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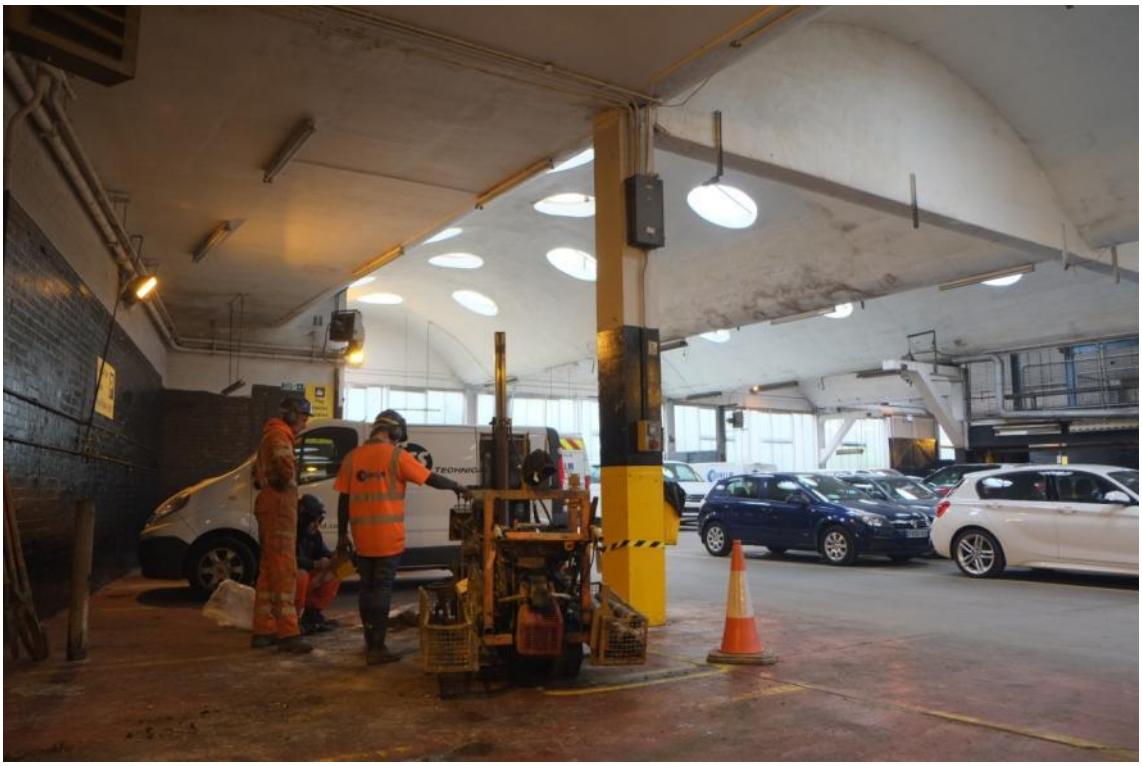

ARCHAEOLOGICAL BOREHOLE INVESTIGATIONS AT 47–50 PICCADILLY, YORK

By Ben Reeves

BOREHOLE EVALUATION REPORT

Report Number 2017/89 October 2017

YORK ARCHAEOLOGICAL TRUST

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

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

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

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Abbreviations

OD	**Ordnance Datum**
BPGL	**Below Present Ground Level**
PGL	**Present Ground Level**
YAT	**York Archaeological Trust**

HE	**Historic England**
HTAY	**Historic Towns Atlas York**
RCHME/Y	**Royal Commission on the Historic Monuments of England/York**

NON-TECHNICAL SUMMARY

Archaeological monitoring of window sample boreholes was undertaken by York Archaeological Trust between March 29 and April 4 at the NCP Car Park 47–50, Piccadilly, York (NGR SE 6061 5153) (Figure 1). Eight boreholes were undertaken by Dunelm Ltd using a lightweight windowless dynamic drilling rig, on behalf of Northminster Ltd. The site lies within an area of known archaeological importance on the eastern bank of the River Ouse where evaluation excavations have previously recovered evidence for multi-period occupation and waterlogged organic archaeological preservation.

Samples were sent to Geolabs Ltd for geotechnical testing to assess the permeability and porosity of a small selection of sediment cores. General Biological Samples were sent to Palaeoecology Services Ltd for assessment.

KEY PROJECT INFORMATION

Project Name	Borehole Survey at 47–50 Piccadilly
YAT Project No.	5973
Document Number	e.g. 2017/59
Type of Project	Borehole Evaluation
Client	Northminster Ltd
Planning Application No.	N/A
NGR	SE 6061 5153
Museum Accession No.	N/A
OASIS Identifier	TBC

REPORT INFORMATION

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1 INTRODUCTION

Between March 29 and April 4, YAT archaeologists monitored eight boreholes carried out at the NCP Car Park 47–50 Piccadilly by Dunelm Ltd on behalf of Northminster Ltd. The purpose of the borehole evaluation was twofold: to gather geotechnical and groundwater monitoring for structural engineering purposes; to record, sample and assess the archaeological deposition and preservation and to put in place water level monitoring installations for archaeological purposes. An earlier version of this report, YAT Report 2017/59, version 3 (issued 13/07/17) provided an assessment of the deposition and state of preservation based on observations from the borehole monitoring and an analysis of a set of deposit samples in the context of new HE guidelines on preserving archaeological remains (HE 2016). This document, YAT Report Number 2017/89 version 2 (issued 03/11/17) is updated to include the results and analysis of regular water level monitoring carried out by YAT over a period of six months since the placement of the aforementioned monitoring installations.

2 METHODOLOGY

The borehole locations were intended to provide maximum coverage and provide comparative profiles as broadly as possible across the site (Figure 2). Borehole locations were chosen to avoid below-ground services, as well as underground installations such as fuel tanks, relating to the original use of the site as a motor garage. Their positions were also limited to an extent by consideration of the internal roof heights and the active use of the property as an NCP car park.

The contents of each 1m sleeve, once extracted from the borehole, were carefully laid out in succession on the car park floor by the Dunelm rig team so that the deposit sequence could be recorded and samples taken. When a porosity sample was required by the archaeologist the extracted sleeve was left intact and a 0.3m–1m section, with its ends sealed with plastic and duct tape to prevent drying out, was retained for specialist laboratory analysis. The porosity analysis was undertaken by Geolabs Ltd. The results are discussed by Ian Panter, head of YAT Conservation laboratory (and co-author of the 2016 HE guidelines on archaeological preservation) in Appendix 4 of this report and the tabulated data is provided in Appendix 5.

Depths of deposits were recorded from the cylindrical shaped extracted deposits. Occasionally an obstruction caused a void in the sample sequence that may affect the accuracy of the recorded sequence. All voids were recorded in the borehole logs (see Figure 3). Any measurements given must be taken as a guide and cannot be taken as precise or accurate. Heights in relation to the Ordnance Datum (OD) were calculated from depths below present ground level (BPGL) recorded from the extracted deposits and as far as possible are here given in relation to the nearest OD height taken from COG Architecture Drawing 262(PL)003.

During the initial sample assessment by PRS, hydrocarbon contamination was recorded in boreholes 5, 6 and 7, which resulted in some cores and samples not being processed further.

Borehole 2 and 3, in the northern half of the development, encountered concrete obstructions at approximately 2m BGL / 7.85m OD that prevented further coring. These were interpreted as relating to the foundations of the current building. Borehole 5, in the southern part of the

development, encountered an obstruction at around 3–4m BGL / 6.87–5.87m OD that was thought to be a cobble. This may have fallen into the borehole from higher up during drilling, or could relate to *in situ* nineteenth century structures known to have been present on this site.

