YORK ARCHAEOLOGICAL TRUST

ARCHAEOLOGICAL EVALUATION AT FOSS BARRIER, ST. GEORGE'S FIELD.

By Gary Millward

EVALUATION REPORT

Report Number 2017/47 June 2017

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Abbreviations

AAI	Area of Archaeological Importance
AOD	Above Ordnance Datum
BGL	Below Ground Level
BOD	Below Ordnance Datum
CBM	Ceramic Building Material
GBA	General Biological Analysis
PRS	Palaeoecology Research Services
YAT	York Archaeological Trust

NON-TECHNICAL SUMMARY

Archaeological monitoring of window sample boreholes was undertaken by York Archaeological Trust between the 10th of April and the 12th of April 2017 at the Foss Barrier, St. George's Field, York, NGR SE 6054 5110 (Figure 1). The nearest postcode is that of the York Crown Court, YO1 9WZ.

The archaeological evaluation was conducted using a window sampler which was used to excavate six boreholes within the proposed foot print of the expanded Foss Barrier pumping station. These boreholes were also located within an area where previous SI monitoring by York Archaeological Trust had identified potentially significant deposits.

KEY PROJECT INFORMATION

Project Name	Foss Barrier Evaluation
YAT Project No.	5970
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Type of Project	Evaluation
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NGR	SE 6054 5110
Museum Accession No.	*tbc*
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REPORT INFORMATION

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1 Draft	GM	12/04/17	IDM	21/06/17	IDM	21/06/17
2 Final	GM	26/06/17	IDM	26/06/17	IDM	26/06/17
3 Final	GM	29/06/17	IDM	29/06/17	IDM	29/06/17

1 INTRODUCTION

York Archaeological Trust undertook the monitoring, recording and environmental sampling of six window sample boreholes between 10th April and 12th April 2017. The evaluation was carried out in advance of the expansion of the pumping station at the site of the Foss Barrier (Figure 1), St. George's Field, York (SE 6054 5110).

This work was conducted following a Written Scheme of Investigation (Appendix 5) which had been produced by YAT in response to a brief provided by John Oxley, the City Archaeologist.

The window sample boreholes were overseen by White Young Green (WYG) and undertaken by Exploration Ltd.

The site archive is currently stored by YAT under project code 5970.

2 METHODOLOGY

The aim of this evaluation was to:

determine the extent, condition and character of the deposits identified in the recent archaeological investigation as potentially containing waterlogged organic material.

The borehole locations and AOD heights were established using a Leica GS16 GPS, accurate to 25mm. All six boreholes were carried out in their intended locations (Figure 2).

Archaeological monitoring was carried out on a total of six boreholes. In each instance an inspection pit was hand-excavated to a depth of between 1 and 1.2m to determine the presence of unknown services. The compact tracked rig could achieve a maximum inspection depth of 10m BGL. This depth was attained within three of the six boreholes (Boreholes 2, 3, and 4). The rig encountered deposits which caused a refusal at a depth of 8.8m in Borehole 1, 9m in Borehole 5 and 8.9m in Borehole 6.

The monitoring and logs produced by YAT were designed to establish the depth and character of archaeological deposition and recover environmental samples from the identified deposits which could potentially contain waterlogged organic material.

These samples were taken to allow for;

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

All boreholes were recorded using a pro-forma borehole recording sheet indicating the presence, depth and description of each deposit. The depth of samples taken during the course of the evaluation was also recorded on these pro-forma sheets. Colour digital photography was used to supplement the logs and to capture working shots of the site investigation works in progress. All stratified finds were retained for assessment.

All of the thirty two GBA samples recovered on site were sent for assessment by John Carrott of Palaeoecology Research Services (PRS). As the deposit sequence identified in each borehole was essentially identical, and after consultation with PRS, it was decided that thirteen of the

samples should have detailed microfossil and macrofossil assessment with the remainder undergoing a basic soil assessment. The results of this assessment forms Appendix 3.

Six of the seven sediment core samples were also sent for specialist baseline assessment by Geolabs Ltd. (Watford). The results of this assessment form Appendix 4.

Further detail of the recording and sampling methodology can be found in the WSI which forms Appendix 5 of this report.

3 LOCATION, GEOLOGY & TOPOGRAPHY

The site is situated on a spur of land to the north of the confluence of the rivers Ouse and Foss. To the immediate north of the site is St. George's Field car park, to the east is the River Foss, the Foss Barrier and pump house. The west of the site is bounded by a footpath, New Walk, which runs along the east bank of The River Ouse. New Walk is carried across the Foss at its junction with the Ouse by the Blue Bridge at the far south-east end of St. George's Field.

The ground surface at the boreholes locations ranged in height from 8.39m AOD to 8.62m AOD.

The underlying geology consists of alluvial clay, silt, sand and gravel overlying sandstone of the Sherwood Sandstone Group (www.bgs.ac.uk, accessed 12/04/17).

The site lies within York's Area of Archaeological Importance as designated by the 1979 Scheduled Monuments and Archaeological Areas Act.

4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

4.1 Prehistory

Knowledge of prehistoric activity from this area is limited to the identification of alluvial deposits radiocarbon dated to the late Bronze Age (BC 1510 – BC 900) at the St George Fields pumping station (Hunter-Mann, 1994, 7). These deposits were identified at c.-1 - 0m AOD, some 8.5 - 9m below the current ground level.

4.2 Roman

The site lies 760m to the south-east of the Roman fortress in an area regarded as likely to have been marginal in the Roman period (Ottaway, 2011, 237). Late Roman burials had been recorded at York Castle in 1835 and again in 1956 (RCHMY 1, 67-8). These include three in stone sarcophagi, one in a lead coffin and two in wooden coffins (Ottaway, 2011, 198). There is the possibility that the cemetery continues into St. George's Field. Should this be the case parallels might be drawn with the setting of the Roman cemeteries at both 16 – 22 Coppergate and Hungate. These share a similar position in the landscape close to the west bank of the River Foss (Kendall, 2016 in prep) on marginal land.

4.3 Anglian

Anglian activity is very sparse in the area of St. George's Field, being evidenced only by antiquarian records of burials at Castle Yard, which may have produced 7th century hanging bowls (Tweddle, 1999, 172). Rather greater evidence for activity and settlement during this period has been found on the opposite (eastern) bank of the River Foss around Fishergate

where evidence suggests the location of a 7th – 9th century trading settlement or wic (Kemp, 1996, 64).

4.4 Anglo-Scandinavian

Clifford Street lies c.550m southeast of Coppergate, where the extensive and well-preserved remains of 9th-11th century settlement were identified as Jorvik, the Viking-period settlement of York (Hall, 2014). Anglo-Scandinavian activity in the immediate vicinity is limited, although excavations on the site of St. George's Chapel highlighted the absence of alluvial deposits indicating that the area, only a short distance to the north of the current site, was dry land during the medieval period, if not earlier. Consequently the possibility of Anglo-Scandinavian activity on the site cannot be ruled out (Hunter-Mann, 1990, 20).

4.5 Medieval

Medieval archaeology at St. George's Field is likely to have been focused on St. George's Chapel. Documentary evidence and the excavations carried out by YAT in 1990 place the chapel approximately 150m to the north of the current site. The chapel had been established by the 12th century. It was granted to the Knights Templar in 1246 where it stood on meadowland adjoining their mills (Pugh, 1961, 483). Following the suppression of that order it became a royal free chapel in 1311. By 1447 it was used by the Guild of St. George, from which the chapel and adjacent field take their name (Hunter-Mann, 1990, 14).

4.6 Post Medieval

Following the suppression of the Guild of St. George in 1547 the chapel passed to the York Corporation. The chapel was largely demolished in 1566 with the stone work put towards the rebuilding of Ouse Bridge. From 1576 the site of the chapel was occupied by a timber building used until 1620 as a house of correction from which point it was converted into a workhouse (Hunter-Mann, 1990, 14).

4.7 Modern

Land to the south of the site of the former chapel was occupied from 1856 by public baths. St. George's Fields is thought to have been used for public recreation perhaps since early times and the site of the annual St. Georges Day celebrations (Raine, 1955, 198 – 200). In 1924 the Martinmas Fair was moved from Parliament Street to St. George's Field (Pugh, 1961, 483). In the 1960s the site became a car park. The Foss Barrier and associated pump house were constructed in 1986.

5 RESULTS

All six boreholes were assigned context numbers corresponding to their designation (Borehole 1 commenced with context 1000 onwards, Borehole 2 commenced with context 2000 onwards etc.). These contexts were then allocated to a group which represented one of five 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. As the compact tracked rig could not achieve the same depth of intervention as the works monitored during the watching brief in September 2016 fewer distinct phases of activity were identified.

5.1 Phase 1: Lower alluvial deposits

These deposits comprised layers of coarse sand overlying, in some of the boreholes, a slightly sandy clay (Plate 1). All of these deposits contained silts but were otherwise without inclusions. The coarse sands contained finer grained elements as well as coarser grained gravels and small pebbles. The top of the deposits belonging to this phase were encountered at a depth of between 0.7m AOD and 0.3m BOD. Collectively these deposits measured between 0.2m and 1.4m in thickness across the six boreholes.

Plate 1: Borehole 2 (Window sample sleeve 9-10m, 10m depth to the left)

No finds were recovered during the evaluation from these deposits. It is possible that these deposits are broadly parallel to the phase 3 deposits identified during the watching brief (Savine, 2016, 6).

Five general biological analysis (GBA) samples were taken from deposits belonging to this phase of activity and three of these samples were assessed for macrofossil and microfossils (Contexts 2010, 2011 and 3009). All three of these samples produced no macrofossil or

microfossil evidence and the fineness of two of the samples (most of C2010 and C3009 not retained at 300 microns) was indicative of low energy alluvial activity. The sample from Context 2011 was notably coarser but was also interpreted as being deposited by alluvial activity, albeit at higher energy (possibly a flood). Several ceramic building material (CBM) fragments and a sherd of pottery were recovered from the Context 2010 sample which appear to be intrusive from the higher Phase 2 deposits (this context does not appear to belong to Phase 2 due to the relative paucity of finds material and lack of fuel waste). Overall the samples recovered from the phase 1 contexts support the on-site interpretation of being produced by natural alluviation but contained very little in the way of environmental evidence (Appendix 3).

One of the six sediment core samples taken for baseline assessment was recovered from a deposit (C3009) belonging to this phase of activity. This deposit contained 4.8% organic content and 28.4% water content. This deposit was accessed as having a high potential to retain a large volume of water, when saturated, which would not drain rapidly due to its low porosity (Appendix 4).

5.2 Phase 2: Medieval dumping/levelling deposits

These deposits comprised layers of coarse sand containing frequent inclusions of small abraded ceramic building material fragments (Plate 2). The deposits also varyingly contained inclusions of charcoal flecks, small shell fragments and small sandstone fragments. One of the deposits (Context 3007) produced the only pottery recovered from the entire evaluation. The sherd was extremely abraded but could be broadly dated to the medieval period.

Plate 2: Borehole 5 (Window sample sleeve 6-7m, 7m depth to the left)

A sample of the CBM was recovered from these deposits which was assessed by Jane McComish (YAT ceramic building specialist) as being medieval in date and then discarded.

These deposits have been interpreted as deliberate medieval dumping, possibly as an exercise in land reclamation. The presence of several distinct layers belonging to this phase within four of the six boreholes may be indicative of regular need to raise the ground level, possibly due to flooding. Silts were present within the sands but did not appear to be laminated. The top of the deposits belonging to this phase were encountered at a depth of between 2.4m AOD and 1.6m AOD. Collectively these deposits measured between 1.8m and 2.5m in thickness across the six boreholes.

It is possible that these deposits correspond to the phase 4 deposits encountered during the watching brief. The watching brief deposits produced a greater range and quantity of finds material ranging in date from the 13th to 15th centuries (Savine, 2016, 10).

Seven GBA samples were taken from deposits belonging to this phase of activity and three of these samples were assessed for macrofossil and microfossils (Contexts 2008, 3006 and 3008). Two shell fragments in the residue from the sample from Context 3008 were tentatively identified as of a freshwater mollusc but no other macrofossils or microfossils were recovered from deposits belonging to this phase of activity. Artefactual material in the form of CBM fragments, indeterminate bone fragments and fuel waste (including cinder and charcoal) was recovered from these samples. Overall they appear to be indicative of at least a casual level of dumping of food and artefactual waste (Appendix 3).

The deposits belonging to Phase 2 were too unconsolidated to recover a sample for baseline assessment.

5.3 Phase 3: Medieval-Post medieval alluviation

These deposits comprised layers of sandy clay silt or clayey silt sand, often alternating, which also contained silty inclusions (Plates 3 and 4). Lamination could be observed in most of these deposits which were otherwise free of inclusions. There was one deposit (Context 2005) of coarser sand in the middle of this sequence, observed in borehole 2, and two other deposits of coarser sand (Contexts 3005 and 4004) towards the bottom of this sequence observed in boreholes 3 and 4. These three appear to be indicative of localised variation in alluvial deposition.

The lack of finds material recovered made dating these deposits impossible but they were sealed by post medieval levelling and overlay medieval dumping.

These layers appear to represent a steady accumulation of material spanning the medieval through to post medieval periods. The top of the deposits belonging to this phase were encountered at a depth of between 7.1m AOD and 6.6m AOD. Collectively these deposits measured between 4.2m and 5.2m in thickness across the six boreholes.

