Vining Lodsworth WSW

Geoarchaeological monitoring of Ground Investigation works

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Contents

Summary

A programme of monitoring of Ground Investigation (GI) works was undertaken at Langham Lane, Halfway Bridge, Lodsworth, GU28 9DB. The principal aims of the monitoring were to assess the archaeological potential of the Quaternary superficial deposits at the Site, to make suitable proposals for further work, and to contribute to the overall heritage knowledge of the priory through recording of features exposed during groundworks.

A single borehole (BH101) was undertaken, along with three trial puts (TP1, TP2, TP3), each of which was monitored and described by the attending geoarchaeologist.

The deposits recorded across the Site are situated within a dry valley forming part of the wider palaeodrainage of the River Rother. The sequence of deposits comprised Hythe Formation Sandstone, Colluvium, and Made Ground. There is no evidence for buried soils sealed by the colluvium and the deposit sequence has a low archaeological and geoarchaeological potential. Ceramic building material was found in TP3. The date of the CBM is uncertain; at the earliest it may reflect Roman activity but is most likely Post-Medieval or later date and subsequently moved down slope.

No further archaeological work is required owing to the low geoarchaeological potential of the Quaternary deposits and absence of archaeological features.

Acknowledgements

Wessex Archaeology thanks Southern Water Services LTD and Gina Venton for commissioning the geoarchaeological monitoring. The fieldwork was attended by Matt Kendall. The report was compiled by Miriam Weinbren with contributions from Dr Alex Brown, who reviewed the report. The project was managed on behalf of Wessex Archaeology by Dr Alex Brown.

Vining Lodsworth WSW, West Sussex

Geoarchaeological monitoring of Ground Investigation works

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology has been commissioned by Southern Water Services LTD (the 'client') to undertake archaeological and geoarchaeological monitoring of a programme of Ground Investigation (GI) works for the proposed structural/civil works at Lodsworth WSW.

1.2 Scope of works

1.2.1 The proposed scheme and scope of works, outlined in the Ground Investigation Specification (Trant Engineering Ltd 2023) comprises the following components:

- Provide 2x No. New 450m³ break pressure tanks note (exact tank size yet to be determined).
- Provide 1x No. New Pumping Station Kiosk (approx. 9m x 4m)
- c. Provide 1x No. New Pumping Station MCC Kiosk alongside (approx. 2.5m x 7.5m)
- Nominally 200m of new interconnecting pipework of nominal sizes DN250, DN300 and, DN400

1.2.2 The GI works consists of the following elements requiring archaeological and geoarchaeological monitoring:

- One cable percussion borehole per break pressure tank, BH01, sunk to a minimum depth of 12m.
- Three trial pits for identification to assess the workability and suitable installation of pipes.

1.2.3 The geoarchaeological monitoring will provide further information on the archaeological and geoarchaeological resource that may be impacted by the proposed development 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 strategy (to offset the impact of the development on the archaeological resource) or a management strategy.

1.3 Scope of document

1.3.1 To help frame archaeological and geoarchaeological investigations of this nature, Wessex Archaeology has developed a four-stage approach, encompassing different levels of investigation appropriate to the results obtained, accompanied by formal reporting of the results at the level achieved. The borehole survey reported on here represents Stage 2 of this process (**Table 1**).

1.3.2 In format and content, the work follows the methodology set out within the WSI (REF), 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).

