



Kendal Flood Risk Management Scheme, Kendal, Cumbria

Site Investigation Report

March 2019

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Kendal Flood Risk Management Scheme, Kendal, Cumbria

Site Investigation Report

Written by Steve Clarke and Mairead Rutherford

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Summary

Oxford Archaeology (OA) North were commissioned by VolkerStevin Ltd to undertake a Watching Brief during Ground Investigation (GI) works and produce a Palaeoenvironmental Landscape Interpretation on the Kendal Flood Risk Management Scheme (FRMS), Kendal, Cumbria (SD 51500 92500).

A programme of Ground Investigation (GI) works had been prepared to inform the selection of a preferred route for the flood defence and inform the detailed design process (planning ref. SL/2018/0925). The need for an archaeological watching brief had been identified by the Environment Agency (EA) National Environmental Assessment Service (NEAS) Senior Archaeologist for inclusion in the GI programme. The nature and scope of archaeological intervention throughout the GI programme had also been discussed with the Cumbria County Council (CCC) Historic Environment Officer as archaeological advisor to the Local Planning Authority. VolkerStevin Ltd subsequently commissioned OA North to undertake the Watching Brief and Palaeoenvironmental Landscape Interpretation, based on the borehole logs, in September 2018.

The watching brief comprised 11 borehole locations and one hand-excavated test pit at the northern end of the scheme and three machine-dug test pits excavated at the southern end of the scheme. These were located on both sides of the River Kent from Miller Bridge in Kendal to Helsington Mills, south of Kendal. The fieldwork was undertaken over the course of 13 days between October and December 2018.

The majority of the hand-dug pits revealed made up ground extending beyond 1.2m and revealed little of archaeological interest. Two pits (BHK26 and BHK28) on the west bank of the River Kent within the town did show some possible archaeology. These putative features comprised compact limestone layers, situated at 0.5m and 0.7m below ground level respectively, and could possibly be remnants of a relict surface.

The borehole logs from the scheme as a whole were assessed by a geoarchaeologist to form a Palaeoenvironmental Landscape Interpretation. Eighteen borehole logs were assessed for any significant Quaternary deposits. Throughout the boreholes there were four distinct types of deposit, Made Ground, Sands and Gravels, Silts and Clays and further Sands and Gravels underlying the silts and clays. There were no post-glacial deposits which would have represented floodplain deposits, which would have potentially developed into stabilized areas, allowing for an accumulation of organic material, such as, peat deposits. Most of the deposits within the boreholes appeared to represent sand and gravel deposits of glacial till or post-glacial fluvio-glacial or alluvial deposition. Therefore, no further palaeoenvironmental work is recommended.

Acknowledgements

Oxford Archaeology North would like to thank Jamie Dagleish and Andrew Marshall of VolkerStevin Ltd for commissioning this project. Thanks are also extended to Jeremy Parsons who monitored the work on behalf of Cumbria County Council, for his advice and guidance.

The project was managed for Oxford Archaeology North by Paul Dunn. The fieldwork was undertaken by Steve Clarke and the Palaeoenvironmental Landscape Interpretation was undertaken by Mariread Rutherford. Illustrations were produced by Mark Tidmarsh.

1 INTRODUCTION

1.1 Scope of Work

- 1.1.1 Oxford Archaeology (OA) North was commissioned by VolkerStevin Ltd to undertake a Watching Brief during Ground Investigation (GI) works and produce a Palaeoenvironmental Landscape Interpretation along the length of the Kendal Flood Risk Management Scheme (FRMS), Kendal, Cumbria (NGR SD 51500 92500) (Fig 1).
- 1.1.2 A programme of GI works had been prepared to inform the selection of a preferred route for the flood defence and inform the detailed design process (planning ref. SL/2018/0925). The need for an archaeological watching brief had been identified by the Environment Agency (EA) National Environmental Assessment Service (NEAS) Senior Archaeologist for inclusion in the GI programme. The nature and scope of archaeological intervention throughout the GI programme had also been discussed with the Cumbria County Council (CCC) Historic Environment Officer as archaeological advisor to the Local Authority. A brief was set by VolkerStevin Ltd and a Project Design (*Appendix D*) was produced by OA North detailing Cumbria County Council's requirements for the work. This document outlines how OA North implements the specified requirements.

1.2 Location, Topography and Geology

- 1.2.1 The boreholes and trial pits monitored were located along both sides of the River Kent flowing through the town of Kendal, Cumbria (NGR SD 51500 92500) (Fig 1). The scheme started to the east of Kendal near Jenkinrag extending north-west to the north of the South Lakes Retail Park at which point it follows the River Mint to where it joins the River Kent. The scheme then followed the River Kent through Kendal ending north of Young Spring Wood.
- 1.2.2 The solid bedrock geology of the northern part of the scheme is mapped as sandstone of the Kirkby Moor formation formed in the Silurian period, whilst in the southern part of the scheme it is mapped as Limestone of the Dalton formation formed in the Carboniferous period (BGS 2018)
- 1.2.3 The superficial deposits are clay, sand and gravel alluvium deposited in the Quaternary period (*ibid*). The soils of the area are identified as freely-draining slightly-acid loamy soils (Cranfield 2018)

1.3 Archaeological and Historical Background

- 1.3.1 The archaeological and historical background of the site is discussed in the Historic Environment Assessment produced by ECUS (2018) and the Cultural Heritage Chapter of the Environmental Statement produced by the EA (2019) and will not be repeated here.

2 WATCHING BRIEF AIMS AND METHODOLOGY

2.1 Aims

2.1.1 The project aims and objectives were as follows:

- i. to determine or confirm the general nature of any remains present;
- ii. to determine or confirm the approximate date or date range of any remains, by means of artefactual or other evidence;
- iii. to inform a decision to whether further archaeological investigation will be required in advance or during further works on the Kendal FRMS;
- iv. to undertake a Palaeoenvironmental Landscape Interpretation based upon the results of the assessment of borehole logs;
- v. to compile a professional archival record of any archaeological remains within the test pits.

2.2 Methodology

2.2.1 The full methodology is outlined in the Project Design (*Appendix D*) and was adhered to in full, and, as such, was fully compliant with prevailing guidelines and established industry best practice (ClfA 2014a: 2014b: 2014c: Historic England 2015). A programme of field observation accurately recorded the character of deposits within the excavations. The on-site contractor used hand tools or a mechanical excavator fitted with a toothless ditching bucket for excavating purposes.

2.2.2 The watching brief comprised monitoring of 11 hand-dug test pits in the location of boreholes (prefixed BHK), excavated to a depth of 1.2m, one hand-dug test pit (prefixed HDPK), measuring 0.4m square, 1.2m deep, and three machine-dug test pits (prefixed TPK), measuring 3m long by 0.4m wide and excavated to a depth of 2.3 - 2.9m. There was no requirement to monitor the remaining BHK and HDPK locations as they were identified to be of low archaeological potential by the EA NEAS. The subsoil horizons and resultant spoil were systematically examined during the course of the excavations.

2.2.3 All information identified during the site works was recorded stratigraphically, using a system adapted from that used by the former Centre of Archaeology of English Heritage, with an accompanying pictorial record (plans, sections, and digital photographs). Primary records were available for inspection at all times.

2.2.4 Results of all field investigations were recorded on *pro forma* context sheets. The site archive includes both a photographic record and accurate large-scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10).

2.2.5 A full professional archive has been compiled in accordance with the Project Design (*Appendix D*), and in accordance with current ClfA (2014c) and Historic England guidelines (Historic England 2015). The archive will be deposited with the Kendal Museum of Natural History and Archaeology.

3 RESULTS

3.1 Introduction and presentation of results

3.1.1 The results of the Watching Brief and Palaeoenvironmental Landscape Interpretation are presented below, and include a stratigraphic description of the boreholes and test pits. The full details of all boreholes and test pits monitored, with dimensions and depths of all deposits can be found in *Appendix A*.

3.2 Watching Brief Results

3.2.1 The soil sequences identified in the 11 borehole hand-dug test pits, three mechanically-excavated test pits and one hand-dug test pit were all fairly uniform, with natural geology being identified in eight of the borehole hand-dug test pits (BHK23, BHK25, BHK26, BHK27, BHK28, BHK43, BHK45 and BHK56) and two of the mechanically-excavated test pits (TPK01 and TPK03), at various depths from 0.1 – 1.2m below ground level, generally as brown silty sand with frequent cobble inclusions. This was overlain for the most part by made ground of redeposited sandy gravelly stony soils, which were subsequently overlain by turfed topsoil or hard-standing.

3.2.2 Putative archaeological features in the form of possible surfaces were present in two of the boreholes (BHK26 and BHK 28). They were identified as **2603** (Plate 1) and **2802** (Plate 2), thin compact layers of limestone, 0.1m thick.



Plate 1: BHK26 showing limestone inclusion **2603**, scale 0.20m



Plate 2: BHK28 showing limestone inclusion **2802**, scale 0.20m

3.2.3 The three machine-dug test pits (TPK01, TPK02 and TPK03) were situated around Helsingham Mills on the west bank of the River Kent. They were all 3m long by 0.4m wide and excavated to a maximum depth of 2.9m below ground level. These did not reveal any archaeological features, although TPK02 did expose relict soil horizon **203** at a depth of 1.4m.



Plate 3: TPK02 showing relict soil horizon **203** and a log *in situ*, scale 1m

3.3 Palaeoenvironmental Landscape Interpretation Results

3.3.1 Eighteen borehole logs from the Kendal FRMS were assessed with the principal aim of providing an environmental landscape interpretation of any significant Quaternary (Pleistocene and Holocene) deposits recorded from the borehole sediments. These 18 boreholes were BHK20, BHK21, BHK22, BHK23, BHK24, BHK25, BHK26, BHK27, BHK28, BHK36, BHK37, BHK38, BHK40, BHK49, BHK51, BHK52D, BHK55 and BHK56.

3.3.2 The boreholes contained generally the same deposits throughout the scheme which were:

- Made Ground – comprising variations of Tarmacadam, paving stones, gravel, clay, sandstone, brick, coal and glass. Reflecting local building and construction works;
- Sands and gravel – likely glacial till and fluvio-glacial deposits or post-glacial alluvial deposits;
- Silts and clays - were identified in BHK49, BHK52D and BHK56 and likely relate to post-glacial alluvial deposits;
- Sands and gravels underlying silts – were identified in BHK52D and BHK56 and likely relate to glacial till or fluvio-glacial deposits.

