swords.

2.1.5 Evidence of settlement in the form of *in situ* archaeological features, and evidence of ritual deposition within the River Thames in the form of single artefacts suggests that humans were occupying the area surrounding the site from at least the Neolithic period and possibly earlier.

*Romano - British (AD 43 – AD 409)*

2.1.6 There are a small number of finds of Romano - British date from the area surrounding the Study Area. One non-designated heritage asset is the record of Coway Stakes (**122**), consisting of a set of wooden stakes driven into the riverbed located towards the westernmost end of the Study Area. A possible Roman or medieval fish weir was discovered in an old-gravel pit (**70**) approximately 1.2 km west of the Study Area, dating to late Roman or early medieval period. Possibly associated with this weir are roof tiles and a 4th century flagon (**69**).

2.1.7 The main archaeological evidence for a Romano-British presence is the assemblage of residual pottery sherds recovered during a watching brief in 2011.

*Early medieval and medieval (AD 410 – 1539)*

2.1.8 The archaeological evidence recorded within and surrounding the Study Area suggests that the area was settled during the early medieval and medieval period. Find spots and *in situ* archaeological features suggest that a settlement existed at Walton-on-Thames, with evidence relating to either agricultural use and/or the use of the River Thames as a trade route.

2.1.9 Anglo-Saxon archaeological remains have been discovered within the Study Area in the form of single findspots retrieved from the River Thames. These included an Anglo-Saxon sword, scramasax and spur (**74**). A dug-out canoe (**79**) formed from the trunk of an oak tree was found during dredging works upstream of the Study Area, which has been dated to 405 – 530 AD. Two further assets related to Anglo-Saxon cemeteries have also been recorded close to the site.

2.1.10 Surrey HER records list seven medieval heritage assets within the surroundings of the Study Area consisting of a Grade I Listed Old Manor House (**1**) and six non-designated assets.

*Post-medieval and modern (AD 1540 – present)*

2.1.11 Archaeological, historical and cartographic evidence suggests that a number of developments have taken place within the Study Area since the post-medieval period. These include six versions of Walton Bridge, the likely management of the River Thames by both the Corporation of London and the City of London authority since at least the late 19th century, and more modern developments such as the Thames Improvement Scheme 1930-35.

2.1.12 Sixteen Grade II Listed Buildings and ten non-designated heritage assets dating to the post-medieval period are located within proximity to the Study Area. The oldest consist of two 17th century cottages (**2** and **3**) at Walton-on-Thames. The latter include houses, ancillary buildings, bridges, a mill, a ferry, the Wey Navigation and associated archaeological features (**86**-**95**) (Surrey HER 2020). Only two of these assets are deemed to be relevant to the current study, consisting of Walton Bridge (**95**) and Coway Bridge (**92**). The former stands at the mid-point of the Study Area and was first constructed in 1750. The bridge became structurally unsafe and was reconstructed in 1788 entirely of stone and brick. Unfortunately, this partially collapsed in 1859 and was constructed again in the 1860s.

2.1.13 A fluvial morphology study was then completed by Halcrow Group Limited in 2005. This study compared the data-sets from a 1980 echo-sounding cross section (iSIS), a 1992 echo-sounding cross section (eeby), and swathe bathymetry survey carried out in November 2002. This data concluded that in the time period between 1980 and 2002 river bed levels within the Sunbury reach had risen between 0.26-0.55m (Halcrow Group Limited 2005, 35). According to the above studies, dredging carried out from 1947 to 1997 had a neutral impact upon the river bed levels within the Study Area. Since the cessation of dredging in 1997 and the last bathymetric survey carried out in 2014 the river bed level within the Study Area has increased overall, though it is unclear by exactly how much. This uncertainty regarding sediment accumulation within the river channel in recent years, combined with the lack of knowledge about the depths of any historical dredging carried out within the Study Area (pre-1947), suggests that there is a possibility that the maximum proposed bed lowering depth (0.75m into the river bed) may impact sediment within the river bed which could potentially be undisturbed.

## 2.2 Previous investigations related to the development

*Desk-based assessment (YA 2020b)*

2.2.1 The desk-based assessment produced by YA included a walkover survey, conducted in January 2020, covering the entirety of the southern bank of the River Thames and parts of the northern bank where access allowed. Observations and illustrative photographs from the survey are included in the DBA report (YA 2020b).

2.2.2 Evaluation works were conducted by YA as part of the Scheme, including a Stage 1 Evaluation (YA 2018) and a Stage 2 Trial Trench Evaluation at Desborough Island (YA 2019a). A review of records from the EA was undertaken to determine the impact of previous dredging events (YA 2020a). Lidar imagery and data held by the British Geological Survey were also consulted to assess the potential for palaeochannels and features on the banks.

*Geophysical survey (Wessex Archaeology 2021)*

2.2.3 A geophysical survey was undertaken within the Study Area in order to identify any riverbed or sub-bottom anomalies and assess their likely archaeological significance, as well as to identify any sediment horizons on the sub-bottom profiler data, specifically the sediments of the historic dredge surface.

2.2.4 The geophysical survey was undertaken by Briggs Marine Ltd onboard the vessel *Three Rivers* on the 25 February 2021, with a representative from Wessex Archaeology on the riverbank observing. The survey comprised sidescan sonar and sub-bottom profiler (SBP) data. Originally the data were planned to be acquired by Wessex Archaeology; however, owing to the ongoing COVID-19 pandemic, the decision was made to subcontract Briggs Marine Ltd in order to minimise mixing between different groups of people onboard the vessel.

Palaeogeographic features

2.2.5 No features of palaeographic or palaeoenvironmental interest were identified within the Study Area. Three possible stratigraphic units were tentatively identified within the Study Area (**Table 1**); however, the historic dredge surface was not definitely identified in the SBP data.

**Table 2** Possible stratigraphic units identified within the Study Area

| Unit | Unit Name | Geophysical Characteristics [1] | Sediment Type [2] | Archaeological Potential |
|---|---|---|---|---|
| 3 | Holocene sediments | Generally observed as a thin unit, either acoustically chaotic with occasional parallel reflectors or as an acoustically quiet unit. | Alluvium deposits of. silt, silty clay and sand. | Potential dependant on age of deposits. Deposits which have been unaffected by previous phases of dredging have the potential to contain *in situ* and reworked artefacts as well as palaeoenvironmental material. Sediments deposited since the previous dredging are considered of low potential in itself, but possibly contains re-worked artefacts and can cover other cultural heritage. |
| 2 | Shepperton and ?Taplow Gravels | An acoustically unstructured unit with occasional faint, sub-horizontal reflectors and small parabolas. | River terrace sands and gravels | Possibility of *in situ* and reworked artefacts within the sediment and may contain organic deposits of palaeoenvironmental interest |
| 1 | London Clay Formation | Acoustically unstructured unit with occasional distinct sub-horizontal reflectors | Shallow-marine sands, silts and clays. | Pre-Earliest occupation of the UK, although upper layers could have been a land surface. |

[1] Based on geophysical data

[2] Based on YA 2020 and British Geological Survey Geology of Britain Viewer

2.2.6 A shallow, intermittent unit with a poorly defined basal reflector was identified throughout the Study Area (Unit 3). It was considered possible that this may represent the more recent sediments that have been deposited since the previous phases of dredging. However, this cannot be confirmed with any certainty without further investigation. As such, it was not possible to confirm whether any bed lowering activities will impact previously undisturbed sediments.

2.2.7 It was therefore recommended that during the groundwork investigations, purposive geoarchaeological boreholes are acquired from the different units identified within the Study Area in order to help determine the geoarchaeological and archaeological potential of the sediments.

2.2.8 Following consultation with Historic England a total of six geoarchaeological boreholes were recommended, including an additional borehole (BH 6; **Table 5**) located between Thames Meadow and Cowley Sale in order to characterise the deposits in this stretch of the River.

Riverbed features

2.2.9 The assessment of the geophysical data within the study area resulted in a total of 61 anomalies identified as being of possible archaeological interest (**Appendix 1; Figure 2**), all of which were assigned an A2 archaeological rating. A2 anomalies (receptors) are items of uncertain origin of possible archaeological interest identified during the geophysical survey process as part of the pre-bed lowering investigation work.

2.2.10 It is known that parts of the Study Area have been dredged previously, most recently between 1947 and 1997. Therefore, the anomalies identified within the Study Area are likely to be modern debris and, as such, no archaeological exclusion zones are recommended around any of the identified anomalies.

# 3 GEOARCHAEOLOGICAL BACKGROUND

## 3.1 Introduction

3.1.1 The superficial deposits in the Study Area may include deposits with geoarchaeological and/or archaeological potential of both Pleistocene and Holocene date. These epochs form parts of the Quaternary, a period covering the last 2.6 Mya, and defined by repeated fluctuations between cold (glacial) and warm (interglacial) climate stages (**Table 3**).

3.1.2 Where age estimates are available for deposits these are expressed in millions of years (Mya), thousands of years (Kya) and within the Holocene epoch as either years Before Present (BP), Before Christ (BC) and Anno Domini (AD). Where radiocarbon dates are included, they are quoted as calibrated (cal.) BC or AD. These dates are supplemented where relevant with the comparable Marine Isotope Stage (MIS) where odd numbers indicate an interglacial period and even numbers a glacial period.

**Table 3** British Quaternary chronostratigraphy

| Geological Period | Chronostratigraphy | | Age (Ka) | MIS |
|---|---|---|---|---|
| Holocene | Holocene interglacial | | 11.7 – present | 1 |
| Late Pleistocene | Devensian Glaciation | Loch Lomond Stadial | 11.7 – 12.9 | 2 – 5d |
| | | Windermere Interstadial | 12.9 – 15 | |
| | | Dimlington Stadial | 15 – 26 | |
| | | Upton Warren Interstadial | 40 – 43 | |
| | | Early Devensian | 60 – 110 | |
| | Ipswichian interglacial | | 115 – 130 | 5e |
| Middle Pleistocene | | Unnamed cold stage | 130-374 | 6 |
| | | Avery interglacial | | 7 |
| | | Unnamed cold stage | | 8 |
| | | Purfleet interglacial | | 9 |
| | | Unnamed cold stage | | 10 |
| | Hoxnian interglacial | | 374 – 424 | 11 |
| | Anglian glaciation | | 424 – 478 | 12 |
| | Cromerian Complex | | 478 - 780 | 13 – 19 |

## 3.2 Geoarchaeological assessment

3.2.1 A geoarchaeological assessment of the site was undertaken as part of the Historic Environment DBA compiled by YA (2020b). A summarised excerpt of this assessment if presented here.

*North of the Bed Lowering Area*

3.2.2 To the north of the western extent of the bed lowering area is the outer bend of a meander loop referred to as Thames Meadow, the eastern extent of which is demarcated by the Walton Bridge. This area of low-lying floodplain, at a level of c. 9m OD, contains evidence of the recent phase of southward migration of the meander in the form of scroll bars as identified from lidar-derived imagery (see YA 2020b).

3.2.3 Other landforms observed in the lidar-derived imagery include minor palaeochannels at the northern extent of the Thames Meadow Area. The eastern portion of the northern bank, west of the Walton Bridge, represents a typical floodplain with modern development following the bank of the River Thames. At the eastern extent of the bed lowering area an artificial channel has been cut providing access to Shepperton Marina which was previously the site of sand and gravel extraction operations from the 1930s through to the 1950s (as indicated by cartographic sources).

3.2.4 To the east of this lies the historic county boundary between Surrey and Middlesex (the modern boundary between Elmbridge and Spelthorne respectively) which is likely to be indicative of a previous course of the River Thames. Cartographic sources as well as lidar-derived imagery suggest the presence of a palaeochannel or relict channel relating to a former watercourse, fragments of which remain extant as the alignment of the historic county boundary that extends to the north and west beyond the scope of the bed lowering area (YA 2020b).

*South of the Bed Lowering Area*

3.2.5 South of the western extent of the bed lowering area is the former course of the Engine River. This was diverted into the Desborough Channel between 1930-1935. The watercourse was used from the mid-18$^{th}$ century to supply water to the house at Oatlands which required an engine to pump water from the River Thames (Symes, 1981). It is unclear if a watercourse existed prior to this and was modified to suit its new purpose or if the watercourse is wholly artificial. Lidar-derived imagery suggests that the Engine River may have been a palaeochannel representing a former course or tributary of the River Thames. It is equally likely to have been a previous course of the River Wey (YA 2020b).