3 LOCATION, GEOLOGY & TOPOGRAPHY

The site lies on the east bank of the River Foss approximately 0.6km north of its confluence with the River Ouse. The underlying solid geology of the site is sandstone of the Sherwood Sandstone Group with superficial deposits of alluvial silt, clay, sand and gravel (http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

The site occupies land which has been altered by human agency since the Roman period, the ground level having been built up by around 8m from that of the underlying glacial moraine. The site lies on the edge of an area that was submerged after the Conquest by the damming of the river Foss to feed the Norman castle, known today as Clifford's Tower, which is situated on the opposite bank of the river. Present ground level (PGL) is at around 10m OD with a gentle slope of around 1m towards the river on the west side of the site.

4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The Piccadilly area has been subject to numerous archaeological interventions since the 1980s. In this section, taken from YAT Report 2016/85 (Reeves 2016), a brief overview is given of the current knowledge based on various sources to provide context for the 46–50 Piccadilly site.

4.1 The topography and regime of the River Foss

The importance of York's waterfronts and their potential to provide information about areas of the city once the focus for trade and commerce has long been recognised. The work of York Archaeological Trust since 1972 has shown that excavation of waterfront sites can reveal evidence for 'the economic basis of the city's life throughout its history' (Addyman et. al. 1988, 1). During the extensive 1981–2 watching brief on the area now occupied by the Coppergate Centre on the west bank of the River Foss the ancient course of the river was found along with revetments, installations, ship fragments, and traces of the water defences of York Castle. Further excavations at the site of the former ABC Cinema, 22 Piccadilly, defined an earlier river channel and associated 11th-century riverside revetments (Addyman et. al. 1988, 8).

The 46–50 Piccadilly site is situated on ground at the confluence of the Rivers Ouse and Foss close to the point where these rivers penetrate the York Moraine. The historic fluvial morphology of the lower River Foss is not well understood. What little information there is comes from bore-hole records and excavations carried out along the south-west side of Piccadilly, Coppergate and more recently the Hungate area: all of which demonstrate a complex landscape morphology which is the product of both natural geological processes and large-scale alterations caused by human agency throughout historic periods.

Evidence from the Walmgate and Piccadilly areas, largely derived from small-scale keyhole excavations carried out by YAT in the early 1990s, has provided valuable evidence about the topographical development of the River Foss and its waterfront areas.

Walmgate occupies a ridge of high ground leading to the crossing point of the Foss at Foss Bridge. The top of natural glacial deposits identified at 31 Walmgate on the street frontage was at depths between 9.92m OD to 9.60m OD (Robinson 2013, 6–7, 15).

To the east of this ridge the archaeological evidence from the proposal site and adjacent sites shows that the ground level on the eastern Foss bank has been increased considerably since the Roman period through land reclamation. At 17–21 Piccadilly, approximately 25m north of the proposal site, the natural slope towards the Foss was identified between 4.5m BPGL (approximately 5.5m OD) at the south end of the site to 7.6m BPGL (Approximately 2.4m OD) at the northern end (Lilley 1991, 2). At 50 Piccadilly natural was identified at 1.2m OD and a borehole watching brief at 38 Piccadilly identified natural at approximately 9m BPGL –a depth of approximately 1.65m OD. The slope across the same area today is only around 1.6m (YAT Gazetteer 613; Gajos 2013, 7).

4.2 Prehistoric

Prehistoric remains from York are scarce, amounting to a small number of casual finds since the 19th century, mainly from the south-west of the River Ouse and a small number of undated but possibly pre-Roman features (Wellbeloved 1862, 61–3; Radley 1974, 10–4; Hall 1996, 25). However, evidence is increasingly being found for Bronze Age and Iron Age activity focused on the York Moraine, particularly to the east of the city. Closest of these discoveries, found at 25 Lawrence Street some 0.6km to the east of Piccadilly, was a Bronze Age cremation urn discovered in 2007 (Reeves forthcoming) and an assemblage of Neolithic flint tools consistent with occupation recovered from recent excavations at Hungate (Kendall 2009, 175) some 0.35km to the north of the site both within the lower Foss. Considerable evidence for late Neolithic and Bronze Age occupation comes from further east on the moraine such as the recent discoveries in the Heslington area, approximately 3.5km to the east of the city, made during the expansion of the University of York (Antoni, Johnson and McComish 2009).

Prehistoric water levels at the site of 46–50 Piccadilly would have fluctuated in tandem with those of the tidal Ouse (Briden 1997, 170; Duckham 1967, 17). The resulting complex marshland ecosystem was likely a place of significance and a valuable subsistence resource to local populations (Whyman and Howard 2005, 14). Although it is unlikely, there may be evidence for prehistoric activity preserved at 46–50 Piccadilly, its location and the waterlogged nature of the buried deposits in the area could hold potential for valuable information about fluvial landscape morphology and environment during this period.

4.3 Roman

The site is approximately 450m south-east of the south-east corner of the Roman fortress founded in AD 71. Although the archaeological evidence for Roman activity in the area to the south-east of the River Foss is relatively sparse compared to the fortress area the area seems to have been utilised throughout the Roman period (McComish 2007).

Roman Road 1a, leading to *Eboracum* from *Throlam* near Holme-on-Spalding-Moor is thought to have converged with the Road 1b, a minor road from the south, some 150m to the south east of the 46-50 Piccadilly site. Roads 1a and 2, from *Petuaria* (Brough-on-Humber) are

thought to have converged approximately 30m north of 46–50 Piccadilly (RCHMY I, 2; Ottaway 2004, 12; Ottaway 2015, 9; HTAY 2015, Sheet F). Roman burials were discovered sometime before 2007 by Malton Archaeological Partnership immediately south of Dixon Lane (McComish 2007). A Roman Altar dedicated to the native god Arciaco was found at St Denys Church on Walmgate and two other coffined Roman burials were found nearby (RCHMY 1, 69–70, 118; HTAY 2015, Sheet F).

Evidence for Roman use of the Foss as a navigation comes from 1951–52 excavations for the construction of the Telephone Exchange building in Garden Place, Hungate, where walls and piles interpreted as a Roman wharf and the buried former course of the river were discovered (RCHMY I, 64). In the Piccadilly area, evidence for riverbank activity on the east bank of the Foss comes from excavations at numbers 38, 40 and 50 Piccadilly (Appendix 2). A line of stone pillars beneath the Tax Offices on Piccadilly was interpreted as possible evidence for a Roman riverside jetty (Ottaway 1993, 69).

Furthermore, excavations at 38 and 50 Piccadilly suggest there was significant occupation and river front land use during the late 2nd–3rd centuries in the vicinity of the site comprising evidence for management of the riverside, dumped occupation material including domestic pottery and evidence of possible industrial activity.

4.4 Anglian

Evidence for Anglian period York is generally elusive and what has been recovered to date is sparsely distributed across the city. Excavated sites and the distribution of find spots suggests that settlement at York was polyfocal with distinct nuclei spread out across the former Roman fortress and colonia, interspersed with cultivated or waste areas (AY 7/2, 298; Palliser 2014, 37). As yet, no evidence has been found for wharves or intensive occupation, however, evidence from sites along the course of the River Foss suggests occupation and other activity along the river bank. A number of Anglian pot sherds have been recovered from Hungate (AY 7/2, 196; YAT forthcoming) and the Haymarket excavations (Reeves forthcoming), at 22 Piccadilly Anglian pottery, probably of early–mid 9th century date was recovered from two trenches, one of which was associated with a wicker fence running parallel to the river. Silt accumulations above these levels indicate the area was prone to flooding. Further evidence came from 38 Piccadilly where a sherd of Badorf ware was recovered from some 8m below modern street level beneath a substantial accumulation of probable 11th-century alluvial silt. At 17–21 Piccadilly a 9th century relief-band amphora fragment was recovered from around 5m below the modern street level at around 5.7m OD (AY 7/2, 196–197)

The site, 46–50 Piccadilly, is close to one of the most important Anglian period sites so far excavated in York, 46–54 Fishergate (AY 7/1). The majority of the evidence for Anglian activity elsewhere in the city comes from artefacts which may be the result of casual losses through transient activity and may not necessarily be convincing evidence of occupation. However, evidence from the 1985–6 excavation at the former Redfearn National Glass works, 46–54 Fishergate, some 0.4km to the south of 46–50 Piccadilly, provides evidence of an important production and trading centre, or *wic,* occupying an area of around 2,500m² sited on the lower east bank of the River Foss, directly opposite the point of confluence with the River Ouse (AY 7/1). This 7th–late 9th century settlement apparently began as a well organised, probably

planned, settlement rather than one that developed organically to exploit the natural communications provided by the rivers and the east–west land route of the York Moraine.