Table 1 Staged approach to geoarchaeological investigations

Stage 1: Geoarchaeological Desk-based Assessment (GDBA) and deposit modelling	A Geoarchaeological Desk-Based Assessment (GDBA) examines a range of data (published and unpublished ("grey literature"), LiDAR, historic maps) and models existing Ground Investigation (GI) data to inform on the possible Palaeolithic archaeological and geoarchaeological potential of a site. The GDBA may include, dependant on the site and complexity of a site, a Geoarchaeological Deposit Model which demonstrates the vertical and lateral extent of superficial deposits across the site. The GDBA establishes the requirements for and scope of Stage 2 archaeological and geoarchaeological field elevation. Geoarchaeological potential is defined as potential for paleoenvironmental and dating evidence. Should Stage 2 evaluation be required, appropriate and proportionate recommendations for the site are provided.
Stage 2: Geoarchaeological monitoring of GI works and/or Geoarchaeological borehole survey	Field evaluation to establish the geoarchaeological and archaeological potential of Quaternary deposits within an evaluation area, which informs on the requirements and scope of further works at Stage 2 (e.g. purposive borehole survey), Stage 3 palaeoenvironmental assessment and/or Stage 4 mitigation. The principal methods of geoarchaeological evaluation are through monitoring of Ground Investigation (GI) works or targeted boreholes. A geoarchaeological evaluation report is produced, which includes deposit modelling (where sufficient data allows) and recommendations for further work at Stage 2 or Stage 3 if required. Further works may include additional interventions (stepped trenches, test pits or boreholes) to retain additional/suitable samples for assessment.
Stage 3: Palaeoenvironmental assessment	Palaeoenvironmental samples recovered during Stage 2 are assessed to inform on the archaeological and geoarchaeological potential of deposits and guide the scope and need for Stage 4 analysis. A report is produced outlining the palaeoenvironmental potential of the deposits including targeted and proportionate recommendations for Stage 4 analysis.
Stage 4: Palaeoenvironmental analysis	Based on the results of the Stage 3 palaeoenvironmental assessment, palaeoenvironmental analysis on selected deposits/samples may be required. In addition to full analysis of suitable samples identified during the assessment. work at Stage 4 may include additional scientific dating where appropriate/required. A final analysis report is provided on completion of mitigation program. Where appropriate, this may include recommendations for publication or other forms of dissemination.
Publication	The scope and location of a publication report will be agreed in consultation with the client and LPA advisor. The publication report may comprise a note in a local journal or a larger publication article or monograph, dependant on the significance of the archaeological and geoarchaeological work.

1.4 Location, topography and bedrock geology

1.4.1 The evaluation area is located at Vining Lodsworth SWS, Langham Lane, Lodsworth, West Sussex at National Grid Reference (NGR) 492809 , 122184 (SU 92809 22184).

1.4.2 The underlying bedrock geology across the Site, is mapped by the British Geological Survey (BGS) as Hythe Formation Sandstone; a sedimentary bedrock formed between 126.3 and 113 million years ago during the Cretaceous period.

1.4.3 The Site lies on a gentle slope, with a ground level of approximately 36m above sea level.

1.4.4 Superficial deposits are not mapped directly over the Site, but Head deposits are recorded to the east of the Site (**see section 2 below**).

2 GEOARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The superficial deposits in the Site 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 2**).

2.1.2 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 2 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
		Aveley interglacial		7
		Unnamed cold stage		8
		Purfleet interglacial		9
		Unnamed cold stage		10

Geological Period	Chronostratigraphy	Age (ka)	MIS
	Hoxnian interglacial	374 – 424	11
	Anglian glaciation	424 – 478	12
	Cromerian Complex	478 - 780	13 – 19

2.2 Geoarchaeological background

2.2.1 This section provides relevant background information on the Quaternary superficial deposits that may be present in the Site. BGS mapping suggests that the following deposits are present in the area of the Site and may be encountered during the proposed borehole survey:

Head/colluvium

2.2.2 Head deposits are largely cold climate solifluction deposits, (slope wash occurring as a result of alternate freeze-thaw) accumulating in the base of valley bottoms but may include units derived through alluvial and aeolian processes.

2.2.3 Head/coombe deposits are distinct from colluvium which forms during the Holocene, representing poorly sorted sediment transported to the base of slopes, typically dating to the Neolithic and later periods as a result of mainly agricultural activities.

2.2.4 A series of dry valleys are mapped across the area which most likely formed through a processes of seasonal melt water erosion associated with former watercourses or faults.

2.2.5 It is unclear whether the Superficial deposits mapped within this valley are Head or colluvium.

2.2.6 Head deposits can contain organic remains and archaeological material, but as the deposit has been transported, the source area is uncertain. The overall geoarchaeological potential of these deposits are low except where they contain or seal archaeological layers or in-situ deposits.

