Springhead Bridge Works, Ebbsfleet, Kent

Post-excavation Assessment and Updated Project Design

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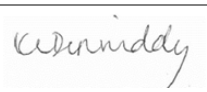
1	22/02/2023	REW	

Contents

Summary ..... *iii*
Acknowledgements ..... *iv*

1 INTRODUCTION 1
1.1 Project and planning background 1
1.2 Scope of the report 2
1.3 Location, topography and geology 2

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND 2
2.1 Introduction 2
2.2 Archaeological and historical context 3

3 AIMS AND OBJECTIVES 6
3.1 Aims 6
3.2 Research objectives 6

4 METHODS 6
4.1 Introduction 6
4.2 Fieldwork methods 7
4.3 Finds and environmental strategies 8
4.4 Monitoring 8

5 STRATIGRAPHIC EVIDENCE 8
5.1 Introduction 8
5.2 Soil sequence and natural deposits 8
5.3 Prehistoric deposits (pre-AD43) 9
5.5 Anglo-Saxon (AD410–1066) 10
5.6 Uncertain date 11

6 FINDS EVIDENCE 11
6.1 Introduction 11
6.2 Pottery 11
6.3 Ceramic building material (CBM) 13
6.4 Fired clay 13
6.5 Stone 13
6.6 Worked flint 13
6.7 Burnt flint 15
6.8 Glass 15
6.9 Metalwork 15
6.10 Animal bone 16
6.11 Conservation 17

7 ENVIRONMENTAL EVIDENCE 18
7.1 Introduction 18
7.3 Results 19
7.4 Discussion 19

8 STATEMENT OF POTENTIAL 20
8.1 Stratigraphic potential 20
8.2 Finds potential 20
8.3 Environmental potential 21
8.4 Summary of potential 21

9 UPDATED PROJECT DESIGN 22
9.1 Updated project aims 22
9.2 Stratigraphic evidence – recommendations for analysis 22
9.3 Finds evidence – recommendations for analysis 22

9.4 Environmental evidence – recommendations for analysis 23
9.5 Radiocarbon dating recommendations 23
9.6 Proposals for publication 23
9.7 Programme for analysis and publication 24
9.8 Personnel and resources 24
9.9 Management structure 25

10 STORAGE AND CURATION 25
10.1 Museum 25
10.2 Preparation of the archive 25
10.3 Selection strategy 26
10.4 Security copy 27
10.5 OASIS 27

11 COPYRIGHT 27
11.1 Archive and report copyright 27
11.2 Third party data copyright 28

REFERENCES 29

APPENDICES 34
Appendix 1: Finds tables 34
Appendix 2: Environmental tables 36
Appendix 3: Dendrochronology report 38
Appendix 4: Selection Strategy 39
Appendix 5: OASIS summary 40

List of Figures

Cover Trenching/level reduction within the northern cofferdam, viewed from the north-west.
Figure 1 Site location
Figure 2 Archaeological features
Figure 3 Initial strip for southern cofferdam, viewed from the north
Figure 4 West facing stepped section for southern cofferdam
Figure 5 Recording timber beam 1127 *in situ* in the northern cofferdam, viewed from the north-west
Figure 6 SSW facing section of ditch 1137
Figure 7 SSW facing section of ditch 1160
Figure 8 South-west facing section of pit 1166
Figure 9 Quarry pit 1186 viewed from the SSE

List of Tables

Table 1 All finds by material type
Table 2 Animal bone: number of identified specimens present (or NISP)
Table 3 Metal objects selected for conservation treatment
Table 4 Task list

Summary

Wessex Archaeology was commissioned by CgMs Consulting, now part of RPS Consulting Services Ltd (London), to undertake a programme of archaeological mitigation which comprised geoarchaeological investigations including a borehole survey, a strip, map and sample excavation, and a controlled watching brief on ground reduction and associated works, these carried out prior to and during the construction of a new road bridge spanning the River Ebbsfleet at Springhead Quarter, part of Ebbsfleet Garden City, Gravesend/Dartford, Kent, centred on National Grid Reference 562900 173000. Planning permission for the construction of the Springhead Road Bridge was originally sought in 1996 (GR/96/35DA-96/47) as part of the overall scheme of work for the Springhead Quarter development. In 2009 a revised planning application was submitted for the construction of the Springhead Road Bridge to Gravesham Borough Council (GR/2009/0058) and to Dartford Borough Council as the northern end of the bridge lies within the Dartford boundary (DA/09/00119).

The geoarchaeological component of the works, undertaken in advance of the construction of three cofferdams, has been reported on separately, with summary details included below. The sequence of peat and organic deposits are predominantly of Neolithic date, with the earliest deposits forming in the Early Neolithic (*c.* 4000 cal. BC), through to the Middle to Late Neolithic (*c*. 2500 cal. BC). One sequence provided a tentative medieval age for the deposits here (cal. AD 900–1110), although it is possible that this incorporated later material introduced due to post-depositional processes.

Evidence of prehistoric activity from the work reported here is indicated by a few pottery sherds and a thin scatter of residual worked flint recovered from various contexts across the site, most of this likely to be of Neolithic date but with some later material present. A single ditch, probably originating in the Romano-British period, may have defined the west side of a trackway (the ditch on the east side recorded in earlier investigations), this being approximately 5 m wide and running along the east bank of the Ebbsfleet. The trackway is likely to have linked the Roman roadside settlement at Springhead to the south with the villa at Northfleet to the north.

Within the northern cofferdam, a part of a tree and a large piece of worked timber beam was recorded, the latter thought from its size and nature likely to be of Romano-British date, possibly accidentally dropped in the Ebbsfleet, its precise origin and destination (a waterfront structure at Springhead?) uncertain. This beam has been subject to dendrochronological investigation, the results of which could not be matched with any known medieval sequences, implying a pre-AD1100 date.

The upper fills of the likely Romano-British ditch contained Anglo-Saxon finds, in particular pottery and animal bone, as well as metalwork and lava quernstone which could be either Romano-British or Anglo-Saxon. The upper fills were relatively rich in charred plant remains that are also indicative of an Anglo-Saxon date. It is likely that these deposits derived from a nearby small riverside settlement recorded in earlier archaeological investigations within the Springhead Quarter development.

A probable chalk quarry pit contained a few Anglo-Saxon finds, but these are thought to have been residual in what was probably a medieval or post-medieval feature.
The recommendation for publication is that ideally it should be published alongside the results of other, more extensive excavations undertaken within the Springhead Quarter over the past two decades. However, if it is to be a stand-alone article then it should be submitted to the county journal, *Archaeologia Cantiana*, for publication in the journal or on-line.

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Wessex Archaeology would like to thank CgMs Consulting, for commissioning the archaeological mitigation works, in particular Alistair Robertson. Wessex Archaeology is also grateful for the advice of the Senior Archaeological Officer, who monitored the project for Kent County Council, and to Balfour Beatty's for their cooperation and help on site.

Springhead Bridge Works, Ebbsfleet, Kent

Post-excavation Assessment and Updated Project Design

1 INTRODUCTION

1.1 Project and planning background

1.1.1 Wessex Archaeology was commissioned by CgMs Consulting (now part of RPS Consulting Services Ltd (London)), to undertake archaeological mitigation works comprising geoarchaeological investigations including a borehole survey (reported on separately), a strip, map and sample excavation, and a controlled watching brief on ground reduction and associated works. The entire Springhead Bridge site covers 2.2 ha, centred on NGR 562900 173000, at Ebbsfleet, Kent (Fig. 1).

1.1.2 Planning permission for the construction of the Springhead Road Bridge was originally sought in 1996 (GR/96/35DA-96/47) as part of the overall scheme of work for the Springhead Quarter development. In 2009 a revised planning application was submitted for the construction of the Springhead Road Bridge to Gravesham Borough Council (GR/2009/0058) and to Dartford Borough Council as the northern end of the bridge lies within the Dartford Boundary (DA/09/00119). The following condition had been applied to the planning application:

Condition 1: *'no development or works involving ground excavation, including stripping of topsoil, shall take place until the applicant, or their agents or successors in title, has secured the implementation of a programme of archaeological work in accordance with a written specification and timetable which has been submitted to and approved by the Local Planning Authority'*

Reason: 'to ensure that features of archaeological interest are properly examined and recorded'.

1.1.3 The development is part of the Springhead Quarter Phase 3 project which in turn is part of the larger Ebbsfleet Garden City Project. This element of the work is concerned with the construction of the Ebbsfleet Road Bridge across the River Ebbsfleet connecting the Northern Link Road, which is also part of a second scheme of work, to the A2660 Ebbsfleet Gateway. The Ebbsfleet Garden City Project and Channel Tunnel Rail Link (CTRL), subsequently Hi Speed 1 (HS1), which bisects Ebbsfleet Garden City, have both been subjected to extensive and on-going archaeological and geoarchaeological investigations; only those with direct relevance will be discussed within this assessment.

1.1.4 The archaeological mitigation (excluding boreholes, reported on separately) for the Springhead Bridge Works comprised a staged approach, with a programme of archaeological watching brief monitoring the enabling works forming the Stage 1 phase. Stage 2 comprised evaluation trenches – where the sedimentary material was deemed suitable for trenching; this phase proved largely unviable (on grounds of health and safety) and was replaced by further monitoring under watching brief conditions. Stage 3 works consisted of archaeological excavation, with one area identified as requiring Stage 3 mitigation prior to the commencement of the construction work. The option for enacting further Stage 3 works beyond the identified area was not requested.

1.1.5 The archaeological mitigation was undertaken in accordance with a written scheme of investigation (WSI), which detailed the aims, methodologies and standards to be employed for the fieldwork and the post-excavation work (Wessex Archaeology 2018a). A separate WSI was issued which covered the Stage 3 excavation (Wessex Archaeology 2018b). The Senior Archaeological Officer for Kent County Council (SAO for KCC) approved the WSIs, on behalf of the Local Planning Authorities (LPA), prior to the fieldwork. The archaeological mitigation was undertaken intermittently between 5th May 2018 and 15th May 2019.

1.2 Scope of the report

1.2.1 This report provides the provisional results of the archaeological mitigation and assesses the potential to address the research aims outlined in the WSIs. Where appropriate, it includes recommendations for further analysis, outlining the resources needed to achieve the aims (including the revised research aims arising from this assessment), leading to dissemination of the archaeological results via publication and the curation of the archive.

1.3 Location, topography and geology

1.3.1 The Springhead Quarter is located within the south-east quadrant of the Ebbsfleet Garden City development on the south bank of the River Thames between Swanscombe and Northfleet, Kent. The site is bound to the east by Springhead Enterprise Park and Northfleet Wastewater Treatment Works, to the south by the A2 (Roman Watling Street), to the west by the A2260, and to the north by Ebbsfleet International Station (Fig. 1).

1.3.2 The site falls almost entirely within the parish of Northfleet under the administration of Gravesham Borough Council.

1.3.3 The Springhead Quarter occupies a spur of land forming the eastern side of the Ebbsfleet Valley and the southern side of an unnamed dry valley. As a result, the central and southern parts of the area are slightly domed at 27–30m above Ordnance Datum (aOD). From the domed area the ground levels fall gently to the north and west towards the River Ebbsfleet. The site is located at the north-west end of the Springhead Quarter and crosses the River Ebbsfleet valley. On the north side of the Ebbsfleet ground levels are between 0.3 m and 2.0 m aOD. On the south side of the river ground levels are around 6 m aOD (in the site compound area) falling to between 4.3 m and 2.6 m aOD in the excavation area adjacent to the Ebbsfleet.

1.3.4 The natural geology underlying the site comprises the Seaford Chalk Formation and Newhaven Chalk Formation. Superficial deposits of alluvium are recorded in the River Ebbsfleet basin with head deposits of clay, silt, sand and gravel recorded on the basin edges (British Geological Survey 2022).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 The Springhead Bridge site lies in an area rich in archaeology. Numerous archaeological investigations have been conducted in the Ebbsfleet Garden City area, including detailed excavations as part of the Channel Tunnel Rail Link (CTRL), subsequently High Speed 1 (hereafter HS1), work. The archaeological foci of the Springhead Bridge works were a Romano-British ditch exposed in an HS1 service trench which crossed the site and was also recorded in the Springhead Phase 3 investigations immediately to the north-east, as well as providing further information on the geoarchaeological significance of the River

Ebbsfleet and associated deposits. The archaeological and historical context below details the relevant investigations.

2.2 Archaeological and historical context

2.2.1 The Ebbsfleet Valley contains a range of Pleistocene and Holocene deposits associated with nationally significant Palaeolithic, Mesolithic and later prehistoric archaeology (Wenban-Smith *et al.* 2020).

Lower and Middle Palaeolithic (500,000 BC–40,000 BC)

2.2.2 Pleistocene sands, gravels and chalk-rich sediments on the valley sides have produced important Lower and Middle Palaeolithic archaeology and paleoenvironmental remains.

2.2.3 The site is located 0.6 km east of the Middle Pleistocene deposits at Southfleet Road (~420 kya), which contained the remains of an elephant and associated Lower Palaeolithic archaeology (Wenban-Smith 2013).

2.2.4 It is also 0.5–0.7 km south-east of Baker's Hole and findspots associated with the Ebbsfleet Channel; these have produced some of the country's most significant early Middle Palaeolithic (240–160 kya) archaeology (Wenban-Smith 1995; Scott 2010, 2011; Scott *et al*. 2010; Wenban-Smith *et al.* 2020). The archaeology derives from late Middle Pleistocene chalky solifluction ('coombe rock') and fluvial deposits.

2.2.5 Part of Baker's Hole and an area of the Ebbsfleet Channel have been afforded Scheduled Monument status (1003557).

2.2.6 In 2003, monitoring of geo-technical test pits (Wenban-Smith 2003a, 2003b) and archaeological evaluation trenches (Wessex Archaeology 2004) within the Springhead Quarter site identified a Pleistocene fluvial terrace deposit with its base at 11 m above Ordnance Datum. Three flint flakes as well as part of a mammoth tusk were recovered, making this area of high Palaeolithic potential.

2.2.7 A further phase of test pit investigation took place in 2006, along the course of the now buried storm water culvert along the eastern and northern sides of the site (Wessex Archaeology 2006; see Fig. 1). This established that the fluvial terrace deposit did not continue further south. However, the southernmost test pit did reveal a second fluvial terrace at a higher elevation with its base of 14 m aOD.

Upper Palaeolithic, Mesolithic and Neolithic (35,000 BC–2500 BC)

2.2.8 Rich late Upper Palaeolithic, Mesolithic and Neolithic archaeological remains are associated with alluvial and peat sequences in the Ebbsfleet Valley bottom and within valley side colluvium (Burchell 1938; Burchell and Piggott 1939; Sieveking 1960; Bates and Stafford 2013; Wenban-Smith *et al.* 2020).

2.2.9 Two areas associated with Late Upper Palaeolithic and Mesolithic worked flint, as well as Middle Neolithic 'Ebbsfleet Ware' (this is the type site for the pottery style), are located 200 m to the north-east and 300 m south respectively of the site, and these have been afforded Scheduled Monument status (SM 1004206).