More recent excavations at the former Mecca Bingo and Blue Bridge Lane area a little further south from Fishergate have produced further evidence of Anglian period pit groups and occupation (Spall and Toop 2011, 7). Excavation carried out at the junction of Dixon's Lane/George Street in 2006 discovered further evidence for activity possibly associated with the *wic* approximately 100m to the east of 46–50 Piccadilly (AYW 9, McComish 2007). Based on current archaeological evidence the 46–50 Piccadilly site lies just to the north-west of the possible Anglian settlement (Palliser 2014, 24).

4.5 Anglo-Scandinavian

The site lies within an extensive area of Anglo-Scandinavian activity to the south-east of the former Roman fortress. It has been suggested that the Anglian period *wic* at Fishergate was in decline by the 860s–870s and was replaced at around this time by occupation around the Ousegate/Coppergate area (AY 8/4, 299–304). However, evidence found in 2007 for craft and trade activity at Dixon Lane/George Street, located midway between the Fishergate and Coppergate/Ousegate areas, suggests a wider spatial continuity between the Anglian *wic* and the Anglo-Scandinavian settlement in the late 9th–10th centuries (AYW 8). Evidence for Anglo-Scandinavian activity from YAT excavations at 118–126, 76–82 and 104–112 Walmgate suggests that Walmgate became an important thoroughfare in the burgeoning 9th and 10th - century town and a substantial suburb developed in the area. The nearby churches of St Stephen, Fishergate and St Denys, Walmgate are thought likely of pre-Conquest origins. A number of sites along Piccadilly have revealed traces of Anglo-Scandinavian activity such as bone working evidence from excavations at 38, 50, and 84 Piccadilly (AY 8/4,469–472).

4.6 Medieval

The landscape of the River Foss was drastically altered by the damming of the southern end of the river at Castle Mills by William the Conqueror to exploit its waters to feed the moat of the Norman castle at York (VCHY 1961, 509–510). The resulting body of water was called the *Stagnum Regis,* the King's pool. The dam of the Fishpool of the Foss probably provided a causeway across the Foss at the site of the modern Castle Mills Bridge. The first documentary evidence for a bridge at Castle Mills is not until 1585 and the structure was destroyed during the Siege of 1644 (VCHY 1966, 519–520; Raine 1955, 196). Cartographic evidence, as well as evidence from the excavations at 38 and 84 Piccadilly show that the area which now forms the west side of Piccadilly was largely flooded by the creation of the Fishpool and remained so for much of the late medieval period, during which time the King's Fishpool gradually silted up and some of the land formerly flooded reclaimed. The series of maps reproduced in Figures 6 and 13 and historic maps Figures 7–9 show the areas flooded based on archaeological and cartographic sources and the gradual change in area taken up by the King's Pool during the early modern period.

The Walmgate sector of the city was enclosed with defences in the late 12th century (RCHMY 2, 11; HTAY 2015, 31). Fishergate Postern, 0.2km to the south was built sometime in the 14th century (Raine 1955, 20).

Cartographic evidence suggests that 46–50 Piccadilly was at the riverside edge of gardens to the rear of properties fronting onto Walmgate during this period and the archaeological evidence discussed further in Section 6 of this report indicates that waste was dumped along the riverside where there were perhaps jetties or revetments designed to consolidate and reclaim land from the river.

4.7 Post-medieval

Canalisation of the River Foss began in the late 18th century, the first stretch from Castle Mills to Monk Bridge being opened in 1794. It was continued to Sheriff Hutton in 1801. Factories and Warehouses at Hungate were still accessible via the Foss Navigation until the 1960s even though its use as a navigation was in decline. In recent decades the remaining light industry has relocated, making way for largely residential development (VCHY 1961, 475; Fife and Walls 1981, 23–25; YAT forthcoming).

The modern street named Piccadilly runs from Pavement across the River Foss and along its east bank to the east end of Castle Mills Bridge. A lane or open space existed at the south end by 1610 and was widened and re-named Piccadilly after the London Street c. 1840. It was extended north to Pavement in 1912 (RCHMY 5, 199).

Much of the street is built over land that was formerly covered by the Kings Pool of the River Foss. The gradual development of the post-medieval landscape can be traced through the historic maps of which there is a sequence available dating from the 17th century. On Speed's map of 1610 the site is depicted as open ground

Richards' map of 1685 which is largely a copy of an earlier map by Captain James Archer(surveyed 1673 and published 1682; not reproduced), shows open ground, presumably used for commercial horticulture with property boundaries and a path or street leading from Walmgate to the east bank of the River Foss. The distinction between streets built-up with houses, and lesser pathways without on these early maps is unclear. Their exact location and orientation in relation to the modern landscape is also difficult to determine with complete accuracy but it seems there has, for a considerable time, been some form of access to the east bank of the Foss from Walmgate and the north side of St Denys' church yard.

By 1750, the publication date of Chassereau's map, the area around St Denys' church is largely built-up, the path leading to the east bank of the Foss is no longer shown and a new path or street leading south towards the Castle Mills Bridge area is indicated, forming the predecessor to the modern southern end of Piccadilly.

4.8 Modern

Hargrove's map of 1818 appears to differentiate between probable horticultural land to the north-west and west of St Denys' church and what appears to be open ground to the south-west. The line of the path running south towards Fishergate Postern from the west end of the

churchyard is in Hargrove's map delineated with a dashed line, possibly indicating it was of lesser status than other lanes shown further to the east. The 1852 Ordnance Survey map shows the path widened and formalised after the creation of Piccadilly.

By 1852 St Denys' Street had been extended along a line to the south-west with a slight dog-leg and is shown as a built-up street of terraced houses. The properties on the north side of the street appear to be small houses with yards and those on the south appear to be back-to-back houses. Walmgate was a notorious area in the 19th century associated with poverty, crime and prostitution. A block of terraced dwellings, immediately south-west of St Denys' Church, were known as Plow's Rectory Buildings. Finnegan describes these as an unwholesome terrace amongst which there were a small number of 'houses of ill fame' such as 'Todds' and 'Mrs Varley's'. Several diseased and destitute prostitutes entered the work house from this address (Finnegan 1979, 54–55).

In the 19th-century the terraced houses of St Denys' Street ran from Walmgate to the south-west across the 46–50 Piccadilly site almost towards the bank of the River Foss. A search of City of York Council 'Imagine York' images archive returned only 1, relatively uninformative, photograph of the east corner of St Denys Street at its junction with Walmgate taken in c. 1933. The eastern end of the street appears to follow a property boundary or thoroughfare running south-west from Walmgate along the north side of St Denys' church, a route that can be traced in the historic maps as far back as Speed's map of 1610.

The buildings on Piccadilly are predominantly of 20th century date consisting of a number of former garages, warehouses, offices and retail shops with some residential flats and a large hotel at the Castle Mills end of the street. A terrace of four small houses (numbers 41, 43, 45) built shortly before 1850 is recorded by the Royal Commission as having been demolished before 1961 and the former White Swan Hotel (now Pavement Vaults and residential flats) at the northernmost end of the street incorporates partial remains of a three-storey mid-18th -century house (RCHMY 5, 199).