4 DISCUSSION

4.1 Watching Brief Interpretation

4.1.1 Little archaeology was identified throughout the monitored GI works and no finds were retrieved. Putative compact limestone surfaces were identified in boreholes BHK26 and BHK28. This lack of archaeological features is likely due to the size of the interventions undertaken as part of the GI works; the hand-dug pits and boreholes were 0.4m by 0.4m and excavated to a depth of 1.2m. As such, despite this lack of archaeological evidence, there is still the potential for archaeological remains to be present throughout the scheme.

4.2 Palaeoenvironmental Landscape Interpretation

4.2.1 As the ice melted at the end of the last glacial period (Dimlington Stadial of the Late Devensian), present day rivers would have cut down into glacial till and partly filled with sand and gravel deposits. If Post-glacial deposits had been identified within the borehole logs, including alluvial silts and sands, they may have represented floodplain deposits, which may have developed into stabilised areas and could have accumulated organic matter, for example, peat deposits. Such deposits would have provided potential for palaeoenvironmental archaeology, allowing interpretation of landscape history and inferred human impact, however, no such deposits have been recorded in the 18 borehole logs provided. Most of the boreholes represent sand and gravel deposits of glacial till or postglacial fluvio-glacial or alluvial deposition.

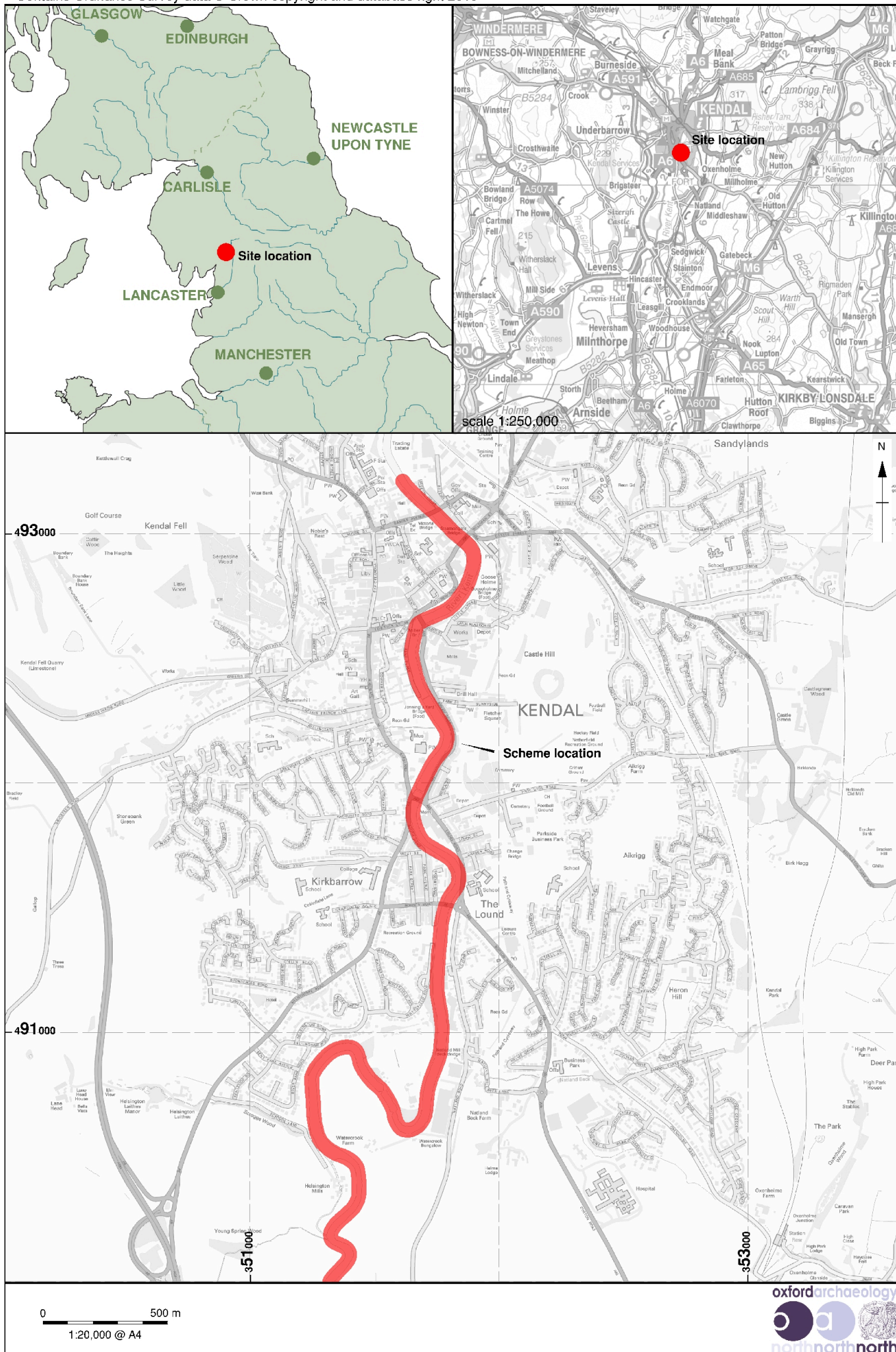


Figure 1: Site location

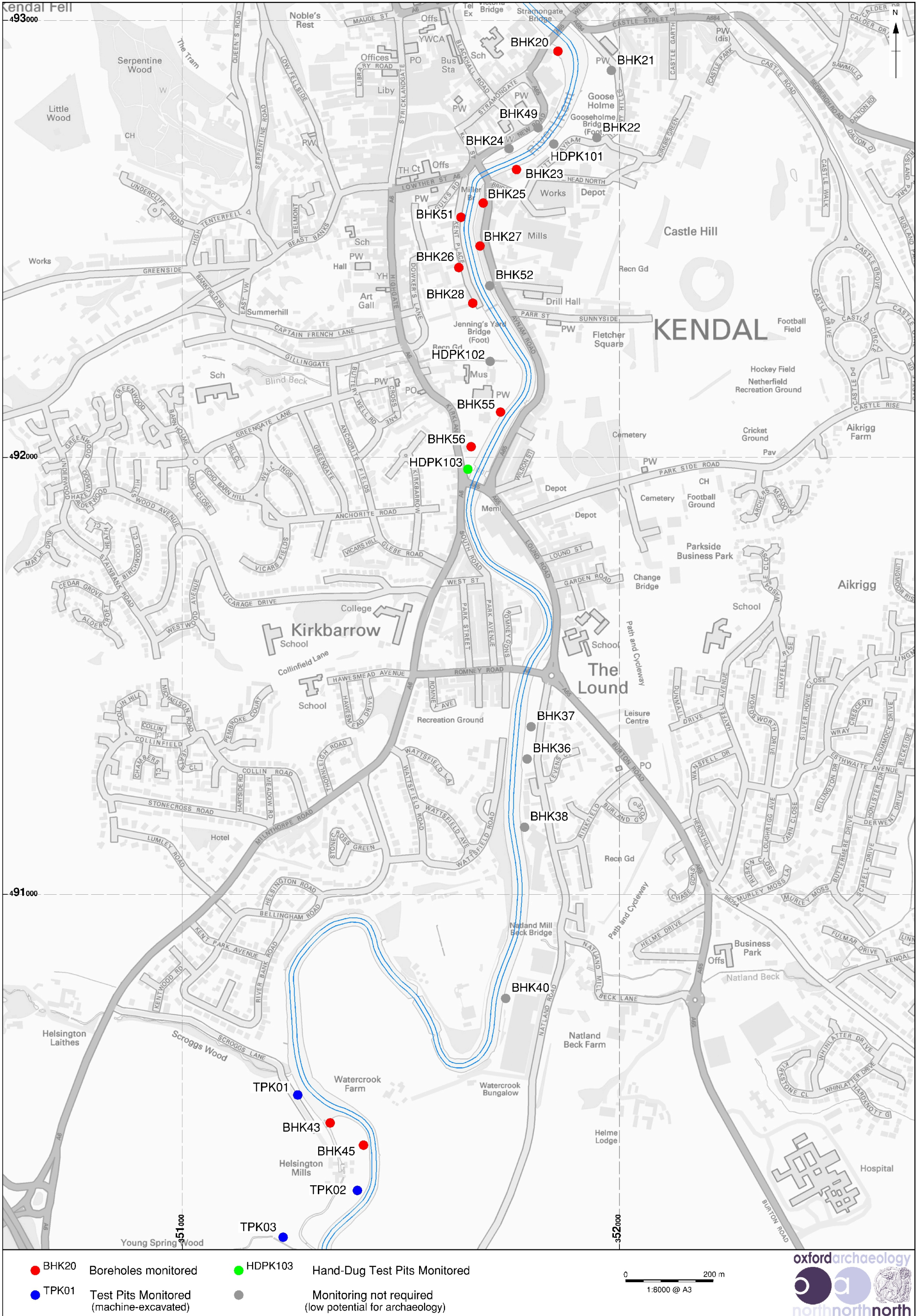


Figure 2: Boreholes and Test Pits monitored

APPENDIX A PIT DESCRIPTIONS AND CONTEXT INVENTORY

HDPK103						
General description					Orientation	-
Pit devoid of archaeology. Topsoil overlying made ground.					Length (m)	0.4
					Width (m)	0.4
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
301	Layer	-	0.5	Topsoil. Greyish black friable silty sandy clay	-	-
302	Layer	-	>0.7	Greyish brown friable sandy silt with moderate small to medium sub-angular limestone inclusions and occasional brick fragment	-	-

BHK20						
General description					Orientation	-
Pit devoid of archaeology. Consists of tarmac surface and aggregate levelling layer over made ground.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2001	Layer	-	0.1	Tarmac surface	-	-
2002	Layer	-	0.1	Pinkish brown aggregate	-	-
2003	Layer	-	>1	Brown sandy gravel with small to large sub-angular limestone inclusions	-	-