2.2.10 Investigations at Swanscombe Marsh for HS1 identified a sequence of late Pleistocene Gravels (Shepperton Member) overlain by two peat horizons that were separated and overlain by clay silts (Bates and Stafford 2013). A series of radiocarbon dates suggest a Mesolithic date for the earlier peat (6610–5520 cal BC) and late Mesolithic to early Bronze

Age date for the younger peat (3970–1500 cal BC). At one location sandy clay alluvial silt directly overlay the fluvial gravel. This unit produced a Late Upper Palaeolithic flint assemblage, while the immediately overlying peat produced an Early Neolithic lithic assemblage.

2.2.11 Work carried out for HS1, the North Kent Line Link and the South Thameside Development Route 4 targeted the sequence of deposits in the lower Ebbsfleet Valley, around Ebbsfleet International Station, immediately north of the site (Bates and Stafford 2013; Wenban-Smith *et al.* 2020). This identified a complex but consistent sequence of sediments buried within the floor of the valley. The sequence consists of Pleistocene chalky solifluction and fluvial gravel, discontinuously overlain by organic sandy silt of early Holocene age (~8500 cal BC), which are themselves sealed by estuarine clay silts deposited during the Late Mesolithic. These are post-dated by peat containing *in situ* Early Neolithic flint scatters. In some places, this peat is overlain by tufa formed between the Early Neolithic and Early Bronze Age. The top of the sequence consists of estuarine clay silts laid down during the Early Bronze Age to Early Iron Age and a second peat horizon, which is dated to the Early Iron Age (840–590 cal BC). Paleoenvironmental evidence, animal bone and waterlogged timber structures were also recovered from these Neolithic and later deposits.

2.2.12 A little over 200 m to the south of the current site, investigations at the HS1 Ebbsfleet River Crossing location recorded sequences of peat and alluvial deposits, as well as archaeological features, dating from the Early Neolithic to the Anglo-Saxon period (Wenban-Smith *et al.* 2020).

2.2.13 An earlier geoarchaeological borehole survey carried out at the site and across the present channel of the River Ebbsfleet identified a similar sequence to that found to the north around Ebbsfleet International Station, with Pleistocene gravels overlain by organic alluvium and peat; in places, the peat was separated by tufa (Wessex Archaeology 2008a). In one borehole, a possible palaeosol associated with the organic alluvium overlying the gravel was identified. This unit was also associated with burnt worked flint and burnt bone, along with a charred hazelnut shell from which a Late Mesolithic radiocarbon date of (4460–4290 cal BC) was obtained.

2.2.14 This sequence was clarified further in updated deposit modelling (Wessex Archaeology 2017). The varied nature of the sand and gravel surface and overlying Holocene deposits represent a complex sequence of sediments accumulating under marine, semi-terrestrial and terrestrial influences and reflects the dynamic nature of the relationship between fluvial and terrestrial environments.

Bronze Age and Iron Age (2500 BC–AD 43)

2.2.15 During the development for HS1, a general scatter of prehistoric (predominantly Bronze Age) worked and burnt flint was recovered from the ploughsoil by fieldwalking and during evaluation trenching in the general vicinity of the site.

2.2.16 Investigations within the HS1 trace and close to the Ebbsfleet indicated the likely potential of a zone of activity along the lower valley slopes within the Springhead Quarter. Investigations at the HS1 Ebbsfleet River Crossing location recorded the palaeoenvironmental sequences of peat and alluvial deposits noted above, as well as Bronze Age features including burnt mounds (Wenban-Smith *et al.* 2020). The remains of an Early Bronze Age burnt mound was also found immediately to the north of the current site in a service trench.

2.2.17 Extensive excavations within the Springhead Quarter Phase 2/3 development have identified a tree-throw hole containing a large assemblage of Neolithic struck flint as well as other Neolithic pits, an important group of five Early Bronze Age ('Beaker') pits and an extensive Middle Bronze Age field system aligned north–south (Wessex Archaeology 2008b). There is some evidence to suggest that the field system, which includes a central drove way, may have originated in the Early Bronze Age. Other features included 10 Middle–Late Bronze Age cremation-related features and various shallow pits of the same date.

2.2.18 Subsequent, Iron Age activity was represented by a series of ditches and pottery, some of the ditches forming three, related D-shaped enclosures (Wessex Archaeology 2008b). Elements of these had been identified in the HS1 excavations and appear to relate to a possible ceremonial way linked to a focus around the springs at the head of the Ebbsfleet, where a concentration of Iron Age coins was recorded (Andrews, Biddulph *et al.* 2011a).

Romano-British (AD43–410)

2.2.19 The Roman 'small town' or roadside settlement at Springhead (*Vagniacis*), lying astride Watling Street, approximately 0.75 km to the south of the site, is of particular significance because of its associated temple and sanctuary complex associated with the springs that made it an important religious centre throughout much of the Romano-British period. Extensive HS1 excavations, as well as earlier work, exposed much of the sanctuary complex and several temples, and also revealed 150 m of the Roman roads lined by properties containing a variety of (mainly timber) buildings associated with various crafts and industries (Andrews, Biddulph *et al.* 2011a). In addition, several cemeteries and a waterfront have been recorded. A ditch extending north along the east bank of the Ebbsfleet was a focus of the current site.

2.2.20 Within the Springhead Quarter site, there is little evidence of settlement but some re-cutting of Iron Age ditches is apparent during the Romano-British period. Three inhumation burials were also recorded.

2.2.21 Downstream at Northfleet, a little over 0.5 km north of the current site, a large part of a Roman villa complex including a waterfront, a detached bath-house and malting facilities, as well as much of the surrounding agricultural landscape, was investigated (Andrews, Biddulph *et al.* 2011a).

Anglo-Saxon (AD410–1066)

2.2.22 A richly furnished Anglo-Saxon inhumation cemetery, of likely 7th to early 8th century date, was partially investigated during the HS1 archaeological works (Andrews, Biddulph *et al.* 2011a). The cemetery extended into the Springhead Quarter area and the remainder was fully exposed within the Phase 2 works, revealing a total of approximately 150 graves (Wessex Archaeology 2008b).

2.2.23 Limited remains of possibly broadly contemporary settlement(s) were also revealed in the HS1 works, represented by two sunken-featured buildings at Springhead and another group of four close to the Ebbsfleet villa site (Andrews, Biddulph *et al.* 2011a). Subsequently, a further example has been recorded immediately to the north of the current site, at the northern extent of the Springhead Quarter (Wessex Archaeology 2008c).

Medieval (AD1066–1500) and post-medieval (AD1500–1900)

2.2.24 Extensive previous work, including that for HS1, did not suggest that any significant medieval remains would be found on the site. A well, a large quarry pit and a number of east–west aligned ditches, likely to have been field boundaries, were amongst the few medieval and post-medieval features recorded in the earlier Springhead Quarter works.

2.2.25 Springhead, specifically the area around the springs but also extending downstream, was also the site of a 19th-century pleasure garden and the location of some of the earliest watercress beds in Britain.

3 AIMS AND OBJECTIVES

3.1 Aims

3.1.1 The general aims of the archaeological mitigation, as stated in the WSIs (Wessex Archaeology 2018a and b) and in compliance with the relevant Chartered Institute for Archaeologists' Standards and guidance documents, *Standard and guidance for an Archaeological Watching Brief* CifA 2014a), *Standard and guidance for an Archaeological Field Evaluation* (CifA 2014b), and *Standard and guidance for archaeological excavation* (CifA 2014c), were to:

- examine the archaeological resource within a given area or site within a framework of defined research objectives;
- seek a better understanding of the resource;
- compile a lasting record of the resource; and
- analyse and interpret the results of the excavation and disseminate them.

3.2 Research objectives

3.2.1 Following consideration of the archaeological potential of the site in line with the Springhead Framework and the known archaeological resource, the research objectives of the excavation defined in the WSI (Wessex Archaeology 2018b) were to:

- Determine the extent, nature and character of the Anglo-Saxon [Romano-British] ditch;
- Seek a better understanding of its use and potential association with Anglo-Saxon features known within the surrounding landscape;
- Assess if any further archaeological features are located in the vicinity of the Anglo-Saxon [Romano-British] ditch, and if further features are found, to determine their extent, nature and character; and
- To better understand the use of the River Ebbsfleet and its riverbanks during the Anglo-Saxon period.

4 METHODS

4.1 Introduction

All works were undertaken in accordance with the detailed methods set out within the WSIs (Wessex Archaeology 2018a and b) and in general compliance with the standards outlined in CIfA guidance (CIfA 2014a, b and c) and Kent County Council's *Specification for an Archaeological Watching Brief in Kent*, *Manuel of Specifications Part B: Evaluation – Trial Trenching Requirements*, and *Manual of specifications Part B: Strip, Map and*

Sample requirements (KCC 2011). The post-excavation assessment and reporting followed advice issued by the Association of Local Government Archaeological Officers (ALGAO 2015). The methods employed are summarised below.

4.1.1 The works were divided into three main areas: the northern cofferdam, central cofferdam and southern cofferdam. On the eastern side of the River Ebbsfleet further enabling works, including a compound area and associated services, were monitored under watching brief conditions.

4.2 Fieldwork methods

General

4.2.1 The excavation area was set out using a Global Navigation Satellite System (GNSS), in the same position as that proposed in the WSI (Fig. 1). The topsoil/overburden was removed in level spits using a 360º excavator equipped with a toothless bucket, under the constant supervision and instruction of the monitoring archaeologist. Machine excavation proceeded in level spits until the archaeological horizon or the natural geology was exposed. Originally it was proposed that evaluation trenching be undertaken within the cofferdams where the sedimentary material was deemed suitable for trenching; however, this proved largely unviable (on grounds of health and safety) due to the trench sides collapsing and ingress of water and was replaced by further monitoring under watching brief conditions.

4.2.2 Where necessary, the surfaces of archaeological deposits were cleaned by hand. A sample of archaeological features and deposits was hand-excavated, sufficient to address the aims of the excavation. A sample of natural features, such as tree-throw holes, was also investigated.

4.2.3 Spoil derived from machine stripping and hand-excavated archaeological features was visually scanned for the purposes of finds retrieval. A metal detector was also used. Artefacts were collected and bagged by context. All artefacts from excavated contexts were retained, although those from features of modern date (19th century or later) were recorded on site and not retained.

Recording

4.2.4 All archaeological features and deposits were recorded using Wessex Archaeology's pro forma recording system. A complete record of excavated features and deposits was made, including plans and sections drawn to appropriate scales (generally 1:20 or 1:50 for plans and 1:10 for sections) and tied to the Ordnance Survey (OS) National Grid.

4.2.5 A Leica GNSS connected to Leica's SmartNet service surveyed the location of archaeological features. All survey data is recorded in OS National Grid coordinates and heights above OD (Newlyn), as defined by OSTN15 and OSGM15, with a three-dimensional accuracy of at least 50 mm.

4.2.6 A full photographic record was made using digital cameras equipped with an image sensor of not less than 16 megapixels. Digital images have been subject to managed quality control and curation processes, which has embedded appropriate metadata within the image and will ensure long term accessibility of the image set.

4.3 Finds and environmental strategies

General

4.3.1 Strategies for the recovery, processing and assessment of finds and environmental samples were in line with those detailed in the WSIs (Wessex Archaeology 2018a and b). The treatment of artefacts and environmental remains was in general accordance with: *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA 2014d), *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011) and CIfA's *Toolkit for Specialist Reporting* (Type 2: Appraisal).

4.4 Monitoring

4.4.1 The SAO for KCC monitored the works on behalf of the LPA. Any variations to the WSIs, if required to better address the project aims, were agreed in advance with the client and the SAO for KCC.

5 STRATIGRAPHIC EVIDENCE

5.1 Introduction

Summary of archaeological features and deposits

5.1.1 The excavation and watching brief recorded a total of three features, a ditch, a small pit and a possible quarry pit, but only the ditch contained secure dating evidence. All of these features were located on the eastern side of the Ebbsfleet, the ditch and small pit within the 55 m by 10 m strip, map and sample excavation adjacent to the east side of the southern cofferdam (Fig. 2). The possible quarry pit lay within the more extensive watching brief area to the east, which included the site compound (Fig. 1).

5.1.2 Within the River Ebbsfleet channel, geoarchaeologically significant deposits including peat and alluvium sealing Pleistocene gravels were recorded. Detailed assessment of these deposits has been reported elsewhere (Wessex Archaeology 2022); therefore, the stratigraphic sequence and dating of these deposits will only be summarised below.

Methods of stratigraphic assessment and quantity of data

5.1.3 All handwritten and drawn records from the excavation have been collated, checked for consistency and stratigraphic relationships. Key data has been transcribed into a database, which can be updated during any further analysis. Preliminary phasing of archaeological features and deposits was principally undertaken using stratigraphic relationships and the spot dating from artefacts, particularly pottery.

5.2 Soil sequence and natural deposits

Southern cofferdam (55 x 7.5 m) and watching brief area

5.2.1 The watching brief monitored stripping for the compound (80 m x 40 m) and installation of associated services (Fig. 2). The compound was located upslope, approximately 20 m from the edge of the River Ebbsfleet. Here the topsoil was thin and comprised a dark greyish brown silty clay loam, 0.20 m thick, covering off-white chalk natural with periglacial striping. A single geological feature (1104), interpreted as a solution hollow, measured 5.60 m long, 1.30 m wide and 1.20 m deep, and contained four chalky fills.

5.2.2 Towards and adjacent to the River Ebbsfleet the soil sequence and natural deposit sequence changed. The topsoil was a 0.2 m thick greyish brown sandy silt covering a 0.3 m deep mid brown clayey silt subsoil. The subsoil overlay a dark greyish brown sandy

clayey silt colluvial deposit, also approximately 0.3 m deep. This colluvium sealed archaeological features/deposits, specifically ditch 1125 and its fills, dating from the Romano-British and Anglo-Saxon periods, at a depth of approximately 0.8 m (Figs 3 and 4). Ditch 1125 was cut through a lower colluvial deposit comprising a greyish brown silty clay. Beneath the lower colluvium in this area were a series of braided channel edge deposits made up of grey silt alluvium and peat.

Central cofferdam (22.5 x 7.5 m)

5.2.3 The sequence recorded within the central cofferdam reflected the braided channel deposits recorded in the southern cofferdam area, with deposits of grey silty alluvium overlying peat. These deposits were recorded directly beneath the River Ebbsfleet.

Northern cofferdam (80 x 20 m max)

5.2.4 A sequence of peat overlying alluvium was recorded within the northern cofferdam. Recovered from the interface between the peat and the alluvium was a large timber beam, considered most likely of Roman date, described further below; part of an unassociated tree trunk was also recovered.

5.3 Prehistoric deposits (pre-AD43)

5.3.1 The following summary is derived from the associated borehole investigation of the Ebbsfleet channel fills (Wessex Archaeology 2022; see Fig. 2 for borehole locations).

5.3.2 A sequence of alluvium was recorded within the various sequences across the north, central and south cofferdams, with organic-rich and peat deposits widely present. These deposits represent the Holocene floodplain alluvium of the River Ebbsfleet.

5.3.3 The sequence of peat and organic deposits are predominantly of Neolithic date, based on radiocarbon dating, with the earliest deposits forming in the Early Neolithic (c. 4000 cal. BC), through to the Middle to Late Neolithic (c. 2500 cal. BC). One sequence from the south cofferdam provided a tentative Late Saxon–medieval date for the deposits here (cal. AD 900–1110), although it is possible that these deposits incorporated later material introduced due to post-depositional processes.

