

**OLD SWAN BRIDGE,
PULBOROUGH, WEST
SUSSEX
AN ARCHAEOLOGICAL
INVESTIGATION**

WEST SUSSEX

REPORT NO: R11466

JULY 2013



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OLD SWAN BRIDGE, PULBOROUGH, WEST SUSSEX
AN ARCHAEOLOGICAL INVESTIGATION

Site Code: WOSB13

Central National Grid Reference: TQ 0459 1848

Local Planning Authority: West Sussex County Council

Planning Application No.: n/a

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July 2013

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DOCUMENT VERIFICATION



Site Name

OLD SWAN BRIDGE, PULBOROUGH, WEST SUSSEX
AN ARCHAEOLOGICAL INVESTIGATION

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Archaeological Investigation

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1 ABSTRACT

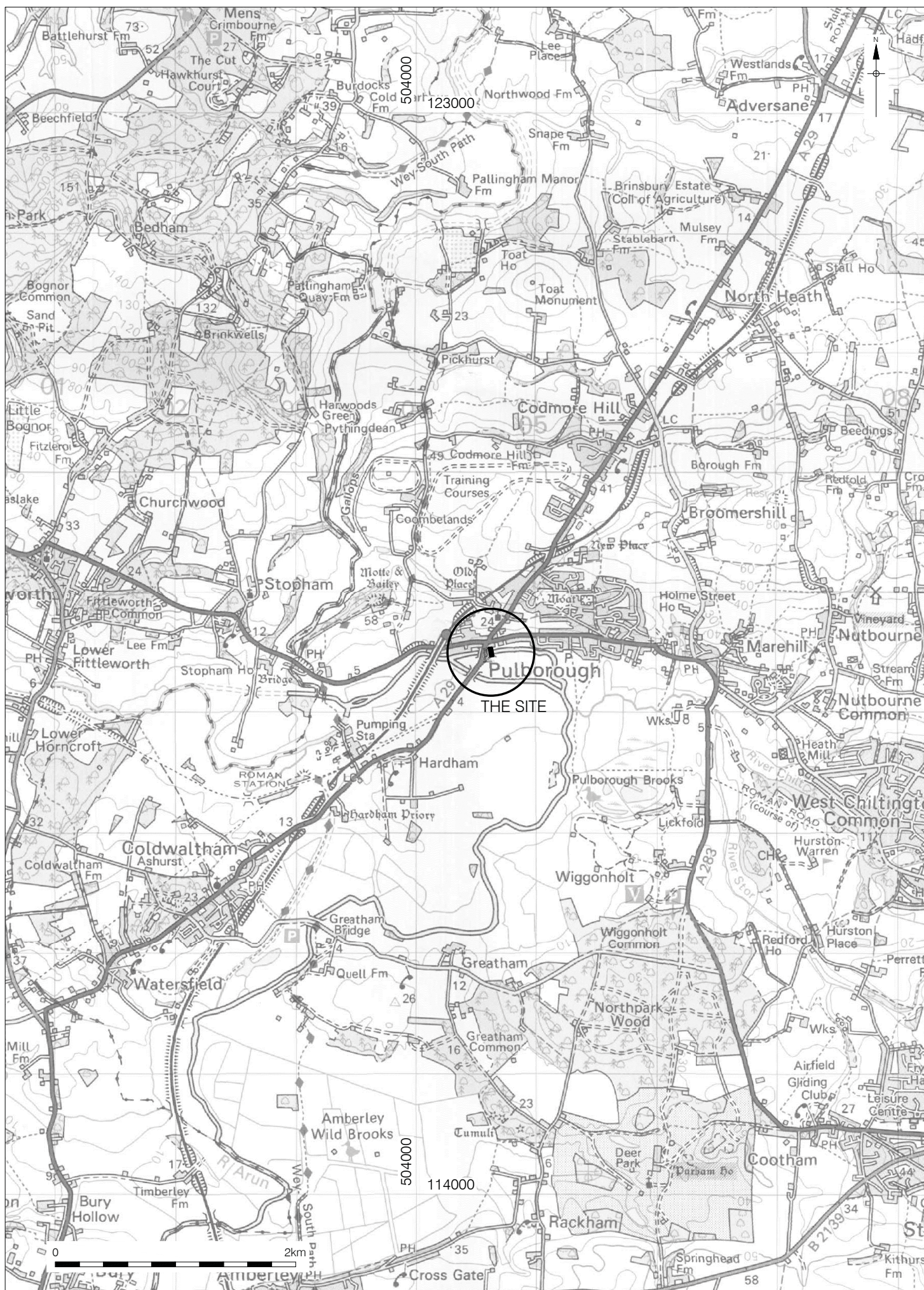
- 1.1 An archaeological investigation was undertaken by Pre-Construct Archaeology Ltd at Old Swan Bridge, Pulborough, West Sussex RH20 2BJ (Figure 1). The investigation involved the hand excavation of two trial holes dug down into the road deck of the bridge. This was to investigate the structural condition of the bridge and, as far as a limited excavation would allow, archaeologically record the building methods used in its construction.
- 1.2 The bridge, a Greensand Sandstone built arch bridge with four spans, dating to the 1730s¹, is a Scheduled Monument, and Grade II Listed. Concerns about the stability of the northernmost arched span of the bridge had been raised and temporary steel supports have been in place since the 1990s (Plate 1). This investigation will inform any future repair work carried out on the bridge.
- 1.3 Evidence of the original 18th century construction methods used on the bridge was observed and recorded, as were later works. An indication of the original road deck level was estimated. Evidence for the condition of the arched span was also revealed and this was inspected and assessed by a structural engineer from WSP whose observations will be the subject of a separate report.
- 1.4 Limited evidence for cultural activity pre-dating the 18th century, possibly Roman or medieval, was observed during the investigation.
- 1.5 Stone from the bridge was identified as Lodsworth Stone from the Upper Greensand. This type of stone has not been previously identified on the bridge before.

1.1.1

¹ Other sources have dated it to 1783.

2 INTRODUCTION

- 2.1 An archaeological investigation was undertaken by Pre-Construct Archaeology Limited, on the surface road deck of Old Swan Bridge, Pulborough, West Sussex, RH20 2BJ, between 24th and 27th June 2013 (Figure 1).
- 2.2 The site is centred at National Grid Reference TQ 0459 1848.
- 2.3 The archaeological investigation was carried out in accordance with an approved Written Scheme of Investigation (WSP 2013) which was prepared for the project. The bridge is a Scheduled Monument (WS 139), and a Grade II Listed building. Scheduled Monument Consent was granted to undertake a limited intrusive investigation in response to a request by Paul Roberts, English Heritage Inspector of Ancient Monuments for Sussex, Surrey and Kent.
- 2.4 Two trial holes measuring approximately 1m x 1m were excavated, totalling an area of 2m² (Figures 2 & 3).
- 2.5 The work was commissioned by WSP Environmental Limited on behalf of West Sussex County Council. The project was managed by Helen Hawkins and supervised by Stuart Watson; both of Pre-Construct Archaeology Limited. The project was monitored by John Mills County Archaeologist, West Sussex County Council and Jim Hunter, Director of Heritage Services WSP limited, who also assisted in the field work.
- 2.6 The site was assigned the code WOSB13.
- 2.7 The archaeological investigation followed the methodology set out in a Written Scheme of Investigation (WSI) prepared for the site by PCA Limited and WSP Limited (WSP 2013) and was intended to discover the quantity and quality of archaeological remains, as dictated by current best practice.
- 2.8 The aims and objectives of the field work were:
- To record the arch structure of the bridge
 - To establish the extent of all past post-depositional impacts on the archaeological resource
 - To establish the nature, date and survival of activity relating to any archaeological periods at the site.
- 2.9 The completed archive, comprising written, drawn and photographic records will be deposited at West Sussex Records Office under the site code **WOSB13**