It is possible that these deposits correspond to the phase 5 deposits encountered during the watching brief. The watching brief deposits were similar in character and also produced no dateable finds material (Savine, 2016, 7).

Plate 3: Borehole 4 (Window sample sleeve 2-3m, 3m depth to the right)

Plate 4: Borehole 6 (Window sample sleeve 4-5m, 5m depth to the right)

Twenty GBA samples were taken from deposits belonging to this phase of activity and seven of these samples were assessed for macrofossil and microfossils (Contexts 2003, 2004, 2005, 2006, 2007, 3001, 3002 and 3003). Only one of the samples (Context 2007) contained any interpretatively valuable assemblages of plant and invertebrate macrofossils. The remains were limited but included frequent freshwater crustacean valves, with some freshwater bivalve mollusc shell and plant remains of taxa indicative of shallow water, and wet and rough ground. No microfossils were recovered from any of the samples. Very little of the samples was retained at 300 microns indicating low energy aquatic deposition. The presence, however, of wet and rough ground plant remains perhaps suggests intermittent flooding events rather than a permanent body of water (Appendix 3).

Five of the six sediment core samples (C1005, C2006, C4003, C5004, C6006) recovered for baseline assessment were taken from deposits belonging to this phase of activity (these deposits being, generally, at the greatest depth that the window samples were still consolidated enough to recover). The results of this assessment were quite consistent with the estimated organic percentage of the samples ranging between 2.7% and 4.5% and the water content ranging from 27% to 33.8%. These deposits were accessed as having a high potential to retain a large volume of water, when saturated, which would not drain rapidly due to their low porosity (Appendix 4).

5.4 Phase 4: Post medieval landscaping

These deposits comprised between one and three distinct layers of sandy clay of clayey sand all of which contained small fragments of post medieval brick and mortar flecks (Plate 5). A few of the deposits also contained small fragments of shell and charcoal flecks. These deposits ranged between 0.6m and 0.8m in overall thickness across the six boreholes.

These appear to be deliberate dumps of material in order to raise the ground level, perhaps as part of a wider land reclamation effort. The top of the deposits belonging to this phase were encountered at a depth of between 8.0m AOD and 7.3m AOD.

Plate 5: Borehole 1 (Window sample sleeve 1-2m, 2m depth to the right)

It is possible that these deposits correspond to the phase 6 deposits encountered during the watching brief. The watching brief deposits produced a similar range of inclusions and a solitary sherd of pottery dating to the 19th century (Savine, 2016, 9).

No environmental samples were recovered from these deposits due to the high concentrations of CBM and mortar inclusions.

5.5 Phase 5: Modern

The existing car park was constructed from brick sets bedded in sand. This sand overlay a permeable sheet which itself overlay a levelling deposit of angular white stone, which varied in thickness between 0.3m and 1m across the area (Plate 6).

The top of the deposits belonging to this phase were encountered at a depth of between 8.62m AOD and 8.39m AOD. Collectively these deposits measured between 0.5m and 1.1m in thickness across the six boreholes.

Plate 6: Borehole 1 (Arisings from the manual excavation of 0-1m, 1m depth deposits to the left)

This phase of activity is the same as the modern phase 7 described during the watching brief (Savine, 2016, 9). No environmental samples were taken from the modern deposits.

6 DISCUSSION

The borehole survey supports and enhances the current understanding of the archaeological deposition in the area, enabling further refinement of the discoveries made during the Site Investigation monitoring (Savine, 2016).

Across the area of St. George's Field natural geology has been seen to consist of glacial clay, succeeded by late glacial/ early post-glacial river gravels. The glacial clay did not appear to be encountered during these investigations but naturally occurring alluvial deposits (phase 1), extending to a point at or around sea level (0m AOD), were present.

Those alluvial deposits identified towards the bottom of the sequence tend towards coarse sand, although some silty clay deposits were also encountered. Generally the alluvial sands and clays of Phase 1 were observed at depths of, but not exceeding, 0.5m to 1m AOD.

On the whole they were overlain by extensive dumps of waste material of a medieval date (Phase 2 of this investigation and Phase 4 of the SI watching brief). These deposits likely demonstrate extensive and prolonged dumping of domestic refuse, in the form of animal bone, marine shell and pottery as well as building debris, in particular plain tile, down the length of the peninsular. These deposits were first observed at depths ranging from between 1.6m to 2.6m AOD within this investigation and as high as c.3.0m AOD during the SI watching brief (Savine, 2016, 7).

The comparable deposits encountered during the SI watching brief produced a large amount of abraded pottery sherds. The abrasion of smaller sherds may best be explained by wear caused in transit, their size making them more vulnerable to damage. Pottery dates establish that the dumping or reclamation activity took place between the late 13th and early 15th centuries.

The pottery dates place the initiation of the dumping activity to the period when the chapel of St. George, and the adjoining meadowland, was under Templar influence. The suppression of the Templar Order does not appear to have had a significant impact on the dumping activity, which appears to have continued without obvious interruption throughout the period of the royal free chapel. With use of the Chapel passing to the Guild of St. George in 1447, cessation of the dumping activity perhaps occurred at around the same time.

The thickness of these dumps of waste materials (up to 2.5m) demonstrates either an intensity of occupational activity not hitherto hinted at by previous archaeological observations, or as is perhaps more likely a concerted effort to improve or raise the ground level.

Above the medieval dumping accumulations, a largely sterile alluvium between 3.5m and 5.2m thick took hold (Phase 3 of this investigation and Phase 5 of the SI watching brief), bringing levels up to between 5.5m AOD and 7.1m AOD. Indications of anything other than periodic activity is lacking in this phase. The lack of finds material within these deposits appears to indicate that there was little or no waste producing activity, in the vicinity of the peninsula, for an extended period of time. This interpretation is supported by the environmental evidence which suggests that the deposits were formed by intermittent flooding.

Human activity could be observed again in the form of deliberate post-medieval land reclamation (Phase 4 of this investigation and Phase 6 of the SI investigation) which sealed the sterile alluvial deposits. These deposits brought the ground level up to between 6.5m AOD and 8.0m AOD and were sealed by the modern car park levelling and surface.

7 CONCLUSION

The intention of this archaeological evaluation was to further refine the deposit model produced by the SI watching brief and recover environmental samples from the waterlogged deposits in order to assess their potential and condition.

This assessment has demonstrated that biological remains in the deposits underlying this site (up to c.10m BGL) are typically present in very small numbers, poorly preserved and of very little interpretative value (Appendix 3).

The limited amount of organic material observed during the SI watching brief seems to broadly correspond to the results of the environmental analysis. The only contrast being that the lower alluvial deposits, corresponding to phase 3 of those works and phase 1 of this evaluation, contained visible organic material (Savine, 2016, 6). Although it could be suggested that this is an indicator of localised variation in deposition, the homogeneity of these deposits across both investigations indicates otherwise. The author of the watching brief report also stated the following;

"*Some caution however should be taken with regard to the analysis of the cultural material recovered from these lower deposits. On the whole they are overlain by extensive dumps of waste material of a medieval date. A coring technique employed by the cable percussion rig used on boreholes 3-5 involved the lifting and dropping of the core sleeve, this produced a significant risk of contamination resulting from material slumping from a higher deposit*" (Savine, 2016, 10).

It seems likely that the, albeit minor, differences between the descriptions of the lower alluvial deposits are due to the potential contamination of them during the watching brief rather than being indicative of localised variation.

Very little material suitable for AMS dating was recovered from the samples. There *may* be sufficient suitable organic material from Context 2007 and perhaps Context 2008 (Appendix 3) but both of these deposits belong to a phase of activity which belongs to the medieval period, or later, which negatively affects the accuracy of the AMS dating method and would not contribute to the current understanding of these deposits.

The assessment of the baseline conditions appears to indicate that the sub-surface deposits are conducive to the long-term preservation of vulnerable organic archaeological remains, assuming that they are able to recharge, by retaining contact with the rivers or by rainfall (Appendix 4).

The overall conclusion regarding these deposits seems to be that they generally have low environmental potential and organic content and that the below ground conditions appear to be conducive to preserving them.

8 RECOMMENDATIONS

The material (recovered remains, washovers, sorted residue fractions and unprocessed sediment) currently retained by John Carrott of PRS may be discarded.

Technological constraints and ground conditions prevented the recovery of cores and samples below 9m BGL save for Borehole 2 where 10m BGL was achieved. We acknowledge that John Carrot of PRS recommends that future opportunities to recover samples from deposits greater than 9m BGL should be taken.

The works have, however, assessed the potential and survival of environmental remains with regard to this planning condition and the City of York Council is satisfied that these

archaeological works have been satisfactorily completed and that no further archaeological investigation is required.

LIST OF SOURCES

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APPENDIX 1 – INDEX TO ARCHIVE

Item	Number of items
Borehole logs	6
Digital photographs	89
Written Scheme of Investigation	1
Report	1

Table 1 Index to archive

APPENDIX 2 – CONTEXT LIST

Borehole	Context no.	Phase No.	Description
1	1000	4	Make up. Friable, dark greyish brown, clayey sand. Moderately frequent inclusions of modern brick fragments and charcoal flecks.
1	1001	4	Make up. Friable, orangish brown, clayey sand. Moderately frequent inclusions of modern brick fragments.
1	1002	3	Build up. Firm, grey, sandy clay.
1	1003	3	Build up. Damp, firm, dark greyish brown, clayey sand.
1	1004	3	Build up. Damp, firm, greyish brown, clayey sand.
1	1005	3	Build up. Damp, firm, greyish brown, clayey sand.
1	1006	3	Build up. Damp, firm. dark brownish grey, sandy clay.
1	1007	2	Dump. Damp, friable, dark greyish brown, sand with occasional medieval brick fragment inclusions and marine shell fragments.
1	1008	2	Dump. Damp, friable, mid greyish brown, coarse sand with frequent gravel inclusions, charcoal flecks, possibly burnt material, and occasional sandstone fragments.
1	1009	1	Build up. Damp, firm, grey clay.
2	2000	4	Make up. Firm, dark grey, sandy clay with charcoal fleck inclusions.
2	2001	4	Make up. Firm, greyish brown, sandy clay with occasional small modern brick fragment inclusions.
2	2002	4	Make up. Friable, orangish brown, coarse sand.
2	2003	3	Build up. Firm, grey sandy clay.
2	2004	3	Build up. Damp, soft, grey, sandy clay.
2	2005	3	Alluvial deposit? Damp, friable, orangish brown, coarse sand with frequent gravel inclusions.
2	2006	3	Build up. Damp, soft, greyish brown, sandy clay.
2	2007	3	Build up. Damp, soft, grey clay.
2	2008	2	Dump. Damp, friable, brownish grey, coarse sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
2	2009	2	Build up. Damp, friable, orangish brown, slightly clayey coarse sand. Moderately frequent gravels and occasional small cbm fragments.
2	2010	1	Build up. Firm to friable mid grey, clayey sand. Moderately frequent gravels.
2	2011	1	Build up. Damp, friable, greyish, brown coarse sand. Moderately frequent gravels.
3	3000	4	Make up. Friable, dark grey, slightly clayey sand with moderately frequent small brick inclusions and mortar flecks.
3	3001	3	Build up. Friable, greyish brown clayey sand.
3	3002	3	Build up. Damp, firm, brown, sandy clay.
3	3003	3	Build up. Damp, soft, greyish brown, clayey sand.
3	3004	3	Build up. Damp, soft, grey sandy clay.
3	3005	3	Build up. Damp, friable, orangish brown, coarse sand with moderately frequent gravel inclusions.
3	3006	2	Dump. Damp, friable, dark grey, coarse sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.