5.3.4 The results of the palaeoenvironmental assessment indicate the presence of wet woodland (alder carr, possibly with oak) on and around the sampling sites and tree cover on terrestrial areas (oak, hazel, and probably lime). This interpretation is corroborated by the plant macroremain and wood data, which indicates that the woodland environment was composed primarily of alder, although lime was also present during the early stages of peat formation. Very low pollen values for herbaceous taxa and the almost complete absence of aquatics indicate closed woodland, although the possibility of differential preservation means interpretation must be very tentative, since the plant macroremain data provides some evidence for open aquatic and sedge/tall herb-dominated habitats. These areas of sedge/tall herb vegetation are likely to have included permanent areas of standing/slow-moving freshwater and (seasonally) damp/wet ground. The molluscan assemblage similarly includes species indicative of freshwater damp environments such as water meadows, river floodplains or pastures.

5.3.5 There is little evidence for human impact/activity, apart from a few possible cereal-type grains in selected samples, including from the upper part of the peat which may have been washed in. The location/extent of any arable ‘plots’ in the wider landscape cannot be determined from the available data and the presence of cereal type pollen is slightly enigmatic in the wider context of the pollen data. Some ‘anthropogenic indicators’ are

recorded but in very small quantities, whilst the overall diversity of the pollen spectra are rather low. The absence of *Ulmus* (elm) in the samples is consistent with a post-Early Neolithic elm decline (*c.* 4300–3300 cal. BC) date for the majority of the peat sequences, as indicated by the results of the radiocarbon dating. There is little evidence for burning events within the samples, with both microscopic and macroscopic charcoal present in very low concentrations.

5.4 Romano-British (AD43–410)

5.4.1 A single, relatively substantial north-east – south-west aligned ditch, 1125, was recorded in the strip, map and sample area immediately east of the southern cofferdam (Fig. 2). This was the feature targeted here, thought to form a continuation of a Romano-British ditch identified in the HS1 work extending along the east bank of the River Ebbsfleet (Andrews, Biddulph *et al.* 2011a). A total of eight slots were excavated across the 52 m length of the ditch exposed, with between one and six fills recorded. The ditch measured 1.14–2.52 m wide, 0.23–1.11 m deep and had a variable profile (Fig. 6 and 7). The fills comprised a primary fill, from the initial silting, two secondary fills, which had formed as the edges slumped and eroded into the ditch, before two distinctive dumps of material were deposited within the upper part of the ditch, these sealed by a colluvial deposit.

5.4.2 Between the peat and the alluvium within the northern cofferdam was a large, worked timber beam, 1127, at least 5.20 m long, 0.45 m wide and approximately 0.35 m thick (Fig. 5). This was exposed at a height of approximately 0.5 m aOD, lying north-west to south-east across the course of the river, the south-eastern extent unknown as it had been cut through by the sheet piling for the cofferdam; the north-west end was ragged but did not appear to have worked to a point, for example. The timber is oak (*Quercus*), and although it was too damaged/abraded for tool marks to survive, the branches had been removed and the wood shaped into a rectangular cross section. A single knot was noted and a possible shallow slot within one face. A Romano-British date was considered perhaps the most likely in the opinion of the wood specialist during a site visit, partly based on the size of the beam. The wood was recorded in situ and two sections removed for tree-ring analysis, the results of this inconclusive. However, as oak has large reference collections from AD1100–1750, and no matches could be found, this timber is presumed to be most likely from an earlier period (Appendix 3: Arnold and Howard 2019). Overall, a Romano-British date is currently considered most likely for timber beam 1127, possibly dropped in this location when quite fresh, rather than having floated here (from upstream).

5.4.3 In addition to timber beam 1127, part of a tree trunk was recovered from the peat within the northern cofferdam, with no association apparent between them. The tree trunk had no obvious signs of having been worked and is thought interpreted to have simply fallen into the river channel. This tree was also subjected to tree-ring dating, but this too could not be matched with existing sequences (Appendix 3: Arnold and Howard 2019).

5.5 Anglo-Saxon (AD410–1066)

5.5.1 Within ditch 1125 described above, the upper fills comprised a distinctive dark reddish grey silty clay loam 0.09 to 0.42 m thick. These likely represent dumped deposits and contained Anglo-Saxon pottery, relatively large amounts of animal bone, as well as other artefacts including fragments of lava quernstone, ceramic building material and various metal objects. The environmental evidence (see below) further supports a post-Roman date for these uppermost deposits.

5.6 Uncertain date

5.6.1 A small and shallow (0.76 x 0.58 x 0.09 m) pit, 1166, was cut into an upper fill (1154) of ditch 1125. This circular pit had shallow, concave sides and a flat base (Fig. 8). No artefacts were retrieved from the fill.

5.6.2 Located in a trench monitored for new drainage was probable quarry pit 1186. This feature had measurable dimensions of 7 m length by at least 4 m and was 2 m deep. It was possibly circular, with steep, straight sides and a concave base, and contained a single, homogeneous mid to dark brown silty clay loam, interpreted as a deliberate backfill (Fig. 9). A very few, probably residual finds were recovered from this feature.

6 FINDS EVIDENCE

6.1 Introduction

6.1.1 A relatively small assemblage of finds was recovered, ranging in date from prehistoric to modern but predominantly of Anglo-Saxon date. The latter component, consisting of pottery and glass, is comparable to the Anglo-Saxon assemblage recovered from two nearby sites excavated during construction of HS1 at Springhead and Northfleet. It provides a significant addition to the evidence for early Anglo-Saxon activity in the area, including evidence for regional pottery distribution.

6.1.2 All finds have been quantified (count and weight) by material type within each context. Totals by material type are given in Table 1 below, and a full tabulation by context is included in Appendix 1A. An assessment of the archaeological potential of the assemblage is based on the observations made during a brief scan of the material. Recommendations for selection and retention are also made.

Table 1 All finds by material type (number / weight in grammes)

Material	No. frags	Wt. (g)
Pottery	128	2563
Prehistoric	*8*	*37*
Romano-British	*6*	*10*
Anglo-Saxon	*114*	*2516*
Ceramic Building Material	49	5738
Fired Clay	2	87
Stone	5	436
Worked Flint	184	-
Burnt Flint	1186	11,965
Glass	3	3
Metalwork	35	-
Silver	*1*	-
Copper alloy	*12*	-
Iron	*11*	-
Lead	*11*	-
Animal Bone	711	9666

6.2 Pottery

6.2.1 The pottery assemblage amounts to 128 sherds (weighing 2563 g), and this includes material of prehistoric, Romano-British and Anglo-Saxon date.

Prehistoric

6.2.2 Eight sherds are dated as prehistoric. Five are in coarse, flint-tempered fabrics (containing sparse, randomly sorted flint inclusions) and three are in fine-grained sandy fabrics but none are diagnostic. On fabric grounds they can be broadly attributed to the late prehistoric period and, although the longevity of flint-tempered fabrics in Kent means that they cannot be more closely dated with any degree of confidence, the likelihood is that these, and the sandy wares, fall within the Late Bronze Age or Early Iron Age.

6.2.3 All eight sherds are small and abraded and three were almost certainly residual in ditch 1125 (one sherd from fill 1124 and two from fill 1151). The same is also probably true of the five sherds from colluvial layers 1113 and 1116 (Romano-British ceramic building material was recovered from layer 1113).

Romano-British

6.2.4 The six Romano-British sherds, all of which came from ditch 1125, are all samian, comprising the rim from a form 18 platter, dating to the mid–late 1st century AD (fill 1114), and five sherds from a footring base (fill 1138). The fact that these are the only Romano-British sherds found on a predominantly Saxon site may be significant; a bias towards oxidised Romano-British sherds has been noted on other Anglo-Saxon sites and has been attributed to the deliberate collection of Romano-British finewares during that period (eg Plouviez 1985).

Anglo-Saxon

6.2.5 The remaining 114 sherds are Anglo-Saxon. A range of different fabric types are present here, including organic-tempered (although most of these are actually sandy/organic-tempered), sandy and rock-tempered. The sandy wares appear to represent more than one fabric type (and therefore possibly more than one source), some containing angular quartz grains, and some containing rounded grains. The rock inclusions include oolitic limestone, and possible granitic-derived fragments. There are several rims although no reconstructable vessel profiles are present – three rims are from convex or rounded vessels with simple inturned rims, while 11 are from convex or rounded vessels with upright or slightly everted rims.

6.2.6 Two of the latter are decorated, one with at least two horizontal bands of stamped motifs (quartered circles) delineated by tooled lines (ditch fill 1141) and the other with tooled decoration (linear and curvilinear), in both cases situated on the shoulder of the vessel. One body sherd, from a biconical vessel, has tooled horizontal lines on the shoulder, while another body sherd has a small pinched-out boss.

6.2.7 Five oolitic-tempered sherds from ditch fill 1118 are probably from a single vessel, a convex jar with finger-pinched rustication on the exterior. One other sherd, from ditch fill 1138, is finger-pinched, while three sherds (two from ditch fill 1114 and one from ditch fill 1118) are vertically scored – another form of surface rustication.

6.2.8 Nearly all the Anglo-Saxon sherds were found in various fills of ditch 1125, the largest groups coming from fills 1114 (43 sherds) and 1124 (24 sherds). Seven sherds came from other contexts: colluvial layer 1143 (one sherd), layers 1130 (two sherds) and 1177 (one sherd), and quarry pit 1186 (three sherds). Apart from layer 1130, which produced modern metalwork, the Anglo-Saxon sherds constitute the only dating evidence from these contexts.

6.2.9 All of the fabric types seen here are paralleled amongst the previously published assemblage from Springhead and Northfleet, dating between the 5th and 7th centuries (Mepham 2011). In that assemblage, oolitic-tempered fabrics, and others containing rock fragments, were identified as non-local, with potential sources in East Anglia and Leicestershire (the Mountsorrel granodiorite outcrop). The presence of non-local fabrics and surface rustication are considered to be chronologically 'early' traits within the overall date range, focusing on the 5th/6th century, while the use of organic-tempered fabrics is more likely to date to the 6th or 7th century, although the bias towards sandy/organic fabrics rather than those only containing organics might suggest an earlier date within that range. Stamps are generally considered to be typical of the 6th century. It is possible therefore that the whole assemblage could be accommodated within the 6th century.

6.3 Ceramic building material (CBM)

6.3.1 All but one of the 49 fragments of CBM recovered are of Romano-British date; there is also one medieval roof tile. Several Romano-British fragments could be assigned to specific brick/tile types, including seven tegula roof tiles and one combed box flue tile (tubulus). Two fragments have been classified as 'brick' on grounds of thickness (35mm and 40 mm respectively), although the precise type of brick is unknown. Other fragments can merely be classified as 'flat fragments' (thicknesses up to 35 mm, probably mostly from further roof tiles) or 'undiagnostic'. One of the tegulae has a paw print.

6.3.2 All of the CBM is likely to be residual in the contexts in which it was found; these include colluvial layers 1113, 1143, 1155 and 1165, layer 1130 (which also produced modern metalwork), and various fills of Anglo-Saxon ditch 1125. It is of course possible that some of the CBM might have been reused during the Anglo-Saxon period. The single medieval fragment (from a roof tile) came from ditch fill 1142 and is presumed to have been intrusive in this layer.

6.4 Fired clay

6.4.1 Two conjoining ceramic fragments from colluvial deposit 1155 form part of a flat plate with a partially curved edge; the original object may have been subrectangular. The edge is rounded but there are no other distinctive features. The fabric is medium-grained sandy; it does not match any of the pottery fabrics observed. On the basis of associated pottery the object is presumed to be of Anglo-Saxon date but its function is uncertain.

6.5 Stone

6.5.1 Four small, conjoining fragments of stone from ditch 1125 (fill 1114) belong to an imported lava quernstone of probable Anglo-Saxon date (although lava quernstones were imported from the Romano-British period).

6.5.2 Another possible quern fragment was found in ditch 1125 (fill 1149); this is in a probable Greensand. It has a tapering cross-section and appears to be part of a rotary quern of Romano-British type, but whether upper or lower stone is uncertain.

6.6 Worked flint

6.6.1 A total of 184 pieces of worked flint was recovered (Table 1; Appendix 1B). With the exception of a single, unstratified retouched example, the material consists entirely of debitage (flakes and cores). The assemblage is distributed rather thinly across the site and derives from features or deposits of demonstrably later date; in most contexts the material comprises pieces in a mix of conditions and raw material types, and clearly represents a background scatter of redeposited material.

6.6.2 Some context groups are more significant. Colluvium 1113 contained pieces with a cream/white patina and orange 'blotches', as well as exhibiting a considerable degree of wear and edge damage, a condition and degree of preservation typical of pieces from the ploughzone. A fifth piece is glossed and has a pale lemony colour that appears to be an iron mineral stain. The other two pieces are lightly patinated and glossed, but the original colour (grey/brown) is still visible. Cortex where it survives (two flakes are secondary) is thin, worn and pitted, indicating cobble flint. One of the patinated flakes is squat and irregular, but everything else (including a single platform core) demonstrates a good blade technology. Platforms are all plain and there is little sign of any abrasion or other maintenance. Indications are of a Mesolithic or Early Neolithic date.

6.6.3 Flint of a comparable form and very likely dating to the same period was also recovered from layer 1177. This contained six pieces (four of them patinated) including a neat, well maintained single platform blade core and an equally well-made blade, struck with a soft hammer, showing evidence of platform abrasion. Two flakes with parallel dorsal blade scars are also clearly derived from a blade technology.

6.6.4 Fill 1114 in ditch 1125 contained 21 pieces, most of which were glossed and lightly patinated grey/brown flint comprising squat flakes with plain butts and no preparation or maintenance. Cortex is again thin and worn. Most of the pieces (including a single platform core) appear to be a coherent group of later Neolithic flaking. Two pieces (a flake and a broken flake) are in poorer condition and come from a blade-producing technology.

6.6.5 Colluvium 1116 produced a small number of squat flakes in fresh condition in mottled grey/brown flint, and two relatively neat blades with plain butts. What indications there are suggest a (probably later) Neolithic date.

6.6.6 The only retouched piece recovered is unstratified, but possibly provides further support for activity during the later Neolithic period. This object is a neat end scraper that appears to have a finely faceted butt, although modern damage has removed part of this feature. This is a well-documented characteristic of Late Neolithic technology, wherein methods associated with Levallois industries make a reappearance.

6.6.7 Several other contexts contained examples of a purposeful blade technology. Fills 1162 and 1164 (both in ditch 1125) contained two of the larger groups of flint, very possibly chronologically mixed, and comprising largely of flakes. However, they include between them five broken blades, four of which retain clearly prepared platforms and parallel dorsal blade scars (one of which has an oblique truncation). One of these is formed of 'Bullhead' flint, a distinctive raw material with a cortex stained green by its association with Glauconitic Thanet sand deposits which overlie the chalk in this region. This flint is often observed to be favoured by Neolithic flint knappers, particularly early in the period (e.g., Leivers 2008). Blades of a good quality were also found in pit 1166, colluvial deposit 1155 and layer 1126, all of a form consistent with Neolithic technology.