3 ARCHAEOLOGICAL BACKGROUND

3.1.1 There have been limited archaeological works and investigations in the area around the Site. A range of finds and features have however been noted in the wider area.

3.1.2 No Palaeolithic artefacts have been recorded in the immediate vicinity of the Site. However, a scatter of flint tools, including microliths were recorded at Hesworth Common, approximately 6 miles south-east of the Site. These have been tentatively dated to the Mesolithic between 8000 and 7000 cal BC. (David 2019).

3.1.3 A Mesolithic flint and core were found 1.5 miles south of the Site (Monument Number 766901).

3.1.4 A concentration of Bronze Age barrows is located approximately 2.5 miles south of the Site, throughout the area of Graffham. These are part of a wider distribution of barrows along the South Downs, south of the River Rother (Thomas 2013).

3.1.5 A small motte was built to the north of the Site in the 13th century, which may have been repurposed as a windmill base in approximately 1700 (Holden 1967).

4 AIMS AND OBJECTIVES

4.1 Overarching aims

4.1.1 The general aims (or purpose) of the borehole survey, in compliance with the CIfA *Standard and guidance for archaeological field evaluation* (CIfA 2014a), are:

- provide information about the archaeological and geoarchaeological potential of the Site;
- consider the possible significance of any archaeological and geoarchaeological evidence present, or potentially present, in the context of national and regional research priorities and agendas;
- inform either the scope and nature of any further archaeological and geoarchaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

4.2 Overarching objectives

4.2.1 The specific objectives of the geoarchaeological borehole survey are as follows:

- To record the sequence of superficial deposits at the borehole and trial pit locations;
- To obtain geoarchaeological samples of relevant deposits (where possible);
- Interpret the probable environments represented;
- Determine the importance of the deposits with regard to their archaeological and geoarchaeological (including palaeoenvironmental) potential; and
- Make specific recommendations for further work, where appropriate, which may include additional geoarchaeological boreholes, palaeoenvironmental assessment and/or scientific dating.

5 METHODOLOGY

5.1 Monitoring of ground investigation works

5.1.1 An experienced geoarchaeologist from Wessex Archaeology monitored the Ground Investigation (GI) works. A total of three trial pits (TP1, TP2, TP3) and one borehole (BH101) were monitored and described to a maximum depth of 9.50m.

5.1.2 The attending archaeologist liaised closely with the geotechnical drillers to ensure effective communication was maintained throughout the works.

5.1.3 Hand-dug test pits were excavated to a depth of 1.2 metres below ground level (mbgl) prior to drilling.

5.1.4 The supervising geoarchaeologist recorded and interpreted the sequence of deposits encountered to allow assessment of likely geoarchaeological potential. Where appropriate, paleoenvironmental samples were taken.

5.1.5 The boreholes 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*

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

6 RESULTS

6.1 Introduction

6.1.1 This section summarises the results of the purposive geoarchaeological borehole survey and monitoring of the GI works.

6.1.2 The GI works (Trant Engineering Ltd 2023) consists of the following elements requiring archaeological and geoarchaeological monitoring:

- One cable percussion borehole per break pressure tank, BH01, sunk to a minimum depth of 12m.
- Three trial pits for identification to assess the workability and suitable installation of pipes.

6.2 Stratigraphic sequence

6.2.1 The full sequence of superficial geological deposits recorded during the borehole survey and monitoring of the GI works, and forming the basis of the deposit modelling, comprises:

- Topsoil (modern)
- Colluvium (Holocene)
- Bedrock (Hythe Formation Sandstone)

Topsoil

6.2.2 Present across the Site, this was the uppermost unit composed of mid brown sandy loam topsoil, overlying a silty sand subsoil. It ranged in thickness from 0.40m in TP3, to 0.85m in TP1.

Colluvium

6.2.3 Present across the Site, this layer consisted of a sandy clay. Sparse amounts of manganese and ironstone were present. It ranged in thickness from 0.30m in TP3 to 0.80m in BH101.

6.2.4 Two colluvial deposits were noted in TP3, the upper layer consisting of a sandy clay (303), and the other a clay sandy silt (304), representing two colluvial events.