3	3007	2	Build up. Damp, friable, brown coarse sand with moderately frequent inclusions of gravel.
3	3008	2	Dump. Damp, friable, dark grey, coarse sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
3	3009	1	Build up. Firm, light grey, slightly sandy clay.
3	3010	N/A	Same as 3007. Thought to be contamination of lowest WS sleeve from deposits above.
3	3011	N/A	Same as 3008. Thought to be contamination of lowest WS sleeve from deposits above.
4	4000	4	Make up. Soft, greyish brown, sandy clay with moderately frequent inclusions of small cbm fragments, mortar flecks and small shell fragments.
4	4001	3	Build up. Soft, dark brownish grey, sandy clay.
4	4002	3	Build up. Soft, greyish brown, sandy clay.
4	4003	3	Build up. Damp, soft, greyish brown, sandy clay.
4	4004	3	Build up. Damp, friable, orangish brown, slightly clayey sand.
4	4005	2	Dump. Damp, soft to friable, greyish brown, clayey sand with moderately frequent inclusions of small medieval cbm fragments.
4	4006	2	Dump. Damp, soft to friable, dark grey, clayey sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
4	4007	2	Dump. Damp, friable, orangish brown, coarse sand with moderately frequent inclusions of gravel and small medieval cbm fragments.
4	4008	2	Dump. Damp, friable, dark brownish grey, coarse sand with moderately frequent inclusions of gravel and small medieval cbm fragments.
4	4009	2	Dump. Damp, friable, grey, coarse sand with moderately frequent inclusions of gravel and small medieval cbm fragments
4	4010	1	Build up. Damp, friable, orangish brown, coarse sand with moderately frequent inclusions of gravel.
5	5000	4	Make up. Friable, greyish brown, slightly clayey sand with moderately frequent inclusions of small modern cbm fragments and small sandstone fragments.
5	5001	3	Build up. Soft, grey, sandy clay which had a hydrocarbon smell between 1.8m and 2m BGL.
5	5002	3	Build up. Soft, greyish brown, clayey sand.
5	5003	3	Build up. Soft, greyish brown, sandy clay.
5	5004	3	Build up. Firm to friable, orangish brown, clayey sand.
5	5005	3	Build up. Damp, firm, grey, sandy clay.
5	5006	2	Dump. Damp, friable, dark grey coarse sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
5	5007	2	Build up. Damp, friable, brown, coarse sand with moderately frequent inclusions of gravel.
5	5008	2	Dump. Damp, friable, dark grey coarse sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
5	5009	2	Build up. Damp, friable, light brown, coarse sand with moderately frequent inclusions of gravel.
5	5010	2	Dump. Damp, friable, dark grey coarse sand with moderately frequent

			inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
5	5011	1	Build up. Damp, firm, brownish grey, clay.
6	6000	5	Bricks, sandy bedding and white stone make up forming the current ground surface.
6	6001	4	Make up. Friable, dark greyish brown, slightly clayey sand with moderately frequent inclusions of small modern cbm fragments and small chalk fragments.
6	6002	4	Make up. Soft to friable, orangish brown, clayey sand.
6	6003	3	Build up. Soft, dark greyish brown, sandy clay with moderately frequent inclusions with moderately frequent inclusions of coarse sand and small chalk fragments.
6	6004	3	Build up. Soft, dark greyish brown, sandy clay.
6	6005	3	Build up. Damp, soft, light brownish grey, sandy clay.
6	6006	3	Build up. Damp, soft, light grey, sandy clay.
6	6007	3	Build up. Damp, soft, dark grey, sandy clay.
6	6008	2	Dump. Damp, soft to friable, dark grey, slightly clayey sand with moderately frequent inclusions of gravel, medieval cbm fragments, charcoal flecks and shell fragments.
6	6009	2	Build up. Damp, friable, dark grey, coarse sand with moderately frequent inclusions of gravel.
6	6010	2	Build up. Damp, friable, grey, coarse sand with moderately frequent inclusions of gravel and occasional small cbm fragments.
6	6011	1	Build up. Damp, friable, orangish brown, coarse sand with moderately frequent inclusions of gravel.
6	6012	1	Build up. Damp, friable, dark grey, coarse sand with moderately frequent inclusions of gravel.

Table 2 Context list

APPENDIX 3 – ENVIRONMENTAL ASSESSMENT

Palaeoecology Research Services (PRS 2017/19)

Assessment of microfossil and macrofossil remains from borehole investigations of the nature and extent of sub-surface deposits at the Foss Barrier site, York

by

John Carrott and Jane Sheppard

Summary

An archaeological evaluation by borehole survey was undertaken at a site adjacent to the Foss Barrier, York to investigate the potential impact on organic archaeological deposits of a proposed redevelopment of the site. Six boreholes were sunk to depths of up to approximately 9 metres below the current ground level using a compact tracked rig window corer and 33 extracted samples were submitted for an assessment of their bioarchaeological potential.

The assessment demonstrated that biological remains in the deposits underlying this site are typically present in very small numbers, poorly preserved and of very little interpretative value (although a watching brief undertaken in September 2016 encountered deposits at slightly greater depth within which "…surviving plant and wood remains were observed across the proposed development area at -0.65m AOD – 0.8m AOD…".

Only one of the samples processed for the assessment, from Borehole 2 Context 2007 (2.6 to 3.1m AOD) provided small assemblages of plant and invertebrate remains which were of some interpretative value – strongly suggesting aquatic deposition (though perhaps during flooding events rather than within a permanent body of water) – with only occasional other remains from Borehole 2 Context 2008 (0.9 to 1.9m AOD) and Borehole 3 Contexts 3006 (1.5 to 1.7m AOD) and 3008 (-0.5 to -0.2m AOD); the two last yielding the only vertebrate remains recovered (trace levels of indeterminate bone fragments).No interpretatively valuable microfossils were present in any of the deposits examined.

Artefactual material recovered was also minimal amounting to just a little brick/tile from Borehole 2 Contexts 2008 and 2010 (-1.0 to 0.0m AOD) and Borehole 3 Context 3006, with a single pot sherd from Context 2010.

The only artefactual material recovered which may provide dating evidence was the single pot sherd from Borehole 2 Context 2010. There may be sufficient suitable organic material from Context 2007 and perhaps Context 2008 to be submitted for radiocarbon dating (via AMS) but these were the only deposits for which this could be considered.

No further study of the current samples is warranted and, on the evidence of this assessment, the deposits at the site show no significant potential for investigation via their content of organic remains. However, should works be undertaken that will potentially impact on the deposits with organic preservation seen during the watching brief (at -0.65 to 0.8m AOD) then a systematic sampling strategy and subsequent programme of assessment and, where applicable, analysis for organic remains, should be adopted.

KEYWORDS: FOSS BARRIER; YORK; BOREHOLE SURVEY; ASSESSMENT; MEDIEVAL; POST-MEDIEVAL; MODERN; PLANT REMAINS; WOOD (TRACE); CHARRED PLANT REMAINS; CHARCOAL (TRACE); INVERTEBRATE REMAINS; OSTRACODS; INSECTS; BEETLES; FRESHWATER MOLLUSCS; VERTEBRATE REMAINS (TRACE)

Introduction

An archaeological evaluation by borehole survey was undertaken by York Archaeological Trust (YAT), during April 2017, at a site adjacent to the Foss Barrier, York (approximate centre NGR SE 60525 51159), to investigate the potential impact on organic archaeological deposits of a proposed redevelopment of the site incorporating piled foundations.

Five phases were assigned to the deposits encountered as follows:

Phase 1 – undated alluvial deposits (immediately underlying the medieval dumping of Phase 2; see below) – the top of the deposits belonging to this phase were encountered at between 0.7m AOD and 0.3m AOD and they varied in thickness between 0.2m and 1.4m across the six boreholes

Phase 2 – medieval dumping – these deposits have been interpreted as deliberate medieval dumping, perhaps as an exercise in land reclamation (the presence of several distinct layers belonging to this phase within four of the six boreholes may indicate that the ground level needed to be raised regularly, possibly in response to flooding) – the top of the deposits belonging to this phase were encountered at between 2.4m AOD and 1.6m AOD and they varied in thickness between 1.8m and 2.5m across the six boreholes

Phase 3 – medieval/post-medieval alluvium – the lack of finds recovered made dating these deposits impossible but they were sealed by post-medieval levelling/landscaping (Phase 4) and overlay the medieval dumping (Phase 2) – the top of the deposits belonging to this phase were encountered at between 7.1m AOD and 6.6m AOD and they varied in thickness between 4.2m and 5.2m across the six boreholes.

Phase 4 – post-medieval landscaping – these deposits appear to be deliberate dumps of material in order to raise the ground level, perhaps as part of a wider land reclamation effort, and comprised between one and three distinct layers of sandy clay or clay sand, all of which contained small fragments of post-medieval brick and mortar flecks; a few also contained small fragments of shell and charcoal flecks – the top of the deposits belonging to this phase were encountered at between 8.0m AOD and 7.3m AOD and they varied in thickness between 0.6m and 0.8m across the six boreholes

Phase 5 – modern – the existing car park was constructed from brick sets bedded in sand; the sand overlay a permeable sheet which itself overlay a levelling deposit of angular white stone, which varied in thickness between 0.3m and 1m across the area – the top of the deposits belonging to this phase were encountered at between 8.62m AOD and 8.39m AOD and they varied in thickness between 0.5m and 1.1m across the six boreholes.

Thirty-three small 'bulk' sediment samples ('GBA'/'BS' *sensu* Dobney *et al*. 1992) extracted from the boreholes (all from deposits assigned to Phases 1 to 3), were submitted to Palaeoecology Research Services Limited, Kingston upon Hull, for an assessment of their bioarchaeological potential.

Methods

Coring

Six boreholes (designated Boreholes 1 to 6) were sunk to depths of up to approximately 9 metres below the current ground level (-1.5 metres AOD) using a compact tracked rig window corer.

Sediment descriptions and sampling

The borehole cores were recorded on-site by Gary Millward (YAT) and sediment subdivisions were assigned context numbers and the sequences divided into corresponding samples which were placed into labelled polythene bags. Depth ranges for the represented contexts were supplied to PRS in the form of a figure representing all six borehole profiles.

The bagged samples were delivered to the offices of Palaeoecology Research Services Ltd (PRS) in Kingston upon Hull where the lithologies of the sediments were recorded following a PRS *pro forma*.

Sample selection and processing

Thirty-three samples were submitted to PRS – seven from each of Boreholes 1 and 2, six from each of Boreholes 3 and 4, three from Borehole 5 and four from Borehole 6.

Visual inspection of all of the submitted samples revealed the deposit sequences represented in each of the six boreholes to be very similar. After consultation with the excavator, it was decided to assess all of the samples from the two longest and most continuous sequences (i.e. those with the least voids in recovery) from Boreholes 2 and 3, with a sediment description record for each of the remaining samples from Boreholes 1 and 4 to 6.

A total of 13 samples were processed for macrofossils representing deposits within Boreholes 2 and 3 (seven from Borehole 2 and six from Borehole 3). The subsamples were processed for the recovery of plant and invertebrate macrofossils, broadly following the techniques of Kenward *et al*. (1980); weights and approximate volumes of the subsamples were recorded prior to processing. Paraffin flotation, for the separation of insect and other non-molluscan invertebrate remains from waterlogged plant material, was not employed in order to avoid contamination of any potential radiocarbon dating material with fossil hydrocarbons.

For each of the processed macrofossil samples, small quantities of sediment (a few grams) were extracted for a parallel investigation of microfossil content and preservation.

Macrofossil and residue recording

Plant and invertebrate remains in the processed subsample fractions (washovers and residues) were recorded by ‘scanning’ using a low-power, x7 to x45, binocular microscope where necessary, identifiable taxa and other components being listed on paper. All of the washovers contained at least some waterlogged organic material and all were examined wet. A five-point scale was employed to record the proportion of organic material recovered in the washover fraction (p30-31). Five-point scales were also employed to record the abundance, diversity and preservation of the plant and invertebrate remains recovered (p30-31); the scales for diversity and preservation following those created by Smit *et al*. (2006) for the recording of botanical

macrofossils, with some minor modifications to accommodate their extension to additional classes of remains.

The residues were primarily mineral in nature and were dried prior to the recording of their components. The dry weight and approximate volume of each residue was recorded, their general composition was described and they were then sorted. Additional data regarding the quantity, size and weight of any inorganic and biological material sorted from the residues was also recorded (see Table 6). The residue fractions were also scanned for magnetic material but none was present.

Specific identification of macrofossil remains was undertaken where possible to determine values for abundance and diversity and to provide additional information regarding the origin of the material or the nature and depositional environment of the deposits.

Plant macrofossil remains were compared with modern reference material (where possible) and with published works (e.g. Cappers *et al*. 2006) and identified to the lowest taxon possible or necessary to achieve the aims of the project. Nomenclature for plant taxa follows Stace (1997).

Wood identifications were attempted for a small number of fragments (all over 4 mm); none of the few charcoal fragments recovered were over 4 mm and no identifications were attempted. Pieces were broken to give a clean radial cross-sectional surface and the anatomical structures were examined using a low-power binocular microscope (x7 to x45). Basic identifications were attempted by comparison with modern reference material, where possible, and with reference to published works (Hather 2000; Schoch *et al*. 2004). No species level identifications were possible and all of the fragments remained wholly indeterminate, however.

Freshwater mollusc remains were examined and individuals identified as closely as possible, within the time constraints of the assessment (it is, therefore, possible that some identifications could be refined) with reference to published works (chief sources: Ellis 1969 and 1978; Kerney 1999; Macan 1977). Nomenclature follows Kerney (1999). Minimum numbers of individuals present were usually estimated by numbers of shell apices; in cases where numbers of large, and diagnostic, portions of the shell other than the apex were more readily and reliably identified these were used instead. Non-molluscan invertebrates were also identified with reference to published works (e.g. for beetles, Crowson 1956) and within the constraints of an assessment; in the event a single tentative family level identification could be made but none to species level.

Vertebrate remains were very few and none could be identified to species or species group using the PRS modern comparative reference collection and published works (e.g. Schmid 1972 and Hillson 1990). The bones were described as ‘unidentified’ and it was not even possible to assign them to a size category (e.g. as ‘large mammal’ – assumed to be cattle, horse or large cervid).

During recording, consideration was given to the suitability of the remains for submission for radiocarbon dating by standard radiometric technique or accelerator mass spectrometry (AMS). Notes regarding the presence of such material are included in Table 4.

Microfossil recording

Microfossil content and preservation was investigated using the 'squash' technique of Dainton (1992). This was originally developed specifically to assess the content of eggs of intestinal parasitic nematodes but routinely reveals other microfossils, such as pollen and diatoms (which were the focus of the investigations here). The assessment slides were scanned at 150x magnification with 600x used where necessary.

The same scale employed for the proportion of organic material within the washover was used to record the percentage of organic material within the raw sediment seen under the microscope (at 150x magnification). Similar five-point scales to those used to record the abundance, diversity and preservation of macrofossils were created for the assessment of the microfossils (p32-33). No interpretatively valuable microfossil remains were recorded from any of the assessed samples, however.