6.6.8 Despite a lack of diagnostic pieces, there is perhaps some evidence of later material. A flake core from alluvium 1158 is a notably crude example on a thermal fragment, exhibiting numerous mishits, consistently hinged flake removals and a particularly stochastic approach to its reduction. Another similar core was found in ditch 1125 (fill 1148). Three flakes from fills 1162 and 1164 in the same ditch, and one from peat deposit 1180, have broad, cortical butts. These are all typical characteristics of technology in the later Bronze Age when the quality of knapping has significantly declined. There is clearly

only a small number of examples, and such features could be present in earlier assemblages, but the presence of such late material is in keeping with the recovery of a small amount of (probably residual) pottery likely of this date.

6.7 Burnt flint

6.7.1 A total of 1186 pieces (just under 12 kg) of burnt, unworked flint was also collected. More than half of this assemblage (6.4 kg) was extracted from sieved soil samples, which has not only increased the total significantly but also affected the mean fragment size – this is 6.8 g for the burnt flint from samples, 22.1 g for bulk finds and 10.1 g overall.

6.7.2 This material type is intrinsically undatable but is often taken as an indicator of prehistoric activity and the distribution of burnt and worked flint can correlate quite closely. In this instance, however, the probable high level of redeposition of prehistoric material has undoubtedly distorted the picture. Just over half of the assemblage (54.6% by weight) was recovered from Anglo-Saxon ditch 1125 and colluvial layers, in both of which the burnt flint is almost certainly residual (to compare, 82.1% of the worked flint derived from these contexts). However, the largest group (42.7% of the total) came from alluvial layer 1158 which appears to represent an early channel edge deposit.

6.8 Glass

6.8.1 Two fragments of vessel glass and a glass bead were recovered. Both vessel fragments came from Anglo-Saxon ditch 1125. One in pale blue glass (fill 1114) is most likely to be of Romano-British date, although an Anglo-Saxon date cannot be ruled out. The second fragment (fill 1124) is in amber glass with an applied indented trail. This can be more confidently dated as Anglo-Saxon and probably came from the body of a beaker of some form (see, for example, a bag beaker from Faversham, Kent and a claw beaker from Taplow, Buckinghamshire: Evison 2000, pl. 3, d; pl. 4, g). The colouring is unusual at a period when most vessels were in various shades of green or blue.

6.8.2 The bead came from unexcavated alluvial clay layer 1133. This is a small globular bead in opaque pale blue glass. It is not in itself particularly chronologically distinctive, but the stratigraphic position and preponderance of Anglo-Saxon finds from the site suggests that the bead dates to this period.

6.9 Metalwork

6.9.1 Thirty-five metal objects were recovered (1 silver, 12 copper alloy; 11 iron, 11 lead). Ten objects from layer 1130 are certainly of modern date (three 19th-/20th-century coins, a punch, two rod fragments, two small fittings, two small sheet fragments) and two lead waste fragments from the same layer could also be of this date, although other lead waste fragments came from Anglo-Saxon ditch 1125 (see below).

6.9.2 The remaining 22 objects are assumed, on the basis of associated pottery, to be earlier in date, and all of these came from ditch 1125, from various fills. Of these, four are datable, all from fill 1114. One object is definitely Romano-British. This is a copper alloy lock-pin (or possibly a handle) with rectangular-sectioned shaft and spindle-shaped head (Obj No 1110; see Crummy 1983, cat no. 4143). A lock-pin of this size is likely to have been used with a small lock on a box or cupboard, rather than a door. Two sets of tweezers (Obj Nos 1101, 1102), one retaining a suspension ring, could be either Romano-British or Saxon. A partial disc in two joining fragments (Obj No 1105), with a slightly dished profile, could be either a Romano-British coin or possibly an Anglo-Saxon disc brooch.

6.9.3 Other objects from ditch fills 1111, 1118, 1142 and from colluvial deposit 1155 (eight iron nails/nail shanks or tacks, a small copper alloy shank fragment of uncertain function, a small fragment of folded silver sheet, six lumps of lead waste, a fragment of lead sheet and a small lead 'collar') are of uncertain date but given their provenance and associated finds are likely to be either Romano-British or Anglo-Saxon.

6.10 Animal bone

6.10.1 A total of 711 fragments (or 9.666 kg) of animal bone was recovered, primarily from the upper, Anglo-Saxon fills of ditch 1125. When conjoining fragments and associated bone groups (or ABGs) are considered, this total falls to 604 bones. The assemblage includes both hand-recovered and sieved material.

Methods

6.10.2 The assemblage was rapidly scanned, and the following information quantified where applicable: species, skeletal element, preservation condition, fusion and tooth ageing data, butchery marks, metrical data, gnawing, burning, surface condition, pathology and non-metric traits. This information was directly recorded into a relational database (in MS Access) and cross-referenced with relevant contextual information. Table 2 gives the breakdown of the assemblage by species.

Table 2 Animal bone: number of identified specimens present (or NISP)

Species	Ditch 1125	Other features	Layers	Total
Cattle	44	2	12	58
Sheep/goat	18	-	-	18
Pig	24	2	1	27
Horse	1	-	1	2
Dog	1	-	-	1
Red deer	4	-	-	4
Roe deer				
Domestic fowl	5	-	-	5
Gadidae	1	-	-	1
Fish indeterminate	1	-	-	1
Total identified	**99**	**4**	**14**	**117**
Total unidentifiable	**458**	**9**	**20**	**487**
Overall total	**557**	**13**	**34**	**604**

Results

Ditch 1125

6.10.3 The largest single concentration of animal bones came from ditch 1125. Bones from livestock predominate. Cattle bones are common, followed by pig and then sheep/goat, and all three species are represented by a broad range of skeletal elements including both cranial and post-cranial fragments from different stages in the carcass reduction sequence (O'Connor 1993, tab. 1). There is also some limited evidence for horn-working.

6.10.4 Many of the long bones, particularly from cattle, are split longitudinally to access the marrow cavity. Evidence for marrow extraction has been recorded at a wide range of Saxon sites and may indicate a culinary preference for stews (Sykes 2006, 70; 2007, 88),

although this type of evidence is more commonly associated with the latter part of the Saxon period (Crabtree 2013, 3).

6.10.5 The other identified bones are from a small range of species, including horse, dog, red and roe deer, domestic fowl and fish (Gadidae, or cod-family). The dog bones are from the same juvenile animal and comprise a radius, femur, tibia and mandible. Red deer is represented by a sawn piece of antler and proximal metatarsal, while roe deer is represented by fragments of distal humerus and proximal femur. The post-cranial deer bones all show signs of butchery.

6.10.6 In addition, a few small fragments (8 g) of coprolite were recovered from fill 1148 of ditch 1125.

Other features

6.10.7 Eight small unidentifiable fragments of animal bone were recovered from undated pit 1166, and a few cattle and pig bones came from possible post-medieval quarry pit 1186. The latter comprise fragments of cattle tibia and metatarsal, and pig mandible and scapula, some at least likely to be residual. Hook hole damage on the pig scapula, provides evidence that the joint was cured for longer-term storage.

Layers

6.10.8 Animal bones were also recovered from several layers (1126, 1130 and 1177), including peat deposit 1180, and alluvial and colluvial deposits (1143, 1158 and 1165). Most of the identified bones are from cattle; they include a range of post-cranial elements, as well as three mandibles and a complete horn core. In addition, a pig tibia and horse first phalanx were also recovered.

6.11 Conservation

6.11.1 Finds which can be considered as vulnerable, and therefore possibly in need of conservation treatment, comprise the glass and the metal objects. The glass is currently in a stable condition and can be maintained in that state by appropriate packaging (in an airtight container with buffering silica gel).

6.11.2 Amongst the metal objects the iron in particular is in poor, corroded condition while the non-ferrous objects are generally in better condition. The metalwork is currently in stable storage (airtight plastic tubs with drying silica gel), and the metalwork has been X-rayed, essentially as a basic record, but also to inform decisions about further conservation work required. It is likely that the iron objects will be targeted for selective retention (see below, Selection Strategy).

6.11.3 On the basis of a preliminary examination of the metalwork and X-rays, a number of objects (maximum three, all copper alloy) have been selected for further conservation treatment, in the form of investigative cleaning (Table 3). This is aimed at revealing further details of the form and construction of the objects, to help with identifications, but also to ensure that the objects are in suitable condition for long-term curation.

Table 3 Metal objects selected for conservation treatment

Obj	Material	Object type	Condition	Proposed treatment
1102	Copper alloy	Tweezers	Compact, sandy soil; corroded surface	Remove soil; Consolidate if needed
1104	Copper alloy	?Coin/brooch	Broken in 3, only 2 pieces left; compact soil	Remove soil
1110	Copper alloy	Lock pin	Thin corrosion, some scratches reveal copper alloy; loose soil; possible mineralised organic material	Remove soil

7 ENVIRONMENTAL EVIDENCE

7.1 Introduction

7.1.1 Nine bulk sediment samples were taken, most from the upper, Anglo-Saxon fills of a Romano-British ditch, a later pit and a layer, this and the pit undated. The samples were processed for the recovery and assessment of the environmental evidence.

7.2 Aims and methods

7.2.1 The aim of this assessment is to determine the nature and significance of the environmental remains preserved at the site. Appropriate recommendations for further work are provided. This assessment in accordance with Historic England's guidance for environmental archaeology (English Heritage 2011).

7.2.2 The size of the bulk sediment samples varied between 14 and 39 litres, with an average volume of approximately 29.5 litres. The samples were processed by standard flotation methods on a Siraf-type flotation tank; the flot retained on a 0.25 mm mesh, residues fractionated into 4 mm and 1 mm fractions. The coarse fractions of the residues (>4 mm) were sorted by eye for artefactual and environmental remains and discarded. The environmental material extracted from the residues was added to the flots. A riffle box was used to split large flots and fine residues into smaller flot subsamples when appropriate. The fine residue fractions and the flots were scanned and sorted using a Leica MS5 stereomicroscope at magnifications of up to x40.

7.2.3 Different potential indicators of bioturbation were considered, including the percentage of roots, the abundance of modern seeds alongside the presence of animal remains, such as burrowing blind snails (*Cecilioides acicula*), or earthworm eggs and modern insects. The preservation and nature of the charred plant and wood charcoal remains, as well as the presence of other environmental remains such as terrestrial molluscs, and small animal bone was recorded.

7.2.4 Plant remains were identified through comparison with modern reference material held by Wessex Archaeology and relevant literature (e.g., Cappers *et al.* 2006). The volume of charcoal (≥2 mm) from the flots and fine residue fractions was recorded, and preliminary classifications were undertaken through examination of the transverse section: oak, non-oak/diffuse porous and coniferous. Nomenclature follows Stace (1997) for wild taxa and Zohary *et al.* (2012) for cereals and other cultivated crops (using traditional names).

7.2.5 Remains were recorded semi-quantitively on an abundance scale: C = <5 ('Trace'), B = 5–10 ('Rare'), A = 10–30 ('Occasional'), A* = 30–100 ('Common'), A** = 100–500 ('Abundant'), A*** = >500 ('Very abundant'/Exceptional').

7.3 Results

7.3.1 The results are presented in Appendix 2A. The flots from the bulk sediment samples are of varying volumes. Potential indicators of bioturbation are present, indicating the possibility of some contamination from later intrusive material (e.g., modern roots, uncharred seeds, burrowing blind snails, earthworm eggs).

7.3.2 Environmental evidence comprises plant remains preserved by charring, mineralisation and waterlogging alongside varying volumes of wood charcoal. The remains of terrestrial molluscs and small animal bones are also present in many of the samples.

7.3.3 Six samples were taken from several fills of ditch 1125 (fills 1117, 1119, 1122, 1146, 1160, and 1150). These samples are broadly similar in composition, and they contain varying quantities of charred plant remains and wood charcoal. Three of the fills (1117, 1119, and 1122) contained moderate quantities of charcoal and charred plant remains, including grains of free-threshing wheat species (*Triticum aestivum/turgidum*), hulled barley (*Hordeum vulgare*), indeterminate wheat species (*Triticum* sp.), and indeterminate cereals (Triticeae). Another potentially cultivated crop identified are large-seeded legumes including garden peas (*Pisum sativum*) and garden peas/broad beans (*Vicia faba/Pisum sativum*). Wild taxa noted comprise grasses (Poaceae), including oats (*Avena* sp.), and hazel (*Corylus avellana*) nutshell, as well as indeterminate fragments of amorphous plant material. The sample from fill 1146 yielded a small number (<5) hulled wheat (*Triticum spelta/dicoccum*) glume bases.

7.3.4 Ditch 1125 fill 1150 was sterile of all plant remains, however other samples from ditch 1125 (fills 1122 and 1146) produced small quantities of waterlogged plant remains including elder (*Sambucus* sp.) seeds. The sample from fill 1122 also contained waterlogged seeds of the poppy family (Papervaceae), alongside mineralised plant remains. Some of the mineralised seeds are identifiable as mint family (Lamiaceae) species and probable opium poppy (*Papaver* cf. *somniferum*).

7.3.5 A single sample from pit 1166, which cut ditch 1125, produced a large flot which is dominated by wood charcoal, with some charred hazel nutshell.

7.3.6 Two samples from alluvial layer 1158 contain a small quantity of hazel nutshell, alongside some charcoal and a small volume of waterlogged plant material, including highly degraded vegetative plant material, with occasional woody fragments, and seeds including elder, brambles (*Rubus* sp.) and rushes (*Juncus* sp.).

7.4 Discussion

7.4.1 An interesting assemblage of charred, waterlogged and mineralised plant remains, charcoal and terrestrial molluscs has been recovered.

7.4.2 The excavation identified ditch 1125 as part of a probable Romano-British trackway, the ditch finally infilled in the Anglo-Saxon period. The plant remains retrieved from the upper fills are consistent with this. The range of crops recorded (e.g., free-threshing wheat, hulled barley, oats, legumes) is typical of the early and later medieval periods (Moffett 2006; 2011). Often these edible crops are identified alongside wild taxa which are likely weeds of arable cultivation (e.g., wild grasses).

7.4.3 It is unclear if the spelt/emmer glume bases identified in ditch 1125 fill 1146 are contemporary with the Saxon material or residual from Romano-British activity (cf. Pelling *et al.* 2015). Radiocarbon dating on similar sites have indicated that these crops did

continue to be cultivated into early medieval period. However, a lack of dating evidence hinders our understanding of continuity in agricultural practices across this period (cf. Pelling and Robinson 2000).

7.4.4 It is likely that ditch 1125 was infilled using dumps of organic-rich waste (e.g., animal dung, cess), as indicated by the mineralised plant remains, as well as domestic refuse and fuel debris originating from adjacent settlement. There is evidence of Anglo-Saxon activity in the vicinity, as identified during the Ebbsfleet Valley and Northfleet villa excavations (Andrews, Biddulph et al. 2011), and during previous excavations within the Springhead Quarter (Wessex Archaeology 2008b).

7.4.5 The environmental material retrieved from pit 1166 and layer 1158 is unfortunately not indicative of any particular date.

8 STATEMENT OF POTENTIAL

8.1 Stratigraphic potential

8.1.1 It appears that ditch 1125 is not a continuation of the Romano-British ditch recorded during both the HS1 and Springhead Quarter excavations (perhaps here lying just to the east of the stripped area and obscured by colluvium), but instead is likely to have run parallel to it, approximately 5.5 m to the west. The most likely purpose of these ditches is that they defined a trackway which ran parallel with the east side of the River Ebbsfleet along the base of the valley. If so, then it is probable that this trackway linked the Romano-British roadside settlement at Springhead (*Vagniacis*) to the south with the villa downstream at Northfleet.