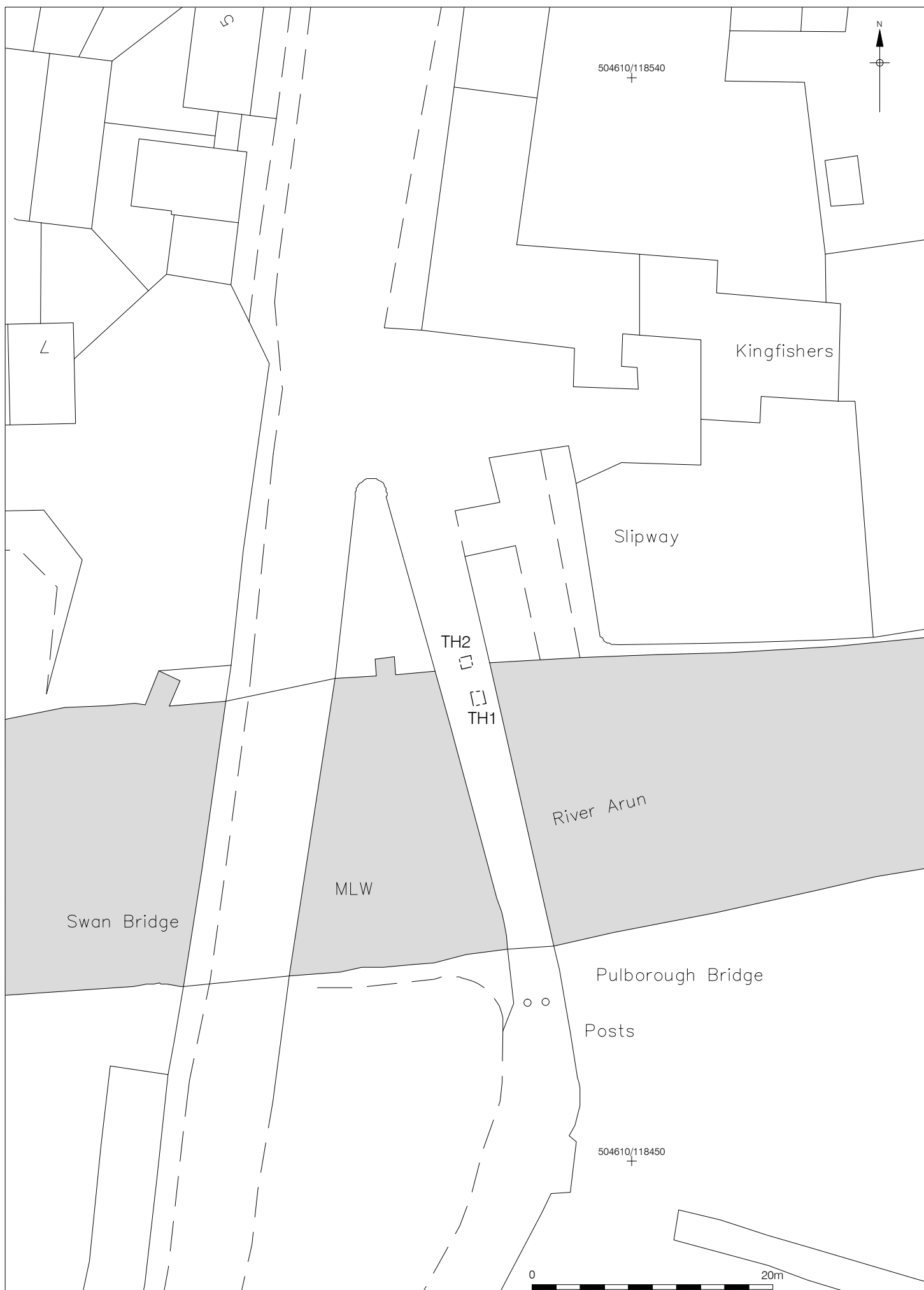


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JB 10/07/13

Figure 1
Site Location
1:40,000 at A4



3 PLANNING BACKGROUND

- 3.1 A Written Scheme of Investigation (WSP 2013) was submitted to and approved by English Heritage on behalf of the Secretary of State. The archaeological work on site was carried out in accordance with the WSI.
- 3.2 Site Constraints
 - 3.2.1 The site is a Scheduled Monument (WS139) and a Grade II listed Building (English Heritage ID 298375). An application for Scheduled Monument Consent to carry out the excavation by hand of two trial holes to investigate the historic structure of the bridge and its condition, was made by WSP Group on 6th March 2013 on behalf of West Sussex County Council. This was in response to a request by Paul Roberts, Inspector of Ancient Monuments for Sussex, Surrey & Kent, that an archaeological watching brief be carried out during the trial hole investigation works which themselves required Scheduled Monument Consent.
- 3.3 The Investigation
 - 3.3.1 Two trial holes measuring c1.0m square were excavated by hand through the top of the northern span of the bridge to investigate the historic structure of the bridge and its condition. The investigation was the initial phase of a longer term plan for the repair and restoration of the bridge at a later date.

4 GEOLOGY AND TOPOGRAPHY

4.1 Geology

4.1.1 The study site is a standing bridge and as such no geological formations were encountered.

4.2 Topography

4.2.1 Old Swan Bridge spans the River Arun at Pulborough, West Sussex. The Arun, at 60km, is the longest river in Sussex. Its source is a series of small streams in St. Leonard's Forest, east of Horsham and it eventually flows into the English Channel at Littlehampton (internet source 1).

4.2.2 The typical river levels at Old Swan Bridge range between 0.67m and 3.71m. The highest recent recorded level was 4.47m in December 2008 when the river flooded (internet source 2). The River Arun at this point is tidal.

4.2.3 The northern bank of the river is built up and is the centre of the settlement of Pulborough. The southern bank in contrast is a flat undeveloped flood plain known as the Arun Marches, crossed by a raised causeway believed to date back to the Roman period.

4.2.4 The investigation was limited to the northern end of the bridge where levels ranged from 5.97m OD at the top of Trial Hole 1 (the more southerly of the two) to 5.82m OD at the top of Trial Hole 2.