Results

The results of the investigations of the samples submitted from Boreholes 2 and 3 are summarised below by borehole. Details of the sediment samples submitted from all six boreholes are presented in Table 3. Details and summary data for the plant and invertebrate macrofossil remains recovered in the washovers from the processed samples are given in Tables 4 and 5, Table 6 shows the results from the corresponding residues and the microfossil records are presented in Table 7.

It should be noted that any depths given in the following text (and tables) have been extrapolated from the deposit model figure supplied by the excavator and are only approximate.

Borehole 2

Seven samples from Borehole 2 were processed representing the deposits encountered at 5.7 to 7.0 m (Context 2003; Phase 3), 4.6 to 5.7 m (Context 2004; Phase 3), 3.5 to 4.3 m (Context 2006; Phase 3), 2.6 to 3.1 m (Context 2007; Phase 3); 0.9 to 1.9 m (Context 2008; Phase 2), -1.0 to 0.0 m (Context 2010; Phase 1) and -1.4 to -1.0 m (Context 2011; Phase 1) AOD.

Only three of the samples gave a separate washover fraction (from Contexts 2003, 2007 and 2008) and, of these, only one, from Context 2007, contained any interpretatively valuable assemblages of plant and invertebrate macrofossils. Even here, remains were rather few but there were frequent ostracod (freshwater crustacean) valves, together with some freshwater bivalve mollusc shell and plant remains of taxa indicative of shallow water (water-pepper), and wet and rough ground (pale persicaria and stinging nettle, respectively); there were also occasional well preserved beetle sclerites which would be identifiable to further study (none were identified within this assessment, however). Aquatic deposition is quite strongly implied; although the presence of remains of plants of wet and rough ground perhaps suggests flooding events rather than a permanent body of water.

A background level of fine coal was recorded from all of the processed samples from Borehole 2 but is perhaps most likely to reflect a small amount of material eroded from the natural drift rather than fuel waste – the only convincing evidence of which was nine pieces of cinder

recovered from Context 2008. Context 2008 and Context 2010 were the only deposits to give any artefactual remains with both yielding a little brick/tile and the latter also a single sherd of pot.

No interpretatively valuable microfossils were recorded from the samples from Borehole 2.

The general lack of recovered remains, both biological and artefactual, provided little of interpretative value. However, it is perhaps worth noting that for the Phase 3 (medieval/post-medieval alluvium) deposits (Contexts 2003-2007) much of the original sediment was not retained at 300 microns. This generally 'fine-grained' nature of the deposits suggests low-energy essentially 'natural' deposition (aquatic in the case of Context 2007) in line with the excavators' interpretation. The remains from the single Phase 2 (medieval dumping) deposit (Context 2008) were similarly consistent with the deposit's interpretation, incorporating fuel and artefactual waste; Context 2010 was assigned to Phase 1 (undated alluvial deposits) but also contained brick/tile fragments and a pot sherd suggesting that it may perhaps belong to Phase 2 or has become contaminated from the overlying dumping deposits. The lowermost Phase 1 deposit, Context 2011, gave a significantly coarser residue fraction than those from the later alluvial deposits (dominated by stones of up to 45 mm) indicating significantly higher energy but similarly 'natural' (there were no artefacts present) deposition.

Borehole 3

Six samples from Borehole 3 were processed representing the deposits encountered at 5.0 to 7.0 m (Context 3001; Phase 3), 4.0 to 5.0 m (Context 3002; Phase 3), 2.8 to 4.0 m (Context 3003; Phase 3), 1.5 to 1.7 m (Context 3006; Phase 2); -0.5 to -0.2 m (Context 3008; Phase 2), and -1.5 to -0.5 m (Context 3009; Phase 1) AOD.

Only two of the samples gave a separate washover fraction (from Contexts 3006 and 3008) and biological remains recovered (including from the residues) were restricted to a little indeterminate wood, charcoal, shell and bone, together with a trace of waterlogged plant detritus (from Context 3006). Two shell fragments in the residue from the sample from Context 3008 were tentatively identified as of a freshwater mussel (*Margaritifera*/*Unio*) but no other identifications could be made.

Artefactual remains were confined to Context 3006 and consisted of just 13 fragments of brick/tile – a little coal fine coal was present in all of the samples but, as previously note for Borehole 2, here this seems most likely to reflect material eroded from the natural drift rather than fuel waste (although there was a little charcoal from Context 3006 and a single small piece of cinder from Context 3008).

No interpretatively valuable microfossils were recorded from the samples from Borehole 3; the only record of any note being that Context 3006 appeared to have moderate microscopic charcoal/ash content.

The overall quantities of remains reflected a similar pattern to that seen from Borehole 2 (see above) with very little material recovered (at 300 microns) from the Phase 1 (Context 3009) and Phase 3 (Contexts 3001-3003) alluvial deposits; again, suggesting low-energy, 'natural' deposition. Much larger proportions of the samples from the intervening, Phase 2 (Contexts 3006 and 3008), deposits were retained and these contained small quantities of indeterminate

bone and, for Context 3006, a little brick/tile consistent with at least a casual level of dumping of food and artefactual waste.

Discussion and statement of potential

This assessment has demonstrated that biological remains in the deposits underlying this site are typically present in very small numbers, poorly preserved and of very little interpretative value (although see note in Recommendations – below – regarding deposits encountered at greater depth during a watching brief undertaken by YAT in September 2016).

Only one of the samples processed for the assessment, from Borehole 2 Context 2007 (2.6 to 3.1m AOD) provided small assemblages of plant and invertebrate remains which were of some interpretative value – strongly suggesting aquatic deposition (though perhaps during flooding events rather than within a permanent body of water) – with only occasional other remains from Borehole 2 Context 2008 (0.9 to 1.9m AOD) and Borehole 3 Contexts 3006 (1.5 to 1.7m AOD) and 3008 (-0.5 to -0.2m AOD); the two last yielding the only vertebrate remains recovered (trace levels of indeterminate bone fragments).

No interpretatively valuable microfossils were present in any of the deposits examined.

Artefactual material recovered was also minimal amounting to just a little brick/tile from Borehole 2 Contexts 2008 and 2010 (-1.0 to 0.0m AOD) and Borehole 3 Context 3006, with a single pot sherd from Context 2010.

The only artefactual material recovered which may provide dating evidence was the single pot sherd from Borehole 2 Context 2010. There *may* be sufficient suitable organic material from Context 2007 and perhaps Context 2008 (both Borehole 2) to be submitted for radiocarbon dating (via AMS) but these were the only deposits for which this could be considered.

Recommendations

No further study of the current samples is warranted and, on the evidence of this assessment, the deposits at the site show no significant potential for investigation via their content of organic remains. However, an earlier watching brief by YAT in September 2016, recorded "…layers of undated alluvial material containing organically surviving plant and wood remains were observed across the proposed development area at -0.65m AOD – 0.8m AOD…" (Gary Millward pers. comm.). These alluvial layers overlay a wet silty sand deposits containing Roman pottery in the area immediately north of the proposed building development and were overlain by medieval dumping. There is, therefore, the possibility of deposits with the potential for recovery of interpretatively valuable assemblages of biological remains at considerable depth (the layers observed during the watching brief were reached using a cable percussion coring rig which could achieve greater depths than the compact tracked rig window corer employed for the current survey). Should works be undertaken that will potentially impact on the deposits at these depths (i.e. -0.65 to 0.8m AOD) then a systematic sampling strategy and subsequent programme of assessment and, where applicable, analysis for organic remains, should be adopted.

Retention and disposal

All of the current material (recovered remains, washovers, sorted residue fractions and unprocessed sediment) – other than the occasional artefactual remains which will be returned to the excavator to be considered by appropriate specialists – may be discarded.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 4, National Industrial Estate, Bontoft Avenue, Kingston upon Hull). Palaeoecology Research Services retains the paper and electronic records pertaining to the work described herein.

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Table 3: Borehole investigations of sub-surface deposits at Foss Barrier, York: Description of submitted samples – Boreholes 1 to 6. Key: 'B' = borehole number; 'Wt /kg' = weight in kilograms; 'Vol /l' = approximate volume in litres. Approximate depths 'From' and 'To' (extrapolated from YAT deposit model figure) are given in metres AOD.

B	From	To	Phase	Context	Wt /kg	Vol /l	Sediment description	Evidence of oxidisation?
1	5.3	6.2	3	1003	0.475	0.3	Moist, mid brown (externally) to mid grey (internally), firm to crumbly (working soft and somewhat plastic), silt. No obvious inclusions.	Yes – variation in internal and external colour
1	4.3	5.1	3	1004	0.525	0.4	Moist, mid brown (externally) to mid grey-brown (internally), firm to crumbly (working soft and slightly sticky), sandy silt. Very occasional black flecks of degraded charcoal.	Yes – variation in internal and external colour
1	3.3	4.1	3	1005	0.45	0.3	Moist to wet, mid brown (externally) to mid grey-brown (internally), brittle to crumbly (working soft and slightly sticky), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
1	2.4	2.9	3	1006	0.575	0.4	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft and somewhat plastic), sandy silt. Black flecks of ?waterlogged organic detritus present and slight sulphide odour when lumps of sediment broken open.	Yes – variation in internal and external colour
1	1.4	2.0	2	1007	0.6	0.4	Moist to wet, light/mid to mid brown/grey-brown, unconsolidated, coarse sand. Stones (2 to 30 mm) present,	No
1	-0.3	1.0	2	1008	0.525	0.4	Moist, light/mid to mid brown/grey-brown, unconsolidated, coarse sand. Stones (2 to 30 mm) present,	No
1	-0.6	-0.3	1	1009	0.525	0.4	Moist, mid/dark brown (externally) to mid/dark grey (internally),	Yes – variation in internal

B	From	To	Phase	Context	Wt /kg	Vol /l	Sediment description	Evidence of oxidisation?
							stiff to somewhat brittle (working soft and more or less plastic), clay silt. Black flecks of waterlogged organic detritus and occasional decayed ?wood fragments (to 15 mm) present and slight sulphide odour when lumps of sediment broken open.	and external colour
2	5.7	7.0	3	2003	0.375	0.25	Moist, mid brown (externally) to mid grey (internally), crumbly (working somewhat soft), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
2	4.6	5.7	3	2004	0.575	0.4	Moist, mid brown (externally) to mid grey (internally), firm (working soft), silt. No obvious inclusions.	Yes – variation in internal and external colour
2	3.5	4.3	3	2006	0.375	0.25	Moist, mid brown (externally) to light/mid grey-brown (internally), crumbly (working soft), ?very slightly sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
2	2.6	3.1	3	2007	0.45	0.3	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
2	0.9	1.9	2	2008	0.5	0.3	Moist to wet, mid grey to light/mid grey-brown (mottled at a mm-scale), unconsolidated, slightly silty sand. Stones (2 to 6 mm), black flecks of ?coal and ?brick/tile were present.	No
2	-1.0	0.0	1	2010	0.7	0.5	Moist, light/mid brown to mid grey-brown (mottled at a mm-scale), unconsolidated, ?very slightly silty, coarse sand. Stones (20 to 60 mm) were present.	No
2	-1.4	-1.0	1	2011	0.7	0.5	Moist, mid brown to mid grey (occasionally mid grey-brown and light/mid yellow-brown), stiff to unconsolidated (working soft	Possibly – colour variations but not clear cut

B	From	To	Phase	Context	Wt /kg	Vol /l	Sediment description	Evidence of oxidisation?
							and slightly sticky), clay sand to sandy clay (varies – some parts more or less entirely sand). Stones (2 to 20 mm) and black flecks of ?coal were present.	
3	5.0	7.0	3	3001	0.625	0.45	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), ?very slightly sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
3	4.0	5.0	3	3002	0.5	0.3	Moist, mid brown (externally) to mid grey-brown (internally), firm to crumbly (working soft and slightly sticky), ?very slightly sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
3	2.8	4.0	3	3003	0.75	0.5	Moist, light/mid grey-brown to light/mid brown (on some external surfaces), firm to crumbly (working soft and slightly sticky), sandy silt. No obvious inclusions.	Possibly – colour variation but not clear cut
3	1.5	1.7	2	3006	0.4	0.25	Moist, varicoloured (mixed shades of brown, grey-brown and grey from light/mid to mid/dark with occasional black patches of ?ash or ?very crumbly charcoal), unconsolidated, slightly silty sand. No obvious inclusions other than possible charred material within the black patches.	No
3	-0.5	-0.2	2	3008	0.5	0.3	Moist, varicoloured (mixed shades of brown, grey-brown and grey from light to mid), unconsolidated, ?slightly silty sand. Stones (6 to 60 mm) present.	No
3	-1.5	-0.5	1	3009	0.575	0.4	Just moist, mid/dark grey-brown (with occasional patches of	No

B	From	To	Phase	Context	Wt /kg	Vol /l	Sediment description	Evidence of oxidisation?
							mid/dark brown and mid/dark grey and very occasionally light grey-brown), very stiff (working more or less plastic), silty clay (more silty in places). No obvious inclusions.	
4	5.6	6.2	3	4001	0.6	0.4	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
4	4.6	5.4	3	4002	0.925	0.75	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
4	2.8	4.4	3	4003	0.875	0.7	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), sandy silt. Black flecks of ?waterlogged organic detritus present and slight sulphide odour when lumps of sediment broken open.	Yes – variation in internal and external colour
4	2.4	2.8	3	4004	0.5	0.3	Moist, jumbled mix of light/mid and mid grey-brown (with occasional patches of light/mid orange), crumbly, sand. One bent iron (magnetic) object (approximate total length 140 mm; roughly circular cross-section throughout length with diameter of 8 mm) – orange colouration in sediment probably from rust from this object.	No
4	0.1	0.4	2	4009	0.675	0.5	Wet, mid to mid/dark brown to grey-brown, unconsolidated, coarse sand. Stones (2 to 20 mm) present.	No
4	-0.2	0.1	1	4010	0.4	0.25	Moist to wet, light/mid grey-brown, unconsolidated, coarse sand. Stones (2 to 60 mm) common.	No

