



CONTRACT YORK FAS		CONTRACT No. 764539	
CLIENT EA		DEPTH FROM 1.00 TO 5	
BOREHOLE A4—WS23			

0.20m 0.30m 0.40m 0.50m 0.60m 0.70m 0.80m



Geoarchaeological Borehole Monitoring at Flood Cell B8, Clementhorpe, York

By Clare Jackson

YAT Evaluation Report 2018/52 June 2018





YORK ARCHAEOLOGICAL TRUST



York Archaeological Trust undertakes a wide range of urban and rural archaeological consultancies, surveys, evaluations, assessments and excavations for commercial, academic and charitable clients. We manage projects, provide professional advice and fieldwork to ensure a high quality, cost effective archaeological and heritage service. Our staff have a considerable depth and variety of professional experience and an international reputation for research, development and maximising the public, educational and commercial benefits of archaeology. Based in York, Sheffield, Nottingham and Glasgow the Trust's services are available throughout Britain and beyond.

York Archaeological Trust, Cuthbert Morrell House, 47 Aldwark, York YO1 7BX

Phone: +44 (0)1904 663000 Fax: +44 (0)1904 663024

Email: archaeology@yorkat.co.uk Website: <http://www.yorkarchaeology.co.uk>

© 2015 York Archaeological Trust for Excavation and Research Limited
Registered Office: 47 Aldwark, York YO1 7BX
A Company Limited by Guarantee. Registered in England No. 1430801
A registered Charity in England & Wales (No. 509060) and Scotland (No. SCO42846)

CONTENTS

NON-TECHNICAL SUMMARY	III
KEY PROJECT INFORMATION	III
1 INTRODUCTION	1
2 METHODOLOGY	1
2.1 Boreholes.....	1
3 LOCATION, GEOLOGY & TOPOGRAPHY	1
4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND	2
5 RESULTS	5
5.1 Phase 1 Natural	5
5.2 Phase 2 Modern/post-medieval dumping and made ground	6
5.3 Phase 3 Modern turf and topsoil	8
DISCUSSION	8
LIST OF SOURCES	9
REFERENCES	9
ACKNOWLEDGEMENTS	9
APPENDIX 1 – INDEX TO ARCHIVE	10
APPENDIX 2 – CONTEXT LIST	11
APPENDIX 3 – WRITTEN SCHEME OF INVESTIGATION	13
PLATES	27
FIGURES	30

Plates

Cover: View of WS23 core samples

Plate 1 WS26 alluvial deposits 2604–2607 in cores 2m–5m.....	6
Plate 2 WS25 alluvial clay 2508 at bottom right of plate.....	6
Plate 3 Natural clays 2203 and 2204. WS22 core 2m–3m	6
Plate 4 WS25 showing rubbish dump deposits 2502, 2504	7
Plate 5 WS24. All cores showing post-medieval dumping and made ground.	7
Plate 6 WS26 Context 2601 containing whole bricks.....	8
Plate 7 All cores for WS21. Core 1m–2m at the top	27
Plate 8 All cores for WS22. Core 1m–2m at the top	27
Plate 9 All cores for WS23. Core 1m–2m at the top	28
Plate 10 All cores for WS24. Core 1m–2m at the top	28
Plate 11 All cores for WS25. Core 1m–2m at the top	29
Plate 12 All cores for WS26. Core 1m–2m at the top	29

Tables

Table 1 Index to archive.....	10
Table 2 Context list	11

Figures

Figure 1 Site Location.....	30
Figure 2 Borehole Locations	31
Figure 3 Profile of boreholes.....	32
Figure 4 Borehole profiles with deposit phasing	33
Figure 5 Deposit model, transect north to south	34
Figure 6 Deposit model, based on distance from the River Ouse.....	35

Abbreviations

YAT – York Archaeological Trust

BGL – Below Ground level

AOD – Above Ordnance Datum

CBM – Ceramic Building Material

NON-TECHNICAL SUMMARY

Between the 16th April and the 4th May 2018 2018 York Archaeological Trust undertook monitoring of geoarchaeological boreholes at Flood Cell B8, Clementhorpe, York (SE 60358 51255–SE 60131 49852).

The work was undertaken for CH2M on behalf of the Environment Agency to undertake archaeological monitoring of site investigations for the Five Year Flood Management Plan for York (FMP). The work was based on a Written Scheme of Investigation produced by YAT. The works involved the monitoring and recording of six window sample boreholes.

Natural deposits were encountered at depths between 1.55m and 3.58m BGL (8.04m and 4.65m AOD) and comprised of clay, silty clay and clay sand deposits. The only evidence of human activity recorded comprised deposits of late post-medieval industrial waste and made ground, the top of which were encountered between 0.17m and 0.50m BGL (8.21m and 6.95m AOD) and measured between 0.7m and 3.32m thick.

The result of the boreholes confirms the known archaeology of the area; this part of Clementhorpe largely comprised agricultural fields from the Roman period through to the late post-medieval period and the spread of settlement and occupation from York only began during the post-medieval period in the form of terraced residential housing and industrial works.

KEY PROJECT INFORMATION

Project Name	Flood Cell B8, Clementhorpe, York
YAT Project No.	6027
Document Number	2018/52
Type of Project	Archaeological Borehole monitoring
Client	CH2M on behalf of the Environment Agency
NGR	SE 60358 51255–SE 60131 49852
OASIS Identifier	Yorkarch1-317381

REPORT INFORMATION

Version	Produced by		Edited by		Approved by	
	Initials	Date	Initials	Date	Initials	Date
1	CJ	18/4/18	BR	01/06/18	BR	01/06/18

Copyright Declaration:

York Archaeological Trust give permission for the material presented within this report to be used by the archives/repository with which it is deposited, in perpetuity, although York Archaeological Trust retains the right to be identified as the author of all project documentation and reports, as specified in the Copyright, Designs and Patents Act 1988 (chapter IV, section 79). The permission will allow the repository to reproduce material, including for use by third parties, with the copyright owner suitably acknowledged.

Disclaimer:

This document has been prepared for the commissioning body and titled project (or named part thereof) and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of the author being obtained. York Archaeological Trust accepts no responsibility or liability for the consequences of this document being used for a purpose other than that for which it was commissioned.

1 INTRODUCTION

Between the 16th April and the 4th May 2018 YAT conducted archaeological monitoring of window sample boreholes for the FMP at Flood Cell B8, Clementhorpe, York (SE 60358 51255–SE 60131 49852) (Figure 1, Site Location).

The work was undertaken for CH2M on behalf of the Environment Agency to produce information on the deposit sequence revealed by the window samples.

2 METHODOLOGY

As stated in the WSI (Appendix 3) the aims of the evaluation was to investigate the deposit sequence along the River Ouse and to assess the character of the deposits within the flood cell.

2.1 Boreholes

A total of six window sample boreholes were excavated (Figure 2):

Borehole Ref No.	Easting	Northing	AOD Height
WS21	460248	450606	9.59m
WS22	460233	450516	11.76m
WS23	460227	450418	8.38m
WS24	460215	450258	8.76m
WS25	460181	450103	8.23m
WS26	460169	449866	7.45m

The starter pits for the window samples were hand excavated by the GI contractor to a depth of 1.2m and observed by YAT. Deposit characteristics and depths were recorded on pro forma sheets and digital photographs were taken.

The GI contractor decided to open the sleeves of the window samples at the site compound, therefore it was deemed unnecessary to monitor excavation of the window samples. YAT was present at the compound as the sleeves were opened and subsequently hand cleaned, recorded and photographed the 1m cores encased in plastic tubing. Five of the window sample boreholes reached 5m BGL, however due to a negative result in the first 1m of WS26 the GI contractor extended the borehole to 6m BGL.

All boreholes were recorded using standardised pro forma record sheets and related to Ordnance Datum based on information by the GI contractor.

3 LOCATION, GEOLOGY & TOPOGRAPHY

The site was located at Flood Cell B8, Clementhorpe, York (Figure 1) and stretched along the western bank of the River Ouse. The site comprised to the north and west of residential housing and cultivated green open land, open to the public, to the east and the south. The northern and western edge of the Flood cell is bounded by Bishopgate Street and

Bishopthorpe Road, whilst the River Ouse flows along the eastern edge. Open fields lie to the south of the site's area. The ground surface is roughly level at around 11.5–12m AOD.

The underlying geology of the site consists of alluvial clay, sand and gravel which overlies the sandstone bedrock of the Sherwood Sandstone Group (www.bgs.ac.uk accessed 11/01/18).

4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

An extensive look at the historical and archaeological background was undertaken for the WSI (Appendix 1) and a baseline study (Jackson & Slater 2018); therefore just a summary of these findings will be given here.

Natural

A borehole located close to the Millennium Bridge recorded bedrock deposits at a depth of 18.53m BGL.

Boreholes recorded across the southern half of the site reported river laid deposits of sandy clays, clayey sand, silts and sand, containing in some cases organic material and releasing an 'organic odour'. The top of the deposits were recorded at depths of between 0.25m–2.75m BGL, with boreholes closer to the river recording higher depths than those closer to the residential area.

Prehistory

There is little evidence for prehistoric activity in this part of York. No prehistoric artefacts have been recorded in the vicinity and the only archaeological investigation nearby to have encountered Prehistoric deposits was a borehole survey conducted on Terry Avenue which concluded that Terry Avenue appeared to have been situated within the course of the River Ouse during this period. The deposits were recorded between 2.50m–3.50m BGL.

Roman

The site is located outside the Roman civilian settlement of *Eboracum*, however a known Roman villa site and cemetery was located just to the north of the site, around Clementhorpe road and to the east of Bishopthorpe Road. Evidence of this villa included a tessellated pavement uncovered east of the junction of Cherry Street with Clementhorpe in the mid 19th century and more substantially, stone structures, cobbled surfaces, mosaic floors and post-holes revealed during excavations in the 1970s which overlaid and cut into 2nd century terracing. The villa was thought to have stood in largely open countryside. Roman activity was present at approximately 10.90m–12.40m AOD.

Part of the Roman cemetery was uncovered during recent excavations at the end of Postern Close which uncovered Roman funerary remains. Other burials were recorded in the 18th century further down Bishopthorpe Road along with pottery of Roman date, and a stone coffin was found at the junction of Ebor Street and Cherry Street in 1865. Outside the cemetery burials have also been found in Nunthorpe and two stone coffins were recovered from a field between Middlethorpe and Old Nunthorpe in 1813. Two further coffins were found in the same field in 1826. Archaeological investigations undertaken in 1986, 1988 and 1989 in an area bounded by Bishopgate Street, Terry Avenue and Clementhorpe revealed Roman burials and probable Roman burials were seen during excavations at Clementhorpe Maltings.

Bishopthorpe Road may have had its origins in the Roman period, evidence of which was uncovered in 1981 when a compact cobbled surface was recorded at 2.15m BGL (YAT 6/1 101). Five burials were found in the 19th century along the road (RCHM 1962 67–110).