8.1.2 The apparent deliberate, final infilling of ditch 1125 during the Anglo-Saxon period suggests a possible shift in focus away from the Romano-British roadside settlement and villa. An Anglo-Saxon sunken-featured building was recorded less than 15 m from the eastern ditch during the 2008 excavations (Wessex Archaeology 2008c), and indicates the presence of settlement, albeit it small-scale, likely broadly contemporary with at least two other known foci at this time (Andrews, Biddulph et al. 2011) and possibly the inhumation cemetery on the higher ground to the east (Wessex Archaeology 2008c).

8.2 Finds potential

8.2.1 This assemblage is relatively small and includes elements of prehistoric, Romano-British and Anglo-Saxon date. Much of the prehistoric and Roman-British material appears to be redeposited, but the Anglo-Saxon component constitutes a small but significant addition to the evidence for activity at this period in the area around Springhead and Northfleet.

8.2.2 The prehistoric assemblage (largely composed of worked and burnt flint, with a few sherds of pottery) consists almost entirely of flint debitage in a chronological mix of technologies. This clearly represents a background scatter of redeposited material and as such is of very limited archaeological significance.

8.2.3 Romano-British artefacts (a sparse scattering of ceramic building material with a few pieces of pottery, vessel glass and metalwork) appear to be exclusively residual here in later contexts; their presence is unsurprising given the proximity of the Roman roadside settlement at Springhead and a Roman villa at Northfleet and their archaeological significance is limited, but there is a suggestion that at least some of these finds (the pottery and possibly some metalwork) may have been deliberately collected during the Anglo-Saxon period.

8.2.4 The Anglo-Saxon pottery is perhaps of most interest and has both local and regional significance – the presence of non-local fabric types indicates the exploitation of pottery distribution networks extending as far as East Anglia and the east Midlands. There are close parallels with a previously published assemblage from adjacent sites, and potential for petrographic analysis to supplement that carried out earlier (Mepham 2011; Vince 2011). The Anglo-Saxon vessel glass (not previously recorded from adjacent sites) and a bead are also of intrinsic interest, as are the metal objects potentially also of Anglo-Saxon date (tweezers, possible brooch). The organisation of pottery production is highlighted in the regional research agenda:

- Address a limited understanding of the development and organisation of pottery production. The dating of local Anglo-Saxon pottery is very imprecise, and more work is needed to define the distributional range of specific vessel/fabrics combinations (South East Research Framework, Anglo-Saxon).

8.2.5 The animal bone offers some, albeit limited, potential for further research, particularly in relation to the butchery evidence noted on bones from the Anglo-Saxon deposits in ditch 1125. This information will provide a better understanding of carcass processing and utilisation, and allow broader comparisons with contemporary datasets (e.g., Grimm and Worley 2011, 51–60).

8.2.6 The large, currently undated timber beam found within the northern cofferdam is an interesting though isolated artefact. It should, however, be subjected to radiocarbon dating to confirm an anticipated Romano-British date. If demonstrated, then it can almost certainly be linked in some way with the roadside settlement at Springhead or the villa at Northfleet. How it came to be found where it was will require further consideration.

8.3 Environmental potential

8.3.1 The analysis of the plant remains and charcoal from selected (upper) fills in ditch 1125 has the potential to provide information of local and regional significance. The results of further analysis could provide a comparison with the Anglo-Saxon data from other sites in the local area, as well as contribute to future synthesis of regional data.

8.3.2 It is recommended that further analysis of the plant remains and charcoal is undertaken alongside radiocarbon dating of material from ditch 1125. Radiocarbon dating would establish whether the upper deposits of Anglo-Saxon material originate in the 5th/6th centuries or the 7th/8th century AD. Assemblages of charcoal and plant remains dating to the 5th/6th centuries AD are of particular interest for understanding the transition from the late Romano-British to early medieval arable economy.

8.3.3 The environmental material retrieved from pit 1166 and layer 1158 has no further potential.

8.4 Summary of potential

8.4.1 Overall, ditch 1125, including the related artefactual and ecofactual assemblages, has a relatively small but significant potential to add to our understanding of both the local Romano-British and Anglo-Saxon landscape. Radiocarbon dating of the large timber beam will also have the potential to contribute to this.

9 UPDATED PROJECT DESIGN

9.1 Updated project aims

9.1.1 The updated project aims reflect the limited scale of the archaeological investigations. The discovery of a second, parallel ditch to one found earlier suggests that there was a trackway running adjacent to the River Ebbsfleet probably linking the Romano-British roadside settlement at Springhead to the south with the Northfleet villa to the north. Further evidence for Anglo-Saxon activity was confirmed, comprising domestic debris deriving from adjacent settlement (represented by a sunken-featured building) recorded during earlier work. Further analysis will aim to clarify and extend our understanding of the local landscape in these two periods.

9.2 Stratigraphic evidence – recommendations for analysis

9.2.1 The stratigraphic sequences recorded during the works are well understood and require little further work. Closer comparison of ditch 1125 with the ditch recorded during the HS1 works and 2008 excavations would test the hypothesis that these are separate but contemporary ditches and demarcate a trackway.

9.3 Finds evidence – recommendations for analysis

Pottery

9.3.1 The Anglo-Saxon pottery should be subjected to further analysis to conform to the 'detailed record' advocated by national standards (Barclay *et al.* 2016, section 2.4.6), and the results warrant publication. This will involve full fabric and form analysis. Fabric types defined will be correlated with the existing type series for Springhead and Northfleet (Mepham 2011) and supported by a limited programme of petrographic analysis in order to determine likely sources/source areas (maximum six samples). The report should discuss how this assemblage relates to that recovered from the adjacent sites and highlight any additional information on sources of supply. A maximum of 12 vessels could be illustrated.

Glass

9.3.2 A limited amount of further research should be done in order to find further parallels (preferably from Kent) for the Anglo-Saxon vessel glass and glass bead. No illustration is necessary.

Metalwork

9.3.3 Following conservation treatment on the three selected copper alloy objects, catalogue entries will be enhanced as necessary with any additional information (particularly for the possible coin/brooch ON 1104), and further parallels sought as appropriate. If this does turn out to be a brooch, and cleaning reveals further details, this object could be illustrated.

Animal bone

9.3.4 It is recommended that detailed information relating to age, biometric and butchery is recorded to enhance the archive. This will form the bases for a short contribution towards the proposed publication.

Other finds

9.3.5 No further research is warranted on any of the other finds. The information presented in this report can be adapted for inclusion in any publication report. No illustration is necessary.

9.4 Environmental evidence – recommendations for analysis

Plant remains

9.4.1 The samples proposed for analysis are indicated with a 'P' in the analysis column in Appendix 2B. All identifiable charred plant remains will be extracted from the 4 mm residues and the flot, which may be subsampled with the aid of a riffle box in the case of very rich assemblages. The analysis will involve full quantification (Antolín and Buxó 2011; Antolín and Jacomet 2015) and taphonomic assessment. The identifications will be undertaken using stereo incident light microscopy at magnifications of up to 40x and in consultation with a modern seed reference collection and specialised literature where appropriate. Plant nomenclature will follow Stace (1997) for wild plants, and traditional nomenclature, as provided by Zohary. (2012), for cereals.

Charcoal

9.4.2 The samples proposed for charcoal analysis are indicated with a 'C' in the analysis column in Appendix 2B. Up to 100 charcoal fragments will be identified per context/sample (or 100% where there are <100 fragments). Identification will focus on fragments in the ≥4 mm fractions, with scanning of the 2–4 mm fractions to identify wood from small shrubs and twiggy material (Asouti and Austin 2005). The transverse (TS), tangential longitudinal (TLS) and radial longitudinal (RLS) sections will be examined at up to x400 magnification using a Kyowa ME-LUX2 microscope. Identifications will be assisted by the descriptions of Gale and Cutler (2000), Hather (2000) and Schweingruber (1990), together with modern reference material held by Wessex Archaeology. Other features will be noted where applicable, including growth-ring curvature and the presence/absence of bark, pith, tyloses and reaction wood. Plant nomenclature will follow Stace (1997).

9.5 Radiocarbon dating recommendations

9.5.1 A total of two samples of charred plant remains or charcoal from the upper fills of ditch 1125 should be submitted for radiocarbon dating. The samples will be submitted to the 14CHRONO Centre, Queen's University, Belfast.

9.5.2 A sample from oak beam 1127 should also be submitted for radiocarbon dating, given the failure of dendrochronological analysis to confirm other than a likely pre-medieval date.

9.6 Proposals for publication

9.6.1 Ideally, the current site should be published alongside the results of other, more extensive excavations undertaken within the Springhead Quarter over the past two decades. However, if it is to be a stand-alone article then it should be submitted to the county journal, *Archaeologia Cantiana*, for publication in the journal or on-line.

Springhead Bridge: Prehistoric deposits and Anglo-Saxon settlement by the Ebbsfleet

by Rachel Williams, with specialist contributions

Introduction	1000 words
Results	2000 words
Finds reports	2500 words
Environmental reports	1500 words
Discussion	1000 words

Total: approximately 8000 words, 6 figures, 2 tables (15 pages)

9.7 Programme for analysis and publication

9.7.1 Analysis and publication will commence when this document and the proposals therein have been approved by the SAO for KCC on behalf of the LPA, and the work has been commissioned in full by RPS Consulting Services Ltd.

9.7.2 Typically, the analysis and publication programme for a project of this scale and complexity will take around 12 months but will vary depending on the availability of specialists and external laboratories. A project-specific programme will be developed and agreed at the time of commission.

9.8 Personnel and resources

9.8.1 Table 4 lists the tasks that will be undertaken by Wessex Archaeology core staff.

Table 4 Task list

STAGE	TASK No	DESCRIPTION	DAYS
1	**Management**		
	1.1	Project management	2.50
2	**Pre-analysis**		
	2.1	Stratigraphic records & research	1.00
	2.2	Extraction of environmental materials	1.00
3	**Stratigraphic analysis & reporting**		
	3.1	Stratigraphic report	2.00
4	**Artefact analysis & reporting**		
	4.1	Artefact summary	0.25
	4.2	Pottery	2.00
	4.3	Glass	0.25
	4.4	Metalwork – catalogue update	0.25
	4.5	Conservation	2.00
5	**Environmental remains analysis & reporting**		
	5.1	Environmental summary	1.00
	5.2	Charred plant remains	3.00
	5.3	Wood charcoal	3.00
6	**Scientific dating & analysis (external suppliers)**		
	6.1	Radiocarbon dates x 3	
	6.2	Petrographic analysis x 6	
7	**Report preparation**		
	7.1	Research & text	4.00
	7.2	Illustrations	2.50
8	**Editorial & production**		
	8.1	Edit, review & revise	1.00
9	**Publication & dissemination**		
	9.1	3rd-party management & costs	TBC
10	**Archive preparation & deposition**		
	10.1	Physical archive	1.35
	10.2	Digital archive	1.50
	10.3	Other tasks	
		Total provision for in-house tasks	28.60

9.9 Management structure

9.9.1 The team will be headed by a Project Manager, who will assume ultimate responsibility for the execution of the project as outlined in the Updated Project Design. The Project Manager will ensure performance targets, be they academic or budgetary, are met within the agreed timetable.

9.9.2 The Project Manager may delegate specific aspects of the project to other key staff, who will supervise others and have a direct input into the compilation of the report. They may also liaise with external consultants and specialists who are contributing to the publication, and the recipient museum of the project archive.

9.9.3 The Project Manager will be assisted by the Deputy Research Director, who will ensure that the report meets internal quality standards as defined in Wessex Archaeology's guidelines.

10 STORAGE AND CURATION

10.1 Museum

10.1.1 The archive resulting from the excavation is currently held in the offices of Wessex Archaeology in Salisbury. The site falls within an area where there is currently no collecting museum. Every effort will be made to identify a suitable repository for the archive resulting from the fieldwork, and if this is not possible, Wessex Archaeology will initiate discussions with the local planning authority in an attempt to resolve the issue. If no suitable repository is identified, Wessex Archaeology will continue to store the archive, but may institute a charge to the client for ongoing storage beyond a set period.

10.2 Preparation of the archive

Physical archive

10.2.1 The physical archive, which includes paper records, graphics, artefacts and ecofacts, will be prepared following the standard conditions for the acceptance of excavated archaeological material and in general following nationally recommended guidelines (Brown 2011; CIfA 2014e; SMA 1995).

10.2.2 All archive elements will be marked with the relevant site code, and a full index will be prepared. The physical archive currently comprises the following:

- 7 cardboard boxes or airtight plastic boxes of artefacts and ecofacts, ordered by material type
- 3 files/document cases of paper records and A3/A4 graphics

Digital archive

10.2.3 The digital archive generated by the project, which comprises born-digital data (e.g., site records, survey data, databases and spreadsheets, photographs and reports), will be deposited with a Trusted Digital Repository, in this instance the Archaeology Data Service (ADS), to ensure its long-term curation. Digital data will be prepared following ADS guidelines (ADS 2013 and online guidance) and accompanied by metadata. Full details of the collection, processing and documentation of digital data are given in the project Data Management Plan (available on request).

10.3 Selection strategy

10.3.1 It is widely accepted that not all the records and materials (artefacts and ecofacts) collected or created during the course of an archaeological project require preservation in perpetuity. These records and materials will be subject to selection in order to establish what will be retained for long-term curation, with the aim of ensuring that all elements selected to be retained are appropriate to establish the significance of the project and support future research, outreach, engagement, display and learning activities, i.e., the retained archive should fulfil the requirements of both future researchers and the receiving Museum.

10.3.2 The selection strategy, which details the project-specific selection process, is underpinned by national guidelines on selection and retention (Brown 2011, section 4) and generic selection policies (SMA 1993; Wessex Archaeology's internal selection policy: available on request) and follows CIfA's *Toolkit for Selecting Archaeological Archives*. It should be agreed by all stakeholders (Wessex Archaeology's internal specialists, external specialists, local authority, museum) and fully documented in the project archive.

10.3.3 Detailed selection proposals for the complete project archive, comprising finds, environmental material and site records (analogue and digital), are made in the site-specific Selection Strategy (Appendix 4). The proposals are summarised below.

Finds

- *Animal bone (711 frags)*: small assemblage from early Saxon contexts, some albeit limited potential for future research. Retain all.
- *Burnt (unworked) flint (1186 frags):* intrinsically undatable and most almost certainly redeposited. No further research potential. Already discarded.
- *Ceramic building material (49 frags):* small quantity, almost all RB (1 medieval tile) but almost certainly all redeposited; commonly occurring and well documented types; 1 piece of intrinsic interest (paw print); retain paw printed tile only.
- *Fired clay (2 frags):* two conjoining fragments from object; intrinsic interest although uncertain dating; retain.
- *Glass (2 vessel frags, 1 object):* very small quantity but all pieces of intrinsic interest (RB and Saxon vessel glass, bead of uncertain date); retain.
- *Metalwork (35 objects):* small number of identifiable objects (Romano-British or Anglo-Saxon) are of intrinsic interest (lock pin, possible coin/brooch, tweezers) and these should be retained. Other non-ferrous objects from Anglo-Saxon ditch 1125 (shank, sheet and waste fragments) are of lesser significance and have little or no research potential but are of some interest due to their provenance. All these objects should be retained.