B	From	To	Phase	Context	Wt /kg	Vol /l	Sediment description	Evidence of oxidisation?
5	5.6	6.0	3	5002	0.75	0.5	Moist, mid brown to mid/dark grey-brown (mottled at a mm-scale), crumbly (working soft and somewhat plastic), very slightly sandy silt. No obvious inclusions.	No
5	4.5	5.6	3	5003	0.35	0.25	Moist, mid brown (externally) to mid grey-brown or mid grey (internally), brittle to crumbly (working soft and somewhat plastic), silt. No obvious inclusions.	Yes – variation in internal and external colour
5	2.4	2.9	3	5005	0.425	0.3	Moist, light/mid to mid brown (externally) to mid grey (internally), crumbly (working soft and slightly sticky), sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
6	6.0	6.5	3	6004	0.65	0.5	Moist, mid brown (externally) to mid grey-brown (internally), firm to crumbly (working soft and slightly sticky), very slightly sandy silt. Very occasional black flecks of degraded charcoal.	Yes – variation in internal and external colour
6	5.2	6.0	3	6005	0.45	0.3	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), slightly sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
6	2.6	3.3	3	6007	0.45	0.3	Moist, mid brown (externally) to mid grey (internally), brittle to crumbly (working soft), slightly sandy silt. No obvious inclusions.	Yes – variation in internal and external colour
6	1.4	2.6	2	6008	0.375	0.25	Moist, jumbled mid shades of brown, grey-brown and grey, unconsolidated (with occasional crumbly lumps), silty sand (lumps are more silty). No obvious inclusions.	No

Table 3: Description of submitted samples – Boreholes 1 to 6

Borehole investigations of sub-surface deposits at Foss Barrier, York: Scales employed for the recording of the general composition of the washover fractions from the processed subsamples and the plant and invertebrate (other than unidentified mollusc shell fragments) macrofossil remains recovered.

1) Description of composition of the washover fractions: proportion of organic component

1 – 0%

2 – <25%

3 – <50%

4 – <75%

5 – >75%

2) Abundance: number of recorded items (identifiable waterlogged plant or invertebrate remains – seeds or fruits/minimum number of individuals represented)

1 – sample contained no identifiable items

2 – sample contained 1-20 items

3 – sample contained 21-100 items

4 – sample contained 101-500 items

5 – sample contained more than 500 items

3) Diversity: range of recorded items (minimum numbers of identifiable waterlogged plant or invertebrate taxa present)

1 – sample contained no non-carbonised, determinable botanical macro-remains, or only largely sub-recent intrusive/contaminant remains, carbonised macro-remains may be present

2 – sample contained non-carbonised remains of 1-5 taxa, typically largely corrosion-resistant species (e.g. goosefoot, chickweed, stinging nettle, knotweed)

3 – sample contained non-carbonised macro-remains of 6-10 taxa

4 – sample contained non-carbonised macro-remains of 11-40 taxa

5 – sample contained non-carbonised macro-remains of more than 40 taxa

4) Preservation: condition of recorded items (waterlogged plant or invertebrate remains)

1 – no taxon/species determination was possible to the level that should theoretically be possible for the taxon concerned, the material was too severely fragmented and/or corroded

2 – some species determination was possible, though the remains were highly fragmented and/or the seed coat (for example) was highly corroded

3 – most remains could be determined to the maximum taxonomic level feasible, though there was some damage or corrosion to the seed coat (for example – other than splitting, which can be caused by germination prior to deposition)

4 – remains complete and undamaged, though no fine elements such as hairs or fragile husk remains were present

5 – remains complete and undamaged, and fine, fragile elements such as hairs and some husk remains were present. NB: A large number of species do not include these elements, and the husk of most types of grain is in fact more resistant than the seed coat, so this cannot be used for classification in category 5

The categories for Diversity and Preservation follow Smit *et al*. (2006) with minor modifications.

Borehole investigations of sub-surface deposits at Foss Barrier, York: Scales employed for the recording of the general composition of the 'squash' subsamples and the microfossils present.

1) Description of composition of the 'squash': proportion of organic component

1 – 0%

2 – <25%

3 – <50%

4 – <75%

5 – >75%

2) Abundance: number of recorded items (identifiable microfossil remains)

1 – sample contained no identifiable items

2 – sample contained 1-20 items

3 – sample contained 21-100 items

4 – sample contained 101-500 items

5 – sample contained more than 500 items

3) Diversity: range of recorded items (minimum numbers of microfossil taxa present)

1 – sample contained no non-carbonised, determinable microfossil remains, or only largely sub-recent intrusive/contaminant remains, carbonised remains may be present

2 – sample contained non-carbonised remains of 1-5 taxa

3 – sample contained non-carbonised remains of 6-10 taxa

4 – sample contained non-carbonised remains of 11-40 taxa

5 – sample contained non-carbonised remains of more than 40 taxa

4) Preservation: condition of recorded items (microfossils)

1 – no taxon/species determination was possible to the level that should theoretically be possible for the taxon concerned, the material was too severely fragmented and/or corroded

2 – some species determination was possible, though the remains were highly fragmented and/or corroded

3 – most remains could be determined to the maximum taxonomic level feasible, though there was some damage or corrosion

4 – remains more or less complete and undamaged, there may be some very slight chemical erosion (e.g. parasite eggs may be intact but rather pale)

5 – remains complete and undamaged

Borehole investigations of sub-surface deposits at Foss Barrier, York. General description of the washovers from the samples from Boreholes 2 and 3, with records for plant and other remains present. Key: 'B' = borehole; 'Dep (m)' = approximate depth in borehole in metres (AOD); 'Wt (g)' = weight of processed subsample in grams; 'V (ml)' = approximate volume of processed subsample in ml; 'w/o (ml)' = approximate volume of washover in ml; 'res (g)' = weight of residue in grams; 'C14' = possible/sufficient suitable material for radiocarbon dating present; 'Des' = description; 'Ab' = abundance; 'Div' = diversity; 'Pr' = preservation; 'Vert.' = vertebrate remains; 'det' = indeterminate waterlogged plant detritus; 'se' = seeds or similar structures; 'ch' = charcoal and/or other charred plant remains; 'i' = indeterminate non-molluscan invertebrate cuticle (mostly probably insect); 'b' = beetle sclerite fragments; 'moll' = mollusc shell; 'ost = ostracod valves; 'cin' = cinder.

Semi-quantitative abundance scale: 1 – few/rare, up to 3 individuals/items or a trace level component of the whole; 2 – some/present, 4 to 20 items or a minor component; 3 – many/common, 21 to 50 or a significant component; 4 – very many/abundant, 51 to 200 or a major component; and 5 – super-abundant, over 200 items/individuals or a dominant component of the whole.

Note 1: only five of the 13 samples processed from Boreholes 2 and 3 produced a separate washover fraction – three from Borehole 2 and two from Borehole 3

Note 2: for macrofossil preservation ('Pr') a value of '- (1)' indicates that no identifications were possible owing to a complete absence of remains

										Macrofossils			Botanical remains				Invertebrates				Vert.	Mineral/artefactual		
B	Depth (m)	Phase	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	C14	Des	Ab	Div	Pr	det	se	ch	wood	i	b	moll	ost	bone	coal	sand	cin
2	5.7 to 7.0	3	2003	375	250	<1	12.6	N	2	1	1	- (1)	1	-	-	-	-	-	-	-	-	2	5	-
2	4.6 to 5.7	3	2004	575	400	-	1.5	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
2	3.5 to 4.3	3	2006	375	250	-	0.3	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-

2	2.6 to 3.1	3	2007	450	300	~1	5.7	Y*	4	3	3	2	5	2	1	-	2	1	2	3	-	1	4	-
2	0.9 to 1.9	2	2008	500	300	~1	256.4	Y*	2	2	2	2	2	1	-	-	-	-	-	-	-	3	5	3
2	-1.0 to 0.0	1	2010	700	500	-	533.2	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
2	-1.4 to -1.0	1	2011	700	500	-	362.1	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
3	5.0 to 7.0	3	3001	625	450	-	2.7	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
3	4.0 to 5.0	3	3002	500	300	-	2.9	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
3	2.8 to 4.0	3	3003	750	500	-	15.4	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-
3	1.5 to 1.7	2	3006	400	250	~10	210.3	N	2	2	1	1	1	-	2	2	-	-	1	-	-	5	4	-
3	-0.5 to -0.2	2	3008	500	300	<1	349.6	N	2	1	1	1	-	-	-	-	-	-	-	-	1	2	5	1
3	-1.5 to -0.5	1	3009	575	400	-	6.7	N	1	1	1	- (1)	-	-	-	-	-	-	-	-	-	-	-	-

Table 4: General description of the washovers from the samples from Boreholes 2 and 3, with records for plant and other remains present.

* – indicates that 'suitable' material for radiocarbon dating is present but that the quantity available may be insufficient to obtain a date and/or that the remains *may* be contaminants

Table 5: Borehole investigations of sub-surface deposits at Foss Barrier, York: Written descriptions of washovers from samples from boreholes, with notes on identified (or partially so) macrofossil remains. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (AOD); 'Ph' = Phase; 'CN' = context number; 'Wt (g)' = weight of processed subsample in grams; 'V (ml)' = approximate volume of processed subsample in ml; 'w/o (ml)' = approximate volume of washover in ml; 'res (g)' = weight of residue in grams; 'mnv' = minimum number of valves represented for bivalve taxa; 'mni' = minimum number of individuals represented.

Semi-quantitative abundance scale: 1 – few/rare, up to 3 individuals/items or a trace level component of the whole; 2 – some/present, 4 to 20 items or a minor component; 3 – many/common, 21 to 50 or a significant component; 4 – very many/abundant, 51 to 200 or a major component; and 5 – super-abundant, over 200 items/individuals or a dominant component of the whole.

Note: only five of the 13 samples processed from Boreholes 2 and 3 produced a separate washover fraction – three from Borehole 2 and two from Borehole 3

B	Depth (m)	Phase	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
2	7.0 to 5.7	3	2003	375	250	<1	~0.1	Approximately equal parts sand and fine coal (to 2 mm) – both abundance score 4.	Two or three fragments of ?rootlet only.	None	None
2	3.1 to 2.6	3	2007	450	300	~1	1.2	Mostly waterlogged plant detritus (score 5) and sand (score 4), with traces of fine coal (to 1 mm; score 1) and indeterminate rectilinear charcoal (to 2 mm; score 1)	'Seeds': some (abundance score 2) waterlogged seeds and similar structures, including indeterminate fragments (score 2) but also with more intact remains representing water-pepper	Insect: some (score 2) 'scraps' of heavily fragmented insect cuticle; occasional beetle (Coleoptera) sclerite fragments (score 1) and 1x rather well preserved beetle	None

B	Depth (m)	Phase	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
									(*Persicaria hydropiper* (L.) Spach) achenes (score 1), pale persicaria (*Persicaria lapathifolia* (L.) Gray) achenes (score 2) and ?stinging nettle (cf. *Urtica dioica* L.) achenes (score 1); at least two other unidentified taxa represented (both at score 1).	elytron (perhaps Hydrophilidae sp. and almost certainly identifiable to further study). Mollusc: some (score 2) mollusc shell – indeterminate fragments (to 2 mm; score 2), 2x *Pisidium* sp. valves (mni = 1), a few (score 1) fragments of ?freshwater mussel (cf. *Margaritifera*/*Unio*) valve (to 3 mm; mnv=mni=1). Crustaceans: frequent (score 3) ostracod (Ostracoda) valves – often paired.	
2	1.9 to 0.9	2	2008	500	300	~1	1.1	Mostly sand (score 5), with frequent fine coal (to 2 mm; score 3) and cinder (to 5 mm; score 3), and a little	'Seeds': 1x ?stinging nettle achene and 1x unidentified fragment only.	None	None

B	Depth (m)	Phase	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
								waterlogged plant detritus (score 2).			
3	1.7 to 1.5	2	3006	400	250	~10	8.7	Mostly coal (to 10 mm; score 5) and sand (score 4), with a little indeterminate rectilinear charcoal (to 4 mm; score 2) and very decayed wood (to 16 mm; score 2 – indeterminate).	None	Mollusc: 1x indeterminate shell fragment (to 3 mm) only.	None
3	-0.5 to -0.2	2	3008	500	300	<1	~0.1	Mostly sand (score 5), with a little fine coal (to 2 mm; score 2) and a single piece of cinder (to 2 mm).	None	None	1x unburnt unid. fragment (to 8 mm; <0.1 g)

Table 5: Written descriptions of washovers from samples from boreholes 2 and 3, with notes on identified (or partially so) macrofossil remains

Table 6: Borehole investigations of -surface deposits at Foss Barrier, York: Residue components from samples from boreholes. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (AOD); 'CN' = context number; 'Wt (g)' = weight of processed subsample in grams; 'V (ml)' = approximate volume of processed subsample in ml; 'w/o (ml)' = approximate volume of washover in ml; 'res (g)' = weight of residue in grams; 'res v (ml) = approximate residue volume in ml; 'mnv' = minimum number of valves represented for bivalve taxa; 'mni' = minimum number of individuals represented.