3.2.6 The construction of the Desborough Channel removed part of the Engine River, which ran immediately to the south of the River Thames mainstream close to the site of the Cowey Stakes. This is also the location at which the historic county boundary diverges from the River Thames and aligns itself with the remainder of the Engine River course as it progresses eastwards across the Cowey Sale floodplain. Another watercourse converges with the Engine River to the south of this location, emanating from a large body of water known as Broad Wate, which appears to be an artificial lake associated with the 18$^{th}$ century park at Oatlands (Symes, 1981). It is highly likely that this lake represents another former course of the River Thames and was mapped as a palaeochannel using imagery derived from lidar data by YA (2020b).

3.2.7 The Engine River continues towards Walton Bridge, passing beneath it with the outfall being located in the Walton Marina. Cartographic sources indicate that the marina was formally referenced and mapped as a backwater of the River Thames. Several other channels are

associated with the Engine River around the Cowey Sale and have been identified as likely palaeochannels from lidar-derived imagery (YA 2020b). At the eastern extent of the site, beyond the historic county boundary, the course of the River Thames flows immediately up against the terrace edge of the Shepperton Gravel Formation.

*BGS archive boreholes*

3.2.8 As highlighted by YA (2020b), seven BGS boreholes are located to the north of the River Thames in this area; these are mainly associated with a historical sand and gravel quarry and later developments relating to Shepperton Marina. None of the borehole locations correlate to the mapped palaeochannels identified from Lidar imagery (YA 2020b).

3.2.9 The majority of these logs are unusable due to an absence of sufficient spatial data, including a single log on Desborough Island, south of the River Thames. In addition, ground investigation works relating to the wider RTS project did not extend beyond Desborough Island / the Desborough Channel as this area was beyond the extent of the original scope of the scheme (see YA 2020b).

3.2.10 The only mapped BGS borehole (TQ06NE478) located in close proximity to a possible palaeochannel relating to the River Thames recorded the following sequence: 'Brown Sand & Ballast' from 3.05m bgl overlain by 'Brown Sand' from between 3.05-1.52m bgl, overlain by 'Brown Sandy Clay' from 1.52-0.91m bgl sealed by topsoil between 0.91-0.00m bgl.

*Previous geoarchaeological investigations*

3.2.11 Transects of mapped boreholes have previously been undertaken during the previous phases of study for the wider RTS project (YA 2015; 2016; 2018a and 2018b). The initial geoarchaeological assessment was carried out across the scheme using historical BGS logs and Environment Agency data. The nearest available transect resulting from this work to the bed lowering area is Transect 2, located broadly north-south across Desborough Island (Howard and Stein 2015).

3.2.12 As such, there are no historical borehole or other SI logs within or close to the bed lowering area which may elucidate any nearby underlying sedimentary sequences and therefore no cross-sections or transects can be produced which would provide any information of value (YA 2020b). However, the RTS Stage 1 (geophysics and geoarchaeological survey) and Stage 2 (trial trenching) works were able to create refined transects through deposits at key sites across the scheme, including Desborough Island (YA 2019a).

3.2.13 The deposit modelling and radiocarbon dating of palaeochannel deposits within these key sites have shown the range of deposits likely to be encountered at the site span the Early to Late Holocene. The deposits recorded at Desborough Island, located just to the west of the bed lowering area, demonstrated in-channel accumulation from the Bronze Age (SUERC-79217, 3769±30BP, 2290 to 2051 cal BC) to the Roman period (SUERC-76755, 1852±32BP, 82 to 237 cal AD) (YA 2019a).

3.2.14 Elsewhere across the scheme similar deposits have shown a high potential to preserve palaeoenvironmental remains, such as those recorded at Chertsey (YA 2019b). The deposits assessed here demonstrated good preservation of micro (pollen, ostracods) and macrofossil (plants, insects and molluscs) remains from deposits dating back as far as the early Mesolithic.

### 3.3 Summary of Geoarchaeological potential

3.3.1 The Shepperton Gravel comprises high energy, cold stage gravels with generally low Palaeolithic archaeological potential. However, the surface of the gravels and deposits immediately overlying them can be key contexts for Final Upper Palaeolithic (12–11 Ka) and Mesolithic (11-8 Ka) archaeology.

3.3.2 Any surviving Holocene alluvial deposits overlying the gravel may include both minerogenic and organic sediments. Minerogenic deposits generally have both low archaeological and paleoenvironmental potential; if organic units (including peats) are present in the alluvial sequence, these would have high palaeoenvironmental, and depending on their extent, archaeological potential.

3.3.3 As highlighted above, previous nearby investigations at Desborough Island (YA 2019a) and Chertsey (YA 2019b) have shown that deposits of prehistoric date may be preserved within the alluvial sequence, and that these may contain palaeoenvironmental remains of geoarchaeological significance.

3.3.4 However, it is likely that both the deposits of the Shepperton Gravel and Prehistoric Alluvium are likely to have been heavily impacted within the area of the site by fluvial erosion associated with the modern course of the Thames, historic dredging, and intrusive groundworks along the riverbanks. These are likely to have adversely impacted upon any in situ palaeoenvironmental or archaeological remains within the site, including any remains within the riverbed sediments. However, it is not known whether these activities will have entirely removed all archaeological remains within the riverbed below the proposed bed lowering depth (0.75m).

## 4 AIMS AND OBJECTIVES

4.1.1 A series of aims and objectives were outlined within the approved WSI (Wessex Archaeology 2022) and are presented below.

### 4.2 Aims

*Purposive geoarchaeological boreholes*

4.2.1 A total of six purposive geoarchaeological boreholes (AV01-AV06) will be put down within the Study Area (**Table 5**; **Figure 7**) in order to target and investigate the three possible Stratigraphic Units identified during the geophysical survey.

4.2.2 The methodology for the proposed boreholes is anticipated to be via vibrocore, the samples from which are likely to provide samples more suitable for sediment description and any further palaeoenvironmental assessment. These boreholes will be put down to depths of 3 m below river bed level.

4.2.3 The aims of the geoarchaeological investigation require a continuous sequence of samples to be retained through the deposits of interest, for sediment description on shore and for further palaeoenvironmental assessment where appropriate.

4.2.4 The aim of these boreholes is to:

- Clarify the deposit sequence surviving beneath the riverbed that is likely to be impacted on by the proposed bed lowering;
- Obtain representative samples through these deposits;

- Clarify the palaeoenvironmental potential of the deposits;
- Clarify the archaeological potential of the deposits, and;
- Make suitable and proportionate recommendations for further work where appropriate.

*Watching brief on SI works*

4.2.5 The Site Investigation (SI) works associated with the bed lowering area comprise a total of 36 locations for both cable percussion (BH) and vibrocoring (VBH), arranged in 12 transects of three, with an additional 26 locations for vibrocoring associated with the sediment works (DB). Each of these boreholes will be put down to a depth of 5m below river bed.

4.2.6 The vibrocores associated with the sediment works are being retained for contaminated sediment purposes and are therefore unlikely to provide material suitable for sediment description by a geoarchaeologist. The same is true of the cable percussion boreholes, which are unlikely to provide a continuous sequence of samples for sediment description.

4.2.7 It is therefore proposed that a suitable distribution of the vibrocores associated with the bed lowering works are observed for geoarchaeological purposes; these will comprise a total of 24 of the proposed 36 vibrocores, including two from each of the twelve transects.

4.2.8 The SI works may provide the opportunity to recover intact sleeved samples for sediment description and palaeoenvironmental assessment. Similar to the purposive geoarchaeological boreholes, the aims of the watching brief are to:

- Clarify the suitability of the coring methodology for sediment description and sample retention;
- Where possible, clarify the deposit sequence surviving beneath the riverbed that is likely to be impacted on by the proposed bed lowering;
- Where possible, obtain representative samples through these deposits;
- Clarify the palaeoenvironmental potential of the deposits;
- Clarify the archaeological potential of the deposits, and;
- Make suitable and proportionate recommendations for further work where appropriate, including any requirement for contingent excavation or preservation of possible deposits.

*Grab-sampling*

4.2.9 A programme of systematic sampling of the sediments within the dredge areas will be undertaken in order to examine a selection of the anomalies identified during the geophysical survey.

4.2.10 The strategy for this systematic sampling was determined following a thorough review of the results of the geophysical survey (Wessex Archaeology 2021), and examination of the 61 anomalies identified as being of possible archaeological interest (**Appendix 1**), all of which were assigned an A2 archaeological rating.

4.2.11 Because of the initial number of targets a strategic approach to the ground truthing was taken with a sub-section of light and dark reflectors identified, in addition to a riverbed disturbance, and a suspected rope and chain. Fourteen A2 geophysical anomalies have therefore been identified as of potential archaeological interest warranting further investigation by this ground-truthing (**Figure 2**; **Appendix 2**).

4.2.12 The aims of the grab sampling are:

- To sample a total of 14 of the 61 geophysical anomalies;
- To clarify the presence of any archaeological finds or features at the location of these anomalies;
- To clarify the stratigraphic context of these anomalies;
- To allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works;
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the grab-sampling itself are not sufficient to support treatment to a satisfactory and proper standard; and
- To guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

## 4.3 Objectives

4.3.1 In order to achieve the above aims, the objectives of the geoarchaeological investigations are as follows:

- To put down a total of six purposive geoarchaeological boreholes at predetermined locations at the site, retaining a continuous sequence of sleeved samples through the deposits for sediment description;
- To monitor an appropriate selection of the SI boreholes, comprising a total of 24 of the vibrocores associated with the SI works;
- To undertake sedimentary descriptions of the purposive geoarchaeological boreholes and the monitored SI boreholes (where possible), retaining samples for palaeoenvironmental assessment/scientific dating (where appropriate);
- To establish the potential of the deposits to preserve palaeoenvironmental remains;
- To establish the potential of the deposits to preserve archaeological remains;
- To examine the archaeological resource within the Study Area, including clarifying the presence/absence of any buried archaeological features, deposits, structures, artefacts or ecofacts within the specified works area;
- To record material of archaeological potential as it is recovered and/or encountered during the grab sampling within the River Thames through a Protocol for Archaeological Discoveries (the Protocol);
- To record and establish, within the constraints of the works, the extent, character, date, condition and quality of any surviving archaeological remains (a preservation by record);
- To place any identified archaeological remains within a wider historical and archaeological context in order to assess their significance, and;
- To report on the results, with recommendations and proposals for further work where appropriate.

# 5 METHODS

## 5.1 Introduction

5.1.1 Health and safety override archaeological considerations in all works since, as stated in CIfA guidance, *Health and Safety regulations and requirements cannot be ignored no matter how imperative the need to record archaeological information; hence Health and Safety will take priority over archaeological matters* (CIfA 2014a, 11).

5.1.2 All works were undertaken in accordance with the detailed methods set out within the approved WSI (Wessex Archaeology 2022) and in compliance with the standards outlined in the CIfAs' *Standards and guidance for archaeological geophysical survey* (CIfA 2016), Historic England's guidance notes on *Marine Geophysics Data Acquisition, Processing and Interpretation* (2013), and S*tandard and guidance for archaeological watching brief* (CIfA 2020a), except where they are superseded by statements made below. Any variations to these methods were agreed in writing with the Surrey Council County Archaeologist and the Client, prior to being implemented.

## 5.2 Geoarchaeological borehole survey

5.2.1 In order to target the three possible stratigraphic units identified during the geophysical survey of the Study Area, and following consultation with Historic England, coring was recommended in a total of six locations as shown in **Table 4** and **Figure 7**.

5.2.2 The boreholes were undertaken using a vibrocoring rig on a pontoon operated by BAM Ritchies. The boreholes were put down until bedrock London Clay was reached. Samples retained in sleeved plastic liners were sealed and marked with the project number, site number, borehole number and sample depth and returned to the Wessex Archaeology laboratory for sediment description. Sediment description was undertaken as shown in **5.4**.

5.2.3 The final as-dug locations of boreholes AV01-AV06 are shown in **Table 4**, with the results of the sediment descriptions shown in **Appendix 1**. The boreholes were surveyed by BAM Ritchies with data including depth to river bed and elevation of the river bed.