  Iron objects (nails and shanks) are of very limited significance and have no further research potential; they are unstable and are vulnerable to continued deterioration (X-rays act as basic record); retain none of these.
- *Pottery (128 sherds):* small assemblage almost all of Anglo-Saxon date (a few residual prehistoric and Romano-British sherds). Anglo-Saxon material in particular is of local and regional significance as part of small but growing dataset for Early Saxon (5th-/6th-century) ceramic sequence in south-east England. Further research potential beyond immediate remit of current project. Retain all.
- *Stone (5 frags):* very small quantity, all probably from quernstones. Small lava

fragments are undiagnostic and of limited archaeological significance and have little further research potential; no not retain. One other quern fragment more diagnostic; retain this.

- *Worked flint (184 pieces):* low level background scatter of debitage of mixed chronology, all probably redeposited. Limited archaeological significance and no further research potential. Retain none.

Environmental material

10.3.4 The material retrieved from environmental samples merit retention with the site archive for future access. This is a summary of proposals for a site-specific Selection Strategy (Appendix 4).

10.3.5 All of the flots will be retained within the site archive.

10.3.6 Some residues were retained for the further extraction of charred and mineralised plant remains and charcoal. The remaining residues were discarded after sorting.

Documentary records

10.3.7 Paper records comprise site registers (other pro-forma site records are digital), drawings and reports (written scheme of investigation, client report). All will be retained and deposited with the project archive.

Digital data

10.3.8 The digital data comprise site records (tablet-recorded on site) in spreadsheet format; finds records in spreadsheet format; survey data; photographs; reports. All will be deposited, although site photographs will be subject to selection to eliminate poor quality and duplicated images, and any others not considered directly relevant to the archaeology of the site.

10.4 Security copy

10.4.1 In line with current best practice (e.g., Brown 2011), on completion of the project a security copy of the written records will be prepared, in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

10.5 OASIS

10.5.1 An OASIS (online access to the index of archaeological investigations) record (http://oasis.ac.uk) has been initiated, with key fields completed (Appendix 5). A .pdf version of the final report will be submitted following approval by the SAO for KCC on behalf of the LPA. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service (ADS) ArchSearch catalogue.

11 COPYRIGHT

11.1 Archive and report copyright

11.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the *Copyright, Designs and Patents Act 1988* with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum,

however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

11.1.2 Information relating to the project will be deposited with the Historic Environment Record (HER) where it can be freely copied without reference to Wessex Archaeology for the purposes of archaeological research or development control within the planning process.

11.2 Third party data copyright

11.2.1 This document and the project archive may contain material that is non-Wessex Archaeology copyright (e.g., Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* with regard to multiple copying and electronic dissemination of such material.

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APPENDICES

Appendix 1: Finds tables

A. All finds by context (number / weight in grammes)

Context	Animal Bone	Burnt Flint	CBM	Worked Flint (No.)	Metal	Pottery	Other Finds
Unstrat.	3/310			1			
1111					2 Fe		
1113			1/12	8		4/10	
1114	137/1414	32/288	7/527	21	1 Ag; 5 Cu; 2 Fe; 5 pb	43/1146	1 glass; 4 stone
1116		55/1132		10		1/12	
1118	173/842	41/206	3/360	18	1 Fe; 3 Pb	14/193	
1124	155/1509	45/538	6/599	4		24/340	1 glass
1126	2/525			2			
1130	5/847		3/891		7 Cu; 3 Fe; 2 Pb	2/44	
1138				2		6/55	
1141				1		1/14	
1142	41/1115	2/210	12/1040	3	3 Fe	12/173	
1143	7/174		4/134			1/33	
1148	48/90	71/372		8			
1149	25/633			2		1/34	1 stone
1151		246/713		10		2/11	
1152		3/136		3			
1154	36/871	10/443	6/1203	6	1 Pb	10/231	2 fired clay
1155		91/1407	3/413	5			
1158	3/1	411/5105		16			
1161		3/81		1			
1162		93/504		23			
1164	32/675	5/79	3/310	21		3/66	
1165	17/212	10/428	1/249	5			
1167	16/9	68/323		5			
1177	3/20			6		1/129	
1180	3/106			2			
1187	5/313			1		3/72	
Total	**711/9666**	**1186/11,965**	**49/5738**	**184**	**1 Ag; 12 Cu; 11 Fe; 11 Pb**	**128/2563**	

KEY: Ag = silver; CBM = ceramic building material; Cu = copper alloy; Fe = iron; Pb = lead

B. Worked flint by context

Context	Core frag/ broken core	Flake core	Blade core	Flake	Broken flake	Blade	Broken Blade	Broken Bladelet	Chips / micro-deb	Shatter	Scraper	Total
Unstrat.	-	-	-	-	-	-	-	-	-	-	1	**1**
1113	-	-	1	6	-	1	-	-	-	-	-	**8**
1114	-	1	-	17	3	-	-	-	-	-	-	**21**
1116	-	-	-	6	2	1	1	-	-	-	-	**10**
1118	-	-	-	7	4	-	-	2	5	-	-	**18**
1124	1	-	-	3	-	-	-	-	-	-	-	**4**
1126	-	-	-	-	-	2	-	-	-	-	-	**2**
1138	-	1	-	-	1	-	-	-	-	-	-	**2**
1141	-	-	-	1	-	-	-	-	-	-	-	**1**
1142	-	1	-	2	-	-	-	-	-	-	-	**3**
1148	1	1	-	4	2	-	-	-	-	-	-	**8**
1149	-	-	-	2	-	-	-	-	-	-	-	**2**
1151	-	-	-	3	7	-	-	-	-	-	-	**10**
1152	-	-	-	2	-	1	-	-	-	-	-	**3**
1154	-	-	-	5	1	-	-	-	-	-	-	**6**
1155	-	-	-	2	2	1	-	-	-	-	-	**5**
1158	-	1	-	9	2	-	-	-	3	1	-	**16**
1161	-	-	-	1	-	-	-	-	-	-	-	**1**
1162	-	-	-	11	11	-	1	-	-	-	-	**23**
1164	-	-	-	10	7	-	4	-	-	-	-	**21**
1165	-	1	-	3	1	-	-	-	-	-	-	**5**
1167	-	-	-	2	-	1	-	-	-	-	-	**3**
1177	-	-	1	4	-	-	1	-	-	-	-	**6**
1180	-	-	-	4	-	-	-	-	-	-	-	**4**
1187	1	-	-	-	-	-	-	-	-	-	-	**1**
Total	**3**	**6**	**2**	**104**	**43**	**7**	**7**	**2**	**8**	**1**	**1**	**184**

Appendix 2: Environmental tables

A. Assessment of the environmental evidence: charred, waterlogged, and mineralised plant remains and charcoal.

Feature Type	Feature	Context	Group	Sample Code	Sample vol. (l)	Flot vol. (ml)	Bioturbation proxies	Grain	Chaff	Cereal Notes	Charred Other	Charred Other Notes	Charcoal >2mm (ml)	Other	Preservation	Vegetative parts	Uncharred Other
Ditch	1119	1114	1125	200690_1101	39	250	15%, *Cecilioides acicula* (A*), C	A*	-	*Triticum aestivum/turgidum, Hordeum vulgare, Triticum* sp., Triticeae	B	Poaceae (inc. *Avena* sp.), *Corylus avellana* nutshell, *Vicia faba/Pisum sativum*	100	Moll-t (A*), bone frags (A*), Sab (A - non diagnostic)	Good	-	-
Ditch	1117	1118	1125	200690_1102	38	250	5%, *Cecilioides acicula* (A**), C, E	A*	-	*Triticum aestivum/turgidum, Hordeum vulgare, Triticum* sp., Triticeae	A	Poaceae (inc. *Avena* sp.), *Pisum sativum, Vicia faba/Pisum sativum*, indet burnt material ?organic, *Corylus avellana* nutshell	100	Moll-t (A*), bone frags (A*), fish scales (A), Sab (C), fuel ash slag (A)	Good	-	-
Ditch	1122	1124	1125	200690_1105	37	120	1%, *Cecilioides acicula* (A**)	B	-	*Hordeum vulgare, Triticum* sp., Triticeae	C	*Corylus avellana* nutshell, Poaceae, *Vicia faba/Pisum sativum*	40	Moll-t (A**), bone frags (A), Sab (C), fish scales (B),	Mineralised with some waterlogging, preservation heterogeneous	A*	A – **Waterlogged:** *Sambucus* sp., Papavaceae. **Mineralised:** Lamiaceae, *Papaver* cf. *somniferum*
Ditch	1146	1148	1125	200690_1115	31	45	15%, *Cecilioides acicula* (A*)	-	C	*Triticum spelta/dicoccum,* glume bases	-	-	2	Moll-t (A*),	Poor	A**	A* - **Waterlogged:** *Sambucus* sp.
Ditch	1160	1162	1125	200690_1116	38	15	90%, B	C	-	*Triticum aestivum/turgidum*, Triticeae frags	C	*Corylus avellana* nutshell	1	Moll-t (A),	Poor	-	-
Ditch	1150	1151	1125	200690_1117	24	20	90%, C	-	-	-	-	-	1	Moll-t (A),	-	-	-

Feature Type	Feature	Context	Group	Sample Code	Sample vol. (l)	Flot vol. (ml)	Bioturbation proxies	Grain	Chaff	Cereal Notes	Charred Other	Charred Other Notes	Charcoal >2mm (ml)	Other	Preservation	Vegetative parts	Uncharred Other
Layer	-	1158	-	200690_1118	15	80	<1%	-	-	-			<1	-	Poor	A - Completely degraded vegetative material	A - *Juncus* sp.
Pit	1166	1167	-	200690_1119	14	675	<1%, C	-	-	-	C	*Corylus avellana* nutshell	400	Bone frags (C), Sab (A)	Poor	-	-
Layer	-	1158	-	200690_1120	30	300	15%, E, F	-	-	-	C	*Corylus avellana* nutshell	A*	-	Poor	A* - Fairly degraded vegetative material, occasional woody frags	A - *Sambucus* sp., *Rubus* sp., *Juncus* sp.

KEY: Scale of abundance: C = <5, B = 5–10, A = 10–30, A* = 30–100, A** = 100–500, A*** = >500; Bioturbation proxies: Roots (%), Uncharred seeds (scale of abundance), E = earthworm eggs, Sab = small animal bones, Moll-t = terrestrial mollusc

B. Analysis and radiocarbon potential and recommendations.

Feature Type	Feature	Context	Group	Sample Code	Analysis potential	Analysis recommendations
Ditch	1119	1114	1125	200690_1101	C, P	C, P, C14
Ditch	1117	1118	1125	200690_1102	C, P	C, P
Ditch	1122	1124	1125	200690_1105	C, P	C, P
Ditch	1146	1148	1125	200690_1115	-	-
Ditch	1160	1162	1125	200690_1116	-	-
Ditch	1150	1151	1125	200690_1117	-	-
Layer	-	1158	-	200690_1118	-	-
Pit	1166	1167	-	200690_1119	C	-
Layer	-	1158	-	200690_1120	C	-

KEY: Analysis: C = charcoal, P = plant, M = molluscs, C14 = radiocarbon.

Appendix 3: Dendrochronology report

ntrdl the nottingham tree-ring dating laboratory

SPRINGHEAD BRIDGE; SUMMARY OF TREE-RING ANALYSIS OF EXCAVATED TIMBERS

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March 2019

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Introduction

Three baulks, or sections, of oak timber obtained from archaeological excavations undertaken at Springhead Bridge, near Ebbesfleet in Kent, were provided to the Nottingham Tree-ring Dating Laboratory for dendrochronological analysis. It is believed that two of these pieces were obtained from one large timber, believed to be a worked beam, which was sealed by a peat horizon but was above an alluvial horizon, while a third piece was obtained from what was believed to be a tree found in a peat deposit, and is considered to be unworked.

Preparation and measuring

There being little or no other distinctive dating evidence, it was proposed that the timbers might be dated by dendrochronology, this hopefully indicating their approximate date(s) of felling, this in turn providing some indication of the date of the contexts in which they were found. Single cross-sectional radial slices were thus taken from each baulk of timber provided to the laboratory, these being designated samples 'SHB' (for 'Springhead Bridge) 001, 002, and 003. The radial slices were initially prepared by short-term freezing (this to consolidate their potentially decayed nature), before narrower radial sections were then removed from them. The surfaces of the radial samples were then planed, scalpled, and then finely polished to clearly reveal the annual growth rings (Fig 1a/b).

Starting with the inner-most ring on each sample and working outwards, the width of each successive growth ring was measured to a tolerance of 1/000mm, sample SHB001 providing data for 142 growth rings, sample SHB002 having 130 rings, and sample SHB003 having 94 growth rings. All three samples appear to retain the heartwood/sapwood boundary, this meaning that only the outer 15 to 40 sapwood rings (the 95% confidence interval for the number of sapwood rings on oaks) of the trees have been lost (probably through in-situ decay and erosion).

Analysis

The measured data of the three samples were then compared with each other, this being to test if might have the same growth pattern, and thus be of the same date as each other. As expected (given that they are in fact from the same timber) samples SHB001 and SHB002 have virtually identical growth patterns and thus cross-match with each other very well, providing a combined data set 152 rings long. There was, however, no cross-matching between these two samples and sample SHB003.

The data of each of the three samples was then compared individually to the full oak reference database of the Nottingham Tree-ring Dating Laboratory, but there was no cross-

matching or dating at any position. As is the usual in such situations, the measured data were then sent to other dendrochronology laboratories in the hope that they might produce a match and date. Sadly, however, there was no dating from any other establishment.

Conclusion

It is unlikely that the lack of matching/dating is caused by any particular problems with the timbers/samples themselves. As indicated in the graphic below (Fig 2), the timbers show a good deal of variation year on year (ie, the growth goes up and down a good amount each year indicating a strong annual weather signal), and there do not appear to be any bands of problem rings (ie, no bands of particularly narrow, wide, or distorted, rings), which might make cross-matching and dating difficult.

This lack of cross-matching and dating is, therefore, perhaps more likely to be as a result of both timbers have been sourced from trees which had been growing in woodlands at a time and/or a place for which, as yet, no reference patterns exists against which they can be matched. While the tree-ring database for much of England is well represented in the reference chronologies from ca AD 1100 up to about AD 1750, the period before this, back into the Roman and pre-historic periods, is much more thinly represented, this being caused by so few timbers from these earlier periods being found and presented for analysis. It will only be by filling in these 'voids' that sample from this period might eventually be matched and dated). Given the archaeological context in which these timbers were found, it is possible, but by no means certain, that the timbers considered in this analysis were growing during this less well represented time period.

Further approaches to dating

One possible way of overcoming the lack of dating might be to obtain further dendro samples from the site so that a larger number of samples might group together to make a 'site chronology'. This might have the effect of making the collective data more climatically representative, and the overall chronology longer, both of which might help with dating. This of course is dependent on obtaining further timbers from the site and there being reference chronologies against which they can be matched.