Semi-quantitative abundance scale: 1 – few/rare, up to 3 individuals/items or a trace level component of the whole; 2 – some/present, 4 to 20 items or a minor component; 3 – many/common, 21 to 50 or a significant component; 4 – very many/abundant, 51 to 200 or a major component; and 5 – super-abundant, over 200 items/individuals or a dominant component of the whole.

B	Dep (m)	Phase	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
2	5.7 to 7.0	3	2003	375	250	12.6	~10	Almost all sand (abundance score 5), with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
2	4.6 to 5.7	3	2004	575	400	1.5	~1	Almost all sand (abundance score 5), with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
2	3.5 to 4.3	3	2006	375	250	0.3	<1	Almost all sand (abundance score 5), with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
2	2.6 to 3.1	3	2007	450	300	5.7	~3	Almost all sand (abundance score 5), with a little fine coal (to 1 mm; score 2) and occasional very small stones (to 2 mm; score 2). No magnetic component present.	None
2	0.9 to 1.9	2	2008	500	300	256.4	~150	Mostly stones (to 30 mm; score 5), with frequent sand (score 3) and fragments of brick/tile (to 31 mm; 35.0 g – 31x pieces), a little cinder (to 8 mm; 0.8 g – 9x pieces) and fine coal (to 1 mm; score 2). No magnetic component present.	None

B	Dep (m)	Phase	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
2	-1.0 to 0.0	1	2010	700	500	533.2	~300	Mostly sand (score 5) and stones (to 40 mm; score 4), with a little brick/tile (to 38 mm; 42.6 g – 10x pieces), one pot sherd (to 11 mm; 0,4 g), one shell fragment (to 6 mm; ~0.1 g) and fine coal (to 1 mm; score 2). No magnetic component present.	Shell: 1x indeterminate mollusc shell fragment only
2	-1.4 to -1.0	1	2011	700	500	362.1	~200	Mostly stones (to 45 mm; score 5), with frequent sand (score 3) and a little fine coal (to 1 mm; score 2). No magnetic component present.	None
3	5.0 to 7.0	3	3001	625	450	2.7	~2	Almost all sand, with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
3	4.0 to 5.0	3	3002	500	300	2.9	~2	Almost all sand, with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
3	2.8 to 4.0	3	3003	750	500	15.4	~10	Almost all sand, with a little fine coal (to 1 mm; score 2). No magnetic component present.	None
3	1.5 to 1.7	2	3006	400	250	210.3	~150	Mostly sand (score 5), with frequent stones (to 35 mm; score 3) and a little brick/tile (to 30 mm; 14.9 g – 13x pieces), four shell fragments (to10 mm; <0.1 g), two bone fragments (to 26 mm; 1.2 g) and fine coal (to 1 mm; score 2). No magnetic component present.	Shell: 1x indeterminate fragment only Bone: 2x indeterminate fragments only
3	-0.5 to -0.2	2	3008	500	300	349.6	~200	Mostly sand (score 5), with frequent stones (to 35 mm; score 3), two shell fragments (to 15 mm; 0.4 g) and a little fine coal	Shell: 2x fragments of ?freshwater mussel (cf. *Margaritifera*/*Unio*) valve

B	Dep (m)	Phase	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
								(to 1 mm; score 2). No magnetic component present.	(mnv=mni=1)
3	-1.5 to -0.5	1	3009	575	400	6.7	~5	Mostly sand (score 5), with frequent stones (to 15 mm; score 3) and a little fine coal (to 1 mm; score 2).	None

Table 6: Residue components from samples from boreholes 2 and 3

Table 7. Borehole investigations of sub-surface deposits at Foss Barrier, York: General description of microfossil subsamples and notes on remains present. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (AOD); 'CN' = context number; 'Desc' = description; 'Ab' = abundance; 'Div' = diversity; 'Pres' = preservation; 'N' = semi-quantitative numbers; 'types' = minimum number of taxa represented; '?micro char/ash' = ?microscopic charcoal/ash'; 'f. hy.' = fungal hyphae; 'plant tissue frags' = fragments of indeterminate plant tissue; '+' = 1-5; '++' = 6-20; '+++' = 21-50; '++++' = 51-200; '+++++' = more than 200.

Note: for microfossil preservation ('Pres') a value of '- (1)' indicates that no identifications were possible owing to a complete absence of remains

					Microfossils			**Pollen/spores**		**Diatoms**		**?Phytoliths**		**Fungal spores**					
B	**Dep (m)**	**Phase**	**CN**	**Desc**	**Ab**	**Div**	**Pres**	**N**	**types**	**N**	**types**	**N**	**types**	**N**	**types**	**Notes/ identifications**	**?micro char/ash**	**f. hy.**	**plant tissue frags**
2	5.7 to 7.0	3	2003	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	-
2	4.6 to 5.7	3	2004	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	-
2	3.5 to 4.3	3	2006	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	-
2	2.6 to 3.1	3	2007	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	+
2	0.9 to 1.9	2	2008	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	-
2	-1.0 to 0.0	1	2010	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	-
2	-1.4 to -1.0	1	2011	1	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	-

					Microfossils			Pollen/spores		Diatoms		?Phytoliths		Fungal spores					
B	Dep (m)	Phase	CN	Desc	Ab	Div	Pres	N	types	N	types	N	types	N	types	Notes/ identifications	?micro char/ash	f. hy.	plant tissue frags
3	5.0 to 7.0	3	3001	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	+
3	4.0 to 5.0	3	3002	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	-
3	2.8 to 4.0	3	3003	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	-
3	1.5 to 1.7	2	3006	4	1	1	1	-	-	-	-	-	-	-	-	None	+++	++	++
3	-0.5 to -0.2	2	3008	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	-	-
3	-1.5 to -0.5	1	3009	2	1	1	- (1)	-	-	-	-	-	-	-	-	None	-	+	++

Table 7: General description of microfossil subsamples and notes on remains present

APPENDIX 4 – ASSESSMENT OF SEDIMENT CORE SAMPLES

by Ian Panter, Head of Conservation, York Archaeological Trust

Introduction

To assess whether sub-surface sediments are suitable for in situ preservation of organic archaeological remains it is necessary to carry out a number of physical and chemical tests, from which the baseline character of the deposits can be characterised. Physical testing aims to quantify 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. The rate of ground water flow through sub-surface deposits is influenced by the composition of the sediments (proportions of clay, silt and gravel), the permeability of the sediments (measured by the hydraulic conductivity) and the porosity of the sediments (i.e. the porosity is a measure of the portion of soil occupied by pore spaces). Therefore physical testing comprises an investigation into those three criteria.

Methodology

Laboratory analyses were performed by Geolabs Ltd. (Watford) on six undisturbed sediment cores extracted by Exploration Ltd, using a compact tracked window sampler rig. Each sample was retained in its Perspex tube, which was subsequently sealed to prevent water loss and movement of the column of sediment and despatched to Geolabs Ltd.

Results

Sample	Depth m BPGL	Description	Organic Content %	Water Content %	Hydraulic Conductivity m/s	Porosity
1005	4.50 - 4.85	Sandy clayey silt	2.9	27.5	7.1×10^{-9}	0.38
2006	4.70 - 5.00	Sandy clayey silt	2.7	30.0	4.1×10^{-10}	0.43
3009	9.70 - 10.0	Slightly gravelly slightly sandy silt and clay	4.8	28.4	1.1×10^{-10}	0.44
4003	4.50 - 4.80	Sandy clayey silt	4.4	33.8	1.7×10^{-10}	0.45
5005	4.60 - 4.90	Sandy clayey silt	3.7	27.1	1.2×10^{-9}	0.40
6006	4.70 - 5.00	Sandy clayey silt	4.5	27.0	2.8×10^{-10}	0.43

Table 8: Key physical characteristics of the baseline assessment samples

All sediments are typical alluvial deposits comprised of sandy silts with a clay component, with water contents ranging from 27% to 30% and low organic content (ranging from 2.7% to 4.8%).

Hydraulic conductivity values are to be expected for sediments of this nature, as are the porosity values which indicate these sediments have the capacity to hold a large volume of water when saturated, and the low hydraulic conductivities suggests that the sediments will not drain rapidly if the water table drops.

Conclusion

Based on this limited information the sub-surface deposits appear to be conducive to the long-term preservation of vulnerable organic archaeological remains, assuming they remain in connection with either rivers or from recharge from rainfall.

APPENDIX 5 – WRITTEN SCHEME OF INVESTIGATION

WRITTEN SCHEME OF INVESTIGATION FOR EVALUATION AT THE FOSS BARRIER IMPROVEMENTS

Site Location:	Foss Barrier, St George's Field, York.
NGR:	SE 6054 5110
Proposal:	Archaeological Evaluation
Planning ref:	16/02333/FUL
Prepared for:	CH2M
Document reference:	YAT Report 2017/41
Status of WSI:	Final 31.03.2017

INTRODUCTION

1.1 CH2M have received planning permission to extend the existing pumping station structures as the Foss Barrier as part of improvement works to the pumping facility. The planning condition requires a borehole evaluation to assess the deposit condition in the area to be piled in advance of construction.

1.2 This Written Scheme of Investigation (WSI) has been prepared in response to the planning condition compiled by the City of York Archaeologist:

No ground works shall commence until a Written Scheme of Investigation (WSI)has been submitted to and approved by the local planning authority in writing and the WSI carried out in accordance with the approved details.

The WSI shall be implemented as follows -

a) No boreholes shall be sunk until a Written Scheme of Investigation (WSI) has been submitted to and approved by the local planning authority in writing. The WSI should conform to standards set by the Chartered Institute for Archaeologists.

b) The site investigation and post investigation assessment shall be completed in accordance with the programme set out in the approved WSI and the provision made for analysis, publication and dissemination of results and archive deposition will be secured.

c) A copy of a report on the evaluation and an assessment of the impact of the proposed development on any of the archaeological remains identified in the evaluation shall be deposited with City of York Historic Environment Record to allow public dissemination of results within 6 weeks of completion (or such other period as may be agreed in writing with the Local Planning Authority).

d) Where archaeological features and deposits are identified proposals for the preservation in-situ, or for the investigation, recording and recovery of archaeological remains and the publishing of findings shall be submitted as an amendment to the original WSI. (There shall be a presumption in favour of preservation in-situ wherever feasible).

e) A copy of a report on the archaeological works detailed in Part d shall be deposited with City of York Historic Environment Record within 6 of completion (or such other period as may be agreed in writing with the Local Planning Authority).

Reason: The site lies within an Area of Archaeological Importance. An investigation is required prior to ground works to identify the presence and significance of archaeological features and deposits and ensure that archaeological features and deposits are either recorded or, if of national importance, preserved in-situ, in accordance with section 12 of the NPPF; in particular paragraphs 131 & 141.

1.3 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

2.1 The site is situated at the southern end of a spur of land to the north of the confluence of the rivers Ouse and Foss (Figure 1). To the immediate north of the site is St. George's Field car park, to the east is the River Foss, the Foss Barrier and pump house. The west of the site is bounded by a footpath, New Walk, which runs along the east bank of The River Ouse. New Walk is carried across the Foss at its junction with the Ouse by the Blue Bridge at the far southeast end of St. George's Field.

2.2 The ground surface at the site is level at c. 8.5m AOD.

2.3 The underlying geology consists of alluvial clay, silt, sand and gravel overlying sandstone of the Sherwood Sandstone Group (www.bgs.ac.uk, accessed 24/03/17).

DESIGNATIONS & CONSTRAINTS

3.1 The site lies with York's Area of Archaeological Importance as designated by the 1979 Scheduled Monuments and Archaeological Areas Act.

3.2 The evaluation boreholes have been located to achieve a comprehensive sample of the area to be piled in advance of construction. Obstructions within the sequence may require re-positioning or abandonment of some of these boreholes.

ARCHAEOLOGICAL INTEREST

The following was originally produced for the watching brief report on site investigation works at an earlier stage of the Foss Barrier works (Savine, YAT 2016/64)

4.1 Prehistory

Knowledge of prehistoric activity from this area is limited to the identification of alluvial deposits radiocarbon dated to the late Bronze Age (BC 1510 – BC 900) at the St George Fields pumping station (Hunter-Mann, 1994, 7). These deposits were identified at c.-1 - 0m AOD, some 8.5 - 9m below the current ground level.

4.2 Roman

The site lies 760m to the southeast to the Roman fortress in an area regarded as likely to have been marginal in the Roman period (Ottaway, 2011, 237). Late Roman burials had been recorded at York Castle in 1835 and again in 1956 (RCHMY 1, 67-8). These include three in stone sarcophagi, one in a lead coffin and two in wooden coffins (Ottaway, 2011, 198). There is the possibility that the cemetery continues into St. George's Field. Should this be the case parallels might be drawn with the setting of the Roman cemeteries at both 16 – 22 Coppergate and at Hungate. These share a similar position in the landscape close to the west bank of the River Foss (Kendall, 2016 in prep.) on marginal land.