Number 46–50 Piccadilly was built as a motor garage in 1955 and evidence of this former use is present in both the internal layout of the building and surviving fixtures and fittings.

5 RESULTS

The eight boreholes were assigned context numbers corresponding to their designation (Borehole 1 was designated context 1000 onwards, Borehole 2 was given context 2000 onwards etc.). These contexts were then allocated to phase of activity across the site (Section 5.1 and Figure 3). It must be noted however, that in the absence of datable artefacts from the boreholes the phase designations are based only on the broad impression gained from experienced observation of the deposits by the attendant archaeologist.

Full descriptions of these deposits and their phase designations can be found in the context table which forms Appendix 2 of this report.

Below-ground obstructions prevented boreholes 2, 3, 5, 8 from being completed. A depth of 5 metres BPGL was reached in Borehole 8 and some useful data was recovered. However

Boreholes 2 and 3 had to be abandoned having penetrated less than 2m BPGL and Borehole 5 having reached only 4m.

Height of present ground level (PGL) is given at the beginning of each borehole summary. A graphic representation of the recorded sequence in each borehole is given in Figure 3. The Ordnance Datum (OD) height values at the tops of all eight boreholes were within 110mm of each other, ranging from 9.80m OD to 9.91 demonstrating that the ground surface is relatively level across the site. Any discussion, therefore, between levels 'below present ground level' in different boreholes can be taken as broadly comparable.

5.1 Borehole 1

Borehole 1 (Figures 2 and 3; Plate 1) was monitored on 29.03.17. Ground level on the concrete car park ground surface at the time of recording was approximately 9.91m OD. Four samples were processed from Borehole 1 (Contexts 1006–1008 and 1010). These are discussed by John Carrot of PRS in detail in Appendix 3.

Phase 1 natural

Natural glacial deposits were identified at around 7.8m BPGL (2.11m OD) (Context 1013).

Phase 2 Roman

Deposits 1011 and 1012, between 7.8m BPGL and 6.3m BPGL (2.11m OD–3.61m OD), were quite clean and bright in colour similar to natural glacial deposits, and although no obvious signs of human activity were visible in these layers they are thought to be of possible Roman date.

Further possible Roman deposition was observed at a depth of between 6–5.5 BPGL (3.91m OD–4.41m OD) (Contexts 1008–1010) Context 1010 contained Roman brick (not retained). Context 1008 was sampled for geotechnical permeability testing (discussed in Appendices 4 and 5).

Phase 3 Early–late Medieval

A series of wetter and darker grey deposits representing probable medieval deposition from a depth of 5.5m–3.8m BPGL (4.41m OD–6.11m OD) (Contexts 1004–1007). Context 1007 was noted for its organic content.

Phase 4 Post-medieval

Post-medieval deposition consisted of a clayey layer between 3.8m and 2m BPGL (6.11m OD and 7.91m OD) (Contexts 1002–1003).

Phase 5 Modern

Modern deposits were observed from the ground surface down to a depth of at least 2m BPGL (7.91m OD) (Contexts 1000–1001).

5.2 Borehole 2

Borehole 2 (Figures 2 and 3) was monitored on 03.04.17. The ground level of the concrete car park ground surface at the time of recording was approximately 9.88m OD.

Borehole 2 was abandoned when, having reached a depth of less than 2m, it encountered an obstruction. This was identified as probable concrete and interpreted as relating to the foundations or other sub-surface structures of the current building.

5.3 Borehole 3

Borehole 3 (Figures 2 and 3) was monitored on 03.04.17. The ground level of the concrete car park ground surface at the time of recording was approximately 9.80m OD.

Borehole 3 was abandoned having reached a depth of less than 2m, when an obstruction prevented further drilling. This was identified as probable concrete and interpreted as relating to the foundations or other sub-surface structures of the current building.

5.4 Borehole 4

Monitored on 31.03.17, the ground level of the concrete car park ground surface at the time of recording was approximately 9.84m OD. One sample was processed from Borehole 4 (Context 4007). The results are discussed by John Carrot in detail in Appendix 3.

Phase 1 Natural

Natural was not reached, and borehole 4 had to be abandoned as the low roof height restricted the extension of the drilling rig.

Phase 2 Roman

No definitively Roman deposits were identified.

Phase 3 Early–Late medieval

Deposits 4007–4005. The deepest deposit recorded in Borehole 4 was 4007, a very wet but compacted black organic-rich silt. No dating evidence was recovered. The lower level of this deposit, at around 7m BPGL (2.84m OD) was so wet as to be loose in the sleeve. Overlaying 4007 was a series of dark organic silts and silty clays (Contexts 4006 and 4005).

Phase 4 post-medieval

The probable post-medieval deposition in borehole 4 consisted of context 4004, a firm dark brown-grey silty lay with occasional CBM and mortar fragments between 3m and 2.2m BPGL (6.84–7.64m OD)

Phase 5 Modern

Modern deposits lay between 2m BPGL (7.84m OD) and the concrete floor of the car park and consisted mainly of ground make-up and concrete overlaying a deposit of firm brownish grey clay with occasional CBM fragments.

5.5 Borehole 5

Monitored on 04.04.17, the ground level of the concrete car park ground surface at the time of recording was approximately 9.87m OD.

Borehole 5 was abandoned when, having reached a depth of less than 4m, it encountered an obstruction. This was possibly caused by rubble from upper deposits falling into the borehole, but may also relate to nineteenth century structures known to have been present in this area. Between 3m and 4m BGL, slight hydrocarbon contamination was reported by PRS during the environmental assessment from context 5001. Samples from this context were not processed further.

5.6 Borehole 6

Monitored on 30.03.17, the ground level of the concrete car park ground surface at the time of recording was approximately 9.90m OD (Plate 2). Two samples were processed from Borehole 6 (Contexts 6008 and 6009). These are discussed in detail by John Carrott in Appendix 3.

Phase 1 Natural

Natural was not encountered by the time the rig had reached a depth of 8m BPGL below which depth no further cores were extracted.

Phase 2 Roman

A small quantity of opus signinum and preserved wood fragments [observed but not retained] suggest Roman activity in the vicinity, however, no deposits of certain Roman date could be positively identified in this borehole.

Phase 3 Early–Late medieval

Medieval deposition was observed between 8m and 2.6m BPGL (1.9m OD–7.3m OD) (Contexts 6004–6009). These deposits consisted of a sequence of dark grey gritty sandy silts and sandy clays (Appendix 2).

This part of the sequence was found to be contaminated by hydrocarbons during initial sample assessment by PRS. At 2.8–4m BGL, contamination was recorded as ‘High’ in context 6004; at 4–4.5m BGL as ‘Slight’ in context 6006; and at 6–6.5m BGL as ‘Moderate’ in context 6007. Consequently, no further sample processing was undertaken for these deposits in this part of the borehole 6 sequence.

Phase 4 Post-medieval

Post-medieval deposits were identified between 2.6m and 1.6m BPGL (7.3m–8.3m OD) (Contexts 6001–6003).

Phase 5 Modern

Modern deposits consisted of brick rubble and concrete observed between 1.6m BPGL and the car park ground surface.

5.7 Borehole 7

Monitored on 04.04.17, the ground level of the concrete car park ground surface at the time of recording was approximately 9.85m OD

Phase 1 Natural

Natural had not been reached when the last core was extracted at around 8m BPGL(1.85m OD).

Phase 2 Roman

No deposits of Roman date were positively identified in Borehole 7

Phase 3 Early–Late medieval

Medieval deposits consisted of a series of very dark bands of grey silty clays with varying levels of compaction and water content, Contexts 7004–7012, between a depth of 8m and 2.6m BPGL (1.85m–7.25m OD). Between 3.4–3.6m BGL, hydrocarbon contamination was recorded as 'Moderate' by PRS in context 7005. Samples from this context were not processed further.