An alternative approach might by to try radiocarbon 'wiggle matching' of the rings of one or more sample, which, although not always successful, has been used to good effect. This is accomplished by extracting selected individual annual growth rings from a sample (usually three, five, or sometimes seven individual rings at known positions relative to each other) and determining the radiocarbon (C14) content of each individual ring. Maintaining the relative position of these rings, the C14 content is compared to the annual 'wiggles' of the overall radiocarbon cure, the sample pattern hopefully matching at one point, this indicating

the time period during which the sample rings were formed. It would appear that all three samples would be suitable for such a method, though samples SHB001 and SHB002 (being from a 'worked' timber and having greater contextual significance) might be the better choice.

Judging by past work in this field, something between 3–5 sets of rings are usually required, the Nottingham Tree-ring Laboratory usually collaborating with the Scottish Universities Environmental Research Centre (SUERC) for dating. It is estimated that each determination costs approximately £320+VAT, with recent, 4-sample analysis, costing approximately £1580 (including VAT). Turnaround for such work is currently about 9 weeks. There are of course other laboratories which undertake wiggle matching.

There are two further, though still experimental, alternate methods of dating wood; firstly, analysis of stable isotopes in tree rings, and secondly by Blue Intensity.

In the former, year-on-year variations in oxygen and hydrogen isotopic ratios in tree-rings appear to record the temperature signal to annual resolution level. In the second, the absorption or scatter of (blue) light is determined by the amount of lignin in each year's growth, the amount of lignin again being determined by annual variations in temperature.

Dating of tree-ring sequences can thus be accomplished by determining the annual variation of either the oxygen ratios in a tree-ring sample, or the annual variations in light absorption, and matching this pattern of variation with a 'master' isotope or Blue Intensity sequence. However, as with standard tree-ring analysis, dating can only achieved if a master sequence for a certain time and place exists.

Being still at the experimental stage, such master sequences are not yet fully developed, and the Nottingham Laboratory has been asked to supply dendrochronologically dated tree-ring samples of known date with the aim of establishing master sequences, as well as tree-ring samples of unknown date with which experimental matching can be undertaken. In this latter respect, it is possible that the Springhead Bridge samples analysed here might be worthwhile candidates for submition.

Figure 1a/b; Radial samples SHB001 and SHB002

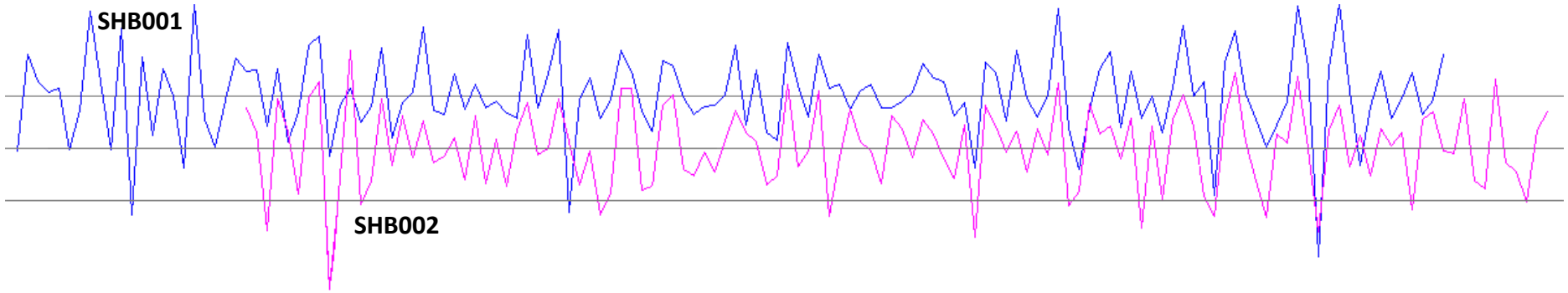


Figure 2: Graphic representation of the cross-matching of two samples, SHB001 and SHB002

When cross-matched at the correct positions, as here, the variations in the rings of these two samples (where they overlap) correspond with a high degree of similarity. As the ring widths of one sample increase (represented by peaks in the graph), or decrease (represented by troughs), so too do the annual ring widths of the second sample. Normally, this similarity in growth pattern is brought about by the trees represented having grown at the *same time* in the *same place.* In this case, however, the high degree of similarity of the growth is a result of the two samples having in fact been derived from the same timber. Had the trees been grown in different place and/or at different times, the growth ring pattern of two samples would never correspond so well.

Appendix 4: Selection Strategy

200690; 263650

Springhead Bridge, Northfleet

version 2, February 2023

Selection Strategy

Project Information

Project Management		
Project Manager	Alexander Brown	
Archaeological Archive Manager(s)	Moira Taylor and Jessica Irwin	
Organisation	Wessex Archaeology (WA)	
Stakeholders		**Date Contacted**
Collecting Institution(s)	*(no collecting museum)* Archaeology Data Service	
Project Lead / Project Assurance	Lead: Rachel Williams Assurance: Alexander Brown	N/A
Landowner / Developer	*Project commissioned through consultants (RPS Consulting Services Ltd); landowner details unknown*	
Other (external)	KCC Senior Archaeological Officer	
Other (internal)	WA Finds Manager (Rachael Seager Smith) WA Environmental Manager (Sander Aerts) WA Geomatics & BIM Manager (Tori Wilkinson) WA internal finds & environmental specialists (see WSI)	N/A; briefed as part of standard project process
Resources		
Resources required	WA Finds and Environmental specialists; WA archives team	
Context		

This overarching selection strategy document is based on the CIfA Archives Selection Toolkit (2019) and relates to archaeological project work being undertaken by Wessex Archaeology as defined in the WSIs.

Relevant standards, policies and guidelines consulted include:
General

- *Selection, Retention and Dispersal of Archaeological Collections* (Society of Museum Archaeologists, 1993)
- *Archaeological archives: a guide to best practice in creation, compilation, transfer and curation* (AAF, revised edition 2011, section 4)

Relevant research agendas

- South East Research Framework (SERF): https://www.kent.gov.uk/leisure-and-community/history-and-heritage/south-east-research-framework

Finds

- *Standard Guidance for the collection, documentation, conservation & research of archaeological materials* (CIFA, 2014)
- *A Standard for Pottery Studies in Archaeology* (Prehistoric Ceramics Research Group, Study Group for Roman Pottery, Medieval Pottery Research Group 2016)

Environmental

- *Environmental Archaeology: A Guide to the Theory, Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011)
- *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record* (Historic England 2015)
- *Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains* (English Heritage 2008)
- *Waterlogged Wood: Guidelines on the Recording, Sampling, Conservation and Curation of Waterlogged Wood* (English Heritage 2010)

Research objectives of the project
Following consideration of the archaeological potential of the site and the regional research framework, the research objectives of the excavation were to:

- Determine the extent, nature and character of the Anglo-Saxon ditch (located during initial watching brief);
- Seek a better understanding of its use and potential association with Anglo-Saxon features known within the surrounding landscape;
- Assess if any further archaeological features are located in the vicinity of the Anglo-Saxon ditch, and if further features are found, to determine their extent, nature and character;
- To better understand the use of the River Ebbsfleet and its riverbanks during the Anglo-Saxon period.

REVIEW POINTS
Consultation with all Stakeholders regarding project-specific selection decisions will be undertaken at a maximum of three project review points:

1. End of data gathering (assessment stage)
2. Archive compilation

1 – Digital Data

Stakeholders

WA Project Manager; WA Archives Manager; WA Geomatics & BIM Manager; KCC Senior Archaeological Officer; ADS

Selection

Location of Data Management Plan (DMP)

This document is designed to link to the project Data Management Plan (DMP), which can be supplied on request.

To promote long-term future reuse deposition file formats will be of archival standard, open source and accessible in nature following national guidance from ADS 2013, CIfA 2014c and the requirements of the digital repository.

Any sensitive data to be handled according to Wessex Archaeology data policy to ensure it is stored and transferred securely. The identity of individuals will be protected in line with GDPR. If required, data will be anonymised and redacted. Selection and retention of sensitive data for archival purposes will occur in consultation with the client and relevant stakeholders. Confidential data will not be selected for archiving and will be handled as per contractual obligation.

Document type	Selection Strategy	Review Points
Site records	Most records will be completed digitally on site (with the exception of registers). All will be selected for deposition.	2
Reports	To include WSIs, Interim reports, post-excavation assessment reports, publication reports. Final versions only will be selected for deposition.	1, 2
Specialist reports	Specialist reports will generally be incorporated in other documents with only minimal editing (reformatting, etc), and will be selected only if the original differs significantly from the incorporated version.	1, 2
Photographic media (site recording)	Substandard and duplicate images will be eliminated; pre-excavation images may not be selected where duplicated by post-excavation shots; working shots will be very rigorously selected to include only good quality images with potential for reuse and those integral to understanding features, their inter-relationships and location on site; site condition and reinstatement photos will not be selected.	1, 2
Photographic media (objects)	Images of individual or groups of objects, to include those of significance selected for publication and reporting. Substandard and duplicate images will be eliminated; all others will be selected.	2
Survey data	Site survey data will be used to generate CAD/GIS files for use in post-excavation activities. Shapefiles of both the original tidied survey data, and the final phased drawings will be selected.	1, 2
Databases and spreadsheets	Context, finds and environmental data in linked databases. Final versions will be selected. Any	1, 2

	specialist data submitted separately will also be selected.	
Geophysical data	RAW data and Interpretation Geo-tiffs	1, 2
Administrative records	Includes invoices, receipts, timesheets, financial information, email correspondence. None will be selected, with the exception of any correspondence relating directly to the archaeology.	2

De-Selected Digital Data

De-selected data will be stored on WA secured servers on offsite storage locations. The WA IT department has a backup strategy and policies that involves daily, weekly and monthly and annual backups of data as stated in the DMP. This strategy is non-migratory, and original files will be held at WA under their unique project identifier, as long as they remain useful and usable in their final version format. This data may also be used for teaching or reference collections by the museum, or by WA unless otherwise required by contractual or copyright obligations.

Amendments

Date	Amendment	Rationale	Stakeholders

2 – Documents

Stakeholders

WA Project Manager; WA Archives Manager; KCC Senior Archaeological Officer

Selection

A security copy of all paper/drawn records is a requirement of CIfA guidelines. This will be prepared on completion of the project, in the form of a digital PDF/A file. If the security copy is not required for deposition by Stakeholders, it will be retained on backed-up servers belonging to Wessex Archaeology.

Note that some information may be redacted to comply with GDPR legislation (personal data).

Document type	Selection Strategy	Review Points
Site records	Selected records only will be completed in hard copy on site (registers, some graphics). All will be selected for deposition.	2
Reports	Hard copies of all reports (SSWSIs, Interim reports, post-excavation assessment reports, publication reports). All will be selected for deposition, with the exception of earlier versions of reports which have been clearly superseded.	1, 2

Specialist reports & data	Specialist reports will generally be incorporated in other documents with no significant editing. Supporting data is more likely to be included in the digital archive, but if supplied in hard copy and not incorporated elsewhere, this will be selected.	1, 2
Photographic media	X-radiographic plates: all will be selected.	2
Secondary sources	Hard copies of secondary sources will not be selected.	2
Working notes	Rough working notes, annotated plans, preliminary versions of matrices etc, will not be selected.	2
Administrative records	Invoices, receipts, timesheets, financial information, hard copy correspondence. None will be selected, with the exception of any hard copy correspondence relating directly to the archaeology.	2

De-Selected Documents

De-selected sensitive analogue data will be destroyed (shredded) subject to final checking by the WA Archives team with the remainder recycled. Possible exceptions include records retained for business purposes, including promotional material, teaching and internal WA library copies of reports.

Amendments

Date	Amendment	Rationale	Stakeholders

3 – Materials

Material type	Artefacts (bulk and registered finds)	**Section 3.**	3.1

Stakeholders

WA Archives Manager; WA Finds Manager; WA internal specialists; KCC Senior Archaeological Officer; landowner. *(Note no museum input, as no collecting museum in area)*

Selection

The following recommendations have been made by WA internal specialists, base don observations made during the assessment stage.

Find Type	Selection Strategy	Review Points
Animal bone (711 frags)	Small assemblage from early Saxon contexts, some albeit limited potential for future research. Retain all.	1, 2

Burnt (unworked) flint (1186 frags)	Intrinsically undatable and most almost certainly redeposited. No further research potential. Already discarded.	N/A
Ceramic building material (49 frags)	Small quantity, almost all RB (1 medieval tile) but almost certainly all redeposited; commonly occurring and well documented types; 1 piece of intrinsic interest (paw print); retain paw printed tile only.	1, 2
Fired clay (2 frags)	Two conjoining fragments from object; intrinsic interest although uncertain dating; retain.	1, 2
Glass (2 vessel frags, 1 object)	Very small quantity but all pieces of intrinsic interest (RB and Saxon vessel glass, bead of uncertain date); retain.	1, 2
Metalwork (35 objects)	Small number of identifiable objects (Romano-British or Anglo-Saxon) are of intrinsic interest (lock pin, possible brooch, two sets of tweezers) and these should be retained. Other non-ferrous objects from Anglo-Saxon ditch 1125 (shank, sheet and waste fragments) are of lesser significance and have little or no research potential, but are of some interest due to their provenance. All these objects should be retained. Iron objects (nails and shanks) are of very limited significance and have no further research potential; they are unstable and are vulnerable to continued deterioration (X-rays act as basic record); retain none of these.	1, 2
Pottery (128 sherds)	Small assemblage almost all of Anglo-Saxon date (a few residual prehistoric and Romano-British sherds). Anglo-Saxon material in particular is of local and regional significance as part of small but growing dataset for Early Saxon (5th-/6th-century) ceramic sequence in south-east England. Further research potential beyond immediate remit of current project. Retain all.	1, 2
Stone (5 frags)	Very small quantity, all probably from quernstones. Small lava fragments are undiagnostic and of limited archaeological significance and have little further research potential; no not retain. One other quern fragment more diagnostic; retain this.	1, 2
Worked flint (184 pieces)	Low level background scatter of debitage of mixed chronology, all probably redeposited. Limited archaeological significance and no further research potential. Retain none.	1, 2
De-Selected Material		
Consideration will be given to the suitability for use for handling or teaching collections by the museum or Wessex Archaeology, or whether they are of particular interest to the local community.		

De-selected material will either be returned to the landowner or disposed of. All will be adequately recorded to the appropriate level before de-selection.

Amendments			
Date	**Amendment**	**Rationale**	**Stakeholders**

3 – Materials

Material type	Palaeoenvironmental material	**Section 3.**	3.2

Stakeholders
WA Archives Manager; WA Environmental Officer; WA internal specialists; KCC Senior Archaeological Officer. *(Note no museum input as no collecting museum in area)*

Selection
All contexts suitable for environmental sampling have been considered for sampling. All environmental sampling has been undertaken following Wessex Archaeology's in-house guidance, which adheres to the principles outlined in Historic England's guidance (English Heritage 2011 and Historic England 2015a) and as stated in relevant WSI.