Beyond the villa and cemetery site, excavations to the south have revealed that the land was mainly used for agricultural purposes; an archaeological evaluation at 292 Bishopthorpe Road produced thick deposits relating to Roman agricultural activity and drainage ditches dating to the 2nd-3rd centuries. However a metal detecting survey and watching brief to the west of the Ouse identified Roman objects including a 2nd century Roman enamelled brooch. Quantities of Roman pottery have also been recovered from low-lying ground in this area; between 1m–2.5m BGL.

Anglian/Anglo-Scandinavian period

Following the withdrawal of Roman administration at the end of the 4th century, there are no documentary references to York before the early 7th century. Therefore there is a paucity of information on the immediate post-Roman period. There is little structural evidence for this period, but that which has been revealed suggests that the settlement was situated further down river than the Roman city. Material remains are largely confined to deposits of 'dark earths', though evidence of activity during this period was recorded at the Roman villa site in the Cherry Street and Lower Darnborough Street. After occupation in the Roman villa had ceased, activity continued in an adjacent wooden building, represented by two beam slots and four post holes. No associated finds were recovered but stratigraphically the building dated between the 4th century and mid-9th century cobble foundation.

Documentary and archaeological evidence show York was both a key administrative centre and substantial settlement in the Anglo-Scandinavian period. However, little is known of the suburbs of York during these periods. Some structural remains were uncovered in the area of the Roman villa and it has been speculated that these remains may have been a church dedicated to St Clement, dating to around the 10th–11th centuries. A large cobble foundation was located at approximately 11.50m AOD, whilst deposits dating to the Anglo-Scandinavian period were recorded between 9.50m–11.00m AOD. Two 9th century coins, a small lead enamelled weight and a coin of King Edward the Confessor were found during the excavations. Further evidence to suggest Anglo-Scandinavian activity in the area can be found in the surviving place-names. In Nunthorpe, Bishopthorpe and Clementhorpe, the common use of *Thorpe*, meaning outlying farmstead or hamlet, is Anglo-Scandinavian in origin (Mason 2004 14).

Medieval period

St Clements Priory, the only medieval nunnery in the vicinity of York was founded by the Benedictine Order between 1125 and 1133 at Clementhorpe. Some structural remains in the form of tiled floors, fragments of walls and a padstone of the Priory were recovered during excavations on the Roman villa in the 1970s along with almost 250 associated inhumation burials and medieval deposits at 11.75m AOD. Twelve intercutting graves associated with the nunnery were also recorded at 6 Colenso Street and a further burial was observed during a watching brief at 4 Colenso Street.

Much of the area around Clementhorpe was agricultural during this period and evidence of medieval field systems have been recorded close to Terry's Chocolate Works. Excavations at Moss Street and 292 Bishopthorpe Road revealed thick deposits relating to agricultural activity and a borehole survey along Terry Avenue produced the same results. Wharfs and structures relating to the use of the River Ouse as a trade route also became a fixture at this time. Medieval pottery has been recovered from sites close to the river in deposits comprising of alluvium and originating from flooding episodes of the River Ouse.

The Knavesmire lies to the west of the study area and throughout the medieval period was used as common grazing land as part of Micklegate Stray. The Knavesmire was also the site of the Tyburn from the late 14th century to 1801, one of four public execution sites in York. Small patches of ridge and furrow exist to the west of the racecourse, on areas less prone to flooding, and also to the south of the study area.

Post-medieval period

The river wharves were in continued use throughout the post-medieval period and the Clementhorpe area on the whole became industrial in nature, with industries such as breweries, boat building and a dye works taking place in the area. Archaeological evidence of post-medieval activity has been scarce in this area; however two lime kilns dated to the 16th century were found truncating the northern wall and floor of the medieval nunnery. A number of post-medieval deposits have also been recorded on sites to the west of Terry Avenue. A thick layer of made ground deposits were recorded in boreholes across the southern part of the study area. The deposits generally comprised of silty clays and sandy gravels with frequent inclusions of brick, tile, ash, clinker and slag. Deposits ranged in thickness from 1m to 1.50m, with two notable exceptions; Borehole 10, located close to the river, only had 0.25m of made ground, and Borehole 06 which had 3.95m of made ground, likely an infill of a pit. Pottery sherds, glass fragments and metal were noted in boreholes along the western edge of the site boundary, close to the residential area and Borehole 09, towards the southernmost edge of the site contained a layer of oyster shells and two complete glass bottles.

Speeds map of 1610 depicts Clementhorpe as relatively undeveloped at this time. Bishopthorpe Road was represented and a small track led southeast, parallel to the River Ouse. Three buildings were illustrated between the track and the river and a road which ran perpendicular to the track which had a large house to its south and two further buildings to the south-east. Situated to the south was a windmill. Richards map of 1685 and Drakes map of 1736 shows Clementhorpe as enclosed fields bounded by Bishopthorpe Road to the west and the parallel running track to the east. A tan yard is visible on the 1811 map of York by Todd, at the northern tip of the site.

The Ordnance Survey map of 1853 showed the extent of York's development in the 19th century, with housing spreading beyond the city walls to the west, south and east, though the southern extent of the study site is still undeveloped agricultural fields at this time. To the southeast of St Clements Nunnery, by the River Ouse, were the Clementhorpe Dye Works and to the southwest was Clementhorpe Well. By 1889 (OS) terrace housing had been built to the east and west of Bishopthorpe Road, south of Clementhorpe. The former tanner's yard to the north became a confectionary works and boat building yard. Along the riverfront to the south of Clementhorpe was St Clements Glass Works.

Modern period

By the late 19th century working class terraced housing had been built south of Clementhorpe, along the eastern edge of Bishopthorpe Road, to accommodate workers of the adjacent industrial works. Rowntree Park, a Grade II Registered Park and Garden, which encompasses the northern part of the site, was created in 1921 as a memorial to the members of staff at the Rowntree Cocoa Works who lost their lives in the First World War.

The Ordnance Survey map of 1907 illustrated the encroachment of terraced housing and industrial buildings which replaced the St Clements Glass Works. Allotment gardens were shown along the river to the immediate south of the old glassworks site. The Nun Ings meadowlands were still undeveloped along the eastern boundary of the site and Terry Avenue ran along the entire eastern side. A series of old gravel pits were located at the southern boundary of the study site.

By 1929 the former Nun Ings meadowlands were shown to be Rowntree Park, which included a band stand, tennis courts, bowling greens and parkland. Only a small portion of Nun Ings meadows survived in the southeast corner of the study area. Little has changed on the study site from 1938 to present day.

5 RESULTS

All six boreholes were assigned context numbers corresponding to their designation (Window Sample 21 commenced with context 2100 onwards, Window Sample 22 commenced with context 2200 onwards etc.). These contexts were then allocated to a group which represented one of three broad phases of activity across the site (Figure 4). Full descriptions of these deposits and their phase designations can be found in the context table which forms Appendix 2 of this report.

5.1 Phase 1: Natural

Natural clays were encountered in boreholes WS21, WS22, WS23, WS24, WS25 and WS26. Probable alluvial clays were the earliest natural deposits encountered; comprising of reddish/orange brown mottled blue grey sandy clay with rounded pebbles (2107, 2207, 2309, 2507, 2605) and mid grey mottled yellow/orange brown silty/sandy clay (2205, 2206, 2306-2308, 2310, 2604, 2606, 2607). Blue grey plastic clay 2508 was encountered at 4.23m BGL (4m AOD) in WS25. The alluvial deposits were encountered between 2.35m BGL and 3.58m BGL (6.03m AOD and 4.65m AOD) and extended to over 5m and 6m BGL.

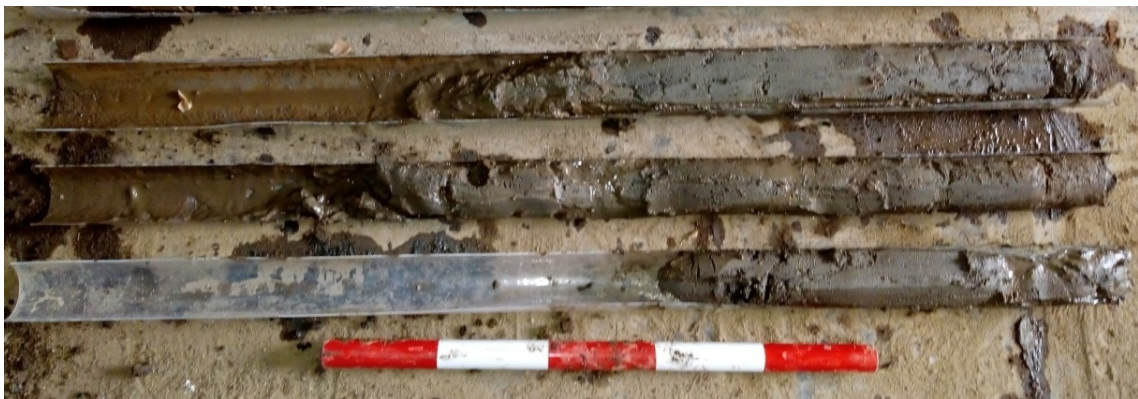


Plate 1 WS26 alluvial deposits 2604–2607 in cores 2m–5m. Top of core to the left



Plate 2 WS25 alluvial clay 2508 at bottom right of plate

Above the alluvial deposits was a mid to light orange brown clay 2103, 2104, 2106, 2203, 2204, 2603; encountered at depths between 1.55m and 2.08m BGL (8.04m AOD and 5.37m AOD).



Plate 3 Natural clays 2203 and 2204. WS22 core 2m–3m, top of core to the left

5.2 Phase 2; Modern/post-medieval dumping and made ground

Evidence of dumping from nearby industrial activity was encountered in all of the window samples; deposits 2101, 2102, 2201, 2202, 2302, 2303, 2305, 2401, 2402, 2403, 2405, 2407, 2501, 2502, 2504, 2506, 2601, and 2602 contained inclusions of clinker, coal, glass, CBM, small pottery sherds dating to the late post-medieval period and animal bone and measured between 0.34m and 1.20m in thickness. Redeposited clays 2304, 2404, 2406, 2408, 2503, 2505, and 2602 interspersed the rubbish deposits.



Plate 4 WS25 showing rubbish dump deposits 2502, 2504 and redeposited clays 2503, 2505 from cores 1m–2m and 2m–3m

In window samples WS23 and WS26 a layer of crushed mortar and demolition rubble was recorded. Contexts 2301 and 2601 comprised of dark grey silty clays containing occasional whole bricks and large fragments of CBM, along with mortar and ash inclusions and measured between 0.08m and 0.20m thick.

The top of the deposits relating to this phase were found immediately below the topsoil, between 0.17m and 0.50m BGL (8.21m AOD and 6.95m AOD), and measured in total between 0.7m and 3.32m thick, extending to between 1.55m and 3.58m BGL (8.04m AOD and 4.65m AOD). A notable exception to this was window sample WS24 which contained post-medieval dumping and made ground deposits to the full 5m length of the window sample. It is possible that the window sample was placed over a large rubbish pit, rather than an area of such substantial made ground build up.