BHK23						
General description					Orientation	-
Pit devoid of archaeology. Consists of gravel surface and aggregate levelling layer overlying made ground, subsequently overlying natural geology.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2301	Layer	-	0.05	Tarmac surface	-	-
2302	Layer	-	0.15	Grey subangular slate gravel aggregate	-	-
2303	Layer	-	0.3	Made ground. Brown, gravelly coarse sand with brick and sandstone inclusions	-	-
2304	Layer	-	>1.1	Natural Geology. Greyish brown friable clayish silt with moderate small to medium cobbles	-	-

BHK25						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlying natural geology.					Length (m)	0.4
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2501	Layer	-	0.3	Topsoil. Greyish black friable silty sandy clay	-	-
2502	Layer	-	0.6	Natural Geology. Greyish brown friable sandy silt with frequent small to medium cobbles	-	-
2503	Layer	-	>0.9	Natural Geology. Firm sandy clay	-	-

BHK26						
General description					Orientation	-
Paved surface and levelling aggregate overlying made up ground. Beneath this is 0.1m compact limestone surface, possibly archaeological, overlying made ground and subsequently natural geology.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2601	Surface	-	0.08	Paving slab on aggregate	-	-
2602	Layer	-	0.17	Greyish brown aggregate compact mix of silty sand and small to medium sub-angular stones	-	-
2603	Layer	-	0.1	Compact medium limestone	-	-
2604	Layer	-	0.65	Made ground. Grey brown gravelly clayey sand with cobble inclusions.	-	-
2605	Layer	-	>0.2	Natural Geology. Brown firm silty sand and cobbles.	-	-

BHK27						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlying made ground and subsequently natural geology.					Length (m)	0.4
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2701	Layer	-	0.3	Topsoil. Greyish black friable silty sandy clay	-	-
2702	Layer	-	0.45	Made Ground. Brown friable clayish silt with frequent medium to large cobbles	-	-

2703	Layer	-	>1.65	Natural Geology. Orange brown clayey sand.	-	-
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BHK28						
General description					Orientation	-
Turfed topsoil overlying a layer of compact limestone, possibly archaeological, which overlays made ground and subsequently natural geology.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
2801	Layer	-	0.5	Topsoil. Greyish black friable silty sandy clay	-	-
2802	Layer	-	0.1	Medium to large limestone	-	-
2803	Layer	-	>0.8	Natural Geology. Brown firm sandy clay lay with frequent small stones and small to medium limestone inclusions	-	-

BHK43						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlying natural geology.					Length (m)	0.4
					Width (m)	0.4
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
4301	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	-
4302	Layer	-	>1.1m	Natural Geology. Greyish black compact silty gravel with very frequent small to medium stones and moderate medium to large cobbles	-	-

BHK45						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlying natural geology.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
4501	Layer	-	0.5	Topsoil. Greyish black friable silty sandy clay	-	-
4502	Layer	-	>0.8	Natural Geology. Blackish grey compact silty gravel with very frequent small to medium stones and moderate medium to large cobbles	-	-

BHK51						
General description					Orientation	-
Pit devoid of archaeology. Surface of Tarmac and levelling aggregate overlaying made ground.					Length (m)	0.5
					Width (m)	0.4
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
5101	Layer	-	0.1	Tarmac	-	-
5102	Layer	-	>1.1	Made Ground. Light brown sandy gravel and frequent small to medium cobbles and limestone inclusions.	-	-

BHK55						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlaying made ground.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
5501	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	-
5502	Layer	-	>1.1	Made Ground. Brown silty sandy clay with frequent small to medium limestone inclusions and occasional cobbles.	Ceramic field drain	-

BHK56						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlaying made ground, which overlies natural geology.					Length (m)	0.3
					Width (m)	0.3
					Depth (m)	1.2
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
5501	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	-
5502	Layer	-	0.8	Made Ground. Brown friable silty sandy clay, medium to large limestone	-	-
5503	Layer	-	>0.3	Natural Geology. Brown firm silty sand	-	-

TPK01						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlaying natural geology.					Length (m)	3m
					Width (m)	0.4
					Depth (m)	2.5
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
101	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	
102	Layer	-	>2.4	Natural Geology. Friable silty sandy gravel, frequent cobbles	-	

TPK02						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlaying gravel and cobbles over a relict soil horizon.					Length (m)	3m
					Width (m)	0.4
					Depth (m)	2.9
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
201	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	
202	Layer	-	1.3	Brown friable silty sandy gravel, frequent cobbles	-	
203	Layer	-	0.3	Grey compact silty clay	-	

TPK03						
General description					Orientation	-
Pit devoid of archaeology. Turfed topsoil overlaying deep subsoil which is overlying natural geology.					Length (m)	3m
					Width (m)	0.4
					Depth (m)	2.3
Context No.	Type	Width (m)	Depth (m)	Description	Finds	Date
3001	Layer	-	0.1	Topsoil. Greyish black friable silty sandy clay	-	
3002	Layer	-	1.2	Light brown slightly sandy silty clay, with occasional small stones	-	
3003	Layer	-	>1m	Natural Geology. Brown friable silty sandy gravel, frequent cobble inclusion	-	

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APPENDIX C SITE SUMMARY DETAILS

Site name:	Kendal Flood Risk Management Scheme, Cumbria
Site code:	KFR18
Grid Reference	SD 51500 92500
Type:	Evaluation
Date and duration:	06/10/18 – 18/12/18, 13 days
Location of archive:	The archive is currently held at OA, Mill 3, Moor Lane Mills, Moor Lane, Lancaster, LA1 1QD, and will be deposited with the Kendal Museum of Natural History and Archaeology.
Summary of Results:	OA North were commissioned by VolkerStevin Ltd to undertake an archaeological Watching Brief and Palaeoenvironmental Landscape Interpretation of GI works undertaken as part of the Kendal Flood Risk Management Scheme, Kendal, Cumbria. The Watching Brief monitored the excavation of eleven borehole locations, one hand-excavated test pit and three mechanically-excavated test pits, throughout the scheme. Evidence of possible archaeological features were revealed in BHK26 and BHK28, on the west bank of the River Kent, comprising a 0.1m layer of compact medium limestone fragments (possibly surfaces) at a depth of 0.5m. The lack of archaeology may be due to the small size of the boreholes and tests pits; as such, there is still potential for archaeological remains to be present throughout the scheme. The Palaeoenvironmental Landscape Interpretation included the assessment of eighteen borehole logs from the scheme by a geoarchaeologist. The results of this assessment were that there is limited potential for palaeoenvironmental remains throughout the scheme and, therefore, no further work was recommended.

APPENDIX D PROJECT DESIGN



Kendal Flood Risk Management Scheme, Cumbria

Heritage Project Design Archaeological Watching Brief

September 2018

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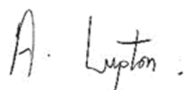
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Planning Reference:
Site Code: KFR18
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Kendal Flood Risk Management Scheme, Cumbria

Heritage Project Design for an Archaeological Watching Brief

Centred on SD 51500 92500

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1 INTRODUCTION

1.1 Project details

- 1.1.1 Oxford Archaeology (OA) has been commissioned by VolkerStevin Ltd to undertake a Watching Brief and subsequent production of a Heritage Site Investigation Report during ground investigate works along the length of the Kendal Flood Risk Management Scheme.
- 1.1.2 Planning permission is required for the Kendal scheme and as such an application will be submitted in September 2018. In advance of this a Cultural Heritage Desk-Based Assessment (CHDBA) is currently being prepared. A programme of Ground Investigation (GI) works is currently also being prepared to inform the selection of a preferred option and inform the detailed design process. The need for an archaeological watching brief as part of the GI process has been identified by the Environment Agency (EA) and has been identified by the EA National Environmental Assessment Service (NEAS) Senior Archaeologist for inclusion in the emerging GI Scope. The nature and scope of archaeological intervention throughout the GI programme has also been discussed with the Cumbria County Council (CCC) curatorial archaeologist as archaeological advisor to the Local Authority. The scope of works has therefore been informed by discussions with the archaeological advisor to the South Lakelands District Council and will cover the Kendal Wall and embankment scheme only; this document outlines how OA will implement those requirements.
- 1.1.3 All work will be undertaken in accordance with local and national planning policies referenced within this document.

1.2 Location, topography and geology

- 1.2.1 The boreholes to be undertaken as part of the GI works are located along both banks of the river Kent flowing through the town of Kendal, Cumbria (Fig 1). The programme of boreholes starts to the east of Kendal near a farm names Jenkinrag. The scheme then extends north-west to the north of the South Lakes Retail Park at which point it follows the river Mint to where it joins the river Kent. The scheme then follows the river Kent through Kendal and ends north of Young Spring Wood.
- 1.2.2 The solid bedrock geology of the northern part of the scheme is mapped as sandstone of the Kirkby Moor formation formed in the Silurian period, whilst in the southern part of the scheme it is mapped as Limestone of the Dalton formation formed in the Carboniferous period (BGS 2018). The superficial deposits are clay, sand and gravel alluvium deposited in the Quarternary period (*ibid*). The soils of the area are identified as freely draining slightly acid loamy soils (Cranfield 2018).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND AND POTENTIAL

2.1 Archaeological and historical background

2.1.1 The archaeological and historical background of the site has been described in detail in Kendal FRMS CHDBA (ref), and will not be reproduced here.

2.2 Potential

2.2.1 Fifteen of the borehole locations throughout the scheme have been identified as requiring monitoring by an archaeological watching brief due to their archaeological potential (Figs 2 and 3). The potential of each location is detailed in table 1 below originally produced in the scope of works document produced by VolkerStevin Ltd.