**Table 4** Purposive geoarchaeological borehole locations (as-dug)

| BH | Easting | Northing | Elevation (m OD) | Target sediment | Target depth |
|---|---|---|---|---|---|
| AV01 | 509673.84 | 166731.79 | 8.45 | Acoustically quiet unit above a relatively distinct sub-horizontal reflector. Possible internal reflector or top of gravels; however may represent a previous dredge surface | Directly below river bed to a depth of around 1.2 m below riverbed |
| AV02 | 509126.12 | 166244.50 | 8.39 | Possible upper unit of Unit 3, may be re-worked sediments or more recent sediment deposition. | Directly below river bed to a depth of approximately 2 m |
| AV03 | 509411.56 | 166662.61 | 8.43 | Possible internal reflector within Unit 1 or Unit 2 | Top of feature at approximately 2 m below the riverbed. Depth uncertain due to penetration of SBP and riverbed multiple. |
| AV04 | 509294.42 | 166591.05 | 8.83 | Unit comprising several dipping horizons, possible Unit 1 or internal within Unit 2. No obvious overlying Unit 3 sediments. | Directly below river bed. Depth uncertain due to penetration of SBP and riverbed multiple. |

| | | | | | |
|---|---|---|---|---|---|
| AV05 | 509065.24 | 166185.61 | 8.32 | Possible Unit 2, may be below veneer of Unit 3 although this isn't certain. | Either directly below river bed or beneath thin unit/veneer of post-dredge sediments. Depth uncertain due to penetration of SBP and riverbed multiple. |
| AV06 | 509240.82 | 166439.90 | 8.37 | Unstructured unit overlying distinct, dipping reflector at approximately 2 m. Possible Unit 2 overlying Unit 1, although uncertain. | Strong horizontal reflector at approximately 2 m |

## 5.3 Geoarchaeological monitoring of SI works

5.3.1 It was proposed within the WSI (Wessex Archaeology 2022) that samples arising from a suitable distribution of the cable percussion boreholes associated with the SI works were recorded for geoarchaeological purposes, with a minimum of 24 of the proposed 36 boreholes recommended for geoarchaeological recording.

5.3.2 Samples from a total of 30 cable percussion boreholes (**Table 5**) were recorded in the logging facility at the Site Compound by an experience geoarchaeologist. All works were carried out in accordance with the methodology outlined in the WSI and industry standards and guidelines (CIfA various). The boreholes were surveyed by BAM Ritchies with data including depth to river bed and elevation of the river bed.

5.3.3 Sediment description was undertaken as shown in **5.4**. The results of the sediment descriptions are shown in **Appendix 2**.

**Table 5** Cable percussion boreholes recorded during the geoarchaeological monitoring

| BH | Easting | Northing | Elevation (m OD) |
|---|---|---|---|
| BH01 | 508945.89 | 166199.34 | 8.69 |
| BH02 | 508941.06 | 166180.31 | 8.61 |
| BH03 | 508922.54 | 166147.28 | 8.66 |
| BH04 | 509039.17 | 166209.01 | 8.70 |
| BH06 | 509053.79 | 166172.57 | 8.59 |
| BH07 | 509146.29 | 166211.01 | 8.64 |
| BH08 | 509126.63 | 166223.52 | 8.65 |
| BH09 | 509112.04 | 166239.11 | 8.69 |
| BH10 | 509210.32 | 166298.79 | 8.50 |
| BH11 | 509188.40 | 166304.01 | 8.67 |
| BH12 | 509170.36 | 166311.56 | 8.75 |
| BH13 | 509227.67 | 166396.11 | 8.48 |
| BH14 | 509212.67 | 166400.53 | 8.73 |
| BH15 | 509193.51 | 166402.14 | 8.72 |
| BH17 | 509242.37 | 166492.19 | 8.71 |
| BH20 | 509315.27 | 166598.43 | 8.53 |
| BH21 | 509301.78 | 166619.27 | 8.52 |
| BH22 | 509363.17 | 166604.18 | 8.71 |
| BH23 | 509346.74 | 166627.53 | 8.56 |

| | | | |
|---|---|---|---|
| BH24 | 509327.58 | 166645.26 | 8.57 |
| BH25 | 509426.52 | 166625.26 | 8.71 |
| BH26 | 509422.12 | 166652.32 | 8.59 |
| BH27 | 509418.65 | 166680.89 | 8.61 |
| BH28 | 509541.30 | 166636.01 | 8.63 |
| BH29 | 509534.46 | 166649.85 | 8.53 |
| BH30 | 509520.92 | 166680.59 | 8.70 |
| BH31 | 509598.00 | 166634.28 | 8.53 |
| BH32 | 509588.16 | 166657.91 | 8.70 |
| BH34 | 509698.54 | 166718.62 | 8.61 |
| BH35 | 509665.30 | 166727.06 | 8.57 |

## 5.4 Sediment description

5.4.1 The boreholes and samples arising from the SI works were recorded using Wessex Archaeology's pro-forma digital recording system. For each stratigraphic unit descriptions and interpretations of the deposits are provided. Descriptions of deposits included information such as:

- *Depth*
- *Texture*
- *Composition*
- *Colour*
- *Inclusions*
- *Structure*
- *Shape and nature of contacts between deposits*

5.4.2 Interpretations included, where possible, probable depositional environments and formation processes.

5.4.3 A full photographic record was made using a digital camera equipped with an image sensor of not less than 10 megapixels. This recorded both the detail and the general context of the principal lithological and stratigraphic features, and the evaluation area as a whole.

5.4.4 Digital images were subject to managed quality control and curation processes which will embed appropriate metadata within the image and ensure long term accessibility of the image set.

5.4.5 The results of the sediment descriptions are shown in **Appendix 2 and 3**.

## 5.5 Grab-sampling

5.5.1 A programme of systematic sampling of the sediments within the dredge areas was undertaken to examine a selection of the anomalies identified during the geophysical survey. The methodology described below includes several modifications to the originally agreed methodology as set out in the WSI.

5.5.2 The strategy for this systematic sampling was determined following a thorough review of the results of the geoarchaeological survey (Wessex Archaeology 2021), and examination

of the 61 anomalies identified as being of possible archaeological interest (**Appendix 3**), all of which were assigned an A2 archaeological rating.

5.5.3 Because of the initial number of targets a strategic approach to the ground truthing was taken with a sub-section of light and dark reflectors identified, in addition to a riverbed disturbance, and a suspected rope and chain. Fourteen A2 geophysical anomalies were therefore identified as of potential archaeological interest, warranting further investigation by this ground-truthing and monitoring by a marine archaeologist (**Table 2**, **Appendix 3**). A2 anomalies are items of uncertain origin of possible archaeological interest.

5.5.4 For all aspects of the grab sampling the bed lowering contractor and Retained Archaeologist adhered to the standards and guidance as set out in *The Assessment and Management of Marine Archaeology in Ports and Harbours* (Gane and Cooper 2016), and English Heritage (2011).

5.5.5 The grab-sampling programme used a Osil 0.25m$^2$ Box Corer to recover the sediment from the riverbed, along with any potential archaeological receptor on or within that sediment. For each anomaly multiple 'grabs' were acquired to ensure enough material was collected to confirm either its archaeological or non-archaeological value by a suitably qualified member of Wessex Archaeology. The material recovered was analysed and recorded according to the principles set out in the current industry standards and guidelines (CIfA various).

5.5.6 At each sampling location the survey vessel was manoeuvre onto station with the aid of the navigation system, using a handheld dGPS to ensure the grab samples were taken within a sub-1-metre (RTK) radius of the recorded location.

5.5.7 Excavated surfaces and material was then inspected by a suitably qualified member of Wessex Archaeology. Recording included written, and photographic elements as conditions allowed.

### 5.6 Deposit modelling

5.6.1 A series of geoarchaeological deposit models were constructed for the site using a total of 36 stratigraphic records, including the six vibrocore boreholes and the results of geoarchaeological recording of 30 cable percussion boreholes monitored during the SI works. The deposit modelling was undertaken following the guidelines in Historic England (2020).

5.6.2 All available data points were entered into industry standard geological utilities software (Rockworks™ 17). Each stratigraphic unit was given a colour and pattern allowing cross correlation and grouping of the different sedimentary units. The grouping of these deposits is based on lithological descriptions, which define distinct depositional environments referred to as 'stratigraphic units'.

5.6.3 The classified data for each of the stratigraphic units was input into a database within the RockWorks 17™ program. Two-dimensional stratigraphic profiles ('transects') of selected interventions across the Study Area were generated, showing the main stratigraphic units and their lateral and vertical variability across these areas of the Study Area (**Figures 8 to 10**).

5.6.4 The key aims of the modelling were to interpret the data, identify the probable depositional environments represented, and determine areas of higher and/or lower geoarchaeological

potential where further work may be required (e.g. deposits with potential for the recovery of significant archaeological and palaeoenvironmental remains).

# 6 RESULTS

## 6.1 Geoarchaeological borehole survey and monitoring of SI works

6.1.1 This section summarises the results of the purposive geoarchaeological borehole survey and monitoring of the SI works, with a summary of the results of the deposit modelling. A total of six purposive vibrocore boreholes (**Appendix 1**) were undertaken as outlined in **5.2**, along with geoarchaeological recording of samples arising from a total of 30 cable percussion boreholes undertaken during the SI works (**Appendix 2**).

6.1.2 The results of the geoarchaeological deposit modelling, comprising six transects aligned perpendicular to the River and one along the length of the Study Area are shown in **Figures 7** to **10**.

6.1.3 The full sequence of sediments recorded during the borehole survey and monitoring of the SI works, supplemented by the results of the deposit modelling, comprises:

- Modern riverbed sediments (predominantly comprising reworked gravels)
- Modern riverbed sediments (predominantly comprising silts/clays)
- Alluvium (Holocene)
- Fluvial sand and gravel (Shepperton Gravel)
- Bedrock (London Clay)

*Modern riverbed sediments*

6.1.4 Modern riverbed sediments, in places containing inclusions of brick fragments or metal, were recorded at the top of the sequence in boreholes AV01, BH02, BH03, BH06, BH07, BH13, BH21, BH23, BH26, BH29 and BH34. In the majority of these sequences the modern riverbed sediments were predominately comprised of flint gravels, likely reworked from the Shepperton Gravel.

6.1.5 The modern riverbed sediments were generally between 0.05 and 0.50m thick, in places present only as a thin veneer of deposits over the London Clay bedrock. In BH26 these deposits were 1.0m thick and comprised of a sandy silty clay with frequent flint clasts. The modern riverbed sediments overlay either fluvial sand and gravel or bedrock (see below).

*Alluvium*

6.1.6 Deposits interpreted as Holocene (Marine Isotope Stage (MIS) 1; 11.7 Ka to present) floodplain alluvium were recorded in boreholes BH10 and BH25; in borehole BH10 the alluvium comprised a gravelly sandy silty clay between 0.2 and 1.0m below riverbed level (brl), whilst in BH25 they were recorded as a slightly sandy silt with occasional detrital organic matter between 0.0 and 1.0 m brl. In both boreholes the alluvium was recorded overlying fluvial sand and gravel (see below).

6.1.7 No organic-rich or peat deposits were recorded within the alluvium, with organic remains limited to the presence of detrital plant material of uncertain source area in BH25.

*Shepperton Gravel*

6.1.8 Deposits recorded as a variably sandy gravel comprising sub-angular to sub-rounded flint clasts of various sizes were recorded in 23 of the 30 boreholes, including in vibrocores AV02, AV03, AV05 and AV06 (**Appendix 1**). These deposits are interpreted as the Late Devensian (MIS 2; 17–11.7 Ka) Shepperton Gravel of Gibbard (1985).

6.1.9 The Shepperton Gravel was absent in boreholes AV01, AV04, BH02, BH06, BH07, BH10, BH13, BH21, BH23, BH32, BH34 and BH35, but elsewhere it was generally between 0.5 and 1.0m thick, although greater thicknesses were recorded in the area of BH15 (shown in **Figure 8**) and BH22 where thicknesses of 2.5 and 2.7m were recorded respectively.

6.1.10 The deposits of the Shepperton Gravel are typical of that formed within a high-energy braided river during the Late Devensian (MIS 2; c. 17-11.7 Ka), with variations in the thickness and surface of the Gravel (see **Figures 8** to **10**) the result of channel and bar formation within this braided river. In general, the Gravel is present at elevations between c. 7.5 and 8.8m OD, although the base of the Gravel is recorded at lower elevations between c. 6.5 and 7.0 m OD in the area of boreholes BH15, BH25, BH26 and BH29, likely represented more deeply incised channels.

6.1.11 No fine-grained or organic-rich units were identified within the Shepperton Gravel in any of the boreholes across the Study Area.

6.1.12 BGS archive boreholes in the vicinity of the Study Area show the Shepperton Gravel at elevations between 8.9 and 2.4m OD 100m to the north of the River (TQ06NE475), with fluvial gravelly sands in TQ06NE671 c. 300m southeast of the River at between 12.1 and 15.8 m OD; these latter deposits may represent the deposits of the earlier Kempton Park or Taplow Gravels, in to which the southern edge of the River has eroded.

*Bedrock*

6.1.13 The bedrock, recorded as a very stiff, grey silty clay (London Clay) was recorded in all boreholes across the Study Area, generally at depths between 0.05 and 1.50m brl. The bedrock was more deeply truncated at the location of boreholes BH15, BH22 and BH25 (2.0-2.7m brl), where it is more deeply incised by channels of the Late Devensian river. In places reworked London Clay bedrock is recorded, likely at least partly reworked by the modern river.