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

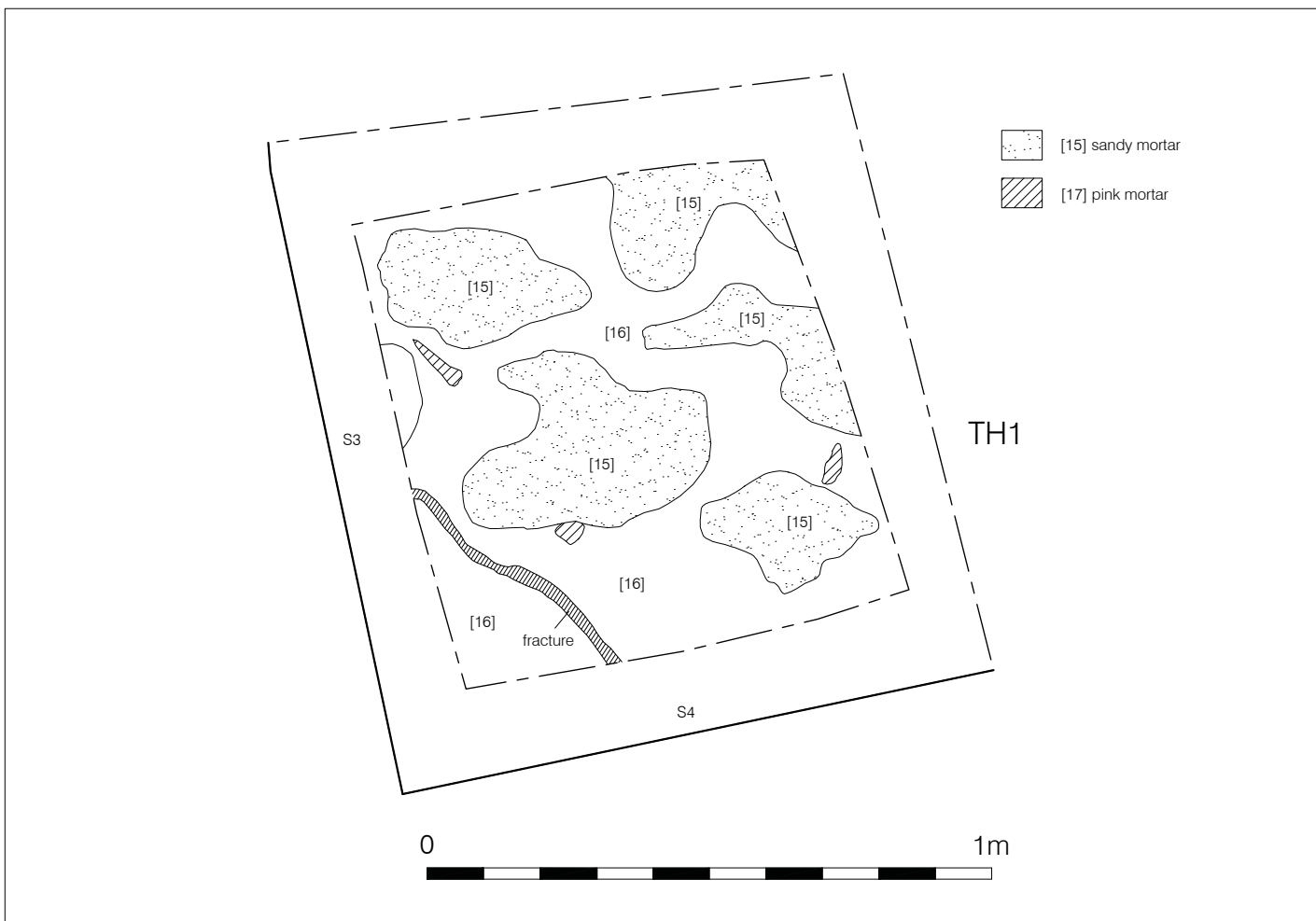
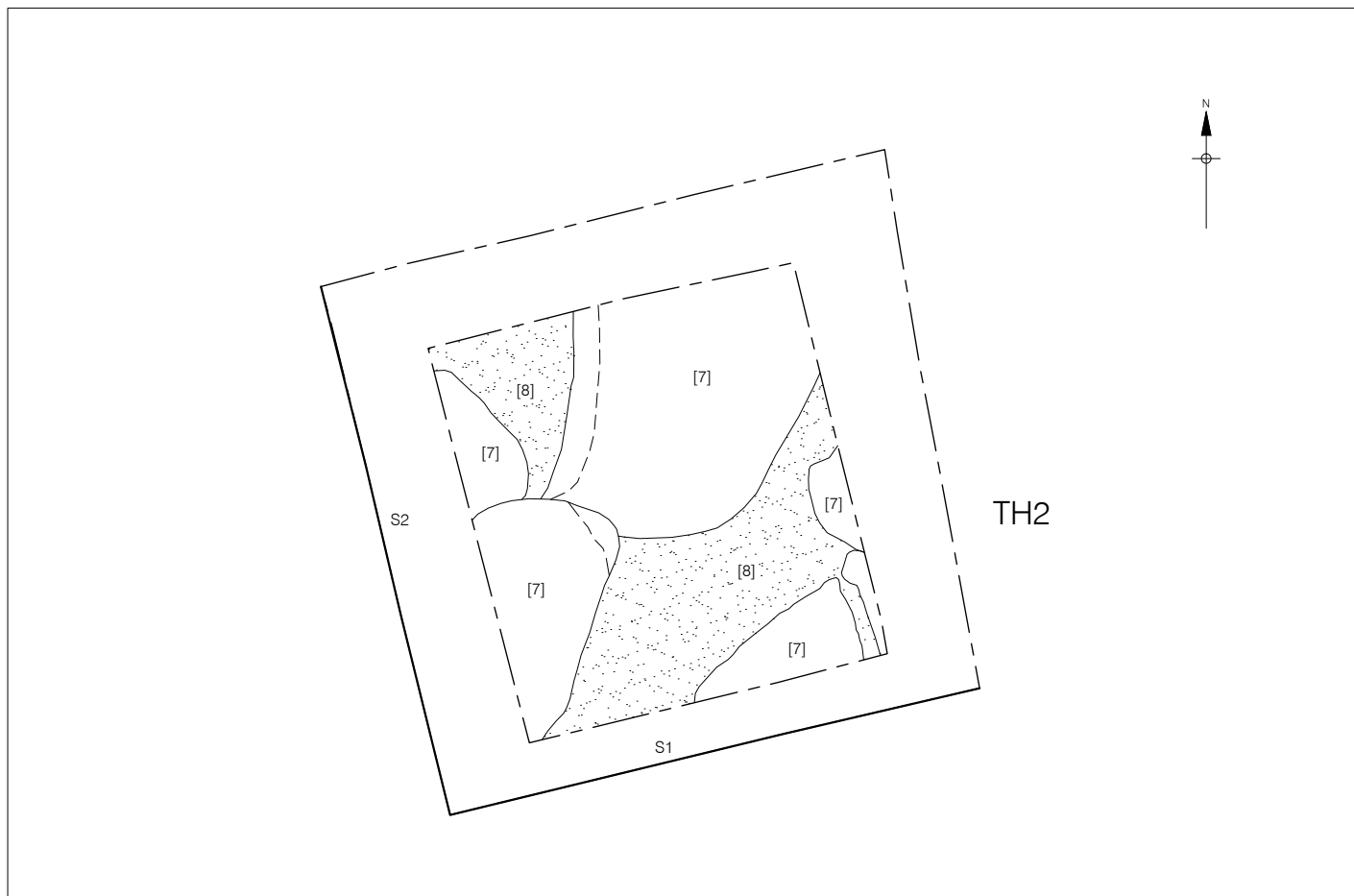
- 5.1 Pulborough is a large village in West Sussex with a population of some 5,000. It is located almost centrally within the County and is 80 km south-west of London.
- 5.2 The village is near the confluence of the Rivers Arun and Rother. The historic settlement of Pulborough lies on the north bank of the River Arun while on the southern side is the broad flood plain of the tidal Arun. Pulborough is on the northern boundary of the newly established South Downs National Park (Internet source 5).
- 5.3 Pulborough lay on the course of Roman Road Stane Street (Margary road no.15) on its way from London (*Londinium*) to Chichester (*Noviomagus Reginorum*) and the settlement grew up around a fording place over the River Arun. The Romans constructed a causeway to take Stane Street across the Arun Marshes on the southern bank of the Arun; traces of the *agger* and gravel and flint metalling have been found leading from the bridges southern end across fields to a *mansio* at Hardham (Margary 1973.66). Here Stane Street formed a junction with the Greensand Way Roman Road heading east to Lewes (Margary road no.140), while the main road continued south-west to Chichester, passing the notable Roman Villa at Bignor.
- 5.4 In the Saxon period the River Arun was bridged at Pulborough and at nearby Stopham, north of the Arun's confluence with the River Rother. From the medieval period until the Industrial Age Pulborough became an important watering and overnight halt for cattle drovers providing easy access to water (Internet source 5).
- 5.5 A mile to the north-west in woodland are the earthwork remains of a Motte and Bailey castle known as Park Mound, dating from the eleventh century (Internet source 5).
- 5.6 Transport connections afforded by the River Arun, its navigation, and later the railway brought Pulborough into the industrial age. Good road connections permitted the development of manufacturing industry, notably heavy engineering in the 20th century along London Road. All of this industry has now gone and Pulborough has reverted to being a small rural settlement (Internet source 5).
- 5.7 Pulborough Bridge, or Old Swan Bridge, is a Grade II listed building, listed in March 1955 (EH ID 298375). The bridge is described in its listing thus; '*Built in 1787 but in the medieval tradition, the southernmost arch added in 1834. Ashlar. Four round-headed arches with blunt cutwaters between them that are carried up above the water level to form buttresses. Parapet with rounded coping.*' (Internet source 3).
- 5.8 There is however, some discrepancy about the date of its construction, other sources date its inception to 1738 (Internet 4, WSP 2013.5).
- 5.9 The 18th century Bridge replaced an earlier wooden bridge that stood on the site. By the mid 20th century the narrow stone built bridge was unable to cope with the increase in road traffic, particularly with the establishment of heavy engineering in Pulborough and it was decided to by-pass it in the late 1930s with a modern single span bridge, adjacent to the west, which now carries the A29 road traffic.