4.3 Anglian

Anglian activity is very sparse in the area of St. George's Field, being evidenced only by antiquarian records of burials at Castle Yard, which may have produced 7th century hanging bowls (Tweddle, 1999, 172). Rather greater evidence for activity and settlement during this period has been found on the opposite (eastern) bank of the River Foss around Fishergate where evidence suggests the location of a 7th – 9th century trading settlement or wic (Kemp, 1996, 64).

4.4 Anglo-Scandinavian

Clifford Street lies c.550m southeast of Coppergate, where the extensive and well-preserved remains of 9th-11th century settlement were identified as Jorvik, the Viking-period settlement of York (Hall, 2014). Anglo-Scandinavian activity in the immediate vicinity is limited, although excavations on the site of St. George's Chapel highlighted the absence of alluvial deposits indicating that the area, only a short distance to the north of the current site, was dry land during the medieval period, if not earlier. Consequently the possibility of Anglo-Scandinavian activity on the site cannot be ruled out (Hunter-Mann, 1990, 20).

4.5 Medieval

Medieval archaeology at St. George's Field is likely to have been focussed on St. George's Chapel, documentary evidence and the excavations carried out by YAT in 1990 place the chapel approximately 150m to the north of the current site. The chapel had been established

by the 12th century. It was granted to the Knights Templar in 1246 where it stood on meadowland adjoining their mills (Pugh, 1961, 483). Following the suppression of that order it became a royal free chapel in 1311. By 1447 it was used by the Guild of St. George, from which the chapel and adjacent field takes its name (Hunter-Mann, 1990, 14).

4.6 Post Medieval

Following the suppression of the Guild of St. George in 1547 the chapel passed to the York Corporation. The chapel was largely demolished in 1566 with the stone work put towards the rebuilding of Ouse Bridge. From 1576 the site of the chapel was occupied by a timber building used until 1620 as a house of correction from which point it was converted into a workhouse (Hunter-Mann, 1990, 14).

4.7 Modern

Land to the south of the site of the former chapel was occupied from 1856 by public baths. St. George's Fields is thought to have been used for public recreation perhaps since early times and the site of the annual St. Georges Day celebrations (Raine, 1955, 198 – 200). In 1924 the Martinmas Fair was moved from Parliament Street to St. George's Field (Pugh, 1961, 483). In the 1960's the site became a car park. The Foss Barrier and associated pump house were constructed in 1986.

PREVIOUS INVESTIGATIONS: SITE INVESTIGATION WATCHING BRIEF YAT 2016/64

5.1 A watching brief was maintained during site investigation works in August-September 2016. The following sequence was observed:

5.2 Natural: natural deposits consisting of compact sands and gravels were observed at -1.7m AOD – 0.4m AOD.

5.3 Roman**:** a 1.5m – 2m thick deposit of wet silty sand containing Roman pottery was observed at 0m AOD – 1.7m AOD immediately north of the proposed new building. This deposit was observed to be deeper than any other archaeology identified during the watching brief and it was suggested this may represent a deep intrusive feature.

5.4 Undated alluvial deposits: layers of undated alluvial material containing organically surviving plant and wood remains were observed across the proposed development area at -0.65m AOD – 0.8m AOD, overlying the Roman deposit referred to above.

5.5 Medieval dumping: A c.2m thick layer of probable dumping or ground make-up deposits bearing medieval material overlay the alluvium referred to above. This phase was observed at c.1.5m AOD – c.3m AOD across the proposed development area except in an area approximately 40m north of the pumping station, where it was absent. This may imply a different land-use or a later intrusion; interestingly this would appear to 'cut off' the southern end of St George's Fields.

5.6 Medieval alluviation: An extensive series of alluvial deposits up to 5.5m thick sealed the medieval dumping and is therefore thought to represent accumulating riverine deposits throughout the medieval period. The upper surface was observed at c.6.5m AOD, and the

deposits in this phase were interspersed with occasional layers of charcoal, suggesting periodic but perhaps sporadic activity within the proposed development area.

5.7 Post-medieval alluvium**:** Alluvial deposits continued to accumulate into the post-medieval period, evidenced by pottery of this date being recovered from deposits between c.6.5m AOD – c.8m AOD across the site.

5.8 Modern surface: The uppermost 0.5m of deposits represent the make-up and surface of the current car park.

5.9 Summary: The extensive alluvial deposits are entirely consistent with the current understanding of this area's development. It is interesting to note medieval landscaping activity and Roman deposits beneath this alluvium, however, suggesting that the land use and accessibility have changed over time. The presence of organically preserved material at depth suggests that there is good potential in this area for detailed understanding of these changes.

PROPOSED DESIGN AND IMPACT ON ARCHAEOLOGICAL SEQUENCE

6.1 Foundation design

6.1.1 The proposed design comprises an extension to the current pumping complex measuring c.35m X 5m. This structure will be piled.

6.2 Impact of scheme on archaeological deposits

6.2.1 The potential archaeological impacts of the scheme relate to the potential for piling to disturb and interrupt potentially significant water-logged archaeological deposits through adversely altering the current hydrology or introducing contaminants into these deposits.

6.3 Evaluation of potentially significant and waterlogged organic deposits

6.3.1 Recently published Historic England guidance on *Preserving Archaeological Remains* (Historic England 2016) has informed the City of York condition to evaluate potential deeply buried, water-logged and organic deposits by borehole. In addition to conventional General Biological Analysis environmental sampling, specialist samples will be taken to assess the potential and condition of these deposits. The sampling strategy is detailed in sections 8 and 10.

AIMS OF BOREHOLE EVALUATION

7.1 The aims of this borehole evaluation are:

to determine the extent, condition and character of the deposits identified in the recent archaeological investigation as potentially containing waterlogged organic material

EVALUATION METHODOLOGY

8.1 The evaluation will comprise the following elements:

- 6 point borehole survey
- AMS dating of waterlogged deposits if suitable material is recovered (SUERC)
- Specialist assessment for environmental potential (YAT)
- Specialist assessment for environmental condition (GEOLABS)

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.

8.2 All six window sample boreholes will be drilled using a compact tracked rig. The location of all the boreholes is shown on Figure 2. It is possible that below ground constraints will result in the final location of boreholes varying from those proposed. In this case the boreholes will be placed where they are accessible and can offer the maximum amount of information to complete the aims of the project.

8.3 Where boreholes will be located using GPS survey equipment, all measurements will be accurate to +/-25mm. If this is not possible trench locations will be accurately plotted using an EDM Total station, or by measurement to local permanent features shown on published Ordnance Survey maps. All measurements will be accurate to +/-10cm, and locatable on a 1:2500 Ordnance Survey map. This is to ensure that the boreholes can be independently relocated in the event of future work.

8.4 The boreholes will use window sample cores to identify and refine the sequence already ascertained on the site by the previous borehole investigation (YAT 2016/64). The recording methodology is set out in Section 9. The aim is to locate the deposits already identified as being of organic potential and target the sample strategy on them.

8.5 When the potential organic deposits identified during previous works are reached, environmental samples will be taken for General Biological Analysis from the core and if present, suitable material will be sent for AMS dating (see Section 9 for Specialist Assessment).

8.6 When organic deposits are reached, 300mm long undisturbed samples will be recovered for further specialist assessment (Section 9).

RECORDING METHODOLOGY FOR BOREHOLE SURVEY

9.1 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 in the recent watching brief (YAT 2016/64).

9.2 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.

9.3 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.

9.4 All finds will be collected and handled following the guidance set out in the CIfA 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.

9.5 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.

SPECIALIST ASSESSMENT

10.1 The stratigraphic information, artefacts, soil 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.

10.2 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 produced. 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).

10.3 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.

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

10.5 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) and Environmental Archaeology: A Guide to the Theory and Practice of Methods from Sampling and Recovery to Post -Excavation 2nd Edition (English Heritage 2011).

10.6 General Biological Analysis (GBA) samples from the potential waterlogged organic deposits will be processed and assessed by specialist staff at YAT. 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.

10.7 If suitable material is identified within the GBA samples then it will 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.

10.8 Undisturbed samples of the organic deposits will be collected per borehole for further specialist assessment at Geolabs Ltd. 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 & ARCHIVE PREPARATION

11.1 Upon completion of the site work, a report will be prepared to include the following:

a) A non-technical summary of the results of the work.

b) An introduction which will include where possible the planning reference number, grid reference and dates when the fieldwork took place.

c) An account of the methodology and detailed results of the operation, describing structural data, archaeological features, associated finds and environmental data, and a conclusion and discussion.

d) A selection of photographs and drawings, including a detailed plan of the site accurately identifying the areas monitored and selected drawings where appropriate.

e) Specialist artefact and environmental reports where undertaken, and a context list/index.

f) Details of archive location and destination (with accession number, where known), together with a context list and catalogue of what is contained in that archive.

g) A copy of the key OASIS form details

h) Copies of the Brief and WSI

i) Additional photographic images may be supplied on a CDROM appended to the report

11.2 Copies of the report will be submitted to the commissioning body. A bound and digital copy of the report will be submitted direct to the City Archaeologist for planning purposes, and subsequently for inclusion into the HER.

11.3 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.

11.4 The owner of the Intellectual Property Rights (IPR) in the information and documentation arising from the work, would grant a licence to the Local Authority 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.

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

POST EXCAVATION ANALYSIS & PUBLICATION

12.1 The information contained in the evaluation report will enable decisions to be taken regarding the future treatment of the archaeology of the development site and any material recovered during the evaluation.

12.2 If further archaeological investigations (mitigation) take place, any further analyses (as recommended by the specialists, and following agreement with City of York Archaeologist) may be incorporated into the post-excavation stage of the mitigation programme unless such analysis are required to provide information to enable a suitable mitigation strategy to be devised. Such analysis will form a new piece of work to be commissioned.

12.3 In the event that no further fieldwork takes place on the site, a full programme of post excavation analysis and publication of artefactual and scientific material from the evaluation may be required by City of York Archaeologist. Where this is required, this work will be a new piece of work to be commissioned.

12.4 If further site works do not take place, allowance will be made for the preparation and publication in a local and/or national journal of a short summary on the results of the evaluation and of the location and material held within the site archive.

HEALTH AND SAFETY

13.1 Health and safety issues will take priority over archaeological matters and all archaeologists will comply with relevant Health and Safety Legislation.

13.2 A Risk Assessment will be prepared prior to the start of site works.

PUBLIC ENGAGEMENT

14.1 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.

14.2 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.

14.3 Public engagement will only take place with the permission of the client.

PRE-START REQUIREMENTS

15.1 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.

15.2 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.

15.3 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.

REINSTATEMENT

16.1 The boreholes will be backfilled with the arisings.

16.2 YAT is not responsible for the reinstatement of the car park surface.

TIMETABLE & STAFFING

17.1 The survey is proposed to commence post-determination of the application at a time to be agreed with the client.

17.2 Specialist staff available for this work are as follows:

Palaeoenvironmental remains –Palaeoecology Research Services / University of Sheffield/YAT facilities at Trent and Peak, Nottingham as available

Conservation and assessment of organic deposits – Ian Panter

Head of Curatorial Services - Christine McDonnell

Finds Researcher - Nicky Rogers

Pottery Researcher - Anne Jenner

Finds Officers – Nienke Van Doorn

MONITORING OF ARCHAEOLOGICAL FIELDWORK

18.1 As a minimum requirement, the City of York Archaeologist 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 and to discuss the requirement any further phases of archaeological work. York Archaeological Trust will notify City of York Archaeologist 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 City of York Archaeologist.

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KEY REFERENCES

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See also the Historic England website for current guidance documents:

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

FIGURES

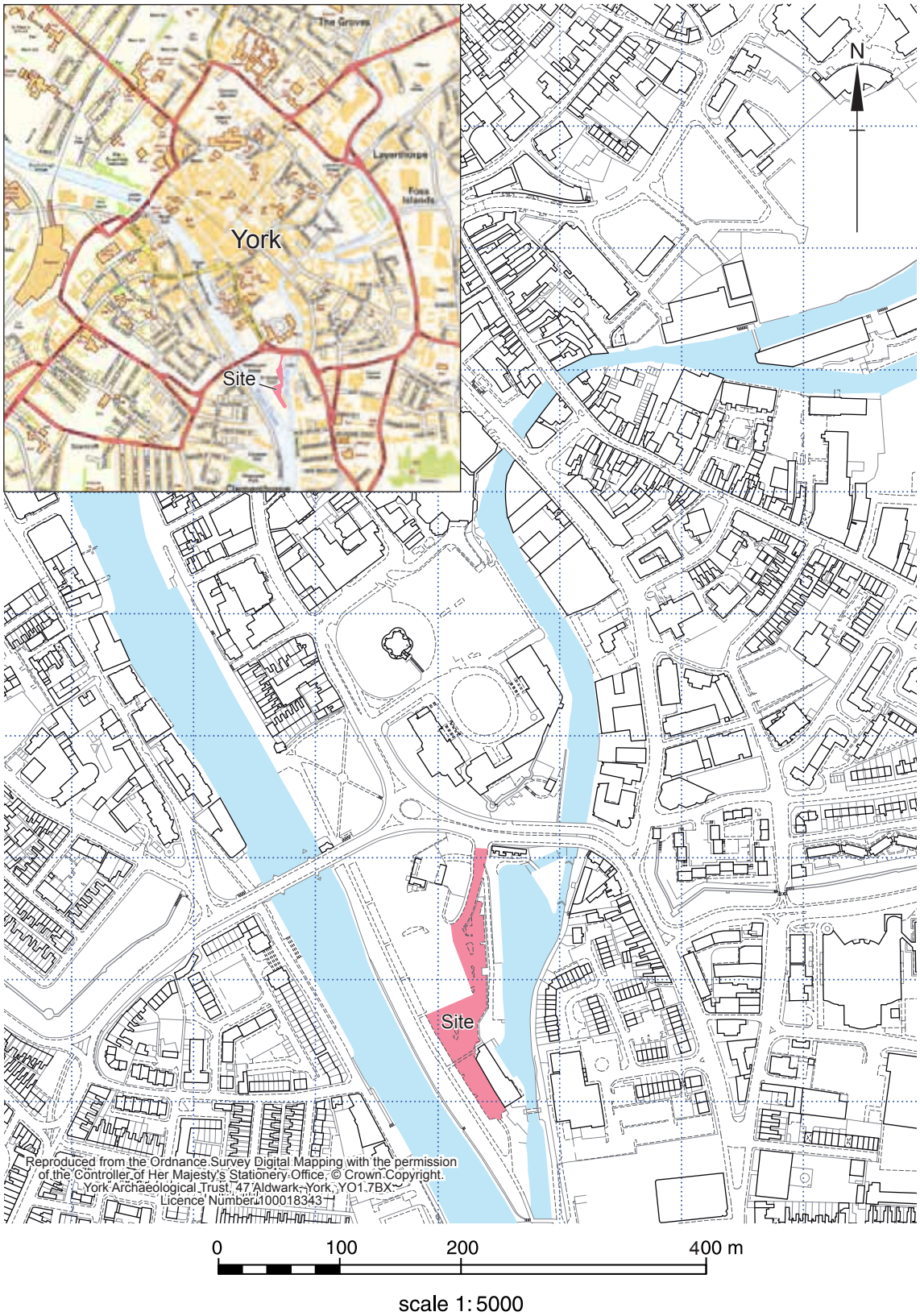

Fig. 1 Site Location

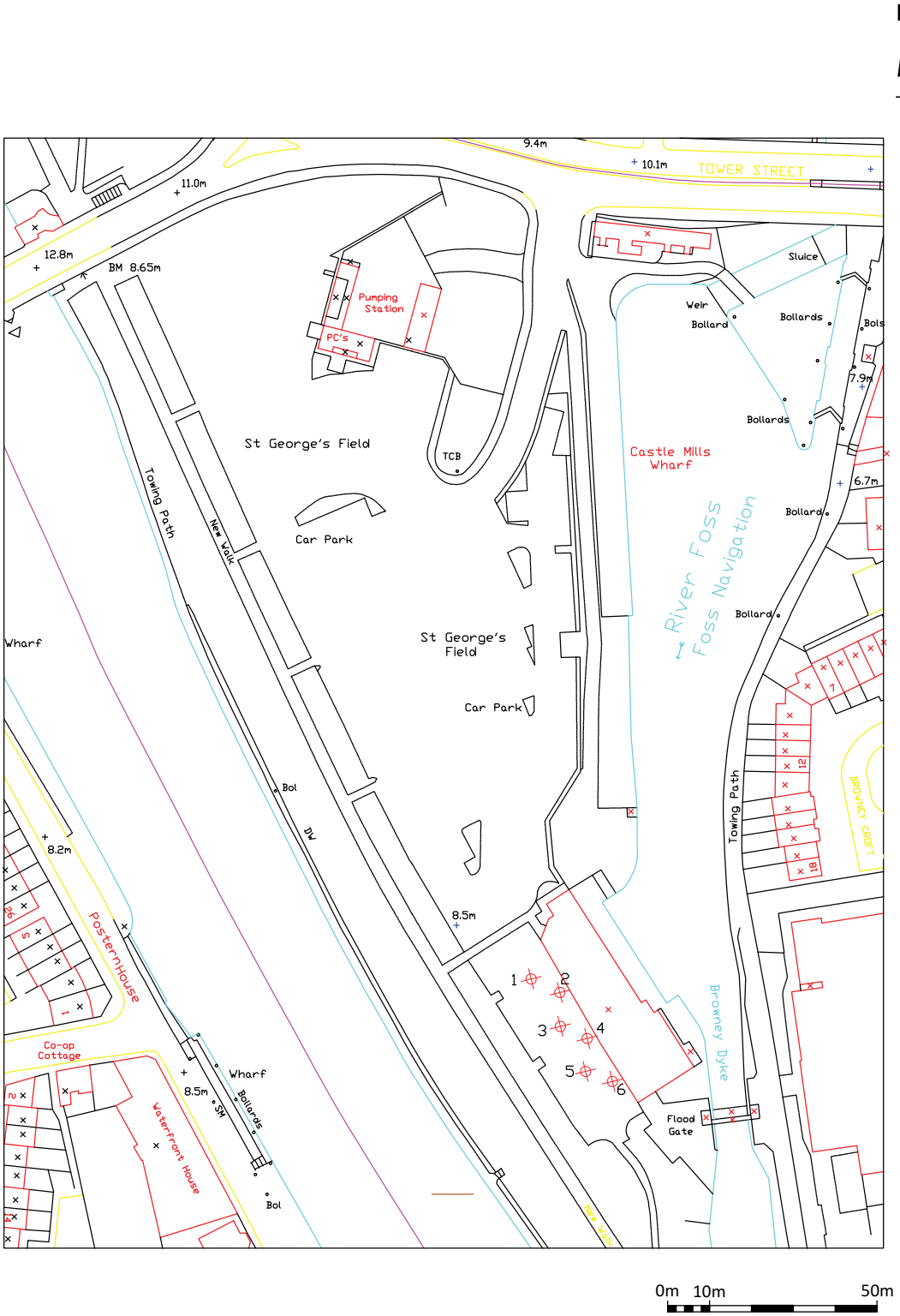

Figure 2 Location of boreholes (indicative scale only)

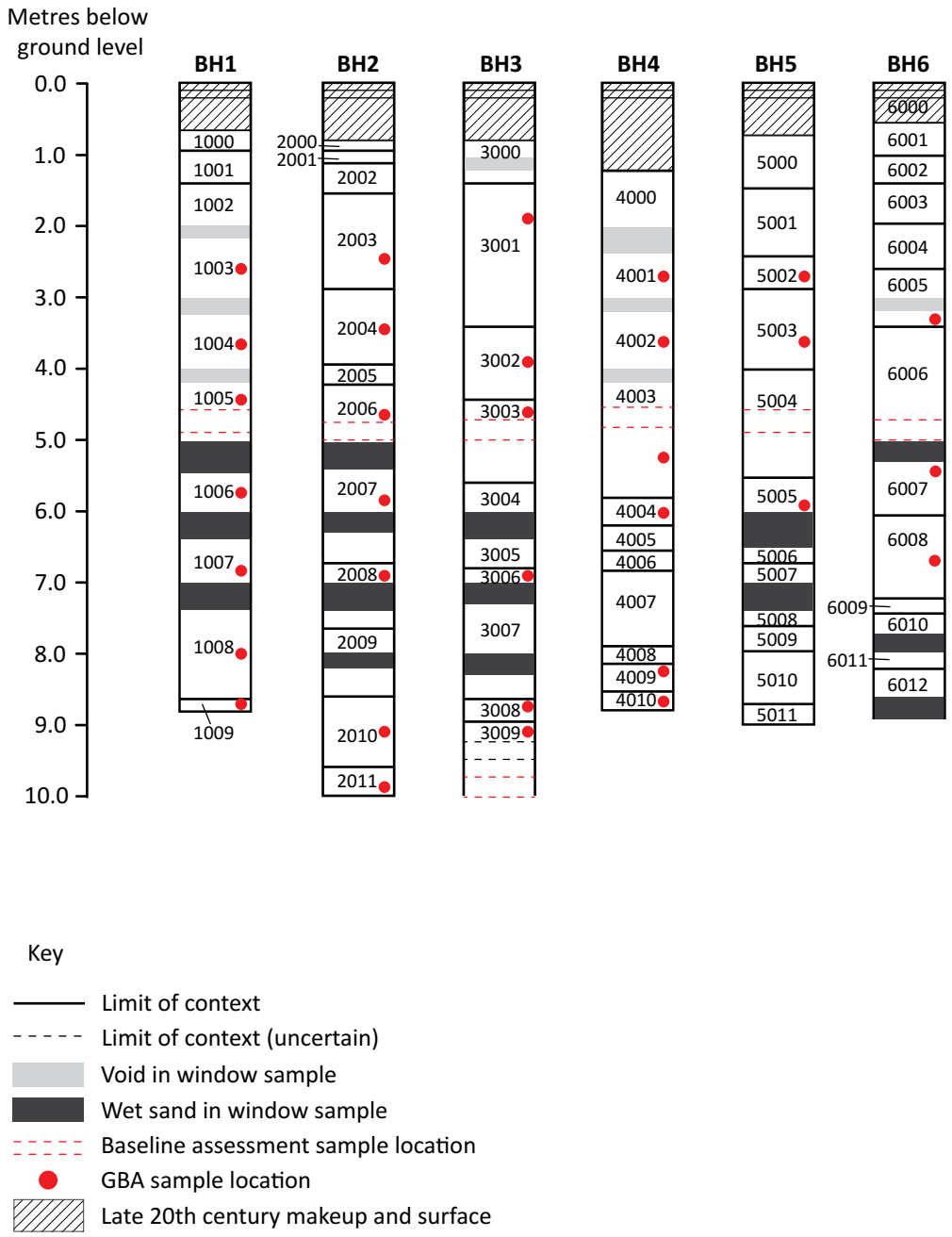

Fig. 3 Borehole Profiles

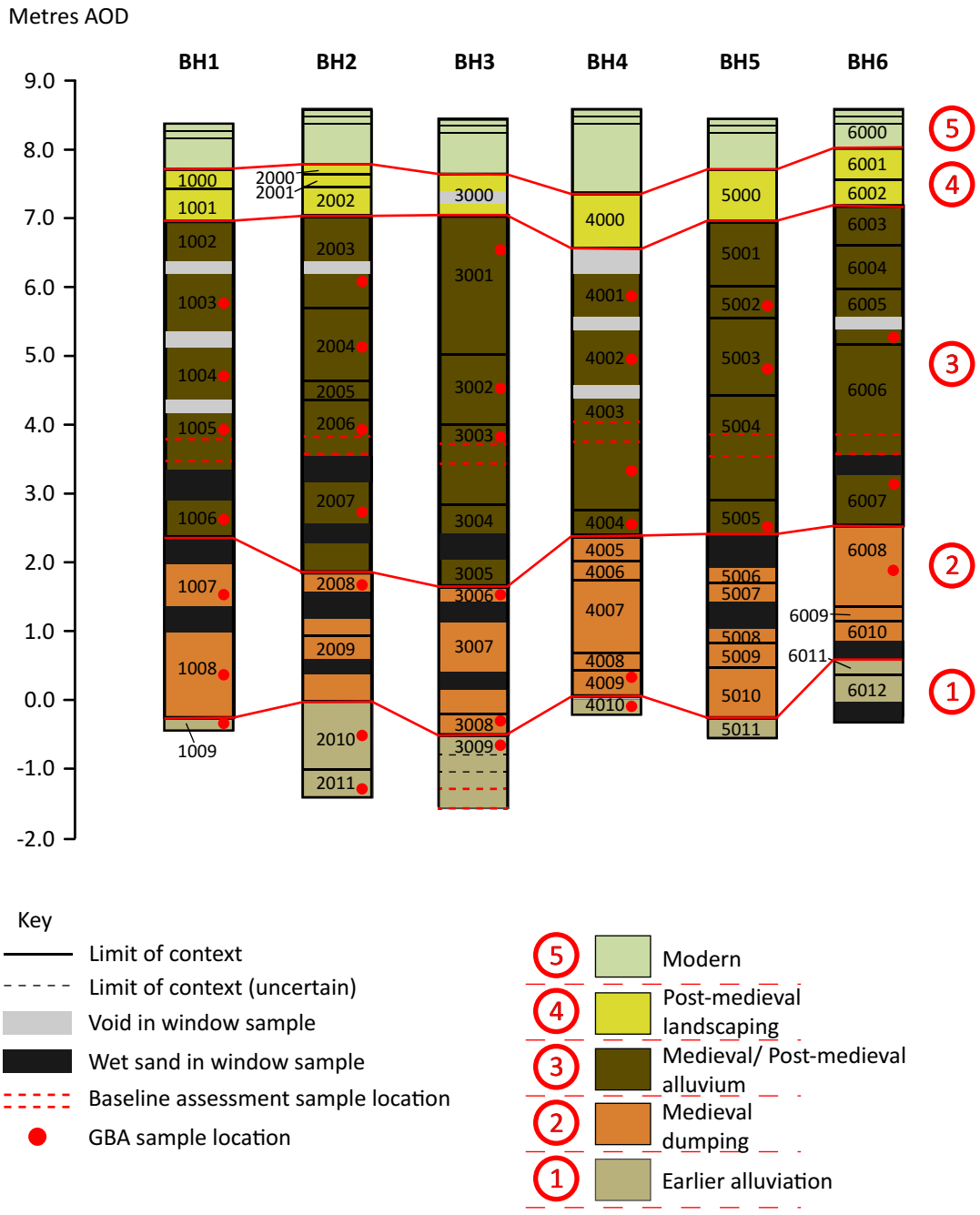

Fig. 4 Deposit Model