## 6.2 Grab-sampling

6.2.1 The archaeological watching brief occurred between the 1st to 3rd November 2022. The work was interrupted on the second day due to high winds preventing crane operations from continuing, before resuming on the third day. Overall, there were no significant delays or interruptions in the work.

6.2.2 The use of the box corer **(Figures 3 to 4a)** did appear to impact the material recovered as it was unable to penetrate into the riverbed. This was partially alleviated by the team carrying out multiple ‘grabs’ at it each location in order to maximise the opportunity to recover material of potential archaeological value from the riverbed.

6.2.3 No material of archaeological value was recovered from the riverbed (**Table 6**). Anthropogenic material recovered comprised of a section of plastic floor matting, a length of wrought iron chain, and lost fishing gear (**Figures 4b** to **6**). Fragments of concrete and glass were present in one other grab load.

6.2.4 None of this material was retained for further assessment or analysis and was disposed of under the guidance of the main contractor.

**Table 6** Results of grab sampling at target locations

| Grab Target Location | WA ID | Classification | Easting | Northing | WB Description | Geophysics Description |
|---|---|---|---|---|---|---|
| GS01 | 7020 | Riverbed disturbance | 509280 | 166603 | Sandy gravel with flint and stone inclusions, with organic material present. No anthropogenic material recovered. | Seabed disturbance identified as angular areas of bright and dark reflectors. Feature comprises either an object with height close to sonar fish or an angular bright reflector, with rectangular dark reflector with height closest to bank. Feature is adjacent to the riverbank and may represent an associated structure. |
| GS02 | 7047 | Rope/chain | 509586 | 166684 | Approximately two kg of material recovered, no anthropogenic material identified | Slightly curvilinear dark reflector with height. Feature possibly had an object with height at one end, although this isn't clear. Possible length of rope or chain. |
| GS03 | 7002 | Bright reflector | 509044 | 166181 | Sandy gravel with flint and stone inclusions, with organic material present. No anthropogenic material recovered. | Straight, linear bright reflector identified close to an area of numerous features which are interpreted as being natural. Possible shadow of poorly imaged dark reflector, although this isn't clear. Possible debris item or natural feature. |
| GS04 | 7009 | Dark reflector | 509181 | 166256 | No archaeological material recovered. Grab picked up small fragment of rope, 'terram' style matting, probably from measures to reinforce the bank and reduce erosion, along with some modern fishing gear. | A large, slightly indistinct, and poorly defined dark reflector with a bright, irregular shadow. Identified in a line with two similar features (7007 and 7008). Possible debris or a natural feature. |
| GS05 | 7013 | Debris field | 509242 | 166555 | Sandy gravel with flint and stone inclusions, with organic material present. No anthropogenic material recovered. | Debris field comprising numerous circular dark reflectors with hollow centres. Possible collection of modern tyres, however this cannot be confirmed without further investigation. |
| GS06 | 7016 | Dark reflector | 509301 | 166580 | Sandy gravel with flint inclusions and organic material. No anthropogenic material recovered. | Poorly defined dark reflector with an irregular shadow indicating varying heights. Possible item of debris or natural feature. |
| GS07 | 7021 | Debris | 509298 | 166613 | No anthropogenic material recovered. Grab recovered clay, gravel, silt, and fine sand. | Linear dark reflector, possibly with a secondary adjacent parallel length, and no discernible height. Possible linear item of debris. |

| Grab Target Location | WA ID | Classification | Easting | Northing | WB Description | Geophysics Description |
|---|---|---|---|---|---|---|
| GS08 | 7022 | Debris | 509304 | 166629 | Two-meter section of heavily corroded wrought iron chain. Item is probably pre-20th century in origin but is considered to not be of archaeological value. | Feature comprising linear dark reflectors with a possible internal cross structure. Feature has no discernible height. Possible item of debris. |
| GS09 | 7030 | Debris | 509487 | 166649 | No archaeological material recovered. Grab recovered branches, twigs, and leaves from willow trees. A short section of fishing line with hook attached was caught in this material. | A bright reflector that appears pointed at one end and squared off at the other. A faint dark reflector along one edge possibly representing a separate object although there is no clear separation. Possible item of debris. |
| GS10 | 7032 | Dark reflector | 509522 | 166646 | Modern glass and concrete fragments. Sand, silt, and gravel recovered. | Dark reflector in a cross formation with no discernible shadow. Appears distinct and anomalous. Possible debris or a natural feature. |
| GS11 | 7033 | Debris field | 509523 | 166657 | No anthropogenic material recovered. Grab recovered gravel, silt, and fine sand. | Possible debris field containing dark reflectors with height and bright reflectors. Feature is surrounded on one edge by a distinct bright reflector which may represent the feature's shadow or associated scour, however it appears very uniform and extends beyond discernible objects and is therefore less certain. Other features identified nearby but these appear less anthropogenic. Possible debris field. |
| GS12 | 7035 | Debris | 509552 | 166655 | No anthropogenic material recovered. Grab recovered gravel, silt, and fine sand. | A straight, linear dark reflector with height. Possible linear item of debris. |
| GS13 | 7040 | Dark reflector | 509557 | 166653 | Small section of hollow aluminium tube with electrical wiring. Modern, and non-archaeological. | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features nearby. Adjacent to similar feature 7039. Possible debris or a natural feature. |
| GS14 | 7043 | Bright reflector | 509569 | 166655 | Large section of black ‘studded’ plastic matting. Modern, and non-archaeological. | A distinct, rectangular bright reflector identified in an area of numerous possible debris items. Possible debris or a natural feature. |

# 7 DISCUSSION

## 7.1 Introduction

7.1.1 Wessex Archaeology was commissioned to undertake purposive geoarchaeological boreholes, grab-sampling of geophysical anomalies and monitoring during SI works prior to bed lowering activities as part of the River Thames Scheme, in a section of the River Thames just east of Desborough Island, Surrey. The work reported followed on from a Historic Environment Desk-Based Assessment (DBA) compiled by YA (2020b) and a report on the geophysical survey of the Study Area (Wessex Archaeology 2021).

7.1.2 The work was undertaken to provide further information on the archaeological and geoarchaeological resource that may be impacted by the proposed bed lowering, anticipated to reach down to a maximum of 0.75m below riverbed level, and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological and geoarchaeological work that may be required.

## 7.2 Geoarchaeological borehole survey and monitoring of SI works

7.2.1 A sequence of deposits comprising bedrock London Clay, fluvial sand and gravel (the Shepperton Gravel), Holocene floodplain alluvium and modern riverbed sediments was recorded in six vibrocores undertaken during the purposive borehole survey, and during recording of samples arising from 30 cable percussion boreholes undertaken during the SI works. The results of these investigations were integrated in to a geoarchaeological deposit model for the Study Area.

7.2.2 The Shepperton Gravel, comprising sand and gravel deposited within a high energy braided channel during the Late Devensian (c. 17-11.7 Ka), was widespread across the Study Area, present in thicknesses of up to 2.7m at elevations between c. 6.5 and 8.8m OD, although it was absent in places including in the area of boreholes AV01, AV04, BH02, BH06, BH07, BH10, BH13, BH21, BH23, BH32, BH34 and BH35. No fine-grained or organic-rich units were identified within the Shepperton Gravel in any of the boreholes across the Study Area, and it is considered to be of low geoarchaeological potential.

7.2.3 Holocene alluvium was rare, recorded in only two sequences (BH10 and BH25), and no organic-rich or peat deposits were recorded within the alluvium. The sequence was capped by modern riverbed sediments comprising reworked gravel or fine-grained alluvium with modern inclusions.

## 7.3 Grab-sampling of geophysical anomalies

7.3.1 The outcome of the archaeological watching brief on the 14 preselected geophysical anomalies was that no finds of archaeological relevance were recovered or identified. As the location accuracy of the grab positions was within the parameters set out in the WSI it must be assumed that the previously identified material has been moved by water flow either deeper into the channel, or away from its recorded position.

7.3.2 A further possibility is that the geophysics targets are deeper in the riverbed than the grab could reach and may therefore still be *in-situ.* It is therefore recommended that in line with the recommendation of the WSI that the Protocol for Archaeological Discoveries is fully implemented during the bed lowering phase of the project, in order to mitigate against chance finds.

# 8 CONCLUSION AND RECOMMENDATIONS

8.1.1 On the basis of the anticipated depth of the proposed bed lowering (0.75m below riverbed level), the work is likely to impact on deposits of both Holocene alluvium and Late Devensian Shepperton Gravel. However, no organic-rich or peat deposits were recorded within the alluvium, and similarly, no fine-grained or organic-rich units were identified within the Shepperton Gravel. On this basis, the geoarchaeological potential of these deposits is considered to be low, and no further geoarchaeological investigations are recommended.

8.1.2 As outlined above, no finds of archaeological relevance were recovered or identified during the grab sampling of geophysical anomalies; however there remains the possibility that previously identified material has been moved by water flow either deeper into the channel, or away from its recorded position, or that the geophysics targets are deeper in the riverbed than the grab could reach and may therefore still be *in-situ*.

8.1.3 In line with methodology set out within the WSI (Wessex Archaeology 2022), it is recommended that the Protocol for Archaeological Discoveries is fully implemented via a watching brief during the bed lowering phase of the project, in order to mitigate against chance finds.

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# APPENDIX

## Appendix 1 Vibrocore sediment description logs

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV01 |
|---|---|---|
| Coordinates (NGR) X: 509673.84 | Coordinates (NGR) Y: 166731.79 | Level (top): 8.45 m OD |
| Length: - | Width: - | Depth: 1.10m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 101 | Fine gravel and coarse sand with silt | Modern Riverbed Sediments (Gravel) | 0.00-0.05 | 8.45-8.40 | - |
| 102 | Bedrock | London Clay | 0.05-1.10 | 8.40-7.35 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV02 |
|---|---|---|
| Coordinates (NGR) X: 509126.12 | Coordinates (NGR) Y: 166244.50 | Level (top): 8.39 m OD |
| Length: - | Width: - | Depth: 0.95m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 201 | Clean well rounded and sub angular mixture of fine and coarse gravel with coarse sand | Shepperton Gravel | 0.10-0.95 | 8.39-7.54 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV03 |
|---|---|---|
| Coordinates (NGR) X: 509411.56 | Coordinates (NGR) Y: 166662.61 | Level (top): 8.43 m OD |
| Length: - | Width: - | Depth: 0.90m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 301 | Clean mixture of coarse and fine well rounded to sub angular gravel and coarse sand.<br>Sharp contact | Shepperton Gravel | 0.00-0.47 | 8.43-7.96 | - |
| 302 | Firm blue grey clay | London Clay | 0.47-0.90 | 7.96-7.53 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV04 |
|---|---|---|
| Coordinates (NGR) X: 509294.42 | Coordinates (NGR) Y: 166591.05 | Level (top): 8.83 m OD |
| Length: - | Width: - | Depth: 1.40m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 401 | Blue grey clay | London Clay | 0.00-0.14 | 8.83-8.69 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV05 |
|---|---|---|
| Coordinates (NGR) X: 509065.24 | Coordinates (NGR) Y: 166185.61 | Level (top): 8.32 m OD |
| Length: - | Width: - | Depth: 0.80m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 501 | Clean coarse cobbles and gravel. Well-rounded to sub angular with coarse sand and some silt sharp to | Shepperton Gravel | 0.00-0.45 | 8.32-7.87 | - |
| 502 | Stiff grey clay | London Clay | 0.45-0.80 | 7.87-7.52 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: AV06 |
|---|---|---|
| Coordinates (NGR) X: 509240.82 | Coordinates (NGR) Y: 166439.90 | Level (top): 8.37 m OD |
| Length: - | Width: - | Depth: 0.85 m |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 601 | Void but with large cobbles and trace of coarse sand and gravel. | Shepperton Gravel | 0.00-0.30 | 8.37-8.07 | - |
| 602 | Stiff grey clay | London Clay | 0.30-0.85 | 8.07-7.52 | - |