Phase 4 post medieval

Post medieval deposits were represented by a thin band of deposits between 2.6m and 2.2m BPGL (7.25m–7.65m OD), Contexts 7002–7003

Phase 5 Modern

Modern deposits consisted of CBM rubble and concrete, Contexts 7000–7001, between a depth of around 2.2m BPGL (7.65m OD) to the present day car park surface.

5.8 Borehole 8

Monitored on 03.04.17, the ground level of the concrete car park ground surface at the time of recording was approximately 9.80m OD

Phase 1 Natural

Natural was not identified in Borehole 8 and an obstruction prevented penetration below a depth of 5m BPGL.

Phase 2 Roman

No deposits were identified as being of Roman date in Borehole 8.

Phase 3 Early–Late medieval

Medieval deposits in Borehole 8 consisted of a series of friable and soft dark grey silty clays, Contexts 8005–8006, between 5m and 2.6m BPGL (4.8m–7.25m OD).

Phase 4 post-medieval

Post-medieval deposits in Borehole 8 consisted of a firm dark brown/grey sandy clay and a soft mid grey silty clay, Contexts 8003–8004, between depths of 2.6m and 1.2m BPGL (7.25m–8.65m OD).

Phase 5 Modern

Modern deposits in Borehole 8 consisted of sand, gravel, pebbles and concrete related to the present-day car park surface between depths of 1.2m BPGL (8.65m OD) to the present ground level.

6 DISCUSSION

Due to the failure of boreholes 2, 3 and 5 to penetrate to significant depths, the scope of the evaluation is somewhat restricted.

However, the successful boreholes have provided significant information about the nature and extent of deposition across the site and enable long-term monitoring of water levels to be undertaken. The following summary provides a guide to the deposit sequence across the site. However, the interpretation given is accompanied by the caveat that any measurements are approximate (voids and movement of deposits during the coring process can affect the accuracy of such data) and that any dating and interpretation is limited by the chance process of recovering datable artefacts.

Modern

The evaluation has demonstrated that in Borehole 1, nearest the Piccadilly frontage of the site, the upper 2m BPGL are comprised of modern deposits. None of these deposits were sampled. Borehole 5 may have encountered the remains of nineteenth century structures at approximately 3–4m BGL / 6.87–5.87m AOD.

Post-medieval

Post-medieval deposits were identified between 2m BPGL and 3.5m BPGL. No samples were taken from these deposits.

Medieval

Medieval deposits were identified between 3m and 6m across the site, although distinguishing between medieval and earlier deposition is extremely difficult and highly speculative. Deposits became noticeably wetter, darker and more organic below 3m BPGL in Boreholes 4, 6, 7, 8, and somewhat deeper in Borehole 1 where waterlogged material was present at around 4m BPGL.

Samples from the medieval deposition across the site demonstrate that they are waterlogged and have an appreciable organic content. Preservation is variable but the potential for well-preserved organic plant and macrofossil remains of the medieval period is considerable.

Roman

Roman deposition was tentatively identified between 7.8m and 6.3m BPGL in Borehole 1 where ‘cleaner’ and brighter looking deposition, more akin to natural was identified. However, this interpretation is based purely on the appearance of the deposits which may be the result of re-deposition in the Roman period. However, no datable artefacts were recovered. Overall, the deposition observed in Borehole 1 was less silty and less grey than the sequences in the other boreholes (Appendix 2). It is likely that the different deposition observed in Borehole 1 reflects the location on naturally higher ground further from the River Foss and away from accumulations of the river silts.

Natural

Natural was tentatively identified in Borehole 1 at a depth 7.8m BPGL (2.11m OD) (see Section 5.1.1). This compares closely, given the inherent problems with measuring deposit depths from boreholes, with that recorded a few metres to the west of Borehole 1 in the 1992 evaluation excavation where natural was identified at the slightly higher level of 2.6m OD (Lilley 1992, 9). Such discrepancies are to be expected given that ground levels may vary considerably between areas depending on natural variation in the post-glacial landscape and the nature of archaeological intrusions into it. Natural was not reached in any of the other boreholes before the depth at which the rig was unable to extract samples and a probe was used instead.

Contamination

Hydrocarbon contamination was recorded in boreholes 5, 6 and 7. These boreholes occupy the south-western corner of the development, with the heaviest presence of possible fuel in borehole 6. The contamination was identified between 3m BGL / 6.5m AOD and 6.5m BGL / 3.4m AOD, with the heaviest concentration between 2.8m BGL / 7.1m AOD and 4m BGL / 5.9m OD in Borehole 6. Samples from the affected contexts were not processed beyond an initial assessment.

Conclusion

General Biological Analysis (PRS ltd)

The analysis of general biological samples by PRS demonstrates that organic material is present across the site and that preservation of such material is relatively good. The presence of organic content is also confirmed by the analysis by Geolabs analysis (Appendices 4 and 5). The PRS report notes that there is a strong suggestion of taphonomic bias in the interpretation of the assemblages (ie. predominantly the more robust remains such as carbonised seeds, fruit stones etc. survive) but that consistent evidence for human activity in the form of disposal of artefactual, fuel and food waste was well-preserved due to the waterlogged conditions.

The samples suggest activity related to casual disposal in an area at the periphery of occupation and perhaps the intentional consolidation and reclamation of wet marginal land on the riverside. Waterlogged deposits such as these are sensitive to change and the analysis by PRS suggests that deposits below a depth of approximately 2.6m BPGL are likely to be at risk should future development cause changes to the hydrology of the site.

Evidence for aquatic deposition, observed mainly in the boreholes nearer to the river, is confirmed by the screening undertaken by PRS for diatoms (the silica skeletons of aquatic algae) which confirms their presence in a number of deposits (Contexts 6008, 6009, 7008, 7012, 8005) (Appendix 3, Table 7). Boreholes 6, 7 and 8, were all located on the riverside edge of the site.

Preservation (B. Reeves)

The comparison of samples analysed in 1992 with those recovered and analysed in 2017 to determine whether there has been any deterioration in the last 25 years is somewhat problematic.

From first impressions of the 2017 samples it would seem that preservation conditions have deteriorated at 47–50 Piccadilly because many of the samples contained poorly preserved material. However, John Carrott's summary of 2017 closely resembles many of the statements made in 1992 the report and it must be concluded that the evidence from the 2017 boreholes is insufficient to be able to determine any change in conditions of preservation in the intervening 25 year period:

'the identifiable plant remains were predominantly of robust, decay-resistant, structures and that there is, therefore, a strong suggestion of taphonomic bias in the interpretation of the assemblages. Invertebrate remains were, on the whole, rather poorly preserved and much of the material recovered was indeterminate 'scraps' of insect cuticle; there were, however, occasional better preserved remains of beetle sclerite and in these areas at least it is likely that interpretatively valuable assemblages could be recovered if larger sediment samples (of several Kilos) could be obtained and processed.'

The potential for meaningful conclusions is limited by several factors. Firstly, it is not really possible to make like-for-like comparisons between deposits sampled. The 1992 samples, were recovered from stratified, single context, hand-excavated deposits but the 2017 samples were recovered from boreholes and are therefore from unidentified context types. It is impossible to know, for example, if a dark organic deposit has come from a pit fill or a dumped layer or ground makeup if the sample has been recovered from a borehole. Secondly, in 1992 a 1kg sample was analysed, whereas in 2017 all but one of the samples were between 200g and 675g with the largest being 1375g. The 2017 samples are therefore much smaller and John Carrott states for a number of the deposits that 'larger sediment samples (of several kilos)....would probably yield useful assemblages of beetle remains'. Thirdly, the sample processing methodologies used in 1992 and 2017 were different. The much larger 1992 samples were subjected to paraffin flotation, a method which would potentially have recovered more remains than were recovered from the 2017 samples where paraffin flotation was not used. Additionally, the majority of the boreholes were positioned a considerable distance from the 1992 trench, some were also from riverine deposits rather than river bank occupation or dumping, and therefore probably represent very different deposition types and preservation conditions. With this in mind, samples from Borehole 1, which was relatively close to the 1992 trench, are perhaps those most closely comparable with the samples taken 25 years ago.