6.2.5 Aside from (303), no date can be assigned to the colluvial deposits due to a lack of finds and dateable material. CBM was not retained from (303), so more precise dating is not possible.

Bedrock

6.2.6 Bedrock was recorded as a yellowish-brown sandy clay and was recorded in all trial pits and the singular borehole at depths between at elevations between 1.10m to 2.40m.

7 DISCUSSION

7.1 Introduction

7.1.1 The principal aims of the geoarchaeological monitoring focused on refining understanding of the nature and distribution of Quaternary superficial sediments across the Site, to assess the geoarchaeological potential of those deposits, and to inform on the requirements for any further archaeological and geoarchaeological investigations.

7.1.2 A total of three trial pits (TP1, TP2, TP3) and one borehole (BH101) were monitored, revealing a consistent sequence across the Site, comprising Sandstone bedrock, Colluvium, and Topsoil.

7.2 Sedimentary sequence and depositional environment

7.2.1 The Quaternary superficial deposits recorded across the evaluation areas are situated within a dry valley forming part of the wider palaeodrainage of the River Rother.

7.2.2 Degraded and weathered Hythe Formation Sandstone bedrock is recorded at the base of each sequence. This was directly overlain by colluvial deposits typically comprising a single unit, but with two distinct colluvial units recorded in TP3. Colluvium was overlain by topsoil.

Colluvium

7.2.3 Between 0.30 to 0.80m of colluvium was recorded. There was no evidence for any stratigraphy within the colluvium or evidence for underlying deposits of archaeological or geoarchaeological potential such as buried soils or organic deposits (e.g., peat).

7.2.4 The Site is located at the head of a small dry valley, feeding into the River Rother. A number of dry valleys are located across Sussex, preserving sequences of colluvium and head. Unlike the dry valley discussed here, these are typically recorded over chalk bedrock. While Head deposits are primarily cold climate solifluction deposits (slope wash occurring as a result of alternate freeze-thaw) formed during the Pleistocene, colluvial deposits are a poorly sorted heterogenous sediment of Holocene date. Colluvial deposits are notoriously difficult to date, particularly with an absence of artefacts, but reflect periods of soil instability, which are subsequently related to woodland activity and agricultural activity which has occurred variously since the Neolithic period.

7.2.5 Many colluvial sequences located in areas of slope relief and dry valleys across Southeast England have revealed artefacts extending over a long period of time as a result of land use factors, particularly agricultural activity. These activities have largely occurred since the Neoltihic, increasing during the Bronze age and just defined phases of accumulation during the Roman and post-Roman periods.

7.2.6 These colluvial deposits may vary from predominantly fine to coarser grained material and may reflect a combination of material gradually eroded into valley bottoms or during more episodic and perhaps more energetic events. The predominantly fine-grained structure of the colluvium on site would rather suggest a gradual process of soil creep.

7.2.7 A single find of ceramic building material (CBM) was recorded in TP3. Due to the eroded and mixed natural of colluvium deposits, finds are often difficult to interpret. This particular, isolated find may have been deposited in general waste through a farming practice known as manuring, whereby domestic waste and other debris is mixed into manure piles before being spread across agricultural fields.

7.2.8 On the basis of the CBM, the colluvium deposit may date no earlier than the Roman period. It is however most probably of a Post-Medieval or later date. In addition, archaeological sites, when present, are found either at the top or base of slopes, rather than directly on an area of uneven relief, hence why archaeology is often found in, or sealed by, colluvial deposits.

8 CONCLUSION AND RECOMMENDATIONS

8.1 Summary

8.1.1 Geoarchaeological monitoring of GI works was undertaken, forming part of the program of investigation that will inform subsequent design solutions.

8.1.2 The key results of the geoarchaeological monitoring, and the geoarchaeological potential of the revealed deposits, are summarised below:

- Colluvium was recorded in all interventions, directly overlying degraded Hythe Formation Bedrock. No internal or underlying stratigraphy of archaeological potential was recorded.

- A fragment of ceramic building material was recorded in the colluvium of TP3 which suggest the deposits may be of historic date, no earlier than the Romano-British period and most likely of a medieval or post-medieval date.