## Appendix 2 Sediment description of the cable percussion boreholes

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: BH02 |
|---|---|---|
| Coordinates (NGR) X: 508941.06 | Coordinates (NGR) Y: 166180.31 | Level (top): 8.61 |
| Length: - | Width: - | Depth: 6.00 m |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 201 | Cream silty GRAVEL. Gravel is fine to coarse (2-23mm) angular to subangular chalk | Modern Riverbed Sediments (Gravel) | 0.00-0.20 | 8.61-8.41 | - |
| 202 | Stiff dark grey slightly sandy silty CLAY. Frequent fine to medium (2-10mm) subrounded to subangular flint gravel clasts. | Reworked Bedrock | 0.20-1.00 | 8.41-7.61 | - |
| 203 | Stiff dark grey silty CLAY | Bedrock | 1.00-6.00 | 7.61-2.61 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: BH08 |
|---|---|---|
| Coordinates (NGR) X: 509126.63 | Coordinates (NGR) Y: 166223.52 | Level (top): 8.65 |
| Length: - | Width: - | Depth: 2.00m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 801 | Sandy gravel. Flint clasts, SA-SR, 5-100mm, Avg 40mm. | Shepperton Gravel | 0.00-0.50 | 8.65-8.15 | - |
| 802 | Sand and gravel. Flint clasts, SA-SR, 5-40mm. | Shepperton Gravel | 0.50-1.00 | 8.15-7.65 | - |
| 803 | Slightly sandy gravel. Flint clasts, SA-SR, 5-40mm Avg. 20mm. | Shepperton Gravel | 1.00-1.50 | 7.65-7.15 | - |
| 804 | Stiff grey silty clay | London Clay | 1.50-2.00 | 7.15-6.65 | - |

| Site Code: 225573 | Site Name: RTS Desborough | Borehole ID: BH09 |
|---|---|---|
| Coordinates (NGR) X: 509112.04 | Coordinates (NGR) Y: 166239.11 | Level (top): 8.69 |
| Length: - | Width: - | Depth: 2.00m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 901 | Sand and gravel. Flint clasts 5-60mm SA-SR. | Shepperton Gravel | 0.00-0.50 | 8.69-8.19 | - |
| 902 | Sandy gravel. Flint clasts 5-20mm SA-SR. | Shepperton Gravel | 0.50-1.00 | 8.19-7.69 | - |
| 903 | Sandy gravel. Fine gravel/coarse sand. Flint, 2-5mm, A-SR. | Shepperton Gravel | 1.00-1.50 | 7.69-7.19 | - |

| | | | | | |
|---|---|---|---|---|---|
| 904 | Stiff grey silty clay. | London Clay | 1.50-2.00 | 7.19-6.69 | - |

| **Site Code: 225573** | **Site Name: RTS Desborough** | **Borehole ID: BH11** |
|---|---|---|
| **Coordinates (NGR) X: 509188.40** | **Coordinates (NGR) Y: 166304.01** | **Level (top): 8.67** |
| **Length: -** | **Width: -** | **Depth: 1.50m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 1101 | Sand and gravel. Flint clasts A-SR, 5-40mm | Shepperton Gravels | 0.00-0.50 | 8.67-8.17 | - |
| 1102 | Sand and gravel. Flint clasts SA-SR, 5-15mm | Shepperton Gravels | 0.50-1.00 | 8.17-7.67 | - |
| 1103 | Stiff grey silty clay. | London Clay | 1.00-1.50 | 7.67-7.17 | - |

| **Site Code: 225573** | **Site Name: RTS Desborough** | **Borehole ID: BH12** |
|---|---|---|
| **Coordinates (NGR) X: 509170.36** | **Coordinates (NGR) Y: 166311.56** | **Level (top): 8.75** |
| **Length: -** | **Width: -** | **Depth: 2.00m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 1201 | Sandy gravel, flint clasts SA-SR, 5-15mm | Shepperton Gravels | 0.00-0.50 | 8.75-8.25 | - |
| 1202 | Sandy gravel, flint clasts SA-SR, 5-10mm | Shepperton Gravels | 0.50-1.00 | 8.25-7.75 | - |
| 1203 | Sandy gravel, flint clasts SA-SR, 5-20mm | Shepperton Gravels | 1.00-1.50 | 7.75-7.25 | - |
| 1204 | Stiff grey silty clay with occasional flint clasts. | London Clay | 1.50-2.00 | 7.25-6.75 | - |

| **Site Code: 225573** | **Site Name: RTS Desborough** | **Borehole ID: 15** |
|---|---|---|
| **Coordinates (NGR) X: 509193.51** | **Coordinates (NGR) Y: 166402.14** | **Level (top): 8.72** |
| **Length: -** | **Width: -** | **Depth: 3.00m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 1501 | Slightly sandy gravel. Flint clasts, SA-SR, 5-60mm | Shepperton Gravels | 0.00-0.50 | 8.72-8.22 | - |
| 1502 | Sand and gravel, flint clasts SA-SR, 5-20mm | Shepperton Gravels | 0.50-1.00 | 8.22-7.72 | - |
| 1503 | Sand and gravel, flint clasts SA-SR, 5-20mm | Shepperton Gravels | 1.00-1.50 | 7.72-7.22 | - |
| 1504 | Sand and gravel, flint clasts SA-SR, 5-10mm | Shepperton Gravels | 1.50-2.00 | 7.22-6.72 | - |
| 1505 | Sand and gravel, flint clasts SA-SR, 5-10mm | Shepperton Gravels | 2.00-2.50 | 6.72-6.22 | - |

| | | | | | |
|---|---|---|---|---|---|
| 1506 | Stiff grey silty clay. | London Clay | 2.50-3.00 | 6.22-5.72 | - |

| **Site Code: 225573** | **Site Name: Desborough Cut** | **Borehole ID: BH17** |
|---|---|---|
| **Coordinates (NGR) X: 509242.37** | **Coordinates (NGR) Y: 166492.19** | **Level (top): 8.71** |
| **Length: -** | **Width: -** | **Depth: 5.45m Bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 1701 | Grey brown slightly silty sandy gravel, gravels are flint SA/SR | Shepperton gravels | 0.00-0.30 | 8.71-8.41 | - |
| 1702 | Stiff grey brown silty clay | London Clay | 0.30-5.45 | 8.41-3.26 | - |

| **Site Code: 225573** | **Site Name: RTS Desborough** | **Borehole ID: BH20** |
|---|---|---|
| **Coordinates (NGR) X: 509315.27** | **Coordinates (NGR) Y: 166598.43** | **Level (top): 8.53** |
| **Length: -** | **Width: -** | **Depth: 8.53m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2001 | Sandy gravel. 20% sand. Flint clasts 10-80mm, SA-R. | Shepperton Gravels | 0.00-0.50 | 8.53-8.03 | - |
| 2002 | Sand and gravel. Flint clasts 10-80mm, SA-SR. | Shepperton Gravels | 0.50-1.00 | 8.03-7.53 | - |
| 2003 | Stiff grey silty clay | London Clay | 1.00-1.50 | 7.53-7.03 | - |

| **Site Code: 225573** | **Site Name: RTS Desborough** | **Borehole ID: BH21** |
|---|---|---|
| **Coordinates (NGR) X: 509301.78** | **Coordinates (NGR) Y: 166619.27** | **Level (top): 8.52** |
| **Length: -** | **Width: -** | **Depth: 0.50m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2101 | Flint gravels | Modern Riverbed Sediments (Gravel) | 0.00-0.05 | 8.52-8.47 | - |
| 2102 | Stiff clay | London Clay | 0.05-0.50 | 8.47-8.02 | - |

| **Site Code: 225573** | **Site Name: Desborough Cut** | **Borehole ID: BH22** |
|---|---|---|
| **Coordinates (NGR) X: 509363.17** | **Coordinates (NGR) Y: 166604.18** | **Level (top): 8.71** |
| **Length: -** | **Width: -** | **Depth: 5.45m bgl** |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2201 | Grey silty sandy gravel with SA/SR flint gravels | Shepperton gravels | 0.00-0.27 | 8.71-8.44 | - |
| 2202 | Stiff grey brown slightly sandy silty clay | London Clay | 2.70-5.45 | 8.44-5.69 | - |

| Site Code: 225573 | Site Name: Desborough Cut | Borehole ID: BH23 |
|---|---|---|
| Coordinates (NGR) X: 509346.74 | Coordinates (NGR) Y: 166627.53 | Level (top): 8.71 |
| Length: - | Width: - | Depth: 5.45m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2201 | Grey silty sandy gravel with SA/SR flint gravels | Shepperton gravels | 0.00-0.27 | 8.71-8.44 | - |
| 2202 | Stiff grey brown slightly sandy silty clay | London Clay | 2.70-5.45 | 8.44-5.69 | - |

| Site Code: 225573 | Site Name: Desborough Cut | Borehole ID: BH24 |
|---|---|---|
| Coordinates (NGR) X: 509327.58 | Coordinates (NGR) Y: 166645.26 | Level (top): 8.57 |
| Length: - | Width: - | Depth: 2.00m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2401 | Sandy gravel. Flint clasts SA-SR, 2-8mm. 75% medium to coarse sand | Shepperton Gravels | 0.00-0.50 | 8.57-8.07 | - |
| 2402 | Sand and gravel. Flint clasts 10-50mm SA-SR | Shepperton Gravels | 0.50-1.00 | 8.07-7.57 | - |
| 2403 | Sandy gravel. Flint clasts 20-80mm, SA-R | Shepperton Gravels | 1.00-1.50 | 7.57-7.07 | - |
| 2404 | Stiff grey silty clay | London Clay | 1.50-2.00 | 7.07-6.57 | - |

| Site Code: 225573 | Site Name: Desborough Cut | Borehole ID: BH25 |
|---|---|---|
| Coordinates (NGR) X: 509426.52 | Coordinates (NGR) Y: 509426.52 | Level (top): 8.71 |
| Length: - | Width: - | Depth: 5.45m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2501 | Very soft dark grey slightly sandy silt with occasional organic detrius | Alluvium | 0.00-1.00 | 8.71-7.71 | - |
| 2502 | Silty sandy gravel, gravels are SA/SR flint | Shepperton Gravels | 1.00-2.00 | 7.71-6.71 | - |
| 2503 | Stiff grey brown silty clay | London Clay | 2.00-5.45 | 6.71-3.26 | - |

| Site Code: 225573 | Site Name: Desborough Cut | Borehole ID: BH27 |
|---|---|---|
| Coordinates (NGR) X: 509418.65 | Coordinates (NGR) Y: 166680.89 | Level (top): 8.61 |
| Length: - | Width: - | Depth: 5.45m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 2701 | Grey brown slightly silty sandy gravel, gravel SA/SR flint, sand is fine to coarse | Shepperton Gravels | 0.00-0.30 | 8.61-8.31 | - |
| 2702 | Stiff greyish brown clay | London Clay | 0.30-5.45 | 8.31-3.16 | - |

| Site Code: 225573 | Site Name: Desborough Cut | Borehole ID: BH30 |
|---|---|---|
| Coordinates (NGR) X: 509520.92 | Coordinates (NGR) Y: 166680.59 | Level (top): 8.70 |
| Length: - | Width: - | Depth: 5.45m bgl |

| Context Number | Description | Interpretation | Depth m bgl | Depth m OD | Samples |
|---|---|---|---|---|---|
| 3001 | Grey brown slightly silty sandy gravel, gravels are flint SA/SR | Shepperton Gravels | 0.00-1.00 | 8.70-7.70 | - |
| 3002 | Stiff grey brown silty clay | London Clay | 1.00-5.45 | 7.70-3.25 | - |