Borehole Positions	Archaeological/Historic Potential
BHK19	This position lies within an area considered to have been the location of post-medieval industrial activity (a ropewalk to the north of Stramongate) (C.12.044).
BHK20	This position lies within an area identified as ‘medieval tenements’ on the EUS (C.12.017). It is considered to have developed as a site of industrial activity during the post-medieval period (C.12.023).
BHK23	Bearing in mind the proximate location of medieval industrial activity, there does remain the potential for the presence of similar activities at this location. During the post-medieval period the area to the east starts to develop following the introduction of the canal to the town. There does remain limited potential for the presence of other canal-associated infrastructure at this location.
BHK25	Recent archaeological investigations have recovered evidence for medieval activity in this area. This may possibly be associated with a mill site and associated leat (Jeremy Parsons July 2018, <i>pers comm.</i>).
BHK26	This position lies within an area identified as ‘medieval tenements’ on the EUS (C.12.013).
BHK27	Recent archaeological investigations have recovered evidence for medieval activity in this area. This may possibly be associated with a mill site and associated leat (Jeremy Parsons July 2018, <i>pers comm.</i>).
BHK28	This borehole position appears to be located just within an area of post-medieval gardens associated with Abbot Hall (C.12.031) although it does lie adjacent to an area of industrial activity at this time (C.12.0?).
BHK30	This position lies just within the area identified as part of the medieval church complex by the EUS (C.12.002). There is also the potential for the presence of early medieval activity at this location. While it is unlikely that this inspection pit will have been located within the bounds of the medieval churchyard, the potential for works at this location to encounter either disarticulated or articulated human remains cannot be completely discounted.
BHK32	The EUS records the presence of post-medieval tenements and industrial activity in the area of this borehole (C.12.062).
BHK33	Medieval tenements are recorded immediately to the north of this location. There does remain the potential for the presence of activity associated with the tenements to lie at this position.
BHK41	BHK44 has been removed as it was located within the bounds of the scheduled Roman fort and <i>vicus</i> . The EUS identified a range of find spots in the vicinity surrounding the scheduled Roman site. This evidence may indicate that settlement/military activity extends beyond the bounds of the scheduled monument and/or that manuring associated with agricultural activity was taking place close to the fort and civilian settlement. In any event, a watching brief on inspection pits is advised in these locations. At the time of the preparation of this scope BHK44 had been removed from the GI scheme owing to its proximity to the Scheduled Monument at Watercrook Farm. If this is reinstated within the bounds of the Scheduled Monument then Consent will be required. Any trial pit excavation in this area is also likely to be the focus of archaeological mitigation. There have also been a number of late prehistoric finds recovered in the area of BHK43. BHK45 and 46 also lie close to the site of a former snuff mill.
BHK42	
BHK43	
BHK45	
BHK46	

Table 1: Borehole locations with archaeological potential in the vicinity (VBA 2018).

3 PROJECT AIMS

3.1 General

3.1.1 The general aims of the project can be summarised as follows;

- to adhere to and fulfil the agreed programme of works associated with the archaeological potential of the site, and consequently to successfully discharge any conditions, in whole, or in part, dependent on results;
- to inform a decision as to whether further archaeological investigation will be required in advance of further works on the Kendal FRMS;
- to undertake a Palaeoenvironmental Landscape Interpretation based upon the results of the assessment of borehole logs;
- to compile a professional archival record of any archaeological remains within the test pits.

3.2 Specific aims and objectives

3.2.1 The specific aims and objectives of the watching brief are:

- i. To determine or confirm the general nature of any remains present.
- ii. To determine or confirm the approximate date or date range of any remains, by means of artefactual or other evidence.

4 PROJECT SPECIFIC EXCAVATION AND RECORDING METHODOLOGY

4.1 Scope of works

4.1.1 The works will involve monitoring and recording 15 trial pits excavated to 1.2m deep along the route of the scheme. The spoil will be checked for finds and if significant material is detected this will be retained. Where archaeological deposits are encountered the archaeologist will be afforded the opportunity to clean, investigate, record and sample all archaeological remains to an appropriate degree. If potentially significant archaeological remains are identified, the archaeologist will stop works to enable consultation with the EA NEAS Senior Archaeologist and the curatorial archaeologist for CCC.

4.2 Programme

4.2.1 It is anticipated that the fieldwork will take three weeks to complete, by a team consisting of a Project Archaeologist, TBC, under the management of Paul Dunn, Project Manager.

4.2.2 All fieldwork undertaken by Oxford Archaeology (North) is overseen by the Operations Manager, Alan Lupton MCIfA.

4.3 Site specific methodology

4.3.1 A summary of OA's general approach to excavation and recording can be found in Appendix A. Standard methodologies for Geomatics and Survey, Environmental evidence, Artefactual evidence and Burials can also be found below (Appendices B, C, D and E respectively).

4.3.2 Site specific methodologies will be as follows:

- i. The Project Archaeologist will maintain a watching brief during the excavation of the 15 trial pits identified in table 1;
- ii. The Project Archaeologist will be afforded the opportunity to clean, investigate, record and sample all archaeological remains to an appropriate degree. If potentially significant remains are identified, the Project Archaeologist will stop excavation works. They will only continue with approval from the EA NEAS senior archaeologist and the curatorial archaeologist for CCC.
- iii. A photographic and textual record will be made of the stratigraphy within the test pit, with measurements etc;
- iv. Spoil arising from the excavation will be scanned for finds and palaeoenvironmental evidence, which will be collected if deemed significant;
- v. At all times, the archaeologist will work under the Health and Safety directions of the site contractor.

5 PROJECT SPECIFIC REPORTING AND ARCHIVE METHODOLOGY

5.1 Programme

- 5.1.1 The Heritage Site Investigation report will be completed within three weeks of the completion of the fieldwork.
- 5.1.2 A copy of the report in Adobe Acrobat (.pdf) format will be provided to VolkerStevin Ltd and, via them, to the EA Project Manager, NEAS Environmental Project Manager and NEAS Archaeologist. Once approved a copy will be provided to the archaeological advisor to South Lakelands District Council for comment prior to final issue. Paper copies can also be provided on request.

5.2 Content

- 5.2.1 The content of this report will be as defined in Appendix F. But will also include an archaeological and environmental landscape interpretation for any significant quaternary (Pleistocene and Holocene) deposits. This element will be based on the results of all trial pits and borehole logs, and will be prepared by an appropriately experienced geoarchaeologist.

5.3 Specialist input

- 5.3.1 OA has a large pool of internal specialists, as well as a network of external specialists with whom OA have well established working relationships. A general list of these specialists is presented in Appendix G; in the event that additional input should be required, an updated list of specialists can be supplied.

5.4 Archive

- 5.4.1 The site archive will be deposited with Kendal Museum of Natural History and Archaeology following completion of the project.
- 5.4.2 A summary of OA's general approach to documentary archiving can be found in Appendix H.

6 HEALTH AND SAFETY

6.1 Roles and responsibilities

- 6.1.1 The Project Manager, Paul Dunn, has responsibility for ensuring that safe systems of work are adhered to on site. He delegates elements of this responsibility to the Project Archaeologist, TBC, who implements these on a day to day basis.
- 6.1.2 The Director with responsibility for Health and Safety at OA is Dan Poore Tech IOSH (Chief Business Officer).

6.2 Method statement and risk assessment

- 6.2.1 A summary of OA's general approach to health and safety can be found in Appendix I. A risk assessment has also been undertaken and approved and will be kept on site, along with OA's standard Health and Safety file, which will contain all relevant health and safety documentation.
- 6.2.2 The Health and Safety file will be available to view at any time.

6.3 Monitoring of works

- 6.3.1 Archaeological investigations will be monitored where appropriate by the NEAS Senior Archaeologist. While this scheme constitutes Permitted Development, Historic England and the relevant Local Authority Archaeologists will be notified as to progress and opportunities to monitor fieldwork will be afforded to representatives where appropriate. All such site visits will be carried out under the auspices of the Main Contractors Health and Safety Plan and visitors will have a current CSCS Card, wear appropriate PPE and be accompanied at all times.
- 6.3.2 The NEAS Senior Archaeologist will have free access to the site (subject to Health and Safety considerations) and all records to ensure the works are being carried out in accordance with this WSI and all other relevant standards.

7 BIBLIOGRAPHY

British Geological Survey (BGS), 2018, Geology of Britain Viewer, [Online], available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (accessed September 2018)

Cranfield Soil and Agrifood Institute, 2018, National Soil Resources Institute', Soilscales of Britain Map, [Online], available at: <http://www.landis.org.uk/soilscales/> , Cranfield University (accessed September 2018)

VolkerStevin, Boskalis Westminster and Atkins, 2018, *Scope of Work – Kendal Archaeology*, unpubl report.

OA STANDARD FIELDWORK METHODOLOGY APPENDICES

The following methods and terms will apply, where appropriate, to all OA fieldwork unless varied by the accompanying detailed Written Scheme of Investigation.

Copies of all OA internal standards and guidelines referred to below are available on request.

APPENDIX A GENERAL EXCAVATION AND RECORDING METHODOLOGY

A.1 Standard methodology – summary

Mechanical excavation

- A.1.1 An appropriate mechanical excavator will be used for machine excavation. This will normally be a JCB or 360° tracked excavator with a 1.5 m to 2 m wide toothless ditching bucket. For work with restricted access or working room a mini excavator may be used.
- A.1.2 All mechanical excavation will be undertaken under direct archaeological supervision.
- A.1.3 All undifferentiated topsoil or overburden of recent origin will be removed down to the first significant archaeological horizon, in successive, level spits.
- A.1.4 Following mechanical excavation, all areas that require examination or recording will be cleaned using appropriate hand tools.
- A.1.5 Spoil heaps will be monitored in order to recover artefacts to assist in the analysis of the spatial distribution of artefacts. Modern artefacts will be noted but not retained.
- A.1.6 After recording, evaluation trenches and test pits will usually be backfilled with excavated material in reverse order of excavation, and compacted as far as is practicable with the mechanical excavator. Area excavations will not normally be backfilled.

Hand excavation

- A.1.7 All investigation of archaeological levels will usually be by hand, with cleaning, examination and recording both in plan and section.
- A.1.8 Within significant archaeological levels the minimum number and proportion of features required to meet the aims of the excavation will be hand excavated. Pits and postholes will usually be subject to a 50% sample by volume. Linear features will be sectioned as appropriate. More complex features such as those associated with funerary activity will usually be subject to 100% hand excavation.
- A.1.9 In the case of evaluations, it is not necessarily the intention that all trial trenches will be fully excavated to natural stratigraphy, but the depth of archaeological deposits across the site will be assessed. The stratigraphy of a representative sample of the evaluation trenches will be recorded even where no archaeological deposits have been identified. Any excavation, both by machine and by hand, will be undertaken with a view to avoiding damage to any archaeological features or deposits, which appear to be worthy of preservation in situ.