Good environmental evidence came from some of the 1992 contexts but this was not the case for all of them and it must be pointed out that the deposits analysed were selected from a series of deposits sampled for very specific reasons during a controlled excavation. During the excavation a bias towards samples with higher levels of preservation is likely as those identified as being of high environmental potential would be more likely to have been sampled. Those analysed in 1992 would also have been a further sub-group selected once the dig had been completed (10 of 27 samples). A similar bias is, of course, also true of the

selection process from the 2017 window samples, but the choice of which deposits to sample was much more restricted to begin with due to the samples being from boreholes rather than hand-excavated, single context deposits. The content of just a few of these demonstrates that some deposits contained well-preserved environmental evidence: Context 2044 was described as a 1kg subsample which was examined and 'consisted mostly of fragments of immature insects'. In other contexts, such as Context 2043 a Peaty build up/wattle which 'Consisted of grass/straw culm fragments [and] Cornfield taxa....Mostly cereal straw' the ''Insects [were] extremely rare but very well preserved'' Context 2058 had 'few grain beetles and a Tipnus Unicolour' was 'rich in grass straw' with a 'Modest number of decomposers. Context 2087 was 'Rich in plant remains', 'aquatic insects were rare, [but] ostracods were common''. Context 2133 the ''1kg subsample consisted mainly of insect remains and had a ''rich plant assemblage'' and the context was flagged as deserving 'considerable further investigation'' as it ''stands as the only well-preserved in situ deposition of early Roman date so far recorded from the area S.E. of the Foss. Other deposits were described as containing very little evidence and so 'no further analysis was undertaken' (Contexts 2042, 2104, 2110, 2111, 2112, 2114, 2119, 2120, 2121, 2124, 2127 and 2136). In Context 2122 there were hardly any insect or plant remains in the 1kg sample examined; most of the plant remains were types rather resistant to decay and give no useful interpretive information, though single charred grains of barley and a hexaploid wheat were present.

Porosity and conductivity assessment (Geolabs ltd/Ian Panter)

A total of six undisturbed sediment cores were retained for potential geotechnical testing. Three samples were selected from boreholes which were successfully fitted with a monitoring installation, Contexts 1008, 4006, 7010, and were sent for analysis by Geolabs (Watford). Of the three sent for analysis, Context 4006 was found to be unsuitable for geotechnical permeability testing because of its high gravel content (Appendix 4).

The high porosity value (Appendices 3 and 4), determined by the Geolabs analysis, means that the deposits have the potential to hold large volumes of water and the Low hydraulic conductivity suggests that they drain slowly. The ongoing water monitoring should provide additional information in this regard. Such conditions are good for the preservation of the organic remains seen in the GBA samples, evident in the 1992 excavation, and observed during the borehole where organic material such as preserved timbers was identified.

Site Hydrology

The six month monitoring programme has demonstrated that the below-ground deposits at 46–50 Piccadilly are recharged primarily through rainfall with a general trend of groundwater flow towards the River Foss. Therefore, as the site already comprises standing buildings and areas of hard standing then any broadly similar new construction should not present a barrier to continued groundwater recharge across the site. The substantial clay component ensures that the sediments have a low hydraulic conductivity and are therefore likely to retain water during periods when the water table is lowered, either through low rainfall or temporary ground works associated with redevelopment.