## Appendix 3 Riverbed features of archaeological potential

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7000 | Bright reflector | 509019 | 166177 | A2 | 1.7 | 1.1 | 0.0 | A square bright reflector identified in an area of numerous riverbed features. Appears anomalous and angular. Possible debris or natural feature. |
| 7001 | Debris field | 509029 | 166173 | A2 | 8.8 | 3.1 | 0.5 | Irregular area comprising several elongate and angular dark reflectors with height. Identified in an area of irregular seabed and may be natural, however the features appear more angular than surrounding riverbed. Possible debris field. |
| 7002 | Bright reflector | 509044 | 166181 | A2 | 4.7 | 2.0 | 0.0 | Straight, linear bright reflector identified close to an area of numerous features which are interpreted as being natural. Possible shadow of poorly imaged dark reflector, although this isn't clear. Possible debris item or natural feature. |
| 7003 | Bright reflector | 509036 | 166198 | A2 | 4.3 | 0.6 | 0.0 | Slightly irregular linear bright reflector, possibly with a dark reflector in its centre. May be shadow of poorly imaged dark reflector, although this is not certain. Possible linear item of debris or a natural feature. |
| 7004 | Debris | 509027 | 166204 | A2 | 8.8 | 0.7 | 0.0 | Linear dark reflector in an 'L' shape with no discernible height. Possibly forms part of a larger, square feature with **7005**. Possible item of debris. |
| 7005 | Debris | 509028 | 166207 | A2 | 4.2 | 0.3 | 0.1 | Linear dark reflector in an 'L' shape with a very slight shadow. Possibly forms part of a larger, square feature with **7004**. Possible item of debris. |
| 7006 | Dark reflector | 509105 | 166202 | A2 | 2.2 | 1.7 | 0.8 | Angular dark reflector with a long, tapered shadow. Possible item of debris or a natural feature. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7007 | Dark reflector | 509170 | 166245 | A2 | 3.3 | 2.2 | 1.0 | A large, slightly indistinct and poorly defined dark reflector with a bright, irregular shadow. Identified in a line with two similar features (**7008** and **7009**). Possible debris or a natural feature. |
| 7008 | Dark reflector | 509176 | 166251 | A2 | 2.7 | 1.1 | 0.9 | A large, slightly indistinct and poorly defined dark reflector with a bright, irregular shadow. Identified in a line with two similar features (**7007** and **7009**). Possible debris or a natural feature. |
| 7009 | Dark reflector | 509181 | 166256 | A2 | 4.3 | 2.6 | 0.6 | A large, slightly indistinct and poorly defined dark reflector with a bright, irregular shadow. Identified in a line with two similar features (**7007** and **7008**). Possible debris or a natural feature. |
| 7010 | Dark reflector | 509189 | 166289 | A2 | 5.9 | 0.7 | 1.1 | A large, slightly indistinct and poorly defined dark reflector with a bright, irregular shadow. Possible adjacent secondary objects, although these are indistinct. Possible debris or a natural feature. |
| 7011 | Dark reflector | 509208 | 166377 | A2 | 1.0 | 0.9 | 0.2 | A faint, slightly square shaped dark reflector with slight height. Identified in an area of numerous other objects, although these are not clearly anthropogenic. Possible debris or a natural feature. |
| 7012 | Debris | 509254 | 166534 | A2 | 0.8 | 0.6 | 1.5 | Small, faint, poorly defined dark reflector with a long, narrow shadow indicating significant height above the seafloor. Possible item of debris. |
| 7013 | Debris field | 509242 | 166555 | A2 | 7.9 | 2.9 | 0.2 | Debris field comprising numerous circular dark reflectors with hollow centres. Possible collection of modern tyres, however this cannot be confirmed without further investigation. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7014 | Debris | 509261 | 166548 | A2 | 1.3 | 0.5 | 0.0 | Circular dark reflector with possible hollow centre. Identified in an area of low reflectivity. Feature identified in an area comprising numerous dark reflectors with height, although these have been interpreted as being natural. Possible item of debris, possibly a modern tyre, may be associated with nearby debris field **7013**. |
| 7015 | Dark reflector | 509289 | 166573 | A2 | 4.4 | 2.5 | 1.3 | Large, poorly-defined dark reflector with a distinct elongate high reflectivity edge and irregular shadow indicating varying heights. Possible natural feature or possibly a large broken up object |
| 7016 | Dark reflector | 509301 | 166580 | A2 | 5.3 | 3.5 | 1.2 | Poorly-defined dark reflector with an irregular shadow indicating varying heights. Possible item of debris or natural feature. |
| 7017 | Bright reflector | 509290 | 166593 | A2 | 1.0 | 0.6 | 0.0 | Small, rounded bright reflector with a dark reflector in its centre. Possible tyre, although this cannot be confirmed without further investigation. Possible debris or natural feature. |
| 7018 | Debris | 509288 | 166595 | A2 | 5.0 | 3.5 | 1.1 | Large, square dark reflector, with a distinct, broad shadow. Adjacent to, and possibly slightly overlying a similar object (**7019**). Possible item of debris. |
| 7019 | Debris | 509286 | 166597 | A2 | 5.7 | 2.1 | 1.1 | Large, rectangular dark reflector, with a distinct, broad shadow. Adjacent to, and possibly slightly beneath a similar object (**7018**). Possible item of debris. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7020 | Riverbed disturbance | 509280 | 166603 | A2 | 10.0 | 5.5 | 0.9 | Seabed disturbance identified as angular areas of bright and dark reflectors. Feature comprises either an object with height close to sonar fish or an angular bright reflector, with rectangular dark reflector with height closest to bank. Feature is adjacent to the riverbank and may represent an associated structure. |
| 7021 | Debris | 509298 | 166613 | A2 | 2.4 | 0.4 | 0.0 | Linear dark reflector, possibly with a secondary adjacent parallel length, and no discernible height. Possible linear item of debris. |
| 7022 | Debris | 509304 | 166629 | A2 | 2.7 | 2.2 | 0.0 | Feature comprising linear dark reflectors with a possible internal cross structure. Feature has no discernible height. Possible item of debris. |
| 7023 | Dark reflector | 509343 | 166609 | A2 | 7.3 | 3.2 | 1.1 | Large, poorly-defined dark reflector with a distinct, irregular shadow indicating varying heights. Possible debris or a natural feature. |
| 7024 | Bright reflector | 509364 | 166636 | A2 | 1.4 | 1.0 | 0.0 | A square bright reflector identified in an otherwise relatively featureless area of riverbed. Possible debris or a natural feature. |
| 7025 | Bright reflector | 509365 | 166646 | A2 | 2.6 | 1.2 | 0.0 | Rounded bright reflector with a dark reflector in its centre. May be a bright reflector with a hollow centre, or possibly a dark reflector within an area of scour. Possible debris or natural feature. |
| 7026 | Debris | 509438 | 166629 | A2 | 1.6 | 0.4 | 0.0 | Dark reflector comprised of two parallel linear dark reflectors. Identified towards the edge of the channel. Possible item of debris. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7027 | Bright reflector | 509455 | 166636 | A2 | 2.4 | 1.1 | 0.0 | A distinct, square bright reflector identified towards the edge of the river channel. Possible debris or a natural feature. |
| 7028 | Debris | 509463 | 166644 | A2 | 3.2 | 0.1 | 0.1 | Short, narrow straight dark reflector with a very slight shadow. Possible short linear item of debris. |
| 7029 | Debris | 509486 | 166655 | A2 | 3.5 | 0.1 | 0.1 | Short, narrow straight dark reflector with a very slight shadow, close to possible debris item **7030**. Possible linear item of debris. |
| 7030 | Debris | 509487 | 166649 | A2 | 4.1 | 1.6 | 0.3 | A bright reflector that appears pointed at one end and squared off at the other. A faint dark reflector along one edge possibly representing a separate object although there is no clear separation. Possible item of debris. |
| 7031 | Dark reflector | 509487 | 166627 | A2 | 5.0 | 0.8 | 0.1 | Three closely spaced parallel linear dark reflectors with height although image may be distorted by movement of the sonar fish. Possible debris or a natural feature. |
| 7032 | Dark reflector | 509522 | 166646 | A2 | 0.8 | 0.3 | 0.0 | Dark reflector in a cross formation with no discernible shadow. Appears distinct and anomalous. Possible debris or a natural feature. |
| 7033 | Debris field | 509523 | 166657 | A2 | 7.2 | 6.4 | 0.8 | Possible debris field containing dark reflectors with height and bright reflectors. Feature is surrounded on one edge by a distinct bright reflector which may represent the feature's shadow or associated scour, however it appears very uniform and extends beyond discernible objects and is therefore less certain. Other features identified nearby but these appear less anthropogenic. Possible debris field. |
| 7034 | Debris field | 509545 | 166650 | A2 | 9.6 | 1.4 | 0.3 | Possible debris field comprising numerous dark reflectors with height, including a possible tyre. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7035 | Debris | 509552 | 166655 | A2 | 2.5 | 0.5 | 0.1 | A straight, linear dark reflector with height. Possible linear item of debris. |
| 7036 | Bright reflector | 509554 | 166655 | A2 | 0.8 | 0.6 | 0.0 | Rounded bright reflector with dark reflector in centre. Possible item of debris or a natural feature. |
| 7037 | Bright reflector | 509554 | 166657 | A2 | 0.8 | 0.6 | 0.0 | A small rounded bright reflector with dark reflector in centre. Possible tyre, although this cannot be confirmed without further investigation. The feature is located in an area of numerous other possible debris items. Possible debris or a natural feature. |
| 7038 | Debris | 509560 | 166662 | A2 | 2.1 | 0.1 | 0.1 | Slightly curved linear dark reflector with height, possibly larger at one end. Identified close to other objects on the riverbed. Possible debris. |
| 7039 | Dark reflector | 509558 | 166653 | A2 | 0.6 | 0.4 | 0.1 | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features nearby. Adjacent to similar feature **7040**. Possible debris or a natural feature. |
| 7040 | Dark reflector | 509557 | 166653 | A2 | 0.9 | 0.5 | 0.1 | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features nearby. Adjacent to similar feature **7039**. Possible debris or a natural feature. |
| 7041 | Dark reflector | 509559 | 166641 | A2 | 0.7 | 0.3 | 0.2 | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features nearby. Adjacent to similar feature **7042**. Possible debris or a natural feature. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7042 | Dark reflector | 509559 | 166641 | A2 | 0.7 | 0.2 | 0.1 | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features nearby. Adjacent to similar feature **7041**. Possible debris or a natural feature. |
| 7043 | Bright reflector | 509569 | 166655 | A2 | 4.0 | 2.0 | 0.0 | A distinct, rectangular bright reflector identified in an area of numerous possible debris items. Possible debris or a natural feature. |
| 7044 | Debris field | 509577 | 166655 | A2 | 4.4 | 1.5 | 0.3 | Possible area of debris comprising a faint, but possibly angular dark reflector, a small, rounded bright reflector with a dark reflector in its centre, possibly a tyre and another indistinct object with height. Possibly a collection of unrelated objects but grouped on proximity. Possible debris field. |
| 7045 | Dark reflector | 509581 | 166663 | A2 | 4.8 | 1.1 | 0.5 | A slightly oval shaped dark reflector with a distinct, tapered shadow. Identified in an area of numerous other objects, however these appear less anthropogenic in form. Possible debris or a natural feature. |
| 7046 | Bright reflector | 509593 | 166673 | A2 | 0.8 | 0.4 | 0.0 | Either a small rounded dark reflector with height within scour or a rounded bright reflector with dark reflector in centre, similar to other tyre-like features identified in the site. Possible debris or a natural feature. |
| 7047 | Rope/chain | 509586 | 166684 | A2 | 7.2 | 0.1 | 0.2 | Slightly curvilinear dark reflector with height. Feature possibly had an object with height at one end, although this isn't clear. Possible length of rope or chain. |
| 7048 | Debris | 509626 | 166674 | A2 | 3.9 | 0.9 | 0.2 | Slightly curved linear dark reflector with height. Possible item of debris. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7049 | Debris field | 509616 | 166683 | A2 | 4.9 | 2.3 | 1.1 | Area of possible debris or seabed disturbance comprising at least three, faint, possibly angular dark reflectors with height. Identified in irregular area of riverbed and may therefore be associated natural features; however, the features are seen to have significant height. Possible debris field. |
| 7050 | Debris | 509625 | 166681 | A2 | 3.7 | 0.2 | 0.1 | Straight, linear dark reflector with height identified close to an area of irregular riverbed and a similar linear feature (**7051**). Possible linear item of debris. |
| 7051 | Debris | 509629 | 166684 | A2 | 3.9 | 0.1 | 0.1 | Slightly curved linear dark reflector with slight height, close to a similar linear feature (**7050**). Possible linear item of debris. |
| 7052 | Dark reflector | 509622 | 166698 | A2 | 1.6 | 0.1 | 0.0 | Short, straight elongate dark reflector with a slight shadow. Possible debris or a natural feature. |
| 7053 | Bright reflector | 509623 | 166703 | A2 | 1.4 | 0.9 | 0.0 | Bright reflector close to area of irregular seabed. Other bright reflectors nearby, however these appear less angular and more natural in form. Possible debris or a natural feature. |
| 7054 | Bright reflector | 509626 | 166704 | A2 | 1.6 | 1.2 | 0.0 | Either a rounded bright reflector with dark reflector in centre or a small rounded dark reflector with height within scour. Similar to other tyre-like features identified in the site. Possible debris or a natural feature. |
| 7055 | Dark reflector | 509622 | 166721 | A2 | 2.0 | 0.8 | 0.3 | Large dark reflector with a broad, bright shadow. Close to riverbank and may be part related to bank structures. Other objects identified nearby; however this feature appears larger and more distinct. Possible debris or bank structure, or a natural feature. |

| ID | Classification | Easting | Northing | Archaeological discrimination | Length (m) | Width (m) | Height (m) | Description |
|---|---|---|---|---|---|---|---|---|
| 7056 | Dark reflector | 509653 | 166718 | A2 | 0.9 | 0.2 | 0.7 | A distinct, elongate dark reflector with height identified in an area of irregular riverbed. Possible part of natural formations but appears more distinct. Adjacent to similar feature (7057). Possible debris or a natural feature. |
| 7057 | Dark reflector | 509654 | 166718 | A2 | 0.4 | 0.4 | 0.8 | A distinct, dark reflector with height identified in an area of irregular riverbed. Possibly part of natural formations but appears more distinct. Adjacent to similar feature (7056). Possible debris or a natural feature. |
| 7058 | Dark reflector | 509660 | 166726 | A2 | 3.1 | 0.5 | 0.5 | A distinct dark reflector with height identified in an area of irregular riverbed. Possible part of natural formations but appears distinct. Broad, rectangular shadow. Possible debris or a natural feature. |
| 7059 | Dark reflector | 509659 | 166733 | A2 | 2.1 | 0.9 | 0.8 | A distinct, angular dark reflector with height identified in an area of irregular riverbed. Possible part of natural formations but appears distinct. Possible debris or a natural feature. |
| 7060 | Bright reflector | 509694 | 166772 | A2 | 1.9 | 0.9 | 0.0 | A bright, oval shaped reflector. Possibly a depression but appears distinct and anomalous. Possible debris or a natural feature. |