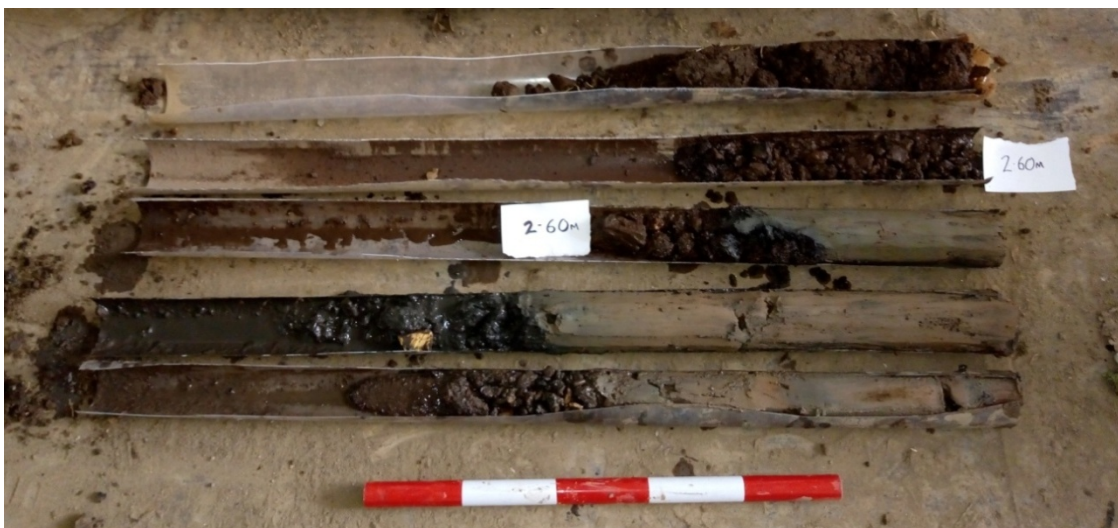


Plate 5 WS24. All cores showing post-medieval dumping and made ground. Top of cores to left



Plate 6 WS26 Context 2601 containing whole bricks

5.3 Phase 3: Modern turf and topsoil

The existing ground surface of the site is grass turf which overlay dark brown sandy silt topsoil measuring between 0.17m and 0.50m thick.

DISCUSSION

Natural clays were encountered between 1.55m and 3.58m BGL, or 8.04m AOD and 4.65m AOD. These roughly correspond with the depths recorded by previous borehole surveys conducted on the site where natural deposits were encountered at between 0.25m and 2.75m BGL (BGS accessed 2018). It is possible that natural clays were present at a lower depth in WS26, however the negative result for core 1m–2m means that this is impossible to determine.

The presence of thick alluvial deposits, particularly in window samples WS25 and WS26 support the conclusion that the River Ouse extended beyond its current banks during earlier periods, both through substantial periods of flooding and a widening of its course. No dating evidence was recovered from these deposits; however a borehole survey at Terry Avenue recovered prehistoric deposits at between 2.5m–3.5 BGL that suggested that it lay beneath the course of the River Ouse during the prehistoric period.

The earliest evidence of human activity comprised of rubbish dumping and made ground deposits dating to the late post-medieval and modern periods. These deposits are evidence of the industrial nature of Clementhorpe during the 19th and early 20th century and of its fast development into a suburb of York. Boreholes WS24 and WS25 stand out as having particularly thick dump deposits; possibly originating from the development of residential housing in the late 19th century, to the north west of the boreholes, or the establishment of Bishopthorpe Chocolate Works in the early 20th century.

The result of the boreholes confirms the known archaeology of the area; this part of Clementhorpe remained unoccupied, comprising largely of agricultural fields, from the Roman period through to the late post-medieval period when terraced housing and industrial works were established along this stretch of the River Ouse. By 1921 the area had been turned into parkland for the creation of Rowntree's Park.

LIST OF SOURCES

British Geological Survey viewer (accessed 16/05/18)

<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

REFERENCES

Jackson, C. & Slater M. 2018. *York Flood Management Plan, Clementhorpe & St George's Car Park Baseline Study Report*. YAT report 2018/33

YAT 2009. *York Archaeological Trust Fieldwork Recording Manual*.

YAT. 2018. *Written Scheme of Investigation for Borehole Monitoring for the York Five Year Flood Management Plan*. YAT report 2018/22

ACKNOWLEDGEMENTS

The author would like to thank Augustus Shaw and Mary-Anne Slater of YAT for their work on site. Thanks are also given to Aisling Mulcahy of Ch2m for her help and support through the project and to the staff of Structural Soils Ltd for their support on site.

APPENDIX 1 – INDEX TO ARCHIVE

Item	Number of items
Borehole Logs	9
Digital photographs	57
Written Scheme of Investigation	1
Report	1

Table 1 Index to archive

APPENDIX 2 – CONTEXT LIST

Context Number	Borehole	Depth of deposit (AOD)	Description
2100	WS21	9.59m	Topsoil. Dark grey brown friable sandy silt
2101	WS21	9.34m	Made ground. Grey brown friable silty clay
2102	WS21	8.89m	Made ground. Brown friable sandy clayey silt
2103	WS21	8.04m	Natural. Mid yellow brown clayey silt
2104	WS21	7.81m	Natural. Light orange brown clayey silt with subangular pebbles
2105	WS21	7.59m	Intrusive material. Mid brown clayey silt with grass.
2106	WS21	7.29m	Natural. Mid orange brown silty clay
2107	WS21	6.29m	Natural. Mid reddish grey brown silty clay
2200	WS22	11.76m	Topsoil. Dark brown grey friable silt
2201	WS22	11.56m	Dumping/made ground. Dark grey/brown friable sandy silt
2202	WS22	11.16m	Made ground. Mid-dark brown friable silty sandy clay
2203	WS22	9.68m	Natural. Mid orange silty clay
2204	WS22	9.28m	Natural. Light orange brown silty clay
2205	WS22	8.66m	Natural. Mid grey brown mottled orange brown silty clay
2206	WS22	7.70m	Natural. Light orange brown silty clay-wet
2207	WS22	7.24m	Natural. Mid reddish grey brown firm sandy clay
2300	WS23	8.38m	Topsoil. Dark brown grey sandy silt
2301	WS23	8.21m	Demo spread. Thin layer of crushed mortar and ash.
2302	WS23	8.13m	Made ground. Dark greyish brown clayey silt
2303	WS23	7.83m	Made ground. Dark orange brown friable silty clay
2304	WS23	6.83m	Made ground. Mid orange brown firm clay with subangular pebbles
2305	WS23	6.37m	Dumping. Dark grey brown friable rubble layer with coal and clinker inclusions.
2306	WS23	6.03m	Natural. Mid blue grey stiff silty clay
2307	WS23	5.66m	Natural. Light yellow brown mottled blue grey silty clay
2308	WS23	5.14m	Natural. Mid Yellow brown silty clay
2309	WS23	4.68m	Natural. Light grey brown mottled with yellow brown silty clay
2310	WS23	3.88m	Natural. Mid reddish grey brown silty clay with round pebbles
2311	WS23	3.46m	Natural. Orange sand
2400	WS24	8.76m	Topsoil. Dark brown sandy silt
2401	WS24	8.50m	Dumping/made ground. Dark grey gravels containing coal, CBM, pottery sherds, two glass bottles and subangular pebbles inclusions
2402	WS24	7.96m	Dumping/made ground. Mid orange brown sandy gravels containing yellow glazed pottery, animal bone, coal, CBM and subangular pebbles inclusions

Context Number	Borehole	Depth of deposit (AOD)	Description
2403	WS24	6.43m	Dumping/made ground. Rubble layer with coal and clinker inclusions
2404	WS24	5.71m	Made ground. Mottled blue grey and yellow brown clay
2405	WS24	5.48m	Dumping/made ground. Rubble layer with coal and clinker inclusions
2406	WS24	5.01m	Made ground. Mid orange brown mottled blue grey silty clay
2407	WS24	4.47m	Dumping/made ground. Gravelly rubble. Piece of stamped metal with spikes was recovered from the layer.
2408	WS24	4.11m	Made ground. Mid grey mottled orange brown silty clay
2500	WS25	8.23m	Topsoil. Dark brown sandy silt
2501	WS25	7.97m	Dumping/made ground. Dark grey gravels containing coal, CBM, pottery sherds, glass and subangular pebbles inclusions
2502	WS25	7.87m	Dumping/made ground. Reddish brown to mid orange brown sandy gravelly silt containing clinker, glass, CBM, coal inclusions
2503	WS25	6.47m	Made ground. Mid grey brown silty clay
2504	WS25	6.22m	Dumping/made ground. Clinker and glass dump
2505	WS25	5.84m	Made ground. Mid reddish brown silty clay
2506	WS25	5.25m	Dumping/made ground. Clinker dump
2507	WS25	4.65m	Natural. Reddish brown silty clay
2508	WS25	4.00m	Natural. Smooth and plastic blue grey clay
2600	WS26	7.45m	Topsoil. Dark brown sandy silt with brick inclusions
2601	WS26	6.95m	Dumping/made ground. Dark grey silty clay with brick inclusions. The bricks were both whole and large fragments, occasional at the top of the deposit and getting more frequent further down.
2602	WS26	7.05m	Made ground. Mid greyish brown clayey silt with rare CBM fragments and coal inclusions
2603	WS26	5.45m	Natural. Mid orange brown silty sandy clay
2604	WS26	4.69m	Natural. Mid blue grey silty sandy clay
2605	WS26	4.36m	Natural. Very wet orange brown silty clay
2606	WS26	3.94m	Natural. Mid blue grey mottled yellow brown silty clay
2607	WS27	2.61m	Natural. Mid grey brown sandy clay

Table 2 Context list

APPENDIX 3 – WRITTEN SCHEME OF INVESTIGATION

WRITTEN SCHEME OF INVESTIGATION FOR BOREHOLE MONITORING FOR THE YORK FIVE YEAR FLOOD MANAGEMENT PLAN

Site Location: Flood Cell B8, Clementhorpe, York

NGR: SE 60358 51255-SE 60131 49852

Planning ref: N/A

Prepared for: CH2M

Document Number: 2018/32

Version	Produced by		Edited by		Approved by	
	Initials	Date	Initials	Date	Initials	Date
1	CJ	10/01/18	IM	10/01/18	IM	10/01/18
2	CJ	28/02/18	BR	01/03/18	BR	01/03/18
3	CJ	09/03/18				

SUMMARY

CH2M have been contracted by the Environment Agency to undertake works on the proposed Five Year Flood Management Plan for York (FMP) at Flood Cell B8, Clementhorpe, York. The scheme will include a series of cable percussive and window sample boreholes.

This Written Scheme of Investigation (WSI) has been prepared in response to a Brief written by Aisling Mulcahy of CH2M. The work will be carried out in accordance with this WSI and according to the principles of the Chartered Institute for Archaeology (CIfA) Code of Conduct, CIfA standards and guidance and all other relevant standards and guidance.