6 ARCHAEOLOGICAL METHODOLOGY

- 6.1 The archaeological investigation was conducted according to a Written Scheme of Investigation (WSI) prepared by WSP Limited (WSP 2013) and approved by English Heritage and the local authority prior to the commencement of works. The fieldwork was designed to record the historic structure of the bridge and assess its condition prior to any future remedial works.
- 6.2 Two trial holes were excavated by hand at the northern end of the historic bridge spanning the River Arun at Pulborough. Both trial holes were dug down from the road deck of the bridge until the masonry inner structure of one the bridges arches was reached (Figures 1 and 2).
- 6.3 Trial Hole 1 was the more southerly of the two trial holes and was located over the apex of the back of span 1. It measured 1.10m east-west by 1m north-south and was excavated to a final depth of 0.52m below ground level at its northern end (at 5.37mOD) and 0.75m below ground level at its southern end (at 5.18mOD).
- 6.4 Trial Hole 2, the northerly of the two, was located over the impost/abutment of span 1. It measured 1m east-west by 1m north-south and was excavated to a final depth of 0.87m at the southern side (0.45mOD) to 0.97m at the northern end (4.77mOD).
- 6.5 Prior to any excavation the area was CAT scanned by a trained operative to determine the location of known services (water and BT). Their position was marked on the ground with line paint.
- 6.6 Both trial holes were excavated by hand. The initial cutting of the surface Tarmac (to a depth of 100mm) was done using a petrol power saw operated by contractors from West Sussex County Council. Thereafter all further excavation was done by archaeologists from PCA and WSP using a combination of an electric Kango-type hammer drill and hand tools (mattock, spade, shovel and trowel).
- 6.7 The spoil from the trial holes was separated into piles according to its stratigraphic position to enable the trial holes to be backfilled in approximately the same order as extracted. The excavated Tarmac was removed from site.
- 6.8 Backfilling was done by the archaeological team and was taken up to a level of approximately 200mm below the surface. This was to allow for a sufficient depth of new Tarmac which was later laid by contractors from WSCC.
- 6.9 Samples from all historic layers (Petrological and mortar) were obtained and analysed at Pre-Construct Archaeology Ltd's main offices in Brockley, London by Dr Kevin Hayward, Pre-Construct Archaeology Ltd's stone and brick specialist.
- 6.10 All archaeological data was recorded onto pro-forma sheets and recorded in plan and section as appropriate.
- 6.11 A comprehensive photographic record was made of each trial hole using high-resolution (12.5MP) digital format photography and 35mm Black and White film stock.
- 6.12 All levels were transferred and calculated from an Ordnance Survey Bench Mark located on the western side of the bridge parapet, at its northern end, which had a value of 6.32mOD.