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PLATES

Plate 1 Borehole 1

Plate 2 Borehole 6

FIGURES

Figure 1 Site Location

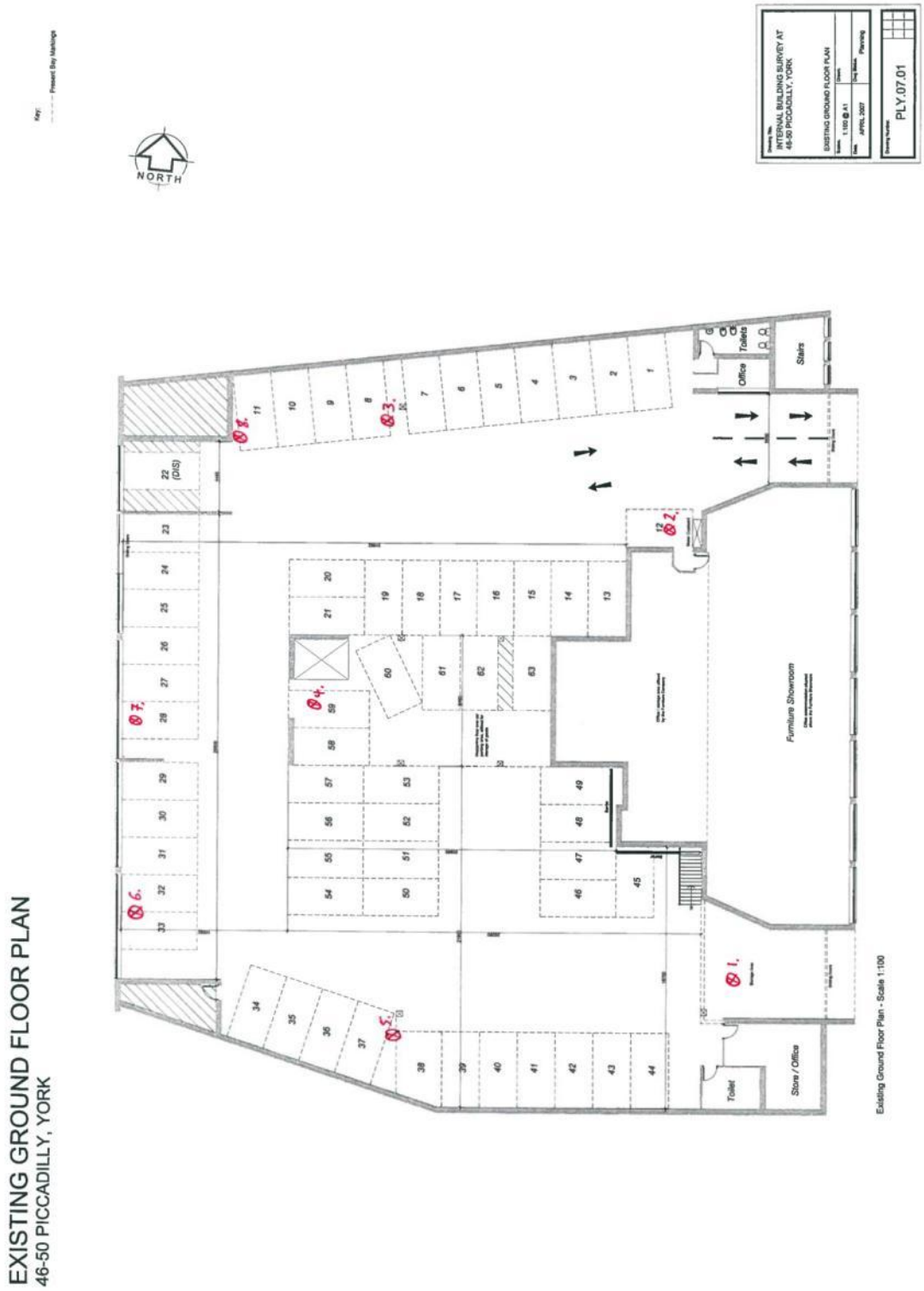

Figure 2 Borehole Locations

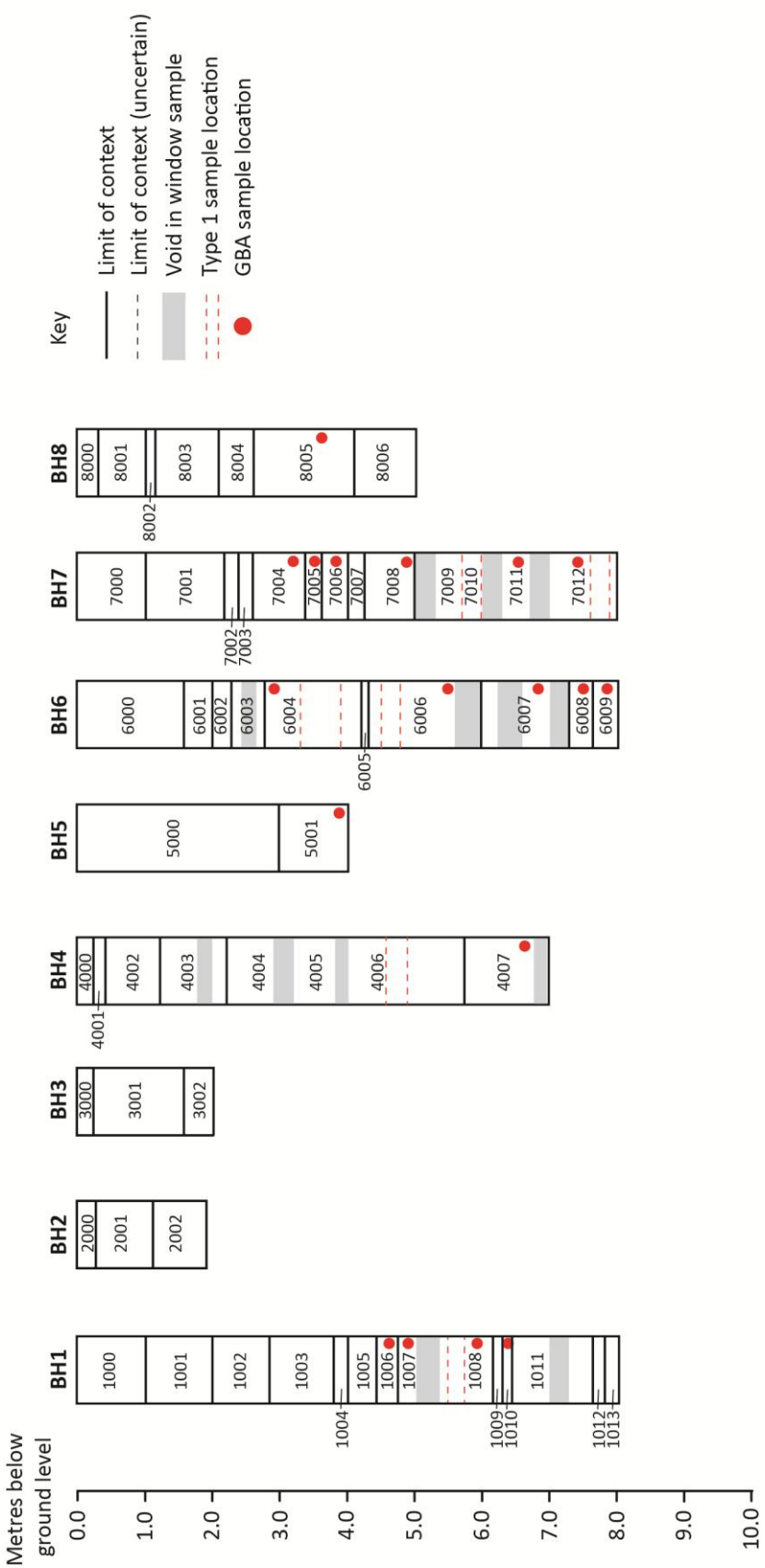

Figure 3 Borehole profiles

APPENDIX 1 – INDEX TO ARCHIVE

Item	Number of items
Sample register	1
Written Scheme of Investigation	1
Report	1

Table 1 Index to archive

APPENDIX 2 – CONTEXT LIST

Borehole	Context no.	Description
1	1000	Concrete
	1001	Graded crushed-limestone hardcore
	1002	Gritty, dark brown clay
	1003	Stiff, mid-brown clay
	1004	Friable, very dark grey/black sandy clayey silt with moderate charcoal
	1005	Stiff, mid-grey-brown sandy clay silt
	1006	Stiff, mid-grey-brown gritty sandy clay silt
	1007	Friable, mid-grey brown organic gritty sandy clay silt
	1008	Compact, dark grey sandy clayey silt[Class 1 sample taken]
	1009	Mid-, slightly green, brown sandy silty clay
	1010	Mid-, slightly green, brown sandy silty clay
	1011	Very compact, slightly olive green-brown slightly clayey silt
	1012	Very compact, mid- slightly olive green-brown clay
	1013	Very compact, mid- orange sand
Borehole	**Context no.**	**Description**
2	2000	Concrete
	2001	Friable, light grey-brown clayey sand with frequent small stones
	2002	Dark, friable grey-black sandy silt
Borehole	**Context no.**	**Description**
3	3000	Concrete
	3001	Friable, orange-brown clayey sand with frequent CBM fragments, gravel and pebbles
	3002	Concrete
Borehole	**Context no.**	**Description**
4	4000	Concrete with pebbles
	4001	Brown grey clayey silt with CBM
	4002	Limestone hardcore and CBM
	4003	Firm, brownish grey silty clay with occasional CBM fragments
	4004	Firm dark brown grey silty clay with CBM and Mortar
	4005	Soft grey brown silty clay with occasional CBM frags
	4006	Dark organic rich silt with occasional CBM
	4007	Compacted black organic rich silt
Borehole	**Context no.**	**Description**
5	5000	Brick rubble
	5001	Compacted gritty sandy clay silt
Borehole	**Context no.**	**Description**
6	6000	Brick rubble
	6001	Friable compacted slightly clayey slightly greeny-dark grey gritty silt with

		occasional CBM, coal and pebbles.
	6002	Mid grey clayey silt becoming quite wet and smells of hydrocarbons
	6003	Friable gritty dark grey/black silt with pebbles. Smells of hydrocarbons
	6004	No description made due to Class 1 sample of entire sheath
	6005	A 70mm thick band of preserved wood
	6006	Soft wet gritty mid grey silt
	6007	Very wet soft gritty mid grey silt with frequent brick and opus signinum and wood fragments sampled.
	6008	Compact, very dark grey silt
	6009	Soft dark grey very gritty silt
Borehole	**Context no.**	**Description**
7	7000	Concrete
	7001	Concrete and CBM in loose gritty black sandy silt. Occasional clinker and slag
	7002	Mid grey compact gritty, slightly clayey silt with occasional limestone fragments and pebbles
	7003	Band of friable very dark grey gritty silt
	7004	friable black-grey gritty silt
	7005	Soft, very wet, black-grey gritty silt
	7006	Friable mid grey gritty silt
	7007	Very wet, soft mid grey gritty silt
	7008	Friable mid grey gritty silt
	7009	Very wet, (sloppy) dark, silvery grey silt with pebbles and CBM fragments
	7010	Friable dark, silvery grey silt with pebbles and CBM fragments
	7011	Wet, soft very dark grey gritty silt with CBM and pebbles
	7012	Wet, soft very dark grey gritty silt with CBM and pebbles
Borehole	**Context no.**	**Description**
	8000	Concrete
	8001	Friable reddish-brown clay sand with frequent gravel and rounded stones
	8002	Concrete
	8003	Firm, dark brown/grey sandy clay with frequent CB<M fragments and mortar flecks
	8004	Friable orange-brown, clay sand with frequent CBM fragments
	8005	Soft, mid-grey silty clay
	8006	Soft, dark grey silty clay (contaminated)

Table 2 Context list

APPENDIX 3 – ASSESSMENT OF MICROFOSSIL AND MACROFOSSIL REMAINS

Palaeoecology Research Services PRS 2017/18

By John Carrott

SUMMARY

An archaeological evaluation by borehole survey was undertaken at 46-50 Piccadilly, York, to investigate the potential impact on organic archaeological deposits of a proposed redevelopment of the site. Eight boreholes were sunk to depths of up to eight metres below the current ground level using a compact tracked rig windowless corer and eighteen extracted samples (from six of the boreholes) were submitted for an assessment of their bioarchaeological potential.