Recording

- A.1.10 Written descriptions will be recorded on proforma sheets comprising factual data and interpretative elements.
- A.1.11 Where stratified deposits are encountered a Harris matrix will be compiled during the course of the excavation.
- A.1.12 Plans will normally be drawn at 1:100, but on urban or deeply stratified sites a scale of 1:50 or 1:20 will be used. Detailed plans will be at an appropriate scale. Burials will be drawn at scale 1:10 or recorded using geo-referenced digital photography.
- A.1.13 The site grid will be accurately tied into the National Grid and located on the 1:2500 or 1:1250 map of the area.
- A.1.14 A register of plans will be kept.
- A.1.15 Long sections of showing layers will be drawn at 1:50. Sections of features or short lengths of trenches will be drawn at 1:20.
- A.1.16 A register of sections will be kept.
- A.1.17 Generally, all sections will be tied in to Ordnance Datum.
- A.1.18 A full photographic record, illustrating in both detail and general context the principal features and finds discovered will be maintained. The photographic record will also include working shots to illustrate more generally the nature of the archaeological work.
- A.1.19 Photographs will be recorded on OA Photographic Record Sheets.

A.2 Relevant industry standards and guidelines

- A.2.1 The Chartered Institute for Archaeologists Standard and Guidance notes relevant to fieldwork are:
- Standard and Guidance for Archaeological Field Evaluation
 - Standard and Guidance for Archaeological Excavation
 - Standard and Guidance for an Archaeological Watching Brief.
- A.2.2 These will be adhered to at all times.

A.3 Relevant OA manual and other supporting documentation

- A.3.1 All fieldwork will be undertaken in accordance with the requirements of the OA Field Manual (ed. D Wilkinson 1992), and the revised OA fieldwork manual (publication forthcoming).
- A.3.2 Further guidance is provided to all excavators in the form of the OA 'Fieldwork Crib Sheets - a companion guide to the Fieldwork Manual'. These have been issued ahead of formal publication of the revised Fieldwork Manual.

APPENDIX B GEOMATICS AND SURVEY

B.1 Standard methodology - summary

- B.1.1 The aim of OA methodology is to provide comprehensive survey cover of all investigation areas. Additionally, it is designed to provide coverage for any areas, beyond the original scope of the project, which arise as a result of further work. It provides digital plans of all required elements of the project and locates them within an overall grid.
- B.1.2 It also maintains all necessary survey data and ensures that the relevant information is copied into the primary record, in order to ensure the integrity of the project archive. Furthermore, it ensures that all core data is securely stored and backed up. It establishes accurate project reference systems utilising a series of control stations and permanent base lines.
- B.1.3 The survey will be conducted using a combination of Total Station Theodolite (TST) survey utilising Reflectorless Electronic Distance Measurement (REDM) where appropriate, hand-measured elements and GPS (Global Positioning System), or photogrammetry.
- B.1.4 Before the main work commences, a network of control stations will be laid out encompassing the area. Control stations will be tied in to known points or existing features using rigorous metric observation. The control network will be set in using a TST to complete a traverse or using techniques as appropriate to ensure sufficient accuracy. A GPS, or other appropriate method, will be used to orientate the control network to National Grid or other recognised coordinate system.
- B.1.5 All control stations will be checked by closed traverse and/or GPS, as appropriate. The accuracy of these control stations will be accessed on a regular basis and re-established accordingly. All stations will be recorded on Survey Control Station sheets.
- B.1.6 Each control station will be marked with a PGM (Permanent Ground Marker). Witness diagrams will include the full 3-D co-ordinates generated, a sketch diagram and measurements to at least three fixed details, written description of the mark and a photograph of the control point in its environs.
- B.1.7 Prior to entry into the field all equipment will be checked, and all pre-survey information will be logged onto the field computer and uploaded onto survey equipment as appropriate. The software in the field computer will be verified and all cabling between the GPS and/or TST and computer will be checked. Prior to conducting the survey, the site will be reconnoitred for locations for a viable control network and check the line of sight and any possible hindrance to survey. Daily record sheets will be kept to record daily tasks and conditions.
- B.1.8 All spatial data will be periodically downloaded onto a field computer, and backed up onto CD, or DVD. It will be cleaned, validated and inspected.
- B.1.9 All survey data will be documented on daily survey record sheets. Information entered on these sheets includes key set up information (Instrument height etc.) as well as daily variables and errors/comments. All survey data will be digitally recorded in a raw

format and translated during the download process this shall allow for any errors to be cross referenced with the daily survey record and corrected accordingly.

- B.1.10** A weekly summary of survey work will be produced to access development and highlight problems. This information also will be recorded on the weekly survey journal. Technical support for the survey equipment and download software shall be available at all times. In those instances, where sites are remotely operated, all digital data will be backed up regularly and a copy returned to Oxford on a weekly basis.
- B.1.11** A site plan will initially be created by a rapid survey of relevant archaeological features by mapping their extent using a combination of TST and GPS. This will form the basis for deciding excavation strategy and will be updated as the excavation clarifies the extent of, and relationships between, archaeological features.
- B.1.12** Excavated archaeological interventions and areas of complex stratigraphy will be hand drawn. At least two Drawing Points (DPs) will be set in as a baseline and measurements taken off this by tape and offset. The hand drawn plans will be referenced to the digitally captured pre-site plan by measuring in the DPs with a TST or GPS. These hand drawn elements will then be scanned in, geo-referenced using the DPs as reference points and digitised following OA's digitising protocols. For further details on hand planning procedure please refer to the fieldwork guidelines.
- B.1.13** Where appropriate photogrammetry or rectified photography may be used to record standing structures or burials. This will be carried out in line with Standard OA procedures for photogrammetry or rectified photography.
- B.1.14** Survey data recorded in the field will be downloaded using appropriate downloading software, and saved as an AutoCAD Map DWG file, or an ESRI Shapefile. These files will be regularly updated and backed up with originals being stored on an OA server in Oxford.
- B.1.15** All drawings will be composed of closed polygons, polylines or points in accordance with the requirements of GIS construction and OA Geomatics protocols. Once created, additional GIS/CAD work will normally be carried out at the local OA central office or at on-site remote locations when appropriate. Support for all GIS/CAD work will be available from OA's Oxford Office during normal office hours. The aim of the GIS/CAD work is to produce workable draft plans, which can be produced as stand-alone products, or can be readily converted to GIS format. Any hand-drawn plans will be scanned and digitised on site in the first instance. Subsequent plans will be added to the main drawing as it develops.
- B.1.16** All plan scans will be numbered according to their plan site number. Digital plans will be given a standard new plan number taken out from the site plan index.
- B.1.17** All digital data will be backed up incrementally on CD or DVD. On each Friday the entire data directory will be backed up and returned to Oxford where it will be copied onto the OA projects server. Each CAD drawing will contain an information layout which will include all the relevant details appertaining to that drawing. Information (metadata) on all other digital files will be created and stored as appropriate. At the end of the survey all raw measurements will be made available as hard copy for archiving purposes.

B.2 Relevant industry standards and guidelines

- B.2.1 Historic England (2007) Understanding the Archaeology of Landscapes A Guide to Good Recording Practice.
- B.2.2 Historic England (2015), Metric Survey Specifications for Cultural Heritage.
- B.2.3 Historic England (2016), Understanding Historic Buildings A Guide to Good Recording Practice.
- B.2.4 Historic England (2017), Photogrammetric Applications for Cultural Heritage. Guidance for Good Practice.

B.3 Relevant OA manual and other supporting documentation

- B.3.1 OA South Metric Survey, Data Capture and Download Procedures
- B.3.2 OA South Digitising Protocols
- B.3.3 OA South GIS Protocols
- B.3.4 These will be superseded by the OA South Geomatics Manual (in progress).

APPENDIX C ENVIRONMENTAL EVIDENCE

C.1 Standard methodology – summary

- C.1.1 Different environmental and geoarchaeological sampling strategies may be employed according to established research targets and the perceived importance of the strata under investigation. Where possible an environmental specialist(s) will visit the site to advise on sampling strategies. Sampling methods will follow guidelines produced by Historic England and Oxford Archaeology. A register of samples will be kept. Specialists will be consulted where non-standard sampling is required (e.g. TL, OSL or archaeomagnetic dating) and if appropriate will be invited to visit the site and take the samples.
- C.1.2 Geoarchaeological sampling methods are site specific, and methodologies will be designed in consultation with the geoarchaeological manager on a site by site basis.
- C.1.3 Bulk soil samples, where possible of 40 litres or 100% of a deposit if less is available, will be taken from potentially datable features and layers for flotation for charred plant remains and for the recovery of small bones and artefacts. Larger soil samples (up to 100L) may be taken for the complete recovery of animal bones, marine shell and small artefacts from appropriate contexts. Smaller bulk samples (general biological samples) of 10-20 litres will be taken from any waterlogged deposits present for the recovery of macroscopic plant remains and insects. Series of incremental 2L samples may be taken through buried soils and deep feature fills for the recovery of snails and/or waterlogged plant remains, depending on the nature of the stratigraphy and of the soils and sediments. Columns will be taken from buried soils, peats and waterlogged feature fills for pollen and/or phytoliths, diatoms, ostracods and foraminifera if appropriate. Soil samples will be taken for soil investigations (particle size, organic matter, bulk chemistry, soil micromorphology etc.) and possibly for metallurgical analysis in consultation with the appropriate specialists.
- C.1.4 Bulk samples from dry deposits will be processed by standard water flotation using a modified Siraf-style machine and meshes of 0.25mm (flot) and 0.5 or 1mm depending on sediment type and like modes of preservation (residue). Heavy residues will be wet sieved, air dried and sorted. Samples taken exclusively for the recovery of bones, marine shell or artefacts will be wet sieved to 2mm. Waterlogged samples (1L sub-sample) and snail samples (2L) will be processed by hand flotation with flots and residues collected to 0.25mm (waterlogged plants) and 0.5mm (snails) respectively; these flots and residues will be sorted by the specialist. Samples specifically taken for insects, pollen, other microflora and microfauna, metallurgy and soil analysis will be submitted as whole earth to the appropriate specialists or processed following their instructions.