7 THE ARCHAEOLOGICAL SEQUENCE

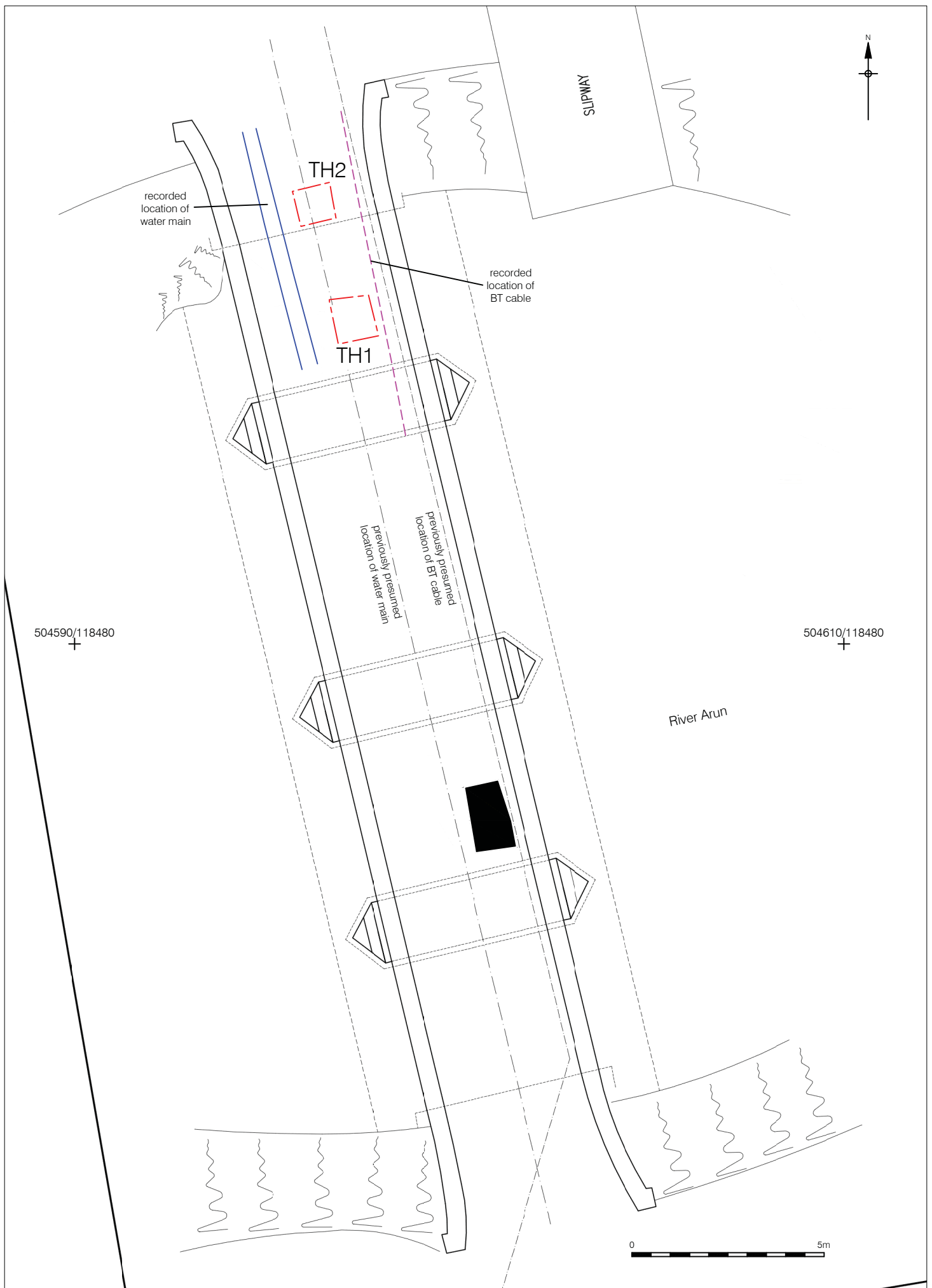
- 7.1 The following description of the stratigraphy details the main characteristics of each context and its position within the phased stratigraphic matrix, as encountered during the archaeological investigation. More details of the archaeological sequence can be found in appendix 1.
- 7.2 The stratigraphic sequence, with the exception of context [2] in Trial Hole 2, was identical in both trial holes.
- 7.3 Phase 1: Original 18th century construction of the bridge.
- 7.4 Trial Holes 1 & 2 (Figures 3,4,5,6. Plates 3-8)
- 7.4.1 Seen in the base of both Trial Holes 1 and 2, the earliest level reached was the stone masonry internal structure of the bridge (Figures 3, 4, 5. Plates 3, 4, 5, 6). In Trial Hole 1 this was given the context number [16] and from its curved profile (from north down to south) this appeared to be the extrados of the arch forming Span 1. Constructed from local Lodsworth Greensand Sandstone from the local Upper Greensand, it measured 0.85m north-south by 0.80m east-west. It curved up from south (at 5.18mOD) to north (at 5.37mOD). The stone was roughly finished and although no joints were visible (the surface was obscured by patches of mortar) its size would suggest more than one stone was present. A 20mm wide crack was noted running across the south-west corner of the stone [16] (Figure 4, 5. Plate 4).
- 7.4.2 In Trial Hole 2 the masonry construction had a different character. Masonry [7] was identified as local Lodsworth Greensand Sandstone (Dr Kevin Hayward pers. com.), but here it consisted of roughly hewn slabs laid in random courses. Dimensions varied; a smaller example measured 200mm by 150mm by 100mm thick while a larger example measured 400mm by 500mm by 200mm thick. The top of this masonry deposit was encountered at between 0.86m (4.95mOD) and 0.95m (4.77mOD) below ground level. It is interpreted as the rubble infill of the bridge's northern abutment (Figures 4 and 5, Plates 5 and 6).
- 7.4.3 In Trial Hole 1, the stone [16] was embedded within a friable layer of mid yellow brown sandy mortar [15]. This also overlaid the stone to a thickness of 0.10m. The top of this layer was encountered at 0.62m below ground level at 5.28m OD and was interpreted as an 18th century mortar layer supporting masonry [16]. One iron nail was found within this layer. This deposit was the same as context [8] observed in Trial Hole 2 where it was encountered at 0.72m below ground level at 5.07mOD (Figure 5).
- 7.4.4 Within layer [15] in Trial Hole 1 was a small isolated lens of a brittle pinkish red mortar [17] with chalk fragments as an inclusion. The lens measured 0.03m thick. Its level was recorded at 5.27m OD. Small patches of this distinctive pink mortar also overlay some of the masonry [16]. Its function is unclear and may be residual Roman material (Figure 6, Appendix 4). Isolated lens of this deposit were also observed in Trial Hole 2 where it was given the context [9] and the level was recorded at 4.98mOD (Figure 5).
- 7.4.5 In Trial Hole 1, overlaying the previous contexts was layer [14]. This was a 0.15 to 0.23m thick layer of crushed and compacted chalk with occasional small to medium flint nodules as an inclusion. The top of this layer was encountered at 0.40m below ground level at 5.53mOD and is interpreted as an 18th century levelling layer (Figure 6). The same deposit was noted in Trial Hole 2 as context [6] where it was recorded as being between 0.18m and 0.30m thick, the top at between 0.55m below ground level (5.27mOD) and 0.57m below ground level (5.17mOD) (Figure 5).
- 7.4.6 In Trial Hole 1, overlaying [14] was context [13], a 0.02m to 0.06m thick layer of friable mid greenish yellow sandy mortar with moderate small well-rounded pebbles as an inclusion. This thin band of mortar was encountered at 0.34m below ground level at 5.59m OD and is interpreted as an 18th century mortar layer, possibly the remains of a bedding layer for cobblestones that once surfaced the bridge (Figure 6). This deposit was the same as context [5] observed in Trial Hole 2, where it was noted as being 0.03 to 0.05m thick. The top of the deposit was encountered at between 0.52m below ground level (5.30mOD) and 0.54m below ground level (5.20mOD) (Figure 5).
- 7.5 Phase 2: Post-Medieval/Modern
- 7.6 Trial Holes 1 & 2 (Figures 3,4,5,6. Plates 3-8)