Env Material Type	**Selection Strategy**	**Review Points**
Unprocessed samples	In the event of any samples being eliminated from processing due to lack of archaeological significance, these will not be retained.	1, 2
Unsorted residues	Residues from samples not proposed for further analysis will be de-selected, with the possible exception of any taken for the recovery of human remains.	1, 2
Assessed flots with no extracted materials	Assessed flots with no extracted materials are considered to be devoid of any significant environmental evidence and will be de-selected.	1, 2
Assessed or analysed flots with extracted materials	All analysed samples will be selected; assessed flots with extracted materials with no further research potential (to be established on a sample by sample case) may be de-selected.	1, 2
Charred & waterlogged plant remains	All extracted plant remains will be selected	2
Mollusca	All extracted mollusca will be selected	2
All other analysed material (eg insects,	All material will be selected	2

pollen)		

De-Selected Material
De-selected material from samples will be disposed of after processing and post-excavation recording. All processed material will be adequately recorded to the appropriate level before de-selection.

Amendments			
Date	**Amendment**	**Rationale**	**Stakeholders**

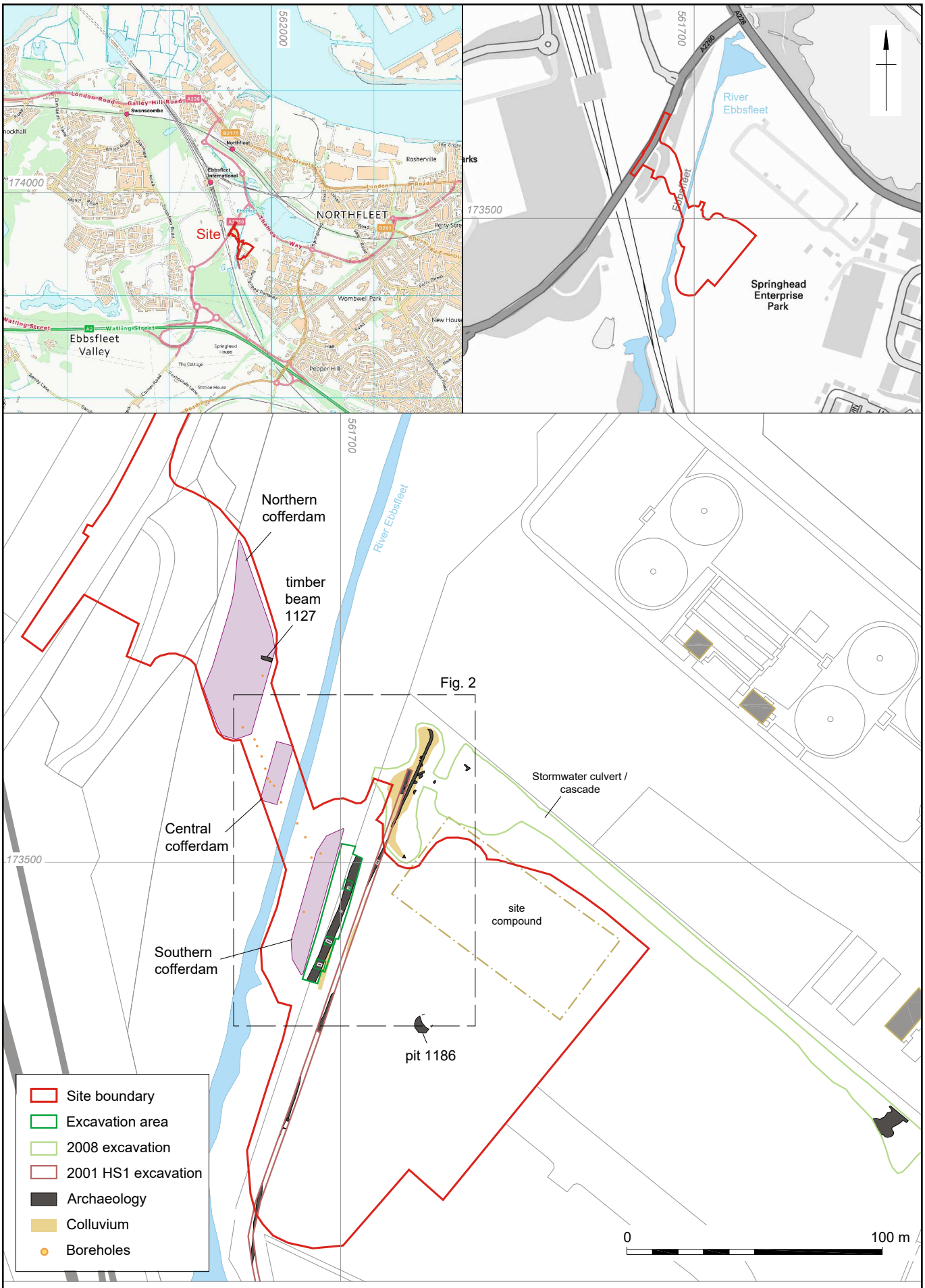
Appendix 5: OASIS summary

Summary for wessexar1-512872

OASIS ID (UID)	wessexar1-512872
Project Name	Springhead Bridge Works, Ebbsfleet, Kent
Sitename	Springhead Bridge
Activity type	Excavation, Watching Brief
Project Identifier(s)	263650
Planning Id	GR/96/35DA-96/47 , GR/2009/0058 , DA/09/00119
Reason For Investigation	Planning: Post determination
Organisation Responsible for work	Wessex Archaeology
Project Dates	05-May-2018 - 15-May-2019
Location	Springhead Bridge NGR : TQ 61682 73519 LL : 51.4375977697442, 0.324792451369043 12 Fig : 561682,173519
Administrative Areas	Country : England County : Kent District : Dartford Parish : Swanscombe and Greenhithe
Project Methodology	Wessex Archaeology was commissioned by RPS Consulting Services Ltd (London) to undertake a programme of archaeological mitigation which included archaeological watching brief, a strip, map and sample excavation over a known Romano-British ditch, and geoarchaeological investigations including a borehole survey and monitoring of ground reductions prior to the construction of a new road bridge spanning the River Ebbsfleet at Springhead Quarter, part of Ebbsfleet Garden Village centred on National Grid Reference 562900 173000. Planning permission for the construction of the Springhead Road Bridge was originally sought in 1996 (GR/96/35DA-96/47) as part of the overall scheme of work for the Springhead Quarter development. In 2009 a revised planning application was submitted for the construction of the Springhead Road Bridge to Gravesham Borough Council (GR/2009/0058) and to Dartford Borough Council as the northern end of the bridge lies within the Dartford Boundary (DA/09/00119). The works proposed by the original WSI included archaeological watching brief, evaluation, and excavation, however the evaluation component of the works in the northern cofferdam area proved to be unviable due to health and safety constraints and this component was replaced with further watching brief over the ground reduction. The geoarchaeological component of the works was reported on separately with a palaeoenvironmental assessment and as such will not be repeated here. Evidence of prehistoric activity was noted with worked flint recovered from a number of contexts throughout the works. The archaeological mitigation recorded a single Romano-British ditch which contains a series of Anglo-Saxon deposits within the upper fills, this ditch is a continuation of a ditch recorded by earlier archaeological investigations as part of the Channel Tunnel Rail Link and Springhead Quarter developments. A large chalk quarry pit containing Anglo-Saxon artefacts was also recorded. Finally, a single undated pit was recorded.

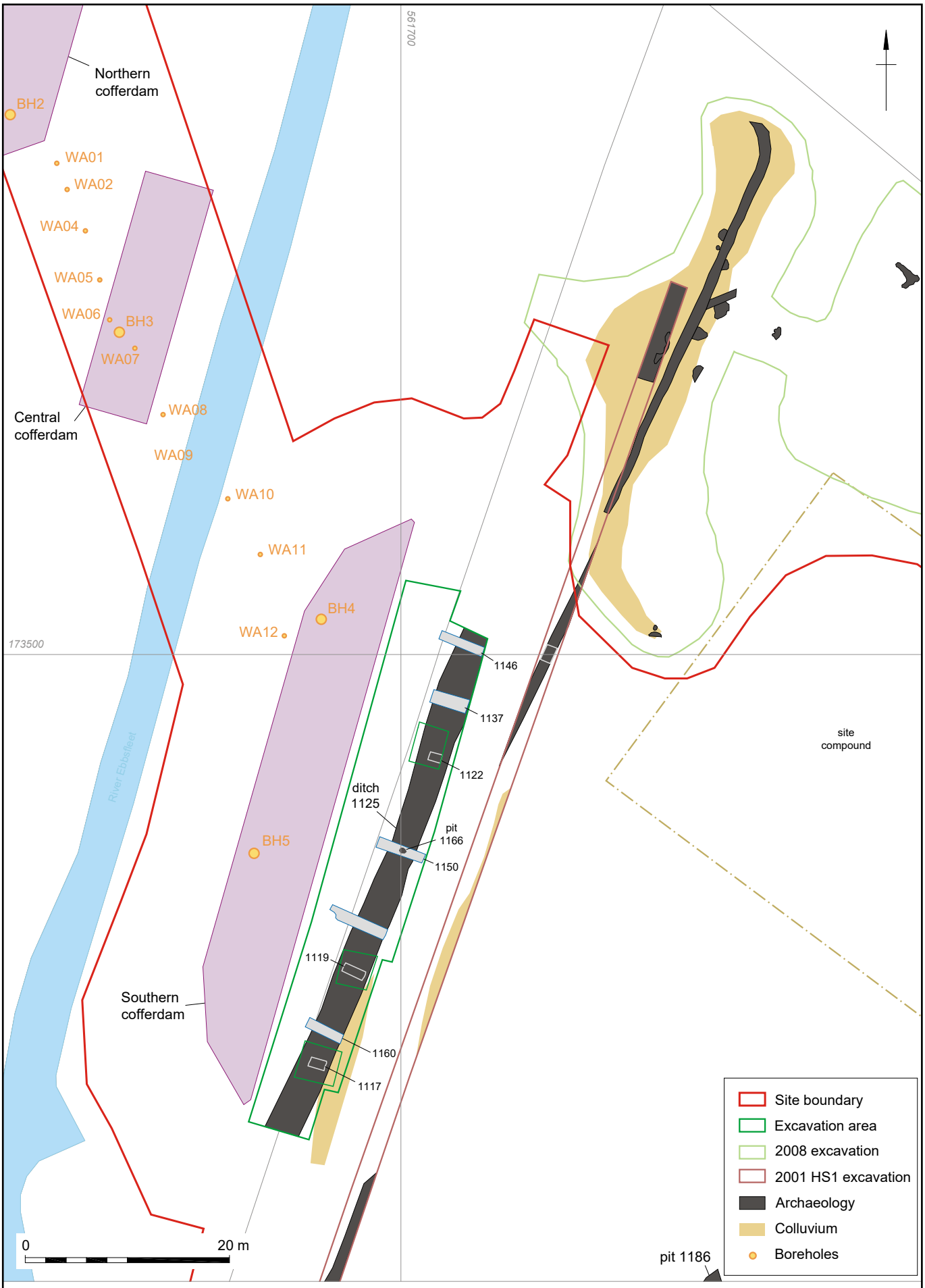
Project Results	Wessex Archaeology was commissioned by CgMs Consulting, now part of RPS Consulting Services Ltd (London), to undertake a programme of archaeological mitigation which comprised geoarchaeological investigations including a borehole survey, a strip, map and sample excavation, and a controlled watching brief on ground reduction and associated works, these carried out prior to and during the construction of a new road bridge spanning the River Ebbsfleet at Springhead Quarter, part of Ebbsfleet Garden City, Gravesend/Dartford, Kent, centred on National Grid Reference 562900 173000. Planning permission for the construction of the Springhead Road Bridge was originally sought in 1996 (GR/96/35DA-96/47) as part of the overall scheme of work for the Springhead Quarter development. In 2009 a revised planning application was submitted for the construction of the Springhead Road Bridge to Gravesham Borough Council (GR/2009/0058) and to Dartford Borough Council as the northern end of the bridge lies within the Dartford boundary (DA/09/00119). The geoarchaeological component of the works, undertaken in advance of the construction of three cofferdams, has been reported on separately, with summary details included below. The sequence of peat and organic deposits are predominantly of Neolithic date, with the earliest deposits forming in the Early Neolithic (c. 4000 cal. BC), through to the Middle to Late Neolithic (c. 2500 cal. BC). One sequence provided a tentative medieval age for the deposits here (cal. AD 900–1110), although it is possible that this incorporated later material introduced due to post-depositional processes. Evidence of prehistoric activity from the work reported here is indicated by a few pottery sherds and a thin scatter of residual worked flint recovered from various contexts across the site, most of this likely to be of Neolithic date but with some later material present. A single ditch, probably originating in the Romano-British period, may have defined the west side of a trackway (the ditch on the east side recorded in earlier investigations), this being approximately 5 m wide and running along the east bank of the Ebbsfleet. The trackway is likely to have linked the Roman roadside settlement at Springhead to the south with the villa at Northfleet to the north. Within the northern cofferdam, a part of a tree and a large piece of worked timber beam was recorded, the latter thought from its size and nature likely to be of Romano-British date, possibly accidentally dropped in the Ebbsfleet, its precise origin and destination (a waterfront structure at Springhead?) uncertain. This beam has been subject to dendrochronological investigation, the results of which could not be matched with any known medieval sequences, implying a pre-AD1100 date. The upper fills of the likely Romano-British ditch contained Anglo-Saxon finds, in particular pottery and animal bone, as well as metalwork and lava quernstone which could be either Romano-British or Anglo-Saxon. The upper fills were relatively rich in charred plant remains that are also indicative of an Anglo-Saxon date. It is likely that these deposits derived from a nearby small riverside settlement recorded in earlier archaeological investigations within the Springhead Quarter development. A probable chalk quarry pit contained a few Anglo-Saxon finds, but these are thought to have been residual in what was probably a medieval or post-medieval feature. The recommendation for publication is that ideally it should be published alongside the results of other, more extensive excavations undertaken within the Springhead Quarter over the past two decades. However, if it is to be a stand-alone article then it should be submitted to the county journal, Archaeologia Cantiana, for publication in the journal or on-line.

Keywords	Ditch - ROMAN - FISH Thesaurus of Monument Types Stone Quarry - EARLY MEDIEVAL - FISH Thesaurus of Monument Types Rubbish Pit - EARLY MEDIEVAL - FISH Thesaurus of Monument Types
Funder	
HER	Kent HER - unRev - STANDARD
Person Responsible for work	Rachel, Williams
HER Identifiers	HER Event No - 200690
Archives	



Date: 14/02/2023	Created by: EE	Revision: 0	Scale: 1:5000 at A4

Figure 1: Site location



Date: 24/01/2023	Created by: EE	Revision: 0	Scale: 1:500 at A4

Figure 2: Archaeological features

Figure 3: Initial strip for southern cofferdam, viewed from the north, 1 m and 2 m scales. (Photograph taken by Lisa McCaig)

Figure 4: West facing stepped section for southern cofferdam, 2 m scale. (Photograph taken by Lisa McCaig)

Figure 5: Recording timber 1127 in situ (Photograph taken by Mark Denyer)

Figure 6: SSW facing section of ditch 1137, 2 m scale.
(Photograph taken by Lisa McCaig)

Figure 7: SSW facing section of ditch 1160, 2 m scale.
(Photograph taken by Lisa McCaig)

Figure 8: South-west facing section of pit 1166, 0.5 m scale.
(Photograph taken by Lisa McCaig)

Figure 9: Quarry pit 1186 viewed from the SSE, 1 m scales.
(Photograph taken by Mark Denyer)

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