C.2 Relevant industry standards and guidelines

- C.2.1 Historic England 2010. Waterlogged Wood: Guidelines on the recording, sampling, conservation and curation of waterlogged wood.
- C.2.2 Historic England 2011. Environmental Archaeology. A guide to the theory and practice of methods, from sampling and recovery to post excavation, (2nd ed)

- C.2.3 Historic England 2004. Dendrochronology: Guidelines on Producing and Interpreting Dendrochronological Dates.
 - C.2.4 Historic England 2006. Archaeomagnetic Dating. Guidelines for Producing and Interpreting Archaeomagnetic Dates.
 - C.2.5 Historic England 2008. Luminescence Dating. Guidelines on Using Luminescence Dating in Archaeology.
 - C.2.6 Historic England 2008. Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains.
 - C.2.7 Historic England 2014. Animal Bones and Archaeology. Guidelines for Best Practice.
 - C.2.8 Historic England, 2015. Archaeometallurgy. Guidelines for Best Practice.
 - C.2.9 Historic England 2015 Geoarchaeology. Using Earth Sciences to Understand the Archaeological Record.
- C.3 Relevant OA manual and other supporting documentation**
- C.3.1 Oxford Archaeology 2005. Environmental Sampling Guidelines, 2nd ed.

APPENDIX D ARTEFACTUAL EVIDENCE

D.1 Standard methodology - summary

- D.1.1 Before a site begins arrangements concerning the finds will be discussed with the Head of Finds. Information will be provided by the project manager about the nature of the site, the expected size and make-up of the finds assemblage and any site specific finds retrieval strategies. On-site requirements will be discussed and a conservator appointed who can be called on to make site visits if required. Special requirements regarding particular categories of material will be raised at this early stage for instance the likelihood of recovering assemblages of waterlogged material, large timbers, quantities of structural stone or ceramic building material. Specialists may be required to visit sites to discuss retrieval strategies.
- D.1.2 The project manager will supply the Head of Finds with contact details of the landowner of the site so that consent to deposit any finds resulting from the investigation can be sought.
- D.1.3 The on-site retrieval, lifting and short term packaging of bulk and small finds will follow the detailed guidelines set out in the OA Finds Manual (sections 2 and 3), First Aid for Finds and the UKIC conservation guidelines No.2.
- D.1.4 All finds recovered from site will be transported to an OA regional office for processing; local sites will return finds at the end of each day, away based sites at the end of each week. Special arrangements can be discussed for certain sites with the department manager before the start of a project. Larger long running sites may in some instances set up on-site processing units to deal with the material from a particular site.
- D.1.5 All finds qualifying as Treasure will be removed to a safe place and reported to the local Coroner according to the procedures relating to the Treasure Act (1996), and the Treasure (Designation) Order 2002. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the finds from theft.
- D.1.6 Each box of finds will be accompanied by a finds context checklist itemising the finds within each box. The number of bags of finds from each context and individual small find from each context will be recorded. A member of the processing team will check the list when it arrives in the department. There are separate forms for finds recovered from fieldwalking.
- D.1.7 The processing programme is reviewed on a weekly basis and priorities are worked out after discussions with the Head of Fieldwork and the Head of Post-excavation. Project managers will keep the Head of Finds informed of any pressing deadlines that they are aware of. All finds from evaluations are dealt with as a matter of priority.
- D.1.8 All bulk finds are washed (where appropriate), marked, bagged and boxed by the processing team according to the guidelines set out in section 4 and 5 of the OA Finds Manual, First-aid for finds and the UKIC guidelines No.2. They must also take into account the requirements of the receiving museum. Primary data recording count and weight of fragments by material from each context is recorded on the site database.

- D.1.9 Unstable and sensitive objects are recorded onto the database and then packaged and stored in controlled environments according to their individual requirements. The advice of a conservator will be sought for sensitive objects in need of urgent conservation. All metalwork will be x-rayed prior to assessment (and to meet the requirements of most receiving museums).
- D.1.10 Finds recovered from the environmental sample processing will be incorporated into the main assemblage and added to the database.
- D.1.11 On completion of the processing and data entry a finds file for each archaeological investigation will be produced, a summary of which is available for the project manager. The assemblage is allocated an OA number for storage purposes. Bulk finds are stored on a roller racking system, metals in a secure controlled storage and organic finds are refrigerated where possible.
- D.1.12 The movement of finds in and out of the department storage areas is strictly monitored and recorded. Carbon copy transit forms exist to record this information. Finds will not be removed from storage without the prior knowledge of the Head of Finds.
- D.1.13 Finds information summarised in the finds compendium is used to assess the finds requirements for the post excavation stages of the project. The Finds department holds a list of all specialists used by OA (see below) both internal and external.
- D.1.14 On completion of the post excavation stage of the project the department prepares the finds assemblage for deposition with the receiving museum. Discussions will be held with the museum, the excavator and the head of finds to finalise any selection, retention or discard policy. Most museums issue strict guidelines for the preparation of archives for deposition with their individual labelling, packaging and recording requirements.

D.2 Relevant industry standards and guidelines

- D.2.1 UKIC, 1983, Packaging and Storage of Freshly-Excavated Artefacts from Archaeological Sites. Conservation Guidelines No.2. Archaeology Section, United Kingdom Institute for Conservation.
- D.2.2 UKIC, 1988, Excavated Artefacts and Conservation: UK sites Revised Edition. Conservation Guidelines No.1. Archaeology Section, United Kingdom Institute for Conservation.
- D.2.3 Society of Museum Archaeologists, 1993, Selection, retention and dispersal of Archaeological Collections. Download available via <http://www.socmusarch.org.uk/publica.htm>
- D.2.4 Watkinson, D E & Neal, V, 1998, First Aid for Finds (3rd edition). RESCUE & UKIC

D.3 Relevant OA manual and other supporting documentation

- D.3.1 Allen, L, and Cropper, C (internal publication only) Oxford Archaeology Finds Manual.

APPENDIX E HUMAN REMAINS

E.1 Standard methodology - summary

- E.1.1 Human remains will not be excavated without a relevant licence/faculty and, where applicable (for example, a post medieval cemetery), a risk assessment from the local environmental officer.
- E.1.2 All human remains will be treated with due care and regard to the sensitivities involved, and will be screened from the public throughout the course of the works.
- E.1.3 Excavation will be undertaken in accordance with ClfA (Roberts and McKinley 1993) and the Advisory Panel on the Archaeology of Burials in England (APABE, 2015, 2017). For crypts and post-medieval burials, the recommendations set out by the ClfA (Cox 2001) and by the Association of Diocesan and Cathedral Archaeologists and APABE (2010) are also relevant.
- E.1.4 In accordance with recommendations set out in the Historic England and Church of England (2005) and updated by the Advisory Panel on the Archaeology of Burials in England (2017), skeletons will not be excavated beyond the limits of the trench, unless they are deemed osteologically or archaeologically important.
- E.1.5 Where any soft tissue survives and/or materials (for example, inner coffins, mattresses and other paddings) soaked in body liquor, no excavation or handling of the remains will take place until an appropriate risk assessment has been undertaken. Relevant protocols (i.e. Cox 2001) for their excavation, recording and removal will be adhered to.
- E.1.6 OA does not excavate or remove modern burials (those less than 100 years old) and does not remove or open sealed lead coffins. Appropriate PPE (e.g. chemical suit, latex gloves) will be worn by all staff when working with lead coffins.
- E.1.7 Graves and their contents will be hand excavated in plan. Each component (for example, skeleton, grave cut, coffin (or remains of), grave fill) will be assigned a unique context number from a running sequence. A group number will also be assigned to all of these, and small finds numbers to features such as coffin nails, hobnails and other grave goods (as appropriate).
- E.1.8 Soil samples will be normally taken during the excavation of inhumations, usually from the region of the skull, chest, right hand, left hand, abdomen and pelvis, right foot and left foot. Infants (circa. less than 5 years) will normally be recovered as bulk samples. Soil samples will also be taken from graves that appear to contain no human bone.
- E.1.9 Burials (including the skeleton, cremation, coffin fittings, coffin, urn, grave goods / other) will be recorded by photographic and written record using specialised pro forma context sheets, although these records may only include schematic representations of the location and position of the skeletons, depending on the nature and circumstances of the burial.
- E.1.10 Where necessary, hand drawn plans (usually at 1:10, sometimes 1:5) will be made, especially of contexts where required details cannot be adequately seen using photography (for example, urned cremations; undisturbed hob nails).

- E.1.11 Levels will be taken. For inhumations this will be on the skull, pelvis and feet as a minimum.
- E.1.12 Human remains that are exhumed will be bagged and labelled according to skeletal region and carefully packed into suitable containers (for example, acid free cardboard boxes) and transported to a suitable storage location. Any associated coffins and coffin fittings will be contained with the human remains wherever possible.
- E.1.13 Unurned cremations will not usually be half sectioned, but excavated in spits and/or quadrants (i.e. large deposits or spreads), or recovered as a bulk sample.
- E.1.14 Wherever possible, urned cremations will be carefully bandaged, recovered whole and will be excavated in spits in the laboratory, as per the recommendations of McKinley (2004, 2017).
- E.1.15 Unless deemed osteologically or archaeologically important disarticulated bone / charnel will be collected and reserved for re-burial if immediate re-internment as close to its original position is not practicable. In some instances, a rapid scan of this material may be undertaken by a qualified osteologist, if deemed relevant.
- E.1.16 If undisturbed, pyre sites will normally be excavated in quadrants, at the very least in 0.5 m blocks of 0.5 m spits.
- E.1.17 Pyre debris dumps will be half sectioned or quadrant and will be subject to 100% sampling.
- E.1.18 Wooden and lead coffins and any associated fittings, including fixing nails will be recorded on a pro forma coffin recording sheet. All surviving coffin fittings will be recorded by reference to Reeve and Adams (1993) and the unpublished master catalogue that is being compiled by OA. Where individual types cannot be paralleled, they will be drawn and/ or photographed and assigned a style number. Biographical details obtained from legible departum plate inscriptions will be recorded and further documentary research will be made.
- E.1.19 Funerary structures, such as brick shaft graves and/or vaults will be recorded by photogrammetry or hand-drawn at a scale of 1:10 or 1:20, as appropriate. Location, dimensions and method of construction will be noted, and the structure added to the overall trench plan.
- E.1.20 Memorials, including headstones, revealed within the areas of development will be recorded irrespective of whether they are believed to be in situ.
- E.1.21 Where required, memorials will be accorded an individual context number and will also be included as part of the grave group, if the association with a burial is clear.
- E.1.22 Memorials will be recorded on pro-forma context sheets, based on and following the guidelines set out by Mytum (2002), and will include details of:
- Shape
 - Dimensions
 - Type of stone used