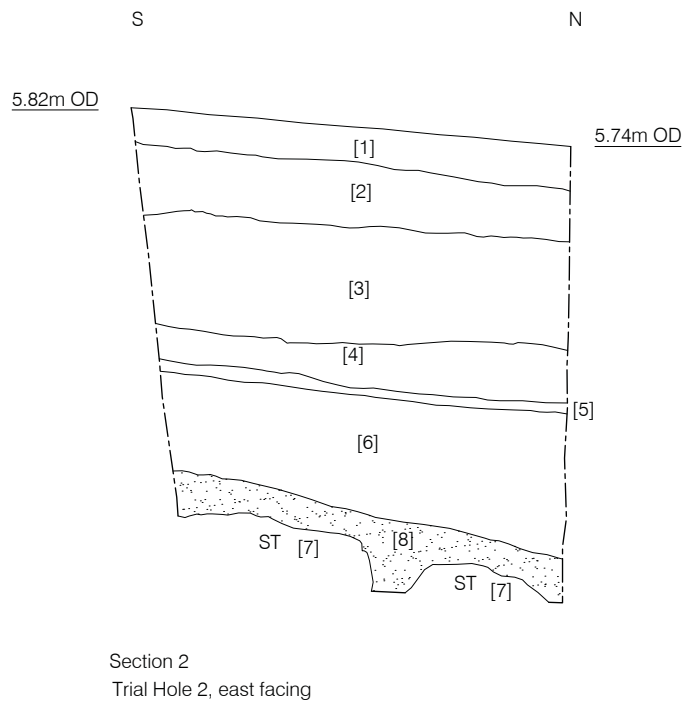
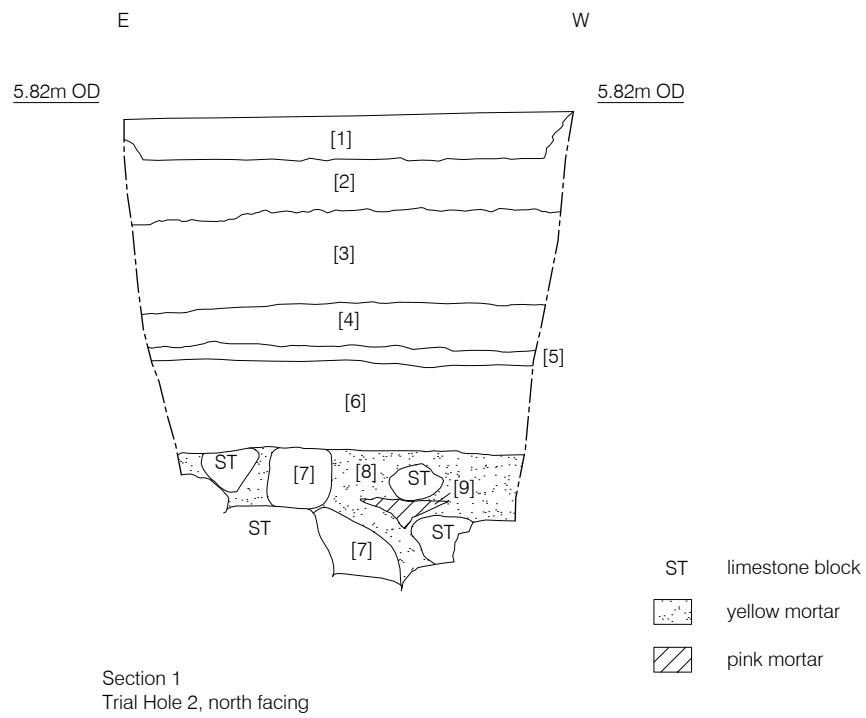


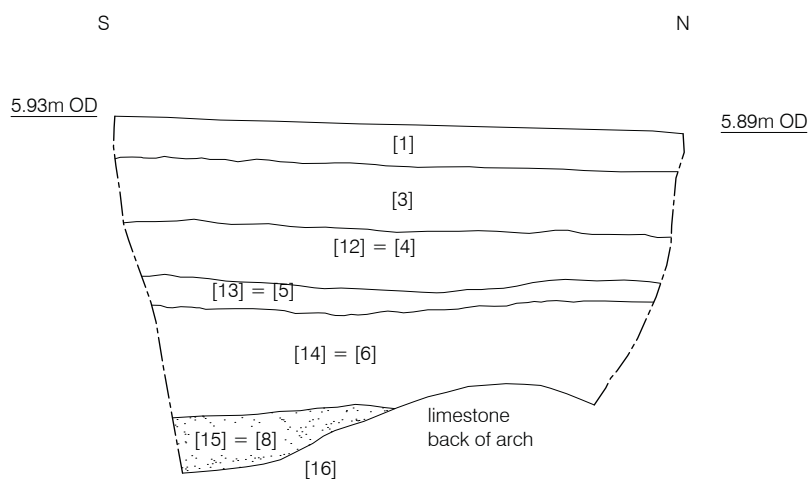
- 7.6.1 The remainder of the sequence of layers in Trial Hole1 and Trial Hole 2 are all post-medieval or modern; their description in ascending order is as follows (Figures 5 and 6);
- 7.6.2 Context [12] was a 0.10m to 0.18m thick layer of friable greyish yellowish white chalky sandy clay with moderate flint nodules and occasional CBM fragments as inclusions. The top was encountered at 0.20m below ground level at 5.76m OD and was interpreted as post-medieval/modern made ground. This deposit was the same as context [4] observed in Trial Hole 2 where the level was recorded as between 5.37mOD and 5.31mOD.
- 7.6.3 Context [3] was a 0.10m thick layer of friable reddish brown course chippings, the top of which was encountered at 0.08m below ground level at 5.84mOD. This was interpreted as modern sub-strata supporting the Tarmac layer above. This layer was also observed in Trial Hole 2 under the same context number where the level was recorded at between 5.60mOD and 5.55mOD.
- 7.6.4 Context [2] was only present in Trial Hole 2 (Figure 5, S.1, 2). This was a 0.10 to 0.15m thick layer of degraded Tarmac. The top was encountered at 0.08m below ground level at between 5.75mOD and 5.65mOD and was interpreted as a modern layer of worn and degraded Tarmac, an earlier surface of the bridge.
- 7.6.5 Context [1] was a 0.08m thick layer of modern Tarmac, the top of which forms the current ground level at between 5.94mOD and 5.90mOD. This layer was also observed in Trial Hole 2 where the top formed the current ground level at between 5.82mOD and 5.74mOD.