- The colluvium was overlain by plough soil. No archaeological finds or features beyond the CBM were identified in any intervention.

8.2 Recommendations

8.2.1 No further archaeological work is required owing to the low geoarchaeological potential of the Quaternary deposits and absence of archaeological features.

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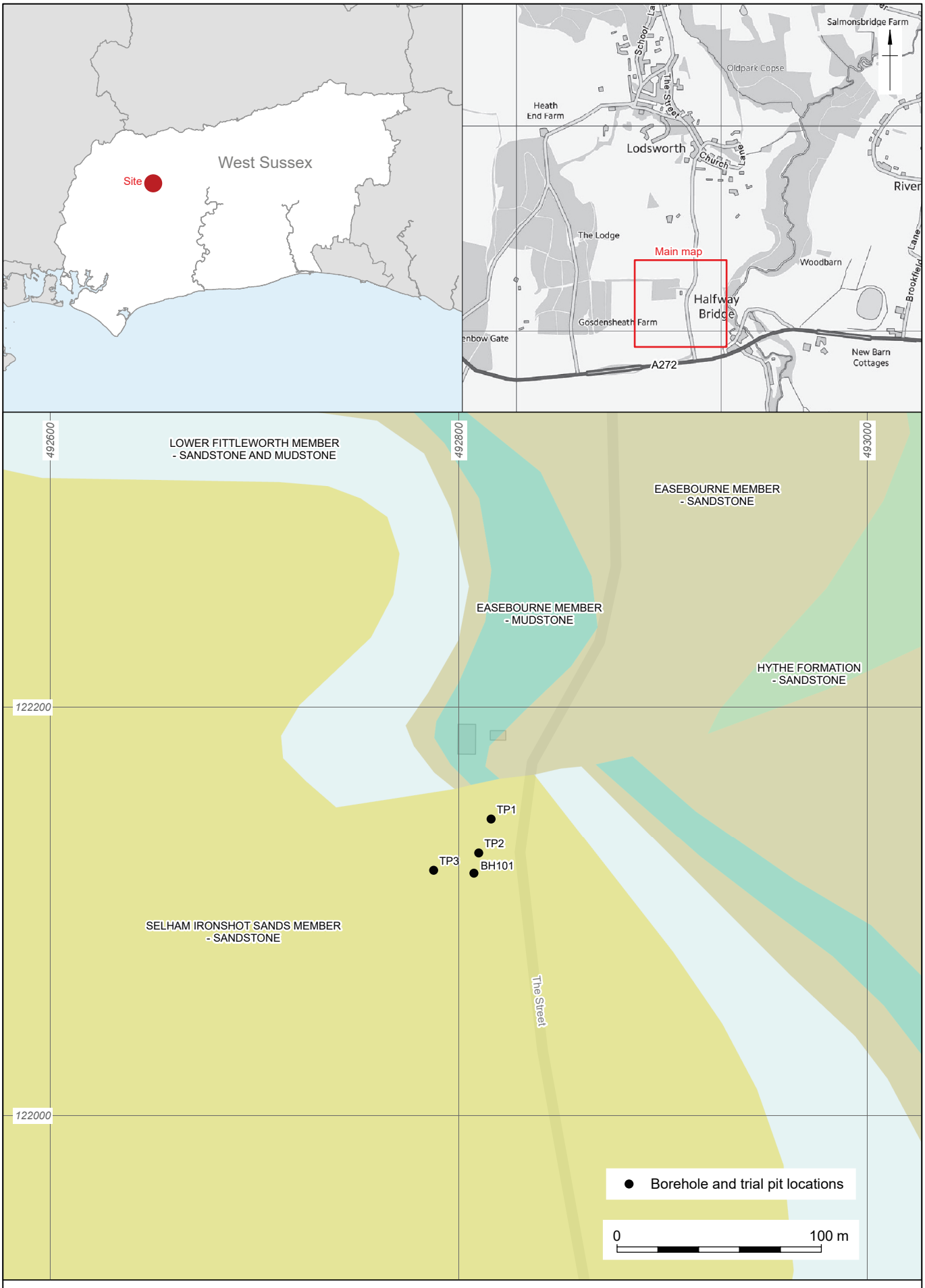