SITE LOCATION & DESCRIPTION

The proposal site is situated at Flood Cell B8, Clementhorpe, York (Figures 1a-c).

The site stretches along the western bank of the River Ouse in the Clementhorpe area of York and comprises largely of residential housing at the north and along the western edge of the Flood Cell and cultivated green open land, open to the public to the eastern and southern edges. The northern and eastern edge of the Flood Cell is bounded by Bishopgate Street and Bishopthorpe Road, whilst the River Ouse flows along the western edge. Open fields lie to the south of the site's area. The ground surface is roughly level at around 11.5–12m AOD.

The underlying geology consists of alluvial clay, silt, sand and gravel overlying sandstone of the Sherwood Sandstone Group (www.bgs.ac.uk accessed 11/01/18).

DESIGNATIONS & CONSTRAINTS

Rowntree's Park is a Grade II listed Park and Garden.

Obstructions within the sequence may require re-positioning or abandonment of some of the boreholes.

ARCHAEOLOGICAL INTEREST

Prehistory

There is no evidence of prehistoric activity in this area, however there could still be potential for prehistoric remains in the area.

Roman

The site is located outside the Roman civilian town, however a known Roman villa site and cemetery is located just to the north of the site, around Clementhorpe road and to the east of Bishopthorpe Road. Evidence of this villa includes; a tessellated pavement uncovered east of the junction of Cherry Street with Clementhorpe in the mid 19th century (EYO2486) and more substantially, stone structures, cobbled surfaces, mosaic floors and post holes revealed during excavations in the 1970s (EYO2345–53) which overlay and cut into 2nd-century terracing. The villa was still being modified in the 4th century and is thought to have stood in largely open countryside (RCHM 1962, 62; Ottaway 2004, 116). Part of the Roman cemetery was uncovered during excavations at the end of Postern Close which uncovered Roman funerary remains. Further burials were recorded in the 18th century further down Bishopthorpe Road along with pottery of Roman date and a stone coffin was found at the junction of Ebor Street and Cherry Street in 1865 (EYO2839). Outside the cemetery burial have also been found in Nunthorpe, along Bishopthorpe Road which may have its origins in the Roman period, evidence of which was uncovered in 1981 when a compact cobbled surface was recorded at 2.00m BGL. Five burials were found in the 19th century along the road (RCHM 1962 67–110), as well as two stone coffins which were recovered from a field between Middlethorpe and Old Nunthorpe in 1813. In 1826 two further coffins were found in the same field.

Beyond the villa and cemetery site, to the south, excavations have revealed that the land was mainly used for agricultural purposes (EYO128), however quantities of Roman pottery has been recovered from sites on low lying ground to the immediate west of the river and at significant depths; between 1m–2.5m BGL.

Anglo-Scandinavian

Some structural remains and finds of this period have been uncovered in the area of the Roman villa and it has been speculated that these remains may have been a church dedicated to St Clement, dating to around the 10th and 11th centuries (Wilson and Mee 1998, 61).

Medieval

St Clement's Priory, the only medieval nunnery in the vicinity of York, was located to the north of the site, in the area around Clementhorpe. The Benedictine nunnery of St. Clement was founded between 1125 and 1133 by Archbishop Thurston (VCH 1974 129–131) and owned extensive lands to the south of its walls, though at any time does not seem to have had more than 10 or 12 nuns living there. The priory served as both the priory church and parish church to the local population, and after the nunnery's suppression on 31st August 1536 remained in its role serving the local population and avoided destruction for the next 50 years. However, due to the local depleting population, the parish was united with that of St. Mary, on

Bishophill Senior and the church was allowed to go to ruin. In 1745 the stone from the buildings were taken and reused to repair the City Walls. Some structural remains of the priory were recovered during the excavations on the Roman villa in the 1970's; which was truncated by the priory structure along with associated inhumation burials (Brinklow & Donaghey 1984, 55).

Much of the area around Clementhorpe was agricultural during this period, and evidence of medieval field systems have been recorded close to Terry's Chocolate Works. Windmills were present in the landscape, including one shown on the 1852 ordnance survey map near the junction of Southlands and Bishopthorpe Road (Nun Windmill). Wharfs and structures relating to the use of the River Ouse as a trade route also became a fixture at this time. Medieval pottery has been recovered from sites close to the river in deposits comprising of alluvium and originating from flooding episodes of the River Ouse (Johnson 2015).

Post-medieval

The river wharves were in continued use throughout the post-medieval period and the Clementhorpe area on the whole became industrial in nature, as shown on the 1852 Ordnance Survey map where a brewery, boat building yard and bone mill are illustrated, as well as Clementhorpe Dye Works (Johnson 2015). The Slip Inn on Clementhorpe is the last surviving structure related to the shipyard, as much of the surrounding works have been demolished to make way for 19th to 20th century residential housing. Archaeological evidence of post-medieval activity has been scarce in this area; however two lime kilns dating to the 16th century have been recorded truncating the northern wall and floor of the nunnery (Brinklow & Donaghey 1984, 55). A number of post-medieval deposits have also been recorded on sites to the west of Terry Avenue.

Modern

By the late 19th century working class terraced housing had been built south of Clementhorpe, along the eastern side of Bishopthorpe Road, to accommodate workers of the adjacent industrial works. Rowntree Park, a Grade II Registered Park and Garden, encompasses the northern part of the site and was created in 1921 as a memorial to the members of staff at the Cocoa Works who lost their lives in the First World War. The park is a large (10ha) green space with play areas, a lake, tennis courts and a cafe and was formerly the meadowland of Nun Ings.

DEPOSIT SEQUENCE

This sequence is taken from borehole logs (BGS) recorded predominantly in the southern half of the site from 1997 to 2007.

Natural

A borehole located close to the Millennium Bridge recorded bedrock deposits at a depth of 18.53m BGL.

Boreholes recorded across the southern half of the site reported river lain deposits of sandy clays, clayey sand, silts and sand, containing in some cases organic material and releasing an 'organic odour'. The top of the deposits were recorded at depths of between 0.25m–1.40m

BGL, with boreholes closer to the river recording higher depths than those closer to the residential area of Clementhorpe.

Made ground

A thick layer of made ground deposits were recorded across the southern part of the site. The deposits generally comprised of silty clays and sandy gravels with frequent inclusions of brick, tile, ash, clinker and slag. Deposits ranged in thickness from 1.00m to 1.50m, with two notable exceptions; Borehole No.10, which is located close to the river, only had 0.25m of made ground, and Borehole No. 6 which had 3.95m of made ground, likely an infill of a pit. Pottery sherds, glass fragments and metal were noted in boreholes along the western edge of the site boundary, close to the residential area and Borehole No.9, towards the southernmost edge of the site contained a lens of oyster shells and two complete glass bottles.

It is important to note that records of 'made ground' deposits on geology borehole logs is a generic term allocated to deposits that are not natural geology. Therefore it cannot be definitively stated that the 'made ground' recorded across these boreholes is of the same date or is in fact made ground at all. However, the inclusions of clinker and brick and pottery heavily suggest that it is related to the industrial activity and the subsequent demolition of its related structures that occurred in this area in the post-medieval to modern period.

Topsoil

The top 0.15m–0.20m of the sequence comprised topsoil and grass.

Summary

The presence of made ground deposits with clinker and brick inclusions is consistent with the known industrial activities that occurred in this area towards the end of the post-medieval period. It is also probable that some of the made ground deposits relate to the agricultural activity that occurred in this part of York during the Roman to early post-medieval period. The proximity of the site to the Roman villa and cemetery at Clementhorpe and to the Roman Bishopthorpe Road cannot be ignored and therefore there is potential for more substantial Roman remains, including burials. The presence of organically preserved material within the river lain deposits suggests that there is potential for the preservation of any earlier remains.

SCOPE OF WORKS

Due to the potential for significant archaeological deposits to be present a sample of the geotechnical interventions will be subject to archaeological monitoring in order to identify and record the deposit sequence revealed. The GI investigations comprise of window samples and percussive boreholes.

The scope of the monitoring and sampling has been determined in consultation with the City of York Archaeologist. The GI interventions to be monitored comprise a sample of window samples as shown in Figures 2a & 2b, location known as of 9th March 2018 (boreholes to be monitored are highlighted in yellow).

A targeted selection of the window samples will be subject to palaeoenvironmental sampling and installation of stand pipes to facilitate groundwater level monitoring as appropriate in

order to assess the character of deep deposits and their potential for organic remains and the depositional environment within which they lie in relation to groundwater levels.

All archaeological works will be carried out in accordance with the methodologies detailed in this WSI and with the Standard and Guidance for an Archaeological Watching Brief (ClfA 2014), the ClfA Code of Conduct (ClfA 2014) and other current and relevant good practice and standards and guidance (Appendix 1).

It may be necessary to relocate interventions due to localised obstructions or constraints. Actual locations of interventions will be mapped by the GI Contractor and this information supplied to the Archaeological Contractor.

AIMS OF BOREHOLE EVALUATION

The aim of this borehole evaluation is to determine the extent, condition and character of the deposits identified in a sample of boreholes located across the development site.

EVALUATION METHODOLOGY

This work will comprise a comprehensive monitoring on the excavation of window sample boreholes. Please note that further stages of work or other mitigation measures could be required by the local authority, depending upon the results of the evaluation.

The window sampling will utilise a compact tracked rig. The location of the boreholes, as known 9th March 2018, is shown on Figures 2a & 2b, with the sample to be monitored highlighted. The location of the monitored boreholes has been determined by considering the known archaeology and history of the area. It is possible that below-ground constraints will result in the final location of boreholes varying from those proposed.

It is not intended that the archaeological monitoring should unduly delay site works. However, the archaeologist on site should be given the opportunity to observe, clean, assess and, where appropriate hand excavate, sample and record any exposed features and finds. In order to fulfil the requirements of this WSI, it may be necessary to halt the earth-moving activity to enable the archaeology to be recorded properly.

Plant or excavators shall not be operated in the immediate vicinity of archaeological remains until the remains have been recorded and the archaeologist on site has given explicit permission for operations to recommence at that location.

If a base plan of intervention areas is available, the areas being monitored will be determined using this information. If a plan is not available, or the watching brief work involves monitoring of long linear works, interventions which are not mapped, or large open areas, the location of the monitoring will be determined using a hand-held GPS, which will provide accuracy to approximately 25mm.

RECORDING METHODOLOGY FOR BOREHOLE SURVEY

All boreholes will be recorded using standardised pro forma record sheets and related to Ordnance Datum. Borehole cores will be examined in the field by an archaeologist suitably experienced in the deep stratigraphic nature of York's archaeological deposits. The results will then be cross referenced to deposits identified by the GI logs.

Each context will be described in full on the pro forma borehole record sheet in accordance with the accepted context record conventions. Each context will be given a unique number. These field records will be checked and indexes compiled.