8 CONCLUSIONS

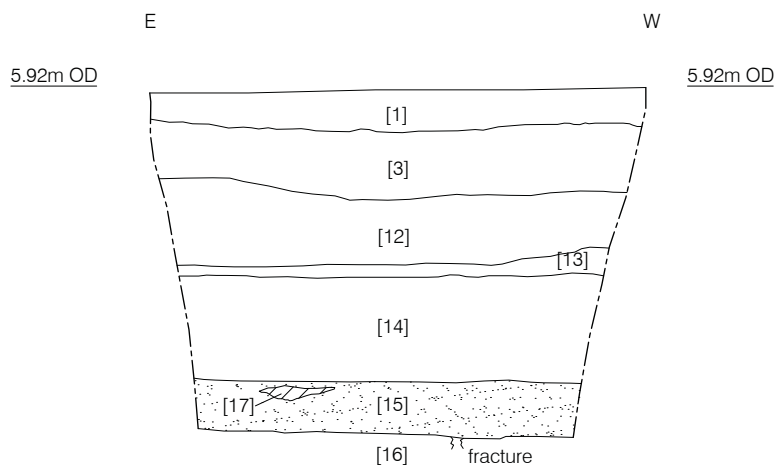
- 8.1 The investigation conducted at Old Swan Bridge, Pulborough found evidence for some of the original 18th century construction techniques employed in building the bridge which will inform any future restoration work of the bridge.
- 8.2 Both trial holes revealed the mass of the internal structure of the bridge to be made of local Lodsworth Greensand Sandstone from the Upper Greensand. Samples taken from contexts [16] and [7] are probably local rubble stones. The same type of stone was used in the Late Iron Age and Roman periods for quern-stones as the Chert content made it an ideal material for grinding cereals (Dr. K Hayward, pers.comm.) This type of stone has not been previously identified on the bridge before.
- 8.3 The upper levels of the abutments, piers and arches would, when constructed, naturally form an undulating surface. In the case of Old Swan Bridge, this appears to have been levelled off with a thick layer of crushed chalk rubble, likely to have been sourced locally from the surrounding chalk Downs. The chalk was rammed and tamped hard to form a flat layer onto which the road deck surface could be laid. This layer was recorded in Trial Hole 1 as [14], where it was between 0.20m and 0.40m thick, and Trial Hole 2 as [6], where it was between 0.20m and 0.30m thick.
- 8.4 Overlaying the chalk layer in both trial holes 1 and 2 was a thin bed of sandy mortar ([13] in Trial Hole 1 and [5] in Trial Hole 2). This layer may represent the remnants of the mortar bed laid to support cobblestones that are believed to have surfaced the bridge in the 18th century and later to have been removed. This deposit has a wide date range (AD50-1600) but is most likely mid post-medieval. It is surmised that over time modern resurfacing of the bridge (at least two episodes are evident in Trial Hole 2 as layers [2] and [1]) have raised the level of the road deck slightly, perhaps by as much as 0.30 to 0.40m. It is also suggested that layer [13]/[5] represents the start of the archaeological horizon proper, with all subsequent layers above being comparatively modern deposits of limited archaeological interest.
- 8.5 The brittle pinkish red mortar lens [9] and [17] is something of an anomaly. It is conceivably of a type that could be Roman, similar to, but not classic *opus signinum*. Equally it could be medieval (it has a spot date of AD50-1600) (Dr. K Hayward, pers.comm.), but in both cases this pre-dates the construction of the bridge. These lenses of mortar must therefore be classified as residual but it is worth reiterating Pulborough's Roman connections. It is also possible that some of the building stone, with Roman mortar still adhering, may have been reused on the bridge from a Roman building nearby. There are several possible local sources such as the Hardham Camp Roman posting station, the Borough Farm Roman villa or the Wiggonholt Roman bath-house, upstream to the east (Pers. comm. John Mills).
- 8.6 The masonry forming the arch of span 1 appears to be only one course thick (Figure 6, Plate 7). The course of the arch on the exterior of the bridge measured 0.50m thick. Comparing the levels on the underside of the exterior of the arch (4.93mOD) with the level at the highest point of the exposed stone in the base of the trench (5.43mOD) reveals the same dimension, 0.50m, as measured on the exterior; thus the stones forming the arch are one course thick.
- 8.7 Trial Hole 1 revealed a 20mm wide crack across the south-west corner of the stone [16]. It is unknown if it penetrated through the entire thickness of the stone, but the width of the fracture on the surface would suggest so (Plates 3 & 4).
- 8.8 The position of Trial Hole 2 revealed a different characteristic of the internal structure of the bridge. The location of Trial Hole 2 placed it above the point, externally, where the intrados slopes steeply down to meet the impost. Therefore masonry [7] is likely to be the upper layers of the rubble infill of the bridge's northern abutment where it overlaps, and therefore masks, the stonework forming the arch of span 1 (Plates 5 & 6).
- 8.9 The condition of the arched span was inspected and assessed by a structural engineer from WSP whose observations will form a separate report.
- 8.10 No archaeological deposits pre-dating the 18th century were encountered during the investigation.









Section 3
Trial Hole 1, east facing



[17] = [19]

Section 4
Trial Hole 2, north facing

- ST limestone block
-  yellow mortar
-  pink mortar



9 ACKNOWLEDGEMENTS

- 9.1 Pre-Construct Archaeology Limited would like to thank Jim Hunter of WSP Limited for commissioning this project.
- 9.2 The author would like to thank Jim Hunter and Guy Seddon for their assistance with the field work, and John Mills the County Archaeologist of West Sussex County Council who inspected the works and provided advice.
- 9.3 Dr Kevin Hayward, Pre-Construct Archaeology Ltd's stone and brick specialist provided identification, spot dates, analysis and assessment of stone and mortar samples.
- 9.4 The author would also like to thank PCA CAD department for the illustrations as well as Helen Hawkins who managed the project and edited this report.

10 BIBLIOGRAPHY

10.1 Printed sources

Margary, Ivan D. 1973 (3rd ed.). *Roman Roads in Britain*. John Barker, London.

WSP 2013: *Old Swan Bridge, Pulborough, West Sussex (ref 1252) An Archaeological Written Scheme of Investigation for Trial Holes*. Unpublished report by WSP Environment Limited.

10.2 Internet sources

Internet 1:

http://en.wikipedia.org/wiki/River_Arun

Internet 2 :

<http://www.environment-agency.gov.uk/homeandleisure/floods/riverlevels/136474.aspx?stationId=1017>

Internet 3 :

<http://www.britishlistedbuildings.co.uk/en-298375-pulborough-bridge-coldwaltham-west-sussex#>

Internet 4 :

<http://www.bbc.co.uk/history/domesday/dblock/GB-504000-117000/page/2>

Internet 5 : <http://en.wikipedia.org/wiki/Pulborough>

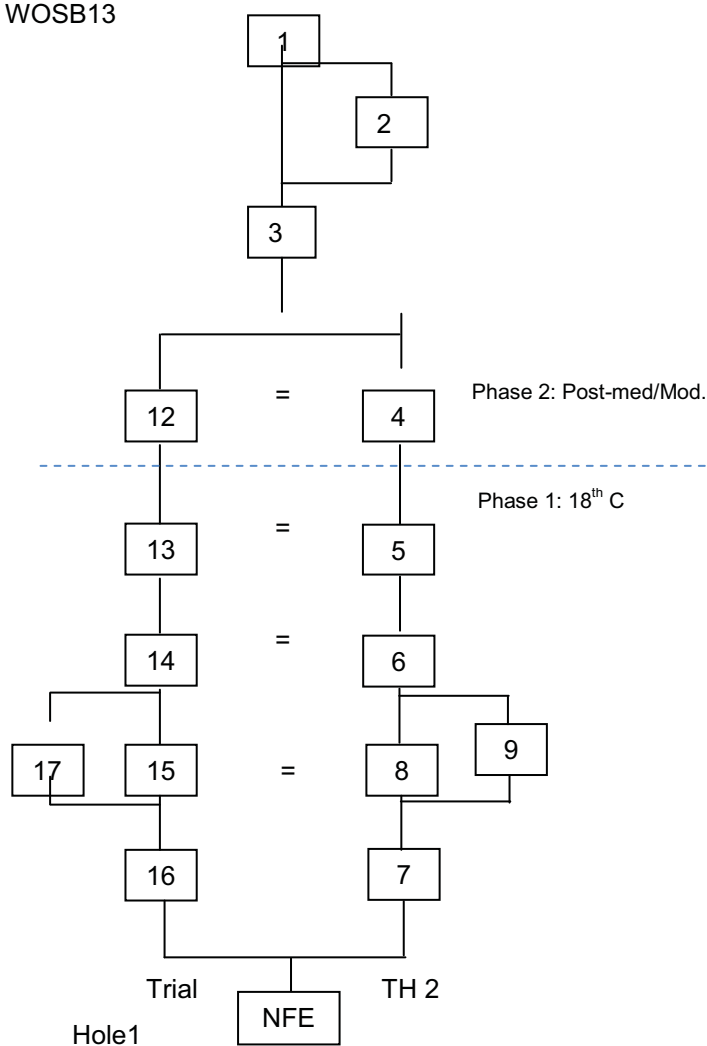
http://www.westsussex.gov.uk/living/environment_and_planning/planning/the_county_plan/west_sussex_character_project/extensive_urban_surveys_eus.aspx