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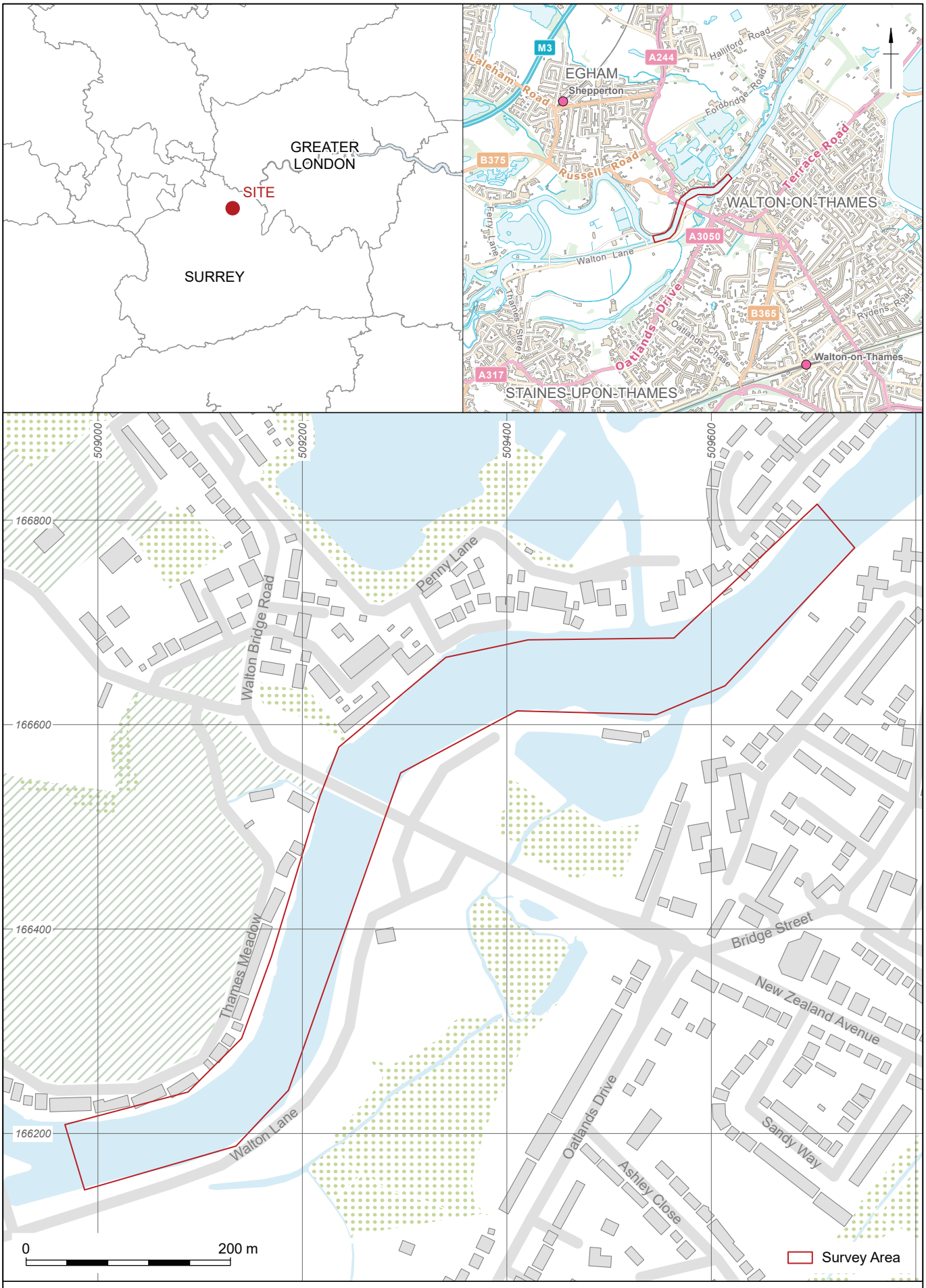


Coordinate system: OSGB 1936 British National Grid



| Date: 28/11/2022 | Created by: AW | Revision: 0 | Scale: 1:5,000 at A4 |
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Figure 1: Study Area Location

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509000 509200 509400 509600 509800

166800 166600 166400 166200

Penny Lane

Thames Meadow

Walton Lane

Bridge Street

New Zealand Avenue

Oatlands Drive

7000 7001 7002 7003 7004 7005 7006 7007 7008 7009 7010 7011 7012 7013 7014 7015 7016 7017 7018 7019 7020 7021 7022 7023 7024 7025 7026 7027 7028 7029 7030 7031 7032 7033 7034 7035 7036 7037 7038 7039 7040 7041 7042 7043 7044 7045 7046 7047 7048 7049 7050 7051 7052 7053 7054 7055 7056 7057 7058 7059 7060

0 25 m

0 25 m

0 100 m

Survey Area

Riverbed features of archaeological potential

A2 – Uncertain origin of possible archaeological interest

Features surveyed in WB

Linear riverbed features

Riverbed feature extents



| Date: 28/11/2022 | Created by: AW | Revision: 0 | Scale: 1:2,500 and insets 1:1000 at A3 |
|---|---|---|---|

Figure 2: Riverbed Features of Archaeological Potential

Figure 3: Osil Box Corer prior to deployment

Figure 4a: Box Corer with section of chain recovered at 7022 (GS08)

Figure 4b: Section of chain recovered at 7022 (GS08)

Figure 5: Modern rope recovered at 7009 (GS04)

Figure 6: Example of organic debris recovered at 7030 (GS09)

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166800
166600
166400
166200
509000
509200
509400
509600
509800

Penny Lane
Walton Bridge Road
Thames Meadow
Walton Lane
Bridge Street
Oatlands Drive
Manor Road

BH01
BH02
BH03
BH04
BH05
BH06
BH07
BH08
BH09
BH10
BH11
BH12
BH13
BH14
BH15
BH16
BH17
BH18
BH19
BH20
BH21
BH22
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BH27
BH28
BH29
BH30
BH31
BH32
BH33
BH34
BH35
BH36
AV01
AV02
AV03
AV04
AV05
AV06

Survey Area
Boreholes
Transect 1
Transect 2
Transect 3
Transect 4
Transect 5
Transect 6
Transect 7

0
100 m

Coordinate system: OSGB 1936 British National Grid



| Date: 16/12/2022 | Created by: AW | Revision: 0 | Scale: 1:2,500 at A3 |
|---|---|---|---|

Figure 7: Borehole and Transect Locations

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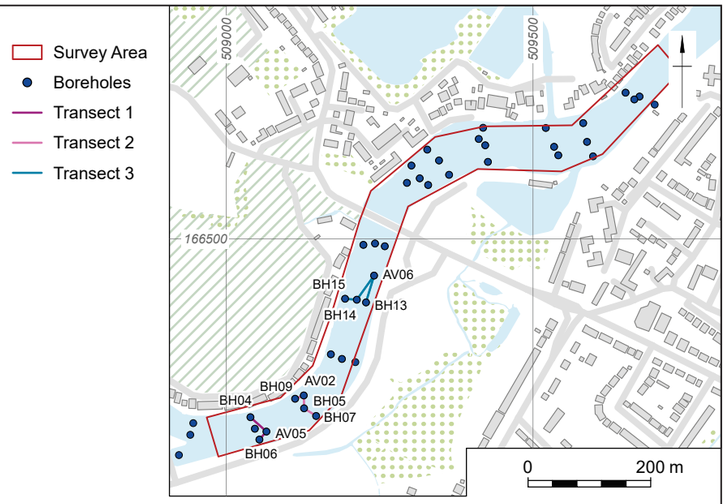
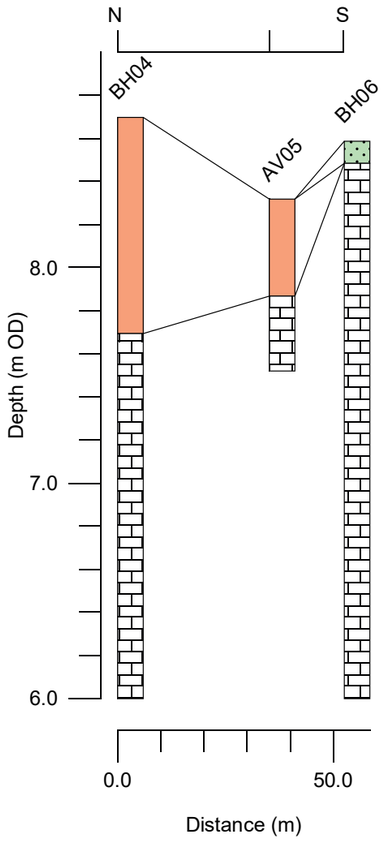
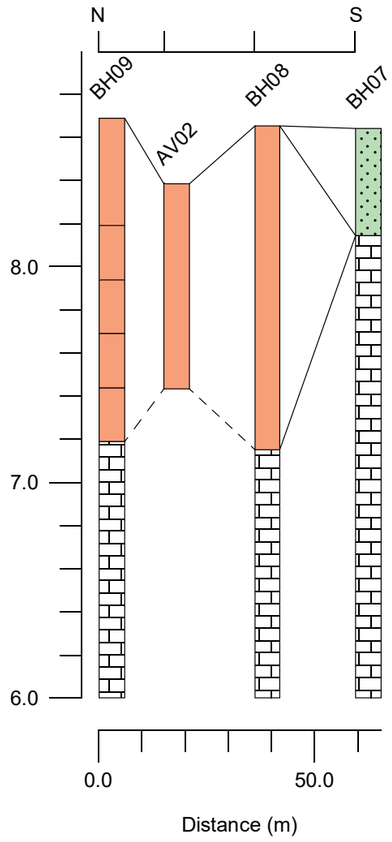


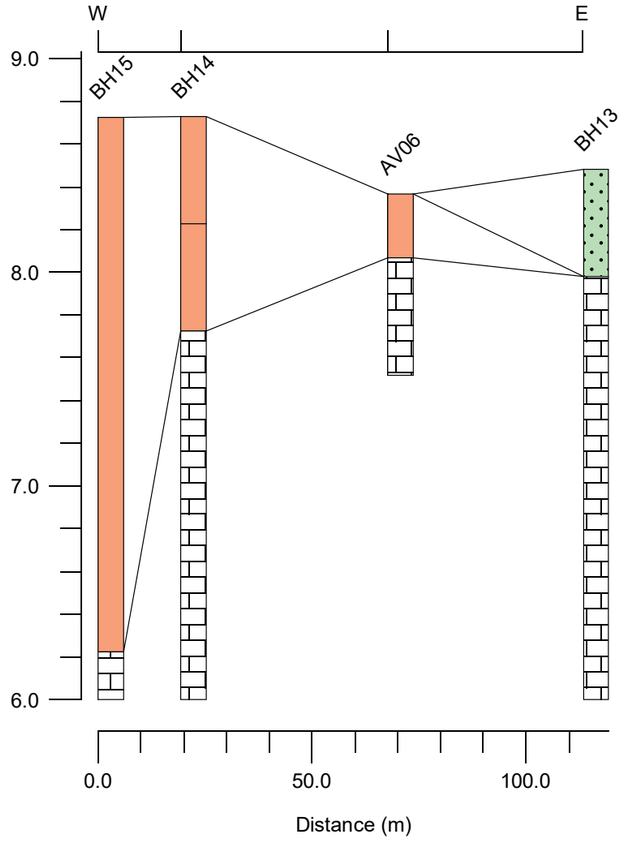

## Transect 1




## Transect 2




## Transect 3




## Stratigraphy

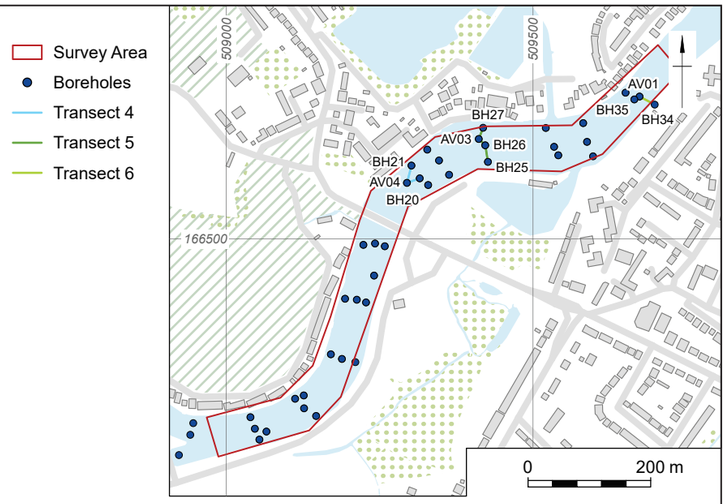
- Alluvium
- Modern Riverbed Sediments (Gravel)
- Modern Riverbed Sediments (Silts/Clays)
- Shepperton Gravel
- Reworked Bedrock
- Bedrock