Photographs of work in progress and recovered cores will be taken. The photographic record will comprise of digital photographs of not less than 10 mega-pixels. All site photography will adhere to accepted photographic record guidelines.

All finds will be collected and handled following the guidance set out in the ClfA guidance for archaeological materials. Unstratified material will not be kept unless it is of exceptional intrinsic interest. Material discarded as a consequence of this policy will be described and quantified in the field. Finds of particular interest or fragility will be retrieved as Small Finds, and located on plans. Other finds, finds within the topsoil, and dense/discrete deposits of finds will be collected as Bulk Finds, from discrete contexts, bagged by material type.

All artefacts and ecofacts will be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication *First Aid for Finds*, and recording systems must be compatible with the recipient museum. All finds that fall within the purview of the Treasure Act (1996) will be reported to HM Coroner according to the procedures outlined in the Act, after discussion with the client and the local authority.

Sampling and analysis of waterlogged and/or organic deposition

Recently published Historic England guidance on Preserving Archaeological Remains (Historic England 2016) has informed the City of York's approach to the evaluation of potential deeply-buried, waterlogged and organic deposits using boreholes.

In consideration of this procedure the PD has identified that window samples may be subject to a series of samples and tests along with groundwater level monitoring. Palaeoenvironmental sampling and installation of stand pipes may therefore be required in these interventions for the characterisation and analysis of deposits to understand their organic content, depositional environment, preservation in relation to hydrological recharge.

In addition to conventional General Biological Analysis environmental sampling, specialist samples may be taken to assess the potential and condition of these deposits. The sampling strategy is outlined in Section 9.1.7 below.

A programme of on-going ground-water monitoring using an audible dip-meter may be undertaken to understand the site hydrology.

These analyses will only be undertaken if the flood management option for which that GI intervention relates is to be taken forward as the preferred option unless otherwise instructed by the consultant.

The evaluation will comprise the following elements:

- AMS dating of waterlogged deposits if suitable material is recovered (SUERC)
- Specialist assessment for environmental character and potential (YAT)
- Specialist assessment for environmental condition (GEOLABS)
- Monitoring of groundwater levels (YAT)

Should suitable organic deposits be identified in the boreholes earmarked for dipwell installation, consultation will be initiated with the Consultant and local authority curator. With their agreement a set of samples can be taken for two separate purposes: firstly, to understand the bioarchaeological content, and secondly, to assess the permeability and condition of the organic deposits. The aims are outlined briefly below.

General Biological Analysis samples will be taken from the core where organic deposits are identified. These samples will be processed and assessed for the recovery of archaeological plant macrofossil and insect remains, charcoal, bones etc and for the presence, abundance and condition of diatoms. If suitable material is present for AMS dating this will be sent to SUERC.

Two 300mm long Class 1 undisturbed samples will be recovered from the organic waterlogged deposits for specialist assessment by Geolabs for; triaxial permeability testing, porosity/bulk density/moisture content testing, particle size distribution analysis and chemical redox potential testing.

The Class 1 samples will be cut from the window sample casings using a saw and sealed using plastic and tape to prevent them from drying.

The samples will be taken to YAT conservation Laboratory for preparation and packaging before being dispatched for analysis.

Groundwater Level Monitoring

The following methodology for groundwater level methodology is provided should this be required and would only be undertaken with prior approval.

60mm diameter standpipes will be inserted into each borehole, surrounded by gravel and Bentonite surrounds and capped with a lockable cover. If practicable, in-situ data loggers will be installed in the dip-wells. If this is not possible then monitoring will be conducted using a dip-meter.

Monitoring of the groundwater levels will be undertaken by YAT staff for a period of 6 months, when there will be an assessment of the results and a report will be made to the client and the City of York Archaeologist, John Oxley.

Groundwater levels will be monitored and recorded on a weekly basis by appropriately trained YAT staff using an audible dipmeter.

Groundwater levels will be plotted, along with rainfall levels recorded by the University of York at Heslington to determine changes in groundwater level in relation to local rainfall.

Physical testing will then be undertaken as part of an investigation into the rate at which groundwater may flow through sediments in order to gauge what may happen if the existing water table fluctuates, or is impacted upon by development.

Analysis will be undertaken on sediment compositions (proportions of clay, silt and gravel), the permeability of the sediments (measured by the hydraulic conductivity) and the porosity of the sediments (the measured portion of a deposit occupied by pore spaces).

Analysis of a combination of hydraulic conductivity and porosity values will be evaluated in relation to changes in groundwater levels recorded over a period of long-term monitoring in order to assess the archaeological sequence and its hydrology.

COMPLETION OF FIELDWORK

The archaeological Contractor shall prepare a Completion Statement to the Consultant within one working day of completing the survey. The survey areas will be left in a tidy and workman-like condition and the Archaeological Contractor will ensure that all materials brought onto site are removed.

An OASIS entry will be completed at the end of the fieldwork, irrespective of whether a formal report is required. The archaeological contractor will complete the online form at <http://ads.ahds.ac.uk/project/oasis> within one month following completion of the fieldwork. The GI contractor will submit copies of their exploratory-hole logs to the archaeological contractor at the earliest opportunity.

POST-EXCAVATION SPECIALIST ASSESSMENT

The stratigraphic information, artefacts, deposit samples, and residues will be assessed as to their potential and significance for further analysis and study. The material will be quantified (counted and weighted). Specialists will undertake a rapid scan of all excavated material. Ceramic spot dates will be given. Appropriately detailed specialist reports will be included in the report.

Materials considered vulnerable should be selected for stabilisation after specialist recording. Where intervention is necessary, consideration must be given to possible investigative procedures (e.g. glass composition studies, residues on or in pottery, and mineral-preserved organic material). Allowance will be made for preliminary conservation and stabilization of all objects and a written assessment of long-term conservation and storage needs will be procured. Once assessed, all material will be packed and stored in optimum conditions, in accordance with Watkinson and Neal (1998), CiFA (2007) and Museums and Galleries (1992).

All finds will be cleaned, marked and labelled as appropriate, prior to assessment. For ceramic assemblages, any recognised local pottery reference collections and relevant fabric codes will be used.

Sampling will be carried out in consultation with the City of York Archaeologist, YAT specialists and the English Heritage Regional Science Advisor, as appropriate.

All sampling for environmental and biological material will take place in accordance with the recommendations contained in the papers: Environmental Archaeology and Archaeological Evaluations, (Association for Environmental Archaeology, 1995), Environmental Archaeology: A Guide to the Theory and Practice of Methods from Sampling and Recovery to Post - Excavation (English Heritage 2011, 2nd Edition), and Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (English Heritage 2004).

General Biological Analysis (GBA) samples from the potential waterlogged organic deposits will be processed and assessed by specialist staff at Palaeoecology Research Services (PRS). The purpose of these samples is to establish baseline conditions regarding preservation of organic

remains, by characterising the potential organic deposits via the recovery of charcoal, burnt seeds, bone, artefacts, macrofossils and microscopic remains such as pollen and insects.

If suitable material is identified within the GBA samples then it will be assessed and submitted for AMS dating. This will be conducted by SUERC and will aim to date samples from the top and bottom of the sequence of potential waterlogged organic deposits, with at least one intermediate point, to contribute to the understanding of the archaeology.

Two undisturbed samples of the organic deposits will be collected per borehole for further specialist assessment at Geolabs. These will be tested to ascertain the quality and condition of the waterlogged organic deposits using the following techniques:

- Triaxial permeability testing
- Porosity/bulk density/moisture content testing
- Particle size distribution analysis
- Chemical redox potential testing

REPORT AND ARCHIVE PREPERATION

Upon completion of the groundworks, a report will be prepared to include the following:

- A non-technical summary of the results of the work.
- An introduction which will include the planning reference number, grid references and dates when the fieldwork took place.
- An account of the methodology and results of the operation, describing structural data, associated finds and environmental data.
- A deposit sequence for each window sample, illustrating the stratigraphic sequence of deposits and any noted archaeological features or remains (at an appropriate and recognised scale)
- An interpretative deposit model of each area if appropriate.
- Where appropriate, an appendix containing specialist assessment /analysis reports (artefacts; palaeoenvironmental / geoarchaeological data) or their equivalent.
- An assessment /conclusion and a statement of potential with recommendations for post-excavation, analysis and publication, if appropriate
- Details of archive location and destination (with accession number, where known), together with a catalogue of what is contained in that archive.
- A copy of the key OASIS form details
- Copies of the Brief and WSI
- Additional photographic images may be supplied on a CDROM appended to the report

The report will incorporate a review of historic borehole information, borehole logs from the GI contractor on all boreholes undertaken, and results of other previous archaeological investigations undertaken in the relevant area.

The report will be submitted to the Consultant for review. Any comments from the Consultant will be addressed and taken into account within a revised final version. The report will then be submitted to the National Environmental Assessment Service (NEAS), before being to the City of York Archaeologist.

Copies of the report will be submitted to the commissioning body and the HER/SMR (also in PDF format).

A field archive will be compiled consisting of all primary written documents, drawings and photographs. Catalogues of contexts, finds, soil samples, drawings and photographs will be produced.

The owner of the Intellectual Property Rights (IPR) in the information and documentation arising from the work, would grant a licence to the County Council and the museum accepting the archive to use such documentation for their statutory functions and provide copies to third parties as an incidental to such functions. Under the Environmental Information Regulations (EIR), such documentation is required to be made available to enquirers if it meets the test of public interest. Any information disclosure issues would be resolved between the client and the archaeological contractor before completion of the work. EIR requirements do not affect IPR.

Upon completion of the project an OASIS form will be completed at <http://ads.ahds.ac.uk/project/oasis/>.

HEALTH AND SAFETY

Health and safety issues will take priority over archaeological matters and all archaeologists will comply with relevant Health and Safety Legislation. The works shall be carried out under The Construction (Design & Management) (CDM) Regulations 2015 with the Archaeological Contractor being part of a wider team under the GI Contractor (whilst on site). The Contractor's Health & Safety Plan, Health & Safety Policies and Risk Assessments will be adhered to at all times.

A Risk Assessment and method statement will be prepared prior to the start of site works.

PUBLIC ENGAGEMENT

The City of York recognises the importance of engaging the public in archaeological issues. Excavations within the City generate significant levels of public interest as well as affording the opportunity for people to see the process as it happens.

YAT is a leader in the field public engagement with archaeology and has a proven track record of integrating public access and presentation into active archaeological projects. The positive responses to this work have created positive press, goodwill towards redevelopment as well as enabling new developments to be 'placed' within the history of their surrounds.

Public engagement will only take place with the permission of the client and the Environment Agency.

PRE-START REQUIREMENTS

The client will be responsible for ensuring site access has been secured prior to the commencement of site works, and that the perimeter of the site is secure.

The client will provide York Archaeological Trust with up to date service plans and will be responsible for ensuring services have been disconnected, where appropriate.

The client will be responsible for ensuring that any existing reports (e.g. ground investigation, borehole logs, contamination reports) are made available to York Archaeological Trust prior to the commencement of work on site.