- Condition, completeness and fragmentation of stones, no longer in original positions
- Iconography (an illustration may best describe these features)
- Inscription (verbatim record of inscription; font of the lettering)
- Stylistic type

E.2 Relevant industry standards and guidelines

- E.2.1 Advisory Panel on the Archaeology of Burials in England, 2017 Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England.
- E.2.2 Advisory Panel on the Archaeology of Burials in England, 2015 Large Burial Grounds. Guidance on sampling in archaeological fieldwork projects.
- E.2.3 Association of Diocesan and Cathedral Archaeologists and APABE. 2010 Archaeology and Burial Vaults. A guidance note for churches. Guidance Note 2.
- E.2.4 British Association of Biological Anthropology and Osteoarchaeology. 2011 Code of Practice.
- E.2.5 British Association of Biological Anthropology and Osteoarchaeology. 2011 Code of Ethics.
- E.2.6 Cox, M, 2001 Crypt archaeology. An approach. ClfA Paper No. 3
- E.2.7 McKinley, J, and Roberts, C, 1993 Excavation and post-excavation treatment of cremated and inhumed human remains, ClfA Technical Paper No. 13
- E.2.8 McKinley, J, 2004 Compiling a skeletal inventory: cremated human bone. In Brickley, M, and McKinley, J (eds) Guidelines to the Standards for Recording Human Remains, ClfA Technical Paper No. 7. 9-13.
- E.2.9 McKinley, J, 2017 Compiling a skeletal inventory: cremated human bone. In Mitchell P, and Brickley, M (eds) Updated Guidelines to the Standards for Recording Human Remains, ClfA 14-19
- E.2.10 Mitchell P, and Brickley, M (eds) Updated Guidelines to the Standards for Recording Human Remains, CIFA 2017
- E.2.11 Mytum, H, 2000 Recording and Analysing Graveyards. CBA Handbook No. 15.
- E.2.12 Reeve, J, and Adams, M, 1993 The Spitalfields Project. Volume I – The Archaeology Across the Styx. CBA Research Report No. 85
- E.2.13 The Human Tissue Act 2004

E.3 Relevant OA manual and other supporting documentation

- E.3.1 Loe, L, 2008 The Treatment of Human Remains in the Care of Oxford Archaeology. Oxford Archaeology internal policy document.
- E.3.2 Excavating and recording of buried human remains. Oxford Archaeology internal guidelines document.

APPENDIX F REPORTING

F.1 Standard methodology - summary

F.1.1 For Watching Briefs and Evaluations, the style and format of the report will be determined by OA, but will include as a minimum the following:

- A location plan of trenches and/or other fieldwork in relation to the proposed development.
- Plans and sections of features located at an appropriate scale.
- A section drawing showing depth of deposits including present ground level with Ordnance Datum, vertical and horizontal scale.
- A summary statement of the results.
- A table summarising the features, classes and numbers of artefacts contained within, spot dating of significant finds and an interpretation.
- A reconsideration of the methodology used, and a confidence rating for the results.
- An interpretation of the archaeological findings both within the site and within their wider landscape/townscape setting.

F.1.2 For Excavations, a Post-Excavation Assessment and Project Design will generally be prepared, as prescribed by Historic England Management of Research Projects in the Historic Environment (MoRPHE) 2006, Section 2.3. This will include a Project Description containing:

- A summary description and background of the project.
- A summary of the quantities and assessment of potential for analysis of the information recovered for each category of site, finds, dating and environmental data. Detailed assessment reports will be contained within appendices.
- An explicit statement of the scope of the project design and how the project relates to any other projects or work preceding, concurrent with or following on from it.
- A statement of the research aims of the fieldwork and an illustrated summary of results to date indicating to what extent the aims were fulfilled.
- A list of the project aims as revised in the light of the results of fieldwork and the current post-excavation assessment process.

F.1.3 A section on Resources and Programming will also be produced, containing:

- A list of the personnel involved indicating their qualifications for the tasks undertaken, along with an explanation of how the project team will communicate, both internally and externally.
- A list of the methods which will be used to achieve the revised research aims.

- A list of all the tasks involved in using the stated methods to achieve the aims and produce a report and research archive in the stated format, indicating the personnel and time in days involved in each task. Allowance should be made for general project-related tasks such as monitoring, management and project meetings, editorial and revision time.
- A cascade or Gantt chart indicating tasks in the sequence and relationships required to complete the project. Due allowance will be made for leave and public holidays. Time will also be allowed for the report to be read by a named academic referee as agreed with the County Archaeological Officer, and by the County Archaeological Officer.
- A report synopsis indicating publisher and report format, broken down into chapters, section headings and subheadings, with approximate word lengths and numbers and titles of illustrations per chapter. The structure of the report synopsis should explicitly reflect the research aims of the project.

F.1.4 The Project Design will be submitted to the County Archaeological Officer or equivalent for agreement.

F.1.5 Under certain circumstances (e.g. with very small mitigations), and as agreed with the County Archaeological Officer or equivalent, a formal Assessment and Project Design may not be required and either the project will continue straight to full analysis, or a simple Project Proposal (MoRPHE 2006 Section 2.1) will be produced prior to full analysis. This proposal may include:

- A summary of the background to the project
- Research aims and objectives
- Methods statement outlining how the aims and objectives will be achieved
- An outline of the stages, products and tasks
- Proposed project team
- Estimated overall timetable and budget if appropriate.

F.1.6 Once the post-excitation Project Design or Project Proposal has been accepted, the County Archaeological Officer or his appointed deputy will monitor the progress of the post-excitation project at agreed points. Any significant variation in the project design will be agreed with the County Archaeological Officer.

F.1.7 The results of the project will be published in an appropriate archaeological journal or monograph. The appropriate level of publication will be dependent on the significance of the fieldwork results and will be agreed with the County Archaeological Officer. An OASIS (Online Access to the Index of Archaeological Investigations) form will be completed for each project as per Historic England guidelines.

F.2 Relevant industry standards and guidelines

F.2.1 Oxford Archaeology (OA) adheres to the national standards in post-excitation procedure as outlined in Historic England's Management of Research Projects in the Historic Environment (MoRPHE; EH 2006). Furthermore, all post-excitation projects

take into account the appropriate regional research frameworks as well as national research agendas such as the Framework for Historic Environment Activities & Programmes in Historic England (SHAPE; EH 2008).

APPENDIX G LIST OF SPECIALISTS REGULARLY USED BY OA

G.1.1 Below are two tables, one containing 'in-house' OA specialists, and the other containing a list of external specialists who are regularly used by OA.

Internal archaeological specialists used by OA

Specialist	Specialism	Qualifications
Lisa Brown	Early Prehistoric pottery	BA, PGDip, MLitt, MCIfA
Paul Booth	Iron Age and Roman pottery	BA, FSA, MCIfA
John Cotter	Medieval and Post Medieval pottery, Clay Pipe and CBM	BA (Hons), MCIfA
Cynthia Poole	CBM and Fired Clay	BA (Hons), MSc
Edward Biddulph	Roman Pottery	BA (Hons), MA, MCIfA
Ian Scott	Metalwork and Glass	BA (Hons)
Leigh Allen	Metalwork and worked bone	BA (Hons), PGDip
Dr Ruth Shaffrey	Worked stone artefacts	BA, PhD, MCIfA
Julian Munby	Architectural Stone	BA, FSA
Dr Rebecca Nicholson	Fish and Bird Bone	BA (Hons), MA, D.Phil, MCIfA, FSA Scot
Dr Mairead Rutherford	Pollen	BSc, MSc
Lee Broderick	Animal bone	BA (hons), MA, MSc, FZG, SAC Dip (ecology)
Julia Meen	Charred and waterlogged plant remains and charcoal	BSc (Hons), MA
Dr Denise Druce	Charred plant remains, charcoal and pollen	BA (Hons), PhD, MCIfA
Elizabeth Stafford	Geoarchaeology and land snails	BA (Hons), MSc
Carl Champness	Geoarchaeology	BA (Hons), MSc, ACIfA
Dr Ian Smith	Animal Bone	BSc, PhD
Nicola Scott	Archaeological archive deposition	BA (Hons Dunelm)
Mike Donnelly	Flint	BSc, MCIfA
Dr Louise Loe	Human Bone	D.Phil, BA, MCIfA
Helen Webb	Human Bone	MSc, BSc
Mark Gibson	Human Bone	MSc, BA
Dr Lauren McIntyre	Human Bone	D.Phil, MSc, BSc

External archaeological specialists regularly used by OA

Specialist	Specialism	Qualifications
Lynne Keys	Slag	BA (Hons)
Quita Mould	Leather	BA, MA

Specialist	Specialism	Qualifications
Penelope Walton Rogers, The Anglo Saxon Laboratory	Identification of Medieval Textiles	FSA, Dip.Acc
Dana Goodburn-Brown	Conservation	BSc (Hons), BA, MSc
Steve Allen, York Archaeological Trust	Conservation	BA, MA, MAAIS
Dr Richard Macphail	Soils, especially Micromorphology	BA (Hons), MSc, PhD
Dana Challinor	Charcoal	MA, MSc
Dr Nigel Cameron	Diatoms	BSc, MSc, PhD
Dr David Smith	Insects	BA (Hons), MA, PhD
Professor Adrian Parker	Phytoliths and pollen	BSc (Hons), D.Phil
Dr David Starley	Metalworking Slag	BSc (Hons), PhD
Wendy Carruthers	Charred and waterlogged plant remains	BA (Hons)
Dr Sylvia Peglar	Pollen	PhD
Dr John Whittaker	Ostracods and Foraminifera	BA (Hons), PhD
Dr John Crowther	Soil Chemistry	MA, PhD
Dr Martin Bates	Geoarchaeology	BSc, PhD
Dr Dan Miles	Dendrochronology	D.Phil, FSA
Dr Jean-Luc Schwenninger	Optically Stimulated Luminescence Dating	PhD
Dr David Higgins	Clay Pipe	BA, PhD, MCIfA
Dr Hugo Anderson- Wymark	Flint	BSc, PhD, FSA Scot, MCIfA
Dr Damian Goodburn- Brown	Ancient Woodwork	BA, PhD