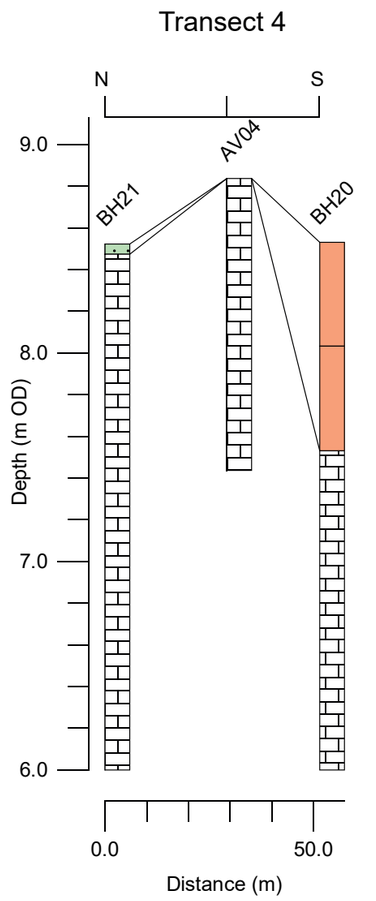
Inset: Coordinate system: OSGB 1936 British National Grid

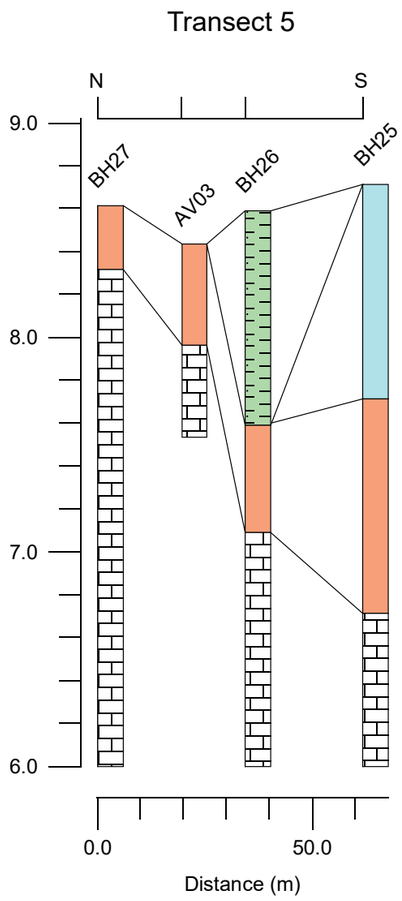


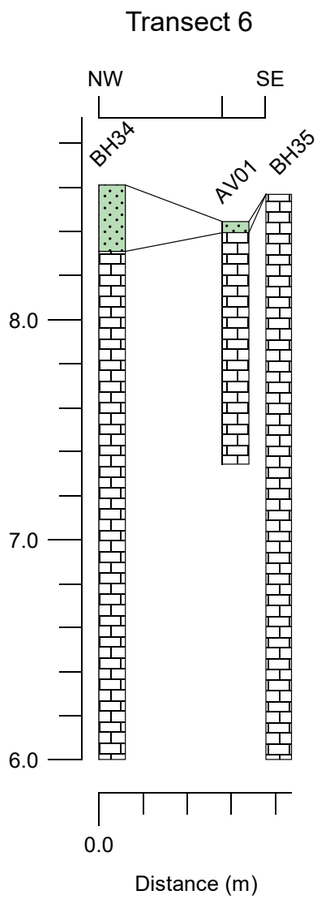
| Date: 16/12/2022 | Created by: AW | Revision: 0 | Scale: Inset 1:10,000 at A3 |
|---|---|---|---|

Figure 8: Transects 1-3




## Stratigraphy

- Alluvium
- Modern Riverbed Sediments (Gravel)
- Modern Riverbed Sediments (Silts/Clays)
- Shepperton Gravel
- Reworked Bedrock
- Bedrock

Inset: Coordinate system: OSGB 1936 British National Grid



| Date: 16/12/2022 | Created by: AW | Revision: 0 | Scale: Inset 1:10,000 at A3 |
|---|---|---|---|

Figure 9: Transects 4-6

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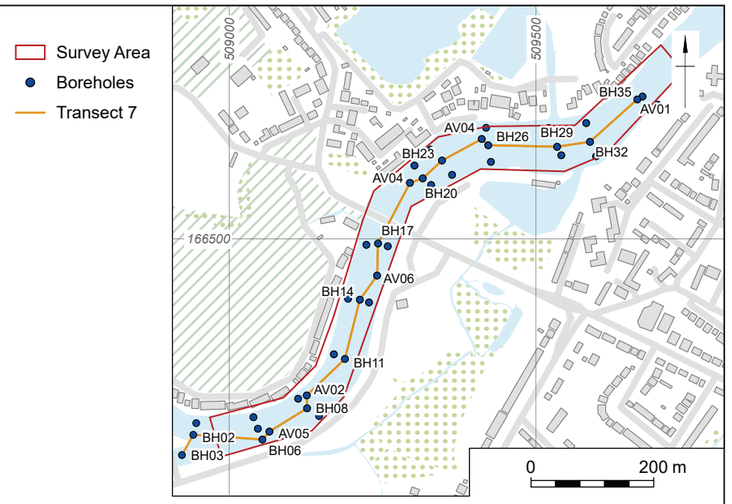
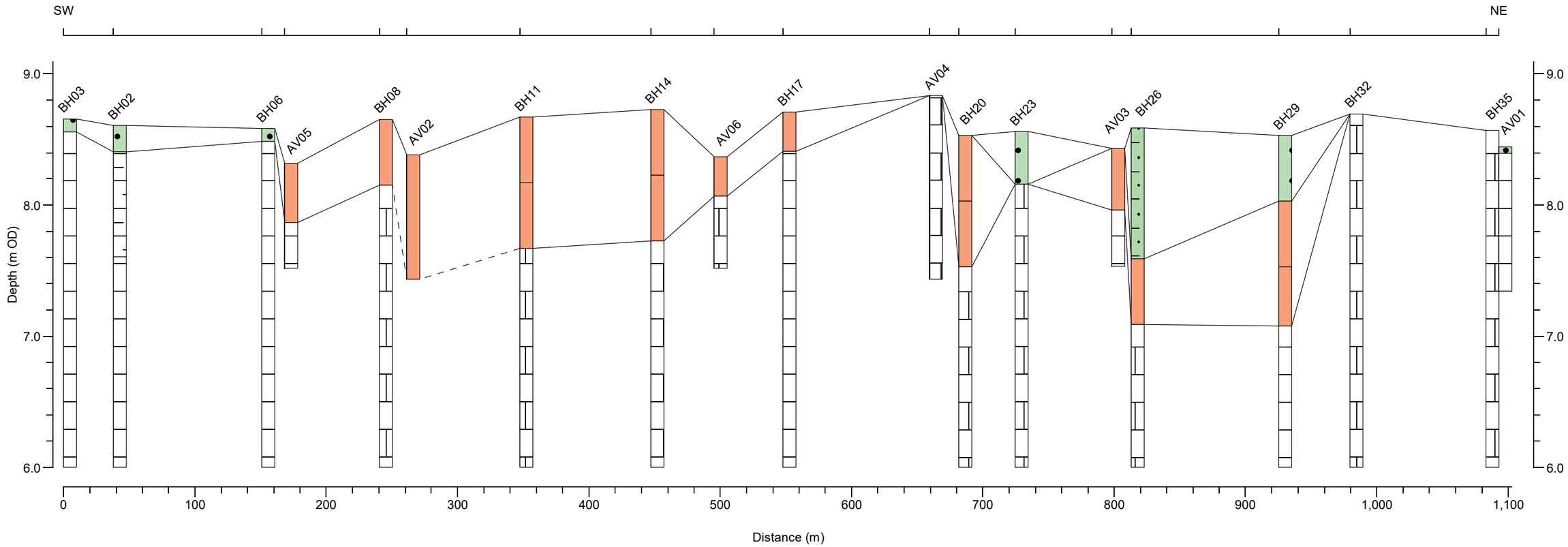
## Stratigraphy

- Alluvium
- Modern Riverbed Sediments (Gravel)
- Modern Riverbed Sediments (Silts/Clays)
- Shepperton Gravel
- Reworked Bedrock
- Bedrock




# Transect 7






| Date: 16/12/2022 | Created by: AW | Revision: 0 | Scale: Inset 1:10,000 at A3 |
|---|---|---|---|

Figure 10: Transect 7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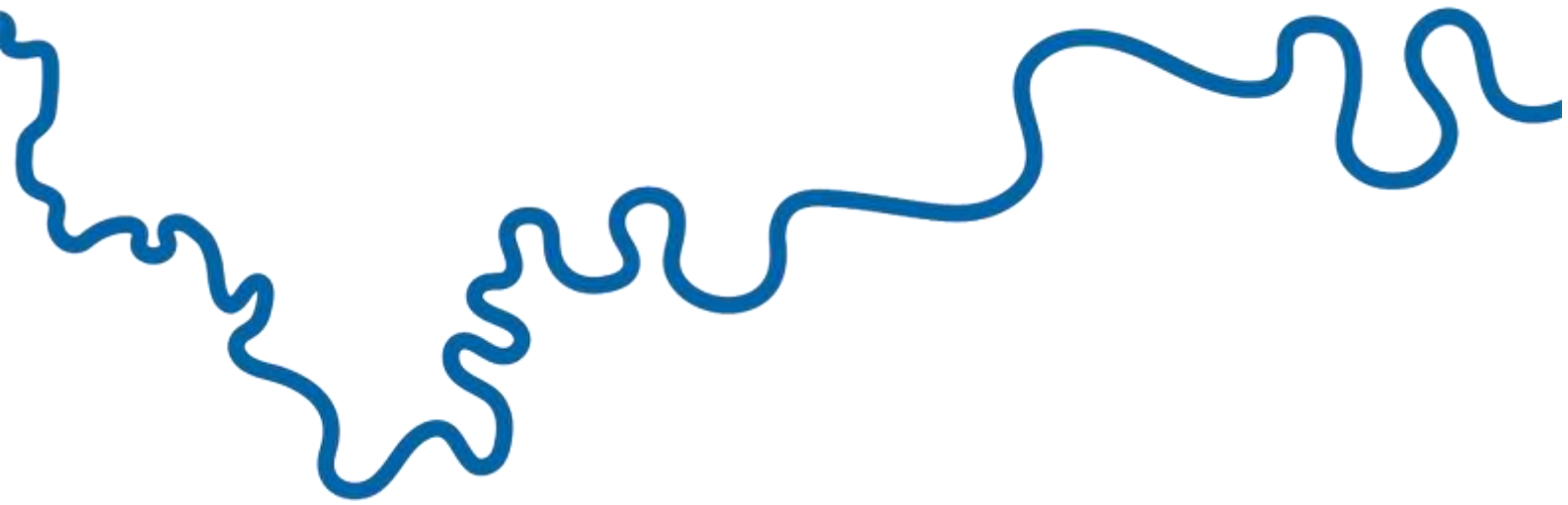

SURREY COUNTY COUNCIL

Environment Agency

The River Thames Scheme represents a new landscape-based approach to creating healthier, more resilient and more sustainable communities by reducing the risk of flooding and creating high quality natural environments.

River Thames
Scheme