APPENDIX 1: CONTEXT INDEX

Context No.	Type	Trench No.	Section No.	Description	Date	Phase
1	Layer	Trial Hole1 & Trial Hole2	1,2,3,4,	Tarmac	Post-Med/mod	2
2	Layer	Trial Hole2	1,2,	Old Tarmac	Post-Med/mod	2
3	Layer	Trial Hole1 & Trial Hole2	1,2,3,4	Type 1 chippings	Post-Med/mod	2
4	Layer	Trial Hole2	1,2	Made ground =[12]	Post-Med/mod	2
5	Layer	Trial Hole2	1,2	Mortar bed=[13]	18 th C	1
6	Layer	Trial Hole2	1,2	Compacted chalk made ground =[14]	18 th C	1
7	Masonry	Trial Hole2	1,2	Limestone infill of bridge	18 th C	1
8	Layer	Trial Hole2	1,2	Sandy mortar =[15]	18 th C	1
9	Deposit	Trial Hole2	1	Pink mortar=[17]	18 th C	1
10				NOT USED		
11				NOT USED		
12	Layer	Trial Hole1	3,4	Made ground =[4]	Post-Med/mod	2
13	Layer	Trial Hole1	3,4	Mortar bed=[5]	18 th C	1
14	Layer	Trial Hole1	3,4	Compacted chalk made ground =[6]	18 th C	1
15	Layer	Trial Hole1	3,4	Sandy Mortar =[8]	18 th C	1
16	Masonry	Trial Hole1	3,4	Limestone arch	18 th C	1
17	Deposit	Trial Hole1	4	Pink mortar=[9]	18 th C	1

APPENDIX 2: MATRIX

WOSB13



APPENDIX 3: PLATES 1 TO 8



Plate 1 D1/23. East side of Old Swan Bridge, Pulborough crossing the River Arun, looking SW. The approximate positions of the trial holes is marked. Note 1990s steel supports below arch.



Plate 2. D1/4 North end of Pulborough Bridge. Red paint lines indicate position of Trial Holes, Trial Hole2 closest to camera. The modern single span bridge is to the right, Scale 1m looking SW.



Plate 3. D1/10. Trial Hole 1. Inner back of stone arch [16] in base of trench. Scales 0.5m and 1m looking N.



Plate 4. D1/18. Trial Hole1. Base of trench showing arch stone [16]. Note fracture. Scales 10cm (over fracture) 0.5m, looking E.



Plate 5. D1/8. Trial Hole2. Rubbly stone infill of abutment in base [7], overlain by white chalk levelling layer [6]. Scales 1m and 0.5m, looking SSW.



Plate 6. D1/16. Base of Trial Hole2 showing masonry [7] and white chalk layer [6]. Scale 0.5m looking East



Plate 7. D1/24. Detail of span 2, east side of Pulborough Bridge showing arch construction. Looking SW.

Plate 8. D1/11 North end of bridge. Trial Hole1 in foreground with Trial Hole2 beyond. Scales 1m and 0.5m. looking N.



APPENDIX 4: STONE AND MORTAR REPORT

Dr Kevin Hayward

WOSB13 BRIDGE PULBOROUGH

Context	Fabric	Wt	Size	Date range of material		Latest dated material		Spot date
5	3101	50	1	50	1600	50	1600	50-1600
6	3117 Chalk	500	1	Natural	Natural	Natural	Natural	Natural
7	3120 Lodsworth Greensand rubble	2500	2	100BC	1800	100BC	1800	100BC-1800
9	3101 Mortar Gravel	50	1	50	1600	50	1600	50-1600
16	3120 Lodsworth Greensand rubble	5000	1	100BC	1800	100BC	1800	100BC-1800
17	3101 Mortar Gravel	50	1	50	1600	50	1600	50-1600

The stone-types recovered from the bridge are local Lodsworth Greensands from the local Upper Greensand. These were probably local rubblestones but it is possible that they could be reused chunks of LIA/ Roman quern. This was the material type of choice for grinding cereal into coarse grain because of the cherty black wisps and exported widely in the province. However, this is also the nearest suitable building rubble material to Pulborough during later periods. Chalk rubble is local too.

Mortar consists of two types. Those from [9] and [17] are reddened gravel mortars of a type that could conceivably be Roman – (not classic opus signinum) – but could also be medieval. They are probably residual in the context in which they were found.

APPENDIX 5: OASIS FORM

Project details

Project name OLD SWAN BRIDGE, PULBOROUGH, WEST SUSSEX. AN ARCHAEOLOGICAL INVESTIGATION

Short description of the project An archaeological investigation was undertaken by Pre-Construct Archaeology Ltd on Old Swan Bridge, Pulborough, West Sussex RH20 2BJ. The investigation involved the hand excavation of two trial holes dug down into the road deck of the bridge. This was to investigate the structural condition of the bridge and, as far as a limited excavation will allow, archaeologically record the building methods used in its construction. The bridge, a stone built arch bridge with four spans, dating to the 1730s, is a Scheduled Monument, and Grade II listed. Concerns about the stability of the northern most arched span of the bridge have been raised (temporary steel supports have been in place since the 1990s) and this investigation will inform any future repair work carried out on the bridge. Evidence of the original 18th century construction methods used on the bridge was observed and recorded, as were later works. An indication of the original road deck level was estimated. Evidence for the condition of the arched span was also revealed and this was inspected and assessed by a qualified structural engineer. Limited evidence for cultural activity pre-dating the 18th century, possibly Roman or medieval, was observed during the investigation.

Project dates Start: 24-06-2013 End: 24-06-2013

Previous/future work Not known / Not known

Any associated project reference codes WOSB13 - Sitecode

Type of project Field evaluation

Site status Scheduled Monument (SM)

Current Land use Transport and Utilities 2 - Other transport infrastructure

Monument type BRIDGE Post Medieval

Significant Finds BRIDGE MASONRY Post Medieval

Significant Finds BRIDGE INTERNAL STRUCTURE Post Medieval

Significant Finds MORTAR Uncertain

Methods & "Trial Holes"
techniques

Development type Bridge

Prompt Scheduled Monument Consent

Position in the After outline determination (eg. As a reserved matter)
planning process

Project location

Country England

Site location WEST SUSSEX HORSHAM PULBOROUGH Old Swan Bridge, Pulborough, West
Sussex

Postcode RH20 2BJ

Study area 2.00 Square metres

Site coordinates TQ 0459 1848 50 0 50 57 20 N 000 30 38 W Point

Project creators

Name of Pre-Construct Archaeology Limited
Organisation

Project brief WSP Environmental
originator

Project design Jim Hunter
originator

Project Helen Hawkins
director/manager

Project supervisor Stuart Watson

Type of County Council
sponsor/funding
body

Name of West Sussex County Council
sponsor/funding
body

Project archives

Physical Archive West Sussex Records Office
recipient

Physical Contents "Metal","Worked stone/lithics"

Digital Archive West Sussex Records Office
recipient

Digital Contents "Metal","Worked stone/lithics"

Digital Media "Images raster / digital photography"
available

Paper Archive West Sussex Records Office
recipient

Paper Contents "Metal","Worked stone/lithics"

Paper Media "Context sheet","Matrices","Photograph","Plan","Report","Section","Unpublished
available Text"

Project
bibliography 1

Publication type Grey literature (unpublished document/manuscript)

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