APPENDIX H DOCUMENTARY ARCHIVING

H.1 Standard methodology – summary

- H.1.1 The documentary archive constitutes all the written, drawn, photographic and digital records relating to the set-up, fieldwork and post-excavation phases of the project. This documentary archive, together with the artefactual and environmental ecofact archive collectively forms the record of the site. The report is part of the documentary archive, and the archive must provide the evidence that supports the conclusions of the report, but the archive may also include data which exceeds the limitations of research parameters set down for the report and which could be of significant value to future researchers.
- H.1.2 At the outset of the project OA Archive department will contact the relevant local receiving museum or archive repository to notify them of the imminent start of a new fieldwork project in their collecting area. Relevant local archiving guidelines will be observed and site codes, which integrate with the receiving repository, will be agreed for labelling of archives and finds.
- H.1.3 Where there is currently no receiving museum for the project archive, although responsibility for the archive ultimately lies with the client, OA will hold the archive on their behalf for a period of up to 3 years after completion of the report, after which time (in the event that a suitable depository has not been secured) provision for further storage of the archive will be made in agreement with Oxford Archaeology, the client and the relevant planning archaeologist.
- H.1.4 During the course of the project the Archive department will assist the Project Manager in the management of the archive including the cataloguing and development technique suitable for photographic archive requirements.
- H.1.5 The hard copy site archive will be security copied by scanning to PdFA and a copy of this will be housed on the OA Archive Server. A full digital copy of the archive, including scanned hard copy and born digital data, will be maintained on the OA server and if requested a copy on disk will also be sent to the receiving museum with the hard copy. This will act as a safeguard against the accidental loss and the long-term degeneration of paper records and photographs.
- H.1.6 Born digital data will only be printed to hard copy for the receiving museum where practical. Archive elements that need maintaining in digital form will be sent to ADS in accordance with Arches Standard and ADS guidelines. A copy will be sent to the receiving museum by CD and back-up copies will be stored on the OA digital network. In most cases a digital copy of the report will be included in the OASIS project library hosted by ADS.
- H.1.7 Prior to deposition the Archive department will contact the museum regarding the size and content of the archive and discuss any retention and dispersal policies which may be applicable in line with local and SMA Guidelines ' Selection, Retention & Dispersal of Archaeological Collections' 1993.
- H.1.8 The site archive will then be deposited with the relevant receiving museum or repository at the earliest opportunity unless further archaeological work on the site is

expected. The documentary archive will include correspondence detailing landowner consent to deposit the artefacts and any copyright licences in accordance with the receiving museum guidelines. Deposition charges will be required from the client as part of the project costs but the level of the fee is set by the receiving body, and may be subject to change during the lifespan of the project. Changes to archiving charges beyond OA's control will be passed across to the client.

- H.1.9 Oxford Archaeology will retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents Act 1988 with all rights reserved; excepting that it will provide the receiving repository or museum for the archive with a full licence for use to the client in all matters directly relating to the project as described in the Written Scheme of Investigation, and in line with the relevant receiving body guidelines.
- H.1.10 OA will advise the receiving repository or museum for the archive of 3rd party materials supplied in the course of projects which are not OA's copyright.
- H.1.11 OA undertakes to respect all requirements for confidentiality about the client's proposals provided that these are clearly stated. It is expected that such conditions shall not unreasonably impede the satisfactory performance of the services required. Archaeological findings and conclusions can be kept confidential for a limited period but will be made publicly available in line with the above procedure either after a specified time period agreed with the client at the outset of the project, or where no such period is agreed, after a reasonable period of time. It is expected that clients respect OA's general ethical obligations not to suppress significant archaeological data for an unreasonable period.

H.2 Relevant industry standards and guidelines

- H.2.1 At the end of the project the site archive will be ordered, catalogued, labelled and conserved and stored according to the following national guidelines:
- H.2.2 The 2014 EAC Guidelines A Standard and Guide to the Best Practice for Archaeological Archiving in Europe (GB) Perrin K, Brown E et al.
- H.2.3 The 2014 CIFA Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives.
- H.2.4 The 2011 AAF guide Archaeological Archives A Guide to Best Practice in Creation, Compilation, Transfer and Curation. Brown D.
- H.2.5 The UKIC's Guidelines for the preparation of excavation archives for long-term storage.
- H.2.6 The MGC's Standards in the museum care of archaeological collections.
- H.2.7 Local museum guidelines such as Museum of London Guidelines: (<http://www.museumoflondonarchaeology.org.uk/English/ArchiveResearch/DeposRe source>) will be adopted where appropriate to the archive collecting area.
- H.2.8 The site archive will be prepared to at least the minimum acceptable standard defined in Management of Archaeological Projects 2, Historic England 1991.

H.3 Relevant OA manual and other supporting documentation

H.3.1 The OA Archives Policy.

APPENDIX I HEALTH AND SAFETY

I.1 Standard Methodology - summary

- I.1.1 All work will be undertaken in accordance with the current OA Health and Safety Policy, the OA Site Safety Procedures Manual, a site-specific Risk Assessment and, if required, Safety Plan or Method Statement. Copies of the site-specific documents will be submitted to the client or their representative for approvals prior to mobilisation, and all relevant H and S documentation will be available on site at all times. The Health and Safety documentation will be read in conjunction with the project WSI.
- I.1.2 Where a project falls under the Construction (Design and Management) Regulations (2015), all work will be carried out in accordance with the Principal Contractor's Construction Phase Plan (CPP).

I.2 Relevant industry standards and guidelines

- I.2.1 All work will be carried out according to the requirements of all relevant legislation and guidance, including, but not exclusively:
 - I.2.2 The Health and Safety at Work Act (1974).
 - I.2.3 Management of Health and Safety at Work Regulations (1999).
 - I.2.4 Manual Handling Operations Regulations 1992 (as amended).
 - I.2.5 The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (2013).
 - I.2.6 The Construction (Design and Management) Regulations (2015).
 - I.2.7 Relevant OA manual and other supporting documentation
 - I.2.8 The OA Health and Safety Policy.
 - I.2.9 The OA Site Safety Procedures Manual.
 - I.2.10 The OA Risk Assessment templates.
 - I.2.11 The OA Method Statement template.
 - I.2.12 The OA Construction Phase Plan template.

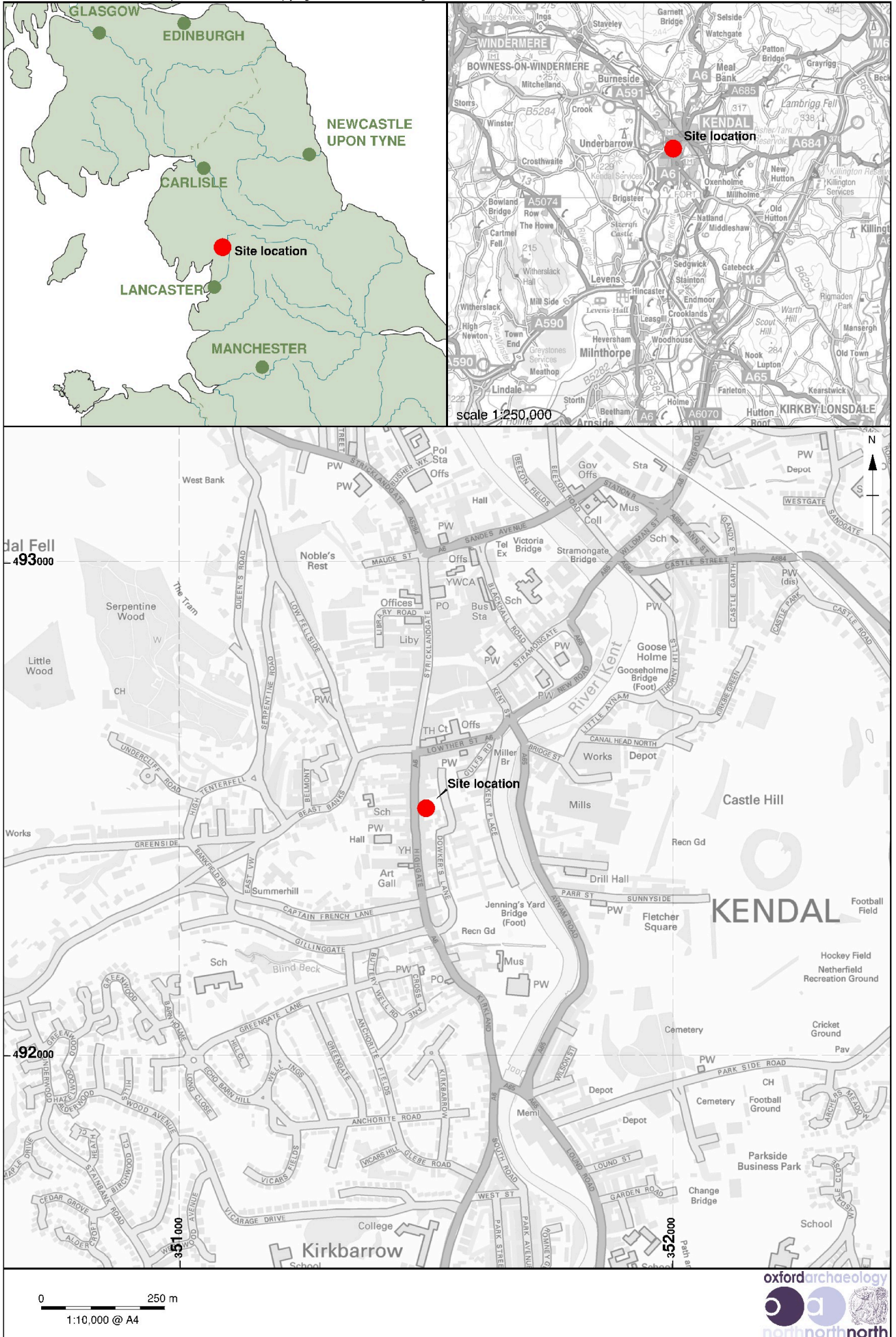


Figure 1: Site location



Figure 2: Borehole location plan



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