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Figure 1: Borehole and trial pit locations and BGS bedrock geology

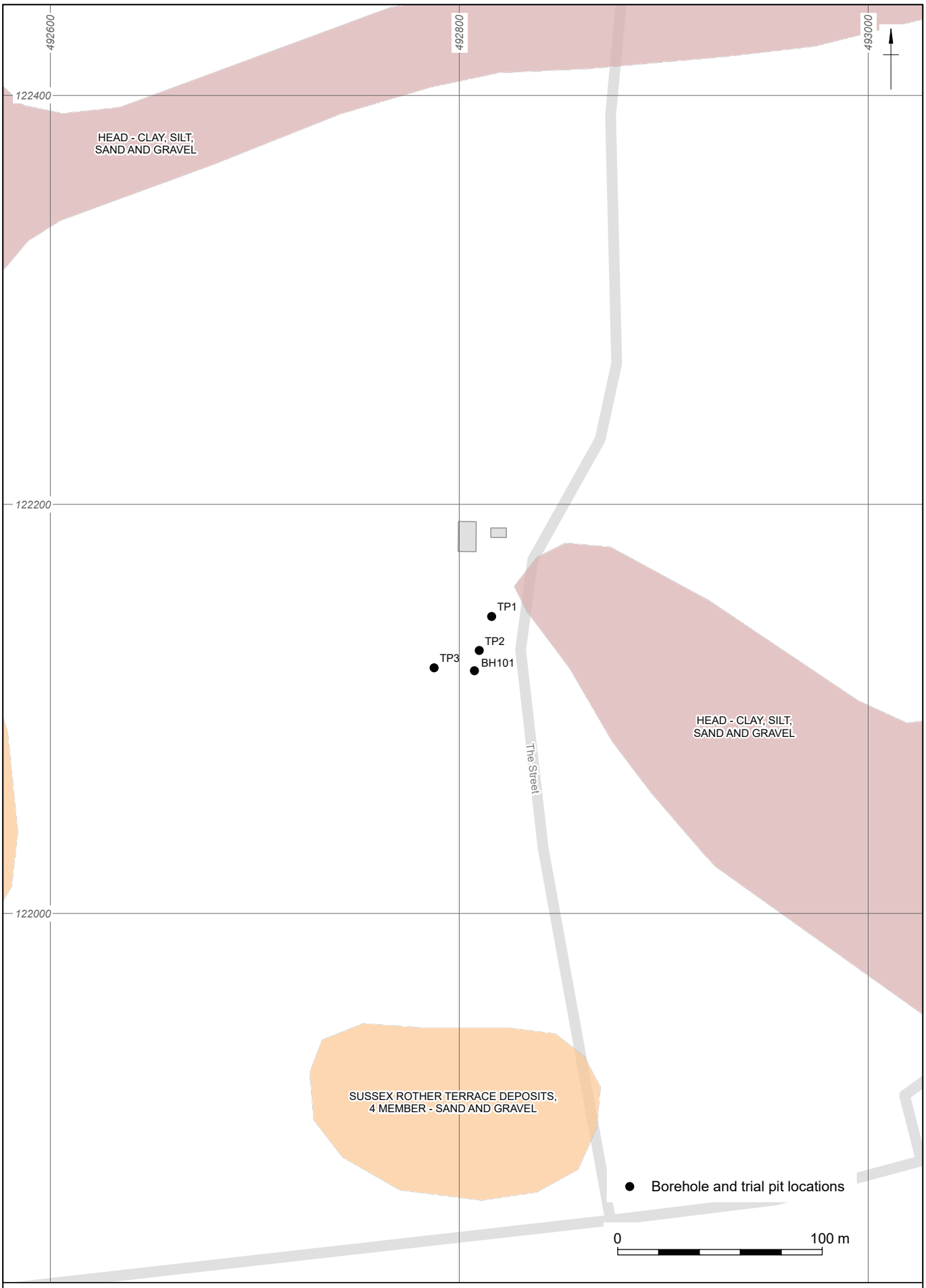

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Figure 2: Borehole and trial pit locations and BGS superficial geology

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