The GI Contractor will agree the following with the Consultant and the Archaeological Contractor and facilitate the Archaeological Contractor to carry out monitoring with the provision of:

- A programme and timetable for the ground investigations ahead of the investigation.
- Provide sufficient notification of the start of each trial pit to allow the Archaeological Contractor time to mobilise to ensure that the GI works are carried out under the supervision of the Archaeological Contractor;
- A Method Statement describing how the GI works will be undertaken;
- All machinery necessary for the boreholes and window samples
- Provide information regarding the level (above Ordnance Datum) of the top of the ground surface at each hole where archaeological monitoring is required
- Undertaking operations at an appropriate speed to allow the archaeologist time observe and record. They must also be allowed when necessary to excavate by hand, sample, record and recover evidenced in order to fulfil the aims and objectives of the PD and this WSI.
- Secure the worksite and supply appropriate barrier fencing where required
- make arrangements to allow the Archaeological Contractor sufficient time to examine, record and remove, if necessary, the revealed and discovered archaeological remains;
- Arrangements to protect archaeological remains to be left in situ.
- Be responsible for protecting and covering any archaeological features under the direction of the Archaeological Contractor.
- Be responsible for providing any protective covering (such as geotextile) as specified by the Archaeological Contractor
- Protecting revealed or discovered archaeological remains to be left in situ to the satisfaction of the Archaeological Contractor.
- Protecting any archaeological remains to the satisfaction of the Archaeological Contractor
- Backfilling and reinstating

The archaeological contractor will make every reasonable effort to complete any essential investigation and recording works without unduly impacting on the GI programme and will not investigate any area outside the approved GI interventions.

Operations may only recommence in an intervention where a stoppage has been required once appropriate recording has been completed and the archaeologist on site has given explicit permission.

The archaeological contractor shall record the date, time and duration of all archaeological monitoring sites until the work is completed.

The archaeological contractor shall ensure that all site records and finds are kept secure at all time, and then conserved and archived to the required standards.

TIMETABLE AND STAFFING

The monitoring will commence at a time to be agreed with the client.

Specialist staff available for this work are as follows:

- Palaeoenvironmental remains – Dr Jennifer Miller

- Head of Curatorial Services - Christine McDonnell
- Finds Researcher - Nicky Rogers
- Medieval Pottery Researcher - Anne Jenner
- Finds Officers – Nienke Van Doorne
- Archaeometallurgy & Industrial Residues – Dr Rod Mackenzie & Dr Roger Doonan
- Conservation – Ian Panter

MONITORING OF FIELDWORK

As a minimum requirement, John Oxley will be given a minimum of one week's notice of work commencing on site, and will be afforded the opportunity to visit the site during and prior to completion of the on-site works so that the general stratigraphy of the site can be assessed. York Archaeological Trust will notify John Oxley of any discoveries of archaeological significance so that site visits can be made, as necessary. Any changes to this agreed WSI will only be made in consultation with John Oxley.

COPYRIGHT

York Archaeological Trust retain the copyright on this document. It has been prepared expressly for CH2M, and may not be passed to third parties for use or for the purpose of gathering quotations.

KEY REFERENCES

<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> (accessed 16/01/2018)

Brinklow, D. & Donaghey, S., 1984. A Roman Building at Clementhorpe in (ed) David Brinklow, R.A. Hall, J.R. Magilton, and Sara Donaghey. *Coney Street, Aldwark and Clementhorpe, Minor Sites, and Roman Roads*. Archaeology of York 6/1, York Archaeological Trust

Brown, D. H., 2007. *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation*. ClfA/AAA

Campbell, G., Moffett, L., and Straker, V. (eds.), 2011. *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-Excavation (second edition)*. English Heritage (Portsmouth)

ClfA. Chartered Institute for Archaeologists, 1993. McKinley, J. I., and Roberts, C. (eds.). *Excavation and Post-Excavation Treatment of Cremated and Inhumed Human Remains*. Technical Paper No. 13

ClfA. Chartered Institute for Archaeologists, 2011. Brown, D.H. *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation (second edition)*.

ClfA. Chartered Institute for Archaeologists, 2014. *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*.

ClfA. Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Archaeological Field Evaluation*

Department for Communities and Local Government, 2012. National Planning Policy Framework.

- Evans, D. 2011. *Sewer Repair, Tower Gardens, York*. York Archaeological Trust unpublished short report. Report number 2011/13.
- Hall, R.A., 2014. *Anglo-Scandinavian Occupation at 16–22 Coppergate*, Archaeology of York 8/5, York Archaeological Trust.
- Historic England, 2002. *With Alidade and Tape –Graphical and Plane Table Survey or Archaeological Earthworks*.
- Historic England, 2005. *Guidance for Best Practice for Treatment of Human Remains Excavated from Christian Burial Grounds in England*.
- Historic England, 2006. *Guidelines on the X-Radiography of Archaeological Metalwork*.
- Historic England, 2007. *Understanding the Archaeology of Landscape –a Guide to Good Recording Practice*.
- Historic England, 2015. *Archaeometallurgy. Guidelines for Best Practice*.
- Historic England, 2015. *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record*.
- Historic England, 2015. *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*.
- Historic England, 2015. *Piling and Archaeology. Guidelines and Best Practice*.
- Historic England, 2015. *Where on Earth are We? The Role of Global Navigation Satellite Systems (GNSS) in Archaeological Field Survey*.
- Historic England, 2016. *Preserving Archaeological Remains. Decision-taking for Sites under Development*.
- Historic England, 2008. *Investigative Conservation. Guidelines on How the Detailed Examination of Artefacts from Archaeological Sites can Shed Light on their Manufacture and Use*.
- Hunter-Mann, K., 1990. *St. George's Field Car Park, York. Phase 1: Report on an Archaeological Evaluation*. York Archaeological Trust.
- Hunter-Mann, K., 1994. 'Prehistoric York through the key-hole', in *Archaeology in York*, Volume 19 Number 3, pp 4–8, York Archaeological Trust.
- Johnson, M. 2015. *Parkside Commercial Centre, Terry Avenue, York: Desk Based Assessment*. York Archaeological Trust unpublished report no. 2015/26
- Leigh, D., Neal, V., and Watkinson, D. (eds.), 1998. *First Aid for Finds: Practical Guide for Archaeologists*. United Kingdom Institute for Conservation of Historic & Artistic Works, Archaeology Section; 3rd Revised Edition.
- Museum and Galleries Commission, 1992. *Standards in the Museum Care of Archaeological Collections*.
- Ottaway, P., 2011. *Archaeology in the Environs of Roman York: Excavations 1976–2005*,

Archaeology of York 6/2, York Archaeological Trust.

RCHME, 1962. *An Inventory of the Historical Monuments in the City of York: Volume 1 Eboracum, Roman York*, HMSO.

RCHME, 1999. *Recording Archaeological Field Monuments –a Descriptive Specification*.

Savine, B. 2016. *Archaeological Investigations at Foss Barrier, St George's Field, SI Monitoring*, YAT Report 2016/64

Standing Conference of Archaeological Unit Managers (SCAUM), 2007. *Health and Safety in Field Archaeology*

Stockwell, M. 1984. *St George's Field, York: A watching brief*. York Archaeological Trust unpublished report

Victoria County History. 1974. Houses of Benedictine nuns: Priory of St Clement, York in *A History of the County of York: Volume 3*. pp 129–131.

For the latest Historic England guidance documents see:

<https://historicengland.org.uk/advice/latest-guidance/>

PLATES



Plate 7 All cores for WS21. Core 1m–2m at the top



Plate 8 All cores for WS22. Core 1m–2m at the top



Plate 9 All cores for WS23. Core 1m–2m at the top



Plate 10 All cores for WS24. Core 1m–2m at the top



Plate 11 All cores for WS25. Core 1m–2m at the top



Plate 12 All cores for WS26. Core 1m–2m at the top

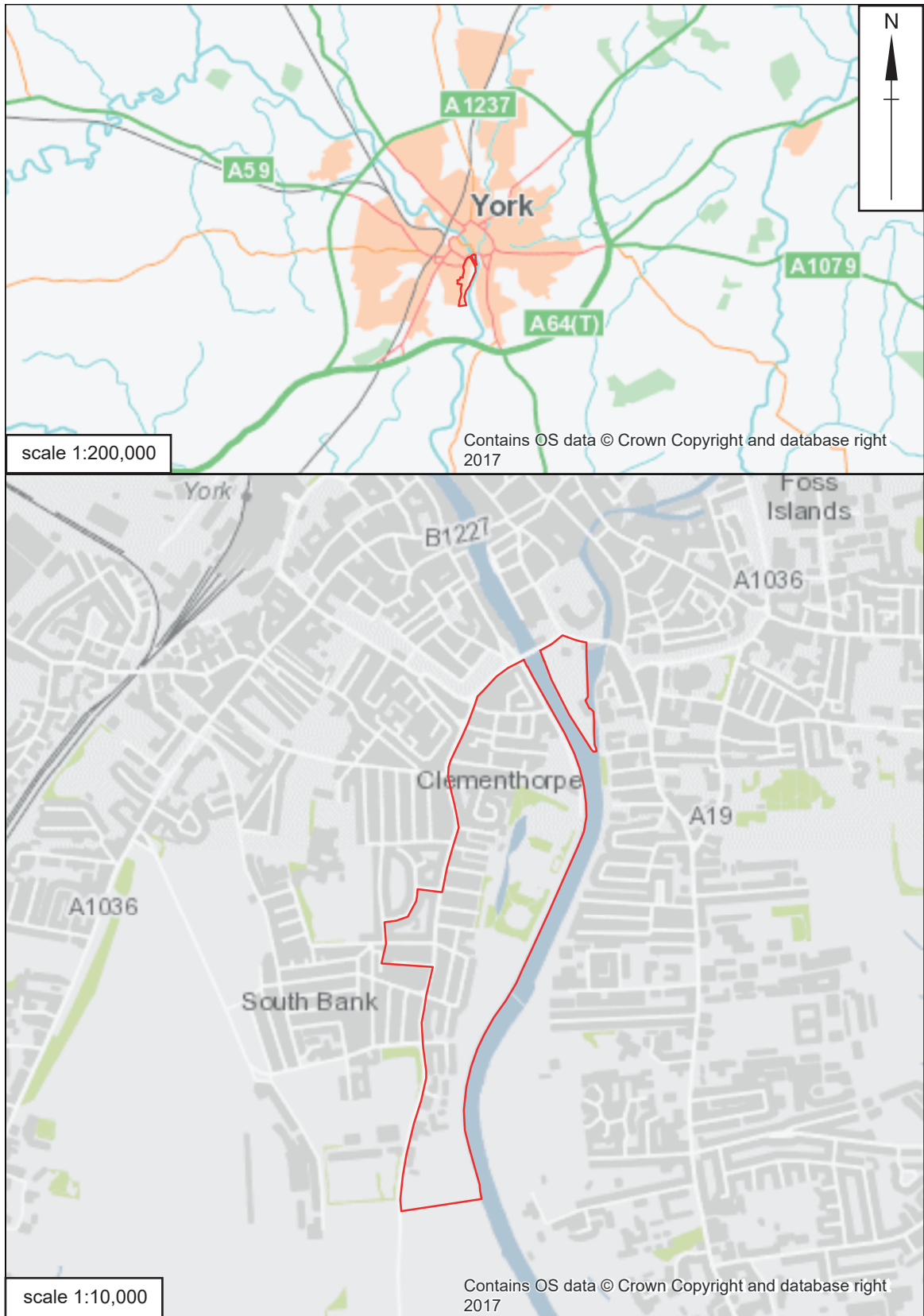


Figure 1 Site Location

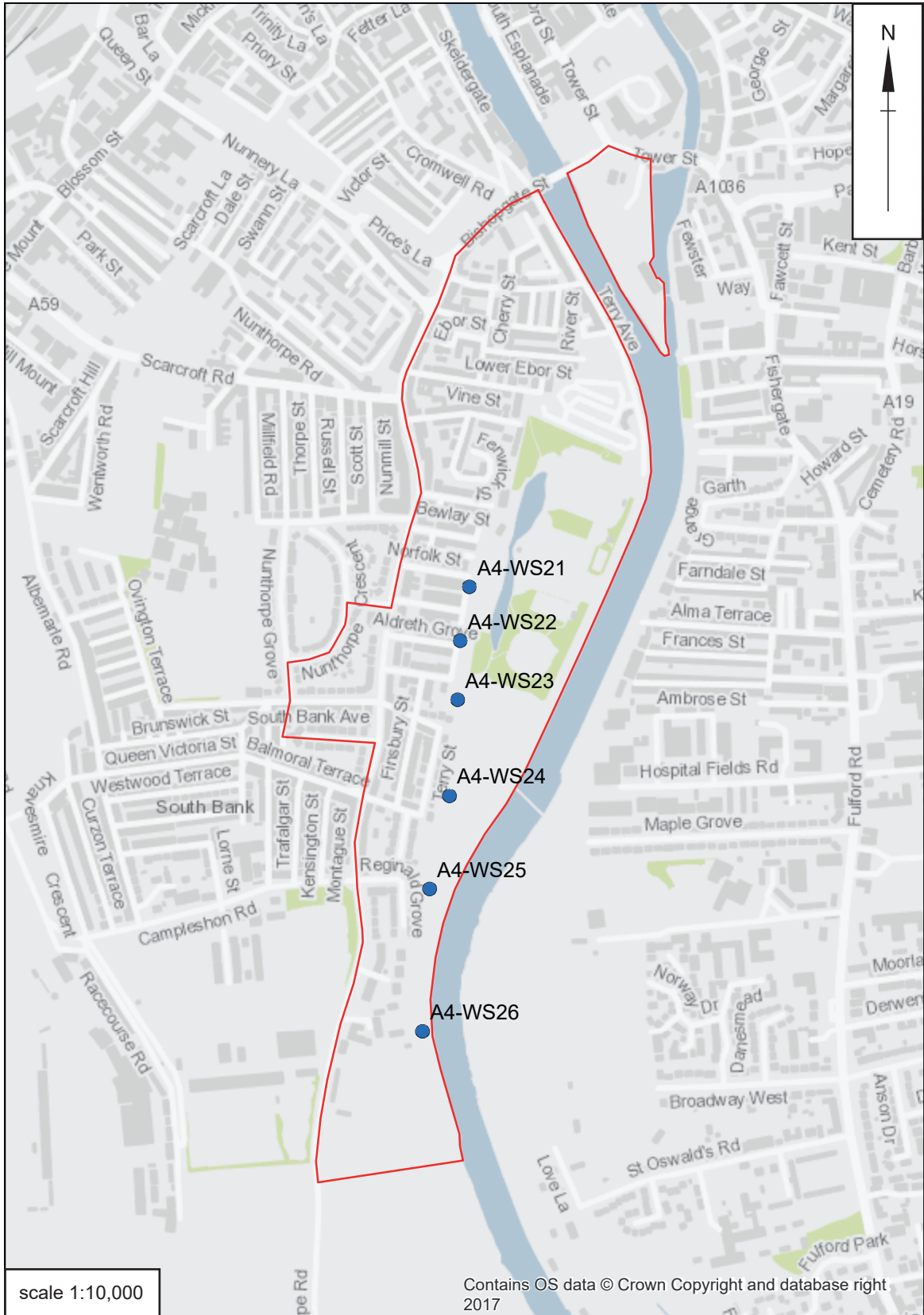
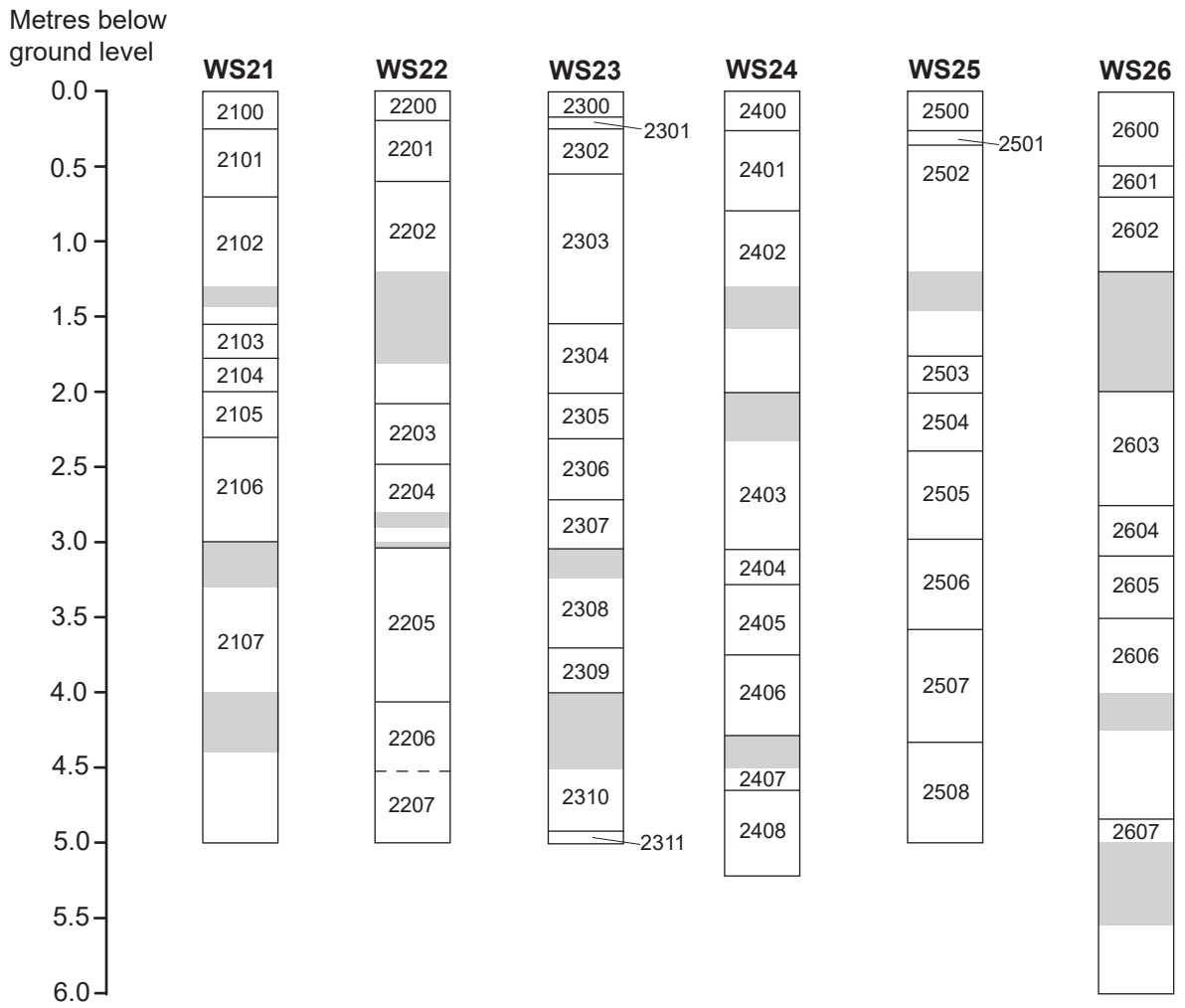


Figure 2 Borehole Locations

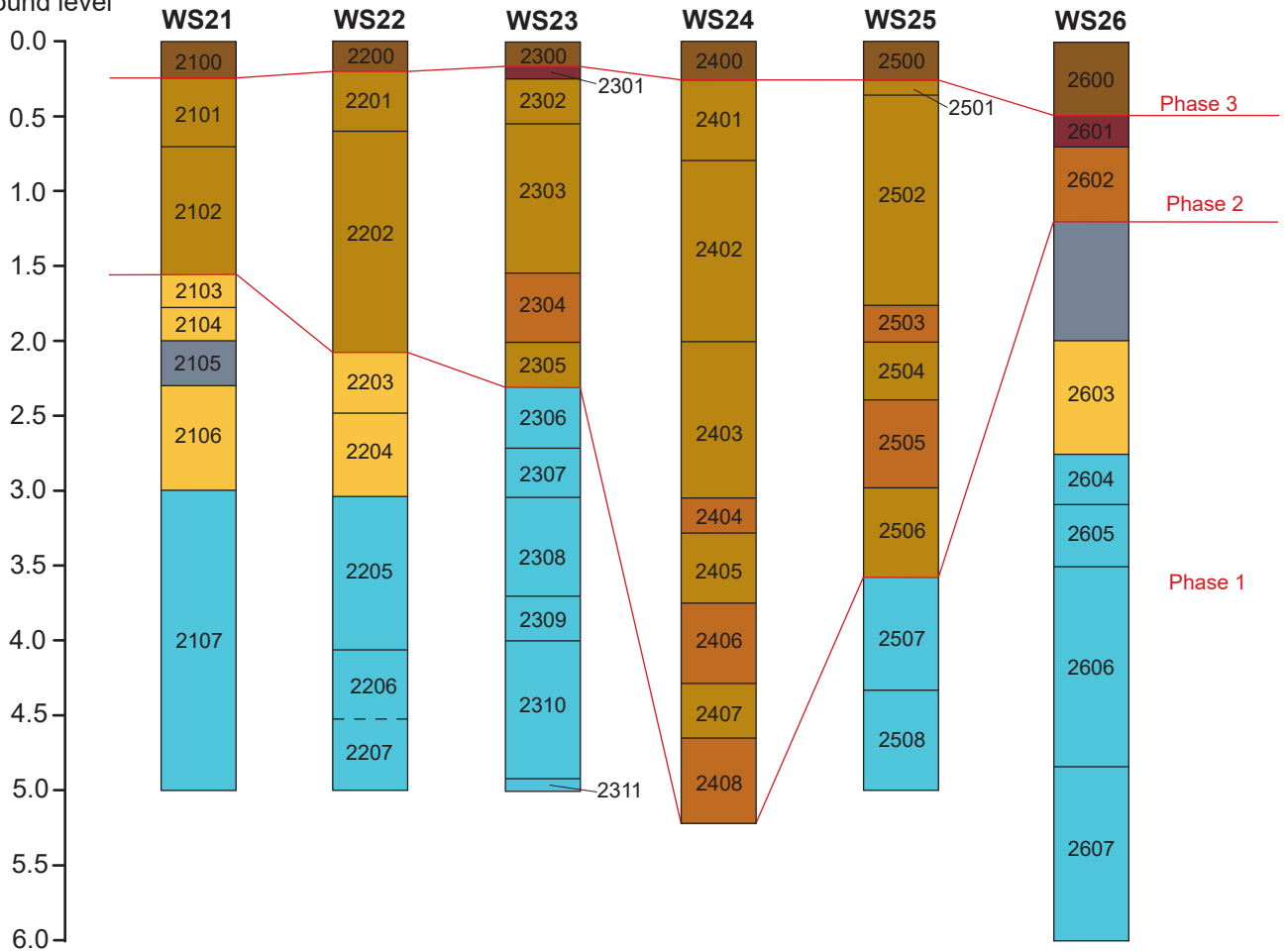


Key

- Limit of context
- - - - Limit of context (uncertain)
- Void in window sample

Figure 3 Borehole Profiles

Metres below ground level



Key

- Limit of context
- - - Limit of context (uncertain)
- Topsoil and turf
- Brick and mortar rubble
- Post-medieval dumping/made ground
- Redeposited clays
- Natural clays
- Alluvial deposits
- Blank core/intrusive deposit

Figure 4 Deposit Model

Metres below ground level

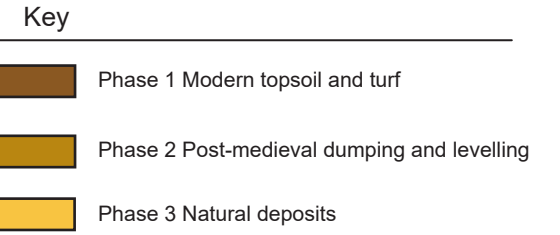
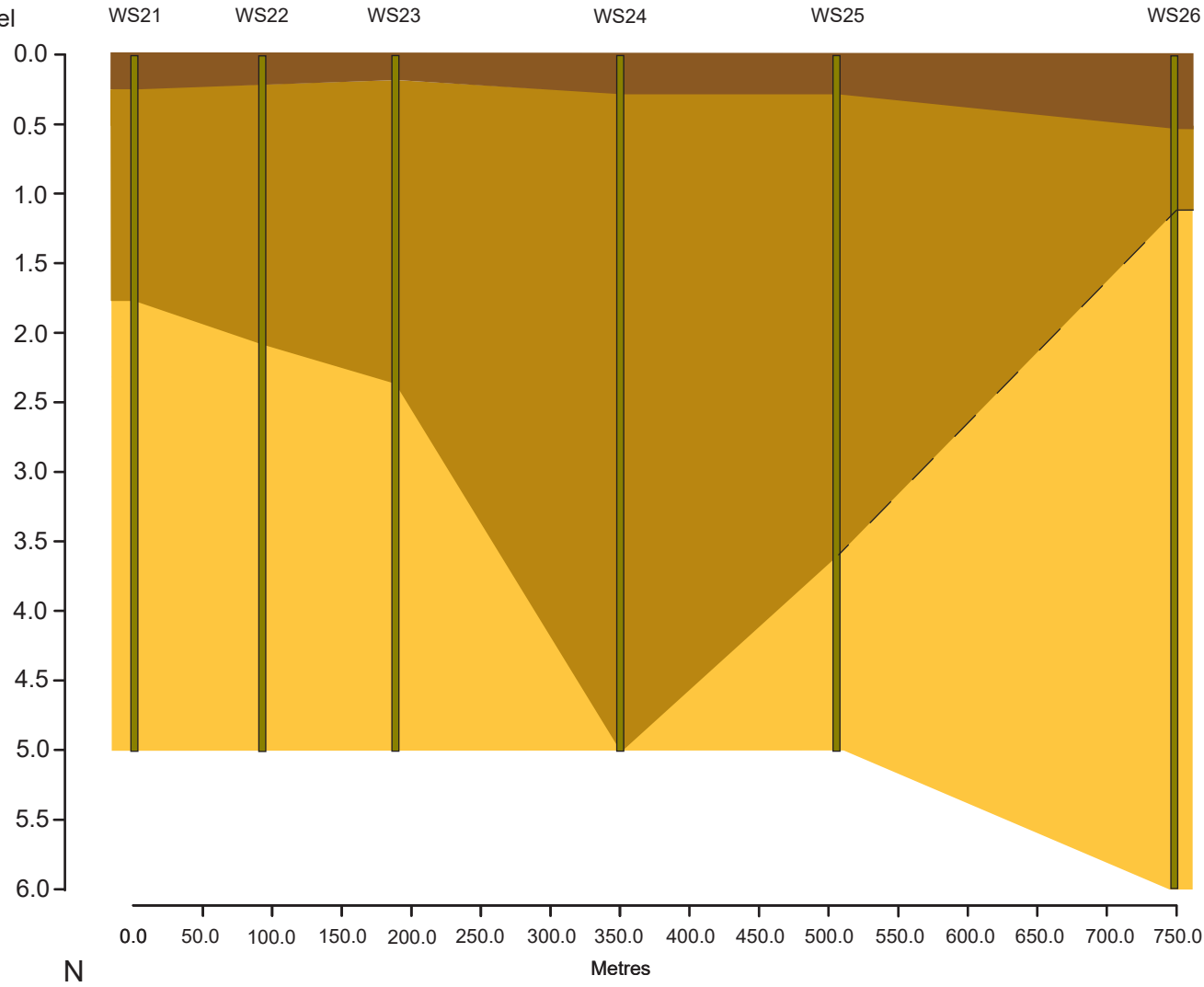


Figure 6 Deposit model, north to south

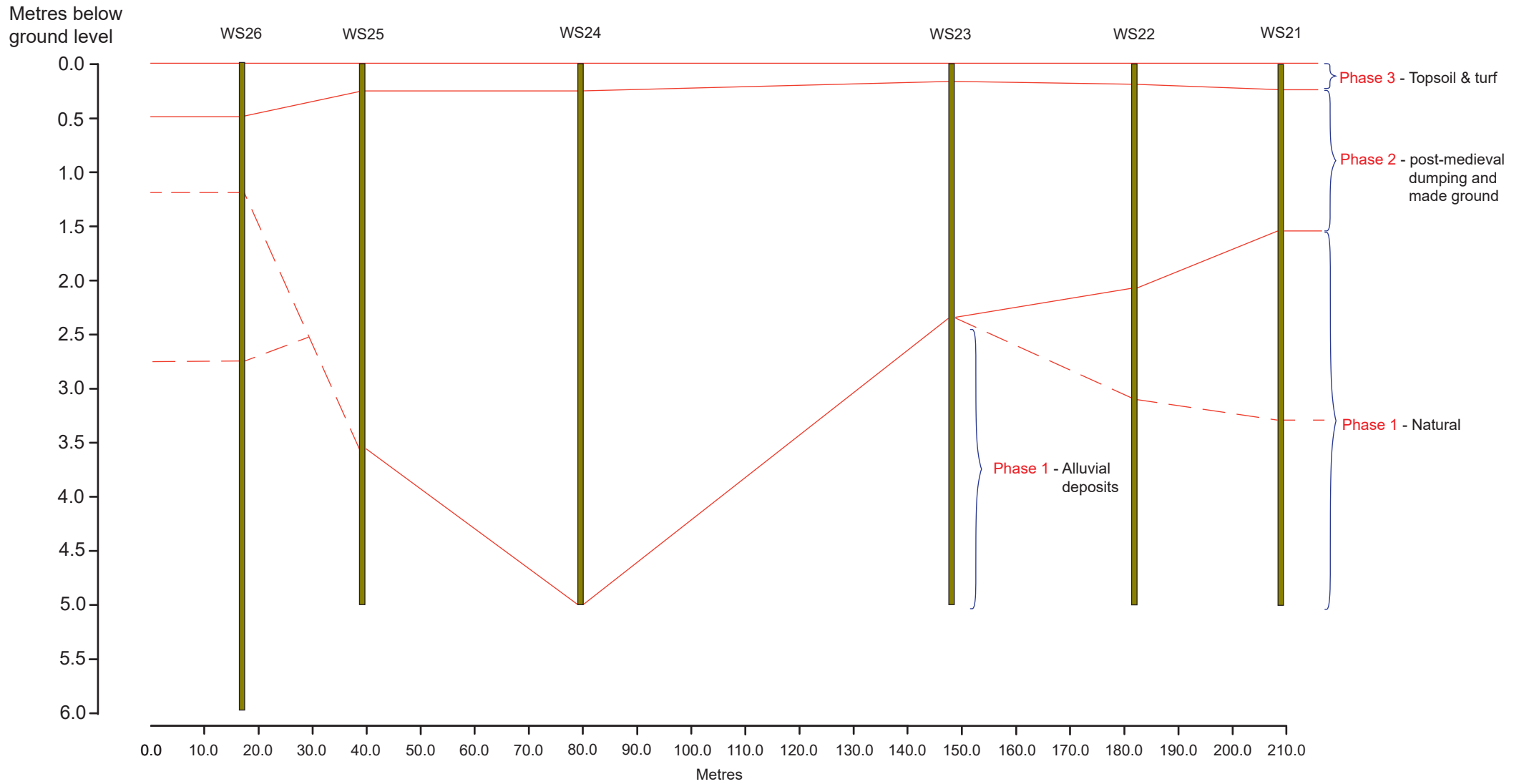


Figure 6 Deposit model, based on distance from River Ouse



YORK ARCHAEOLOGICAL TRUST

York Archaeological Trust undertakes a wide range of urban and rural archaeological consultancies, surveys, evaluations, assessments and excavations for commercial, academic and charitable clients. We manage projects, provide professional advice and fieldwork to ensure a high quality, cost effective archaeological and heritage service. Our staff have a considerable depth and variety of professional experience and an international reputation for research, development and maximising the public, educational and commercial benefits of archaeology. Based in York, Sheffield, Nottingham and Glasgow the Trust's services are available throughout Britain and beyond.



© York Archaeological Trust

York Archaeological Trust, Cuthbert Morrell House, 47 Aldwark, York YO1 7BX

Phone: +44 (0)1904 663000 Fax: +44 (0)1904 663024

Email: archaeology@yorkat.co.uk Website: <http://www.yorkarchaeology.co.uk>

© 2018 York Archaeological Trust for Excavation and Research Limited
Registered Office: 47 Aldwark, York YO1 7BX
A Company Limited by Guarantee. Registered in England No. 1430801
A registered Charity in England & Wales (No. 509060) and Scotland (No. SCO42846)