The assessment demonstrated that biological remains preserved by anoxic waterlogging and charring were present in the deposits underlying the site. Waterlogged plant remains consistently reflected an area of wet/waterlogged rough/waste ground and the presence of diatoms (and occasional other remains) in several deposits indicated aquatic deposition at these locations. It should be noted, however, that the identifiable plant remains were predominantly of robust, decay-resistant, structures and that there is, therefore, a strong suggestion of taphonomic bias in the interpretation of the assemblages. Invertebrate remains were, on the whole, rather poorly preserved and much of the material recovered was indeterminate 'scraps' of insect cuticle; there were, however, occasional better preserved remains of beetle sclerites and in these areas at least it is likely that interpretatively valuable assemblages could be recovered if larger sediment samples (of several kilos) could be obtained and processed.

There was also consistent evidence for human activity which appeared to be primarily the disposal of artefactual, fuel and food waste – there did not appear to be sufficient material present to represent anything more than this but, given that the current samples have been collected from a borehole survey, and are therefore lacking in archaeological context, this can only be provisionally asserted. Casual disposal of waste materials in such an area at the periphery of occupation, or more systematic disposal in an attempt to consolidate an area of wet marginal land, would be entirely consistent with past human activities, however.

A small number of artefactual remains recovered from the assessed samples could, perhaps, provide dating evidence for some of the deposits and radiocarbon dating (via AMS) of plant remains (or perhaps bone/tooth) could also be employed for all bar one (although the quantities of material were typically small).

No further study of the current samples is warranted – however, any future excavations at the site should incorporate a systematic sampling strategy and subsequent programme of assessment and, where applicable, analysis for organic remains. In the absence of further archaeological excavation, any development of the site should aim to minimise impact on the archaeological deposits. In particular, every effort should be made to avoid works which would disturb and potentially cause de-watering of the deposits which exhibit preservation by anoxic

waterlogging which, on the evidence available from this borehole survey, may occur at depths beginning at 2.6 metres below current ground level.

KEYWORDS: 46-50 PICCADILLY; YORK; BOREHOLE SURVEY; ASSESSMENT; UNDATED; PLANT REMAINS; WOOD; CHARCOAL (TRACE); INVERTEBRATE REMAINS; CLADOCERAN EPHIPPIA; INSECTS; BEETLES; MOLLUSCS (TRACE); TERRESTRIAL SNAILS (TRACE); FRESHWATER MOLLUSCS (TRACE); MICROFOSSILS; POLLEN GRAINS/SPORES; DIATOMS; WATERLOGGED PRESERVATION

Introduction

An archaeological evaluation by borehole survey was undertaken by York Archaeological Trust (YAT), between the 29th of March and the 4th of April 2017, at 46-50 Piccadilly, York (NGR SE 6061 5153), to investigate the potential impact on organic archaeological deposits of a proposed redevelopment of the site. The site is currently occupied by a 1950s building originally built as a garage, constructed largely of concrete with a glass shop frontage facing on to Piccadilly, and the redevelopment proposal is for the construction of two buildings, a hotel and restaurant building fronting onto Piccadilly, together with a small residential block at the rear of the site overlooking the River Foss.

A small excavation carried out by YAT in 1992 (Finlayson 1992; Carrott *et al*. 1992) indicated that well-preserved waterlogged deposits of the Roman, Anglo-Scandinavian, and medieval periods are overlain by post-medieval and modern, non-waterlogged deposits which form in total around eight metres of deposition below the present ground level.

Eighteen small 'bulk' sediment samples ('GBA'/'BS' *sensu* Dobney *et al*. 1992) extracted from the boreholes, were submitted to Palaeoecology Research Services Limited, Kingston upon Hull, for an assessment of their bioarchaeological potential.

Methods

Coring

Eight boreholes (designated Boreholes 1 to 8) were sunk to depths of up to eight metres below the current ground level (hereafter BGL) using a compact tracked rig window corer.

Sediment descriptions and sampling

The borehole cores were recorded on-site by Ben Reeves (YAT) and sediment subdivisions were assigned context numbers and the sequences divided into corresponding samples which were placed into labelled polythene bags. Descriptions and depth ranges for the represented

contexts were recorded on a YAT 'test pit/borehole/window sample log' pro forma for each borehole.

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

Eighteen samples were submitted to PRS – four from Borehole 1, one from each of Boreholes 4, 5 and 8, five from Borehole 6 and six from Borehole 7. No samples were collected from Boreholes 2 and 3 both of which encountered obstructions at less than two metres depth and were abandoned at that point.

After initial inspection, five of the samples (the one from Borehole 5, three from Borehole 6 and one from Borehole 7) were excluded from further processing (following discussion with the excavator) owing to hydrocarbon contamination – presumably fuel; the former garage had underground tanks (Ben Reeves pers. comm.).

A total of 13 samples were processed for macrofossils representing deposits within five of the boreholes (four samples from Borehole 1, one from each of Boreholes 4 and 8, two from Borehole 6 and five from Borehole 7). 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; one additional sample, from Borehole 7 (Context 7004) was noted to be already slightly contaminated with fuel (see above), however – this sample was processed as it had not been identified as contaminated during the initial inspection.

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 (see Table 2). Five-point scales were also employed to record the abundance, diversity and preservation of the plant and invertebrate remains recovered (Table 2); 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, other than a single iron nail (from Context 7006; Borehole 7) 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; Jacomet 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 and charcoal identifications were attempted for a small number of fragments (all over 4 mm). 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 made 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 almost all of the fragments remained wholly indeterminate, however.

Terrestrial and 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: Cameron 2003; Cameron and Redfern 1976; Ellis 1969 and 1978; Evans 1972; Kerney 1999; Kerney and Cameron 1979 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, Tottenham 1954; Crowson 1956; Lindroth 1974) and within the constraints of an assessment; in the event some family level identifications could be made but none to species level.

Vertebrate remains were 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 which could not be identified to species were described as ‘unidentified’, within which fragments were grouped into size categories (where possible): large mammal (assumed to be cattle, horse or large cervid), medium-sized mammal (assumed to be caprovid (sheep/goat), pig or small cervid), unidentified small mammal (rat-sized or smaller) and wholly unidentifiable. Subjective records were made of the state of preservation and other information, such as fragment size, dog gnawing, burning, butchery and fresh breaks, was noted, where applicable. Nomenclature for mammals follows Corbet and Southern (1977) and fish follow Wheeler (1969).

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 (Table 3).

Provisional identifications for pollen grains and spores were made by comparison with modern reference material and the use of published works (principally Moore et al. 1991). Semi-quantitative abundances were recorded as outlined above for the macroscopic remains.

Determination of the presence/absence of diatoms, their approximate numbers (semi-quantitative scale as above) and an estimation of the minimum number of different forms represented was made with reference to published works (Barber and Haworth 1981; Hartley et al. 1996).

Results

The results of the investigations are summarised below by borehole. Details of the sediment samples submitted from each borehole are presented in Table 1. 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) are taken from the on-site records of the sediments made during coring and can only be approximate – allowing for voids in the recovery and the possibility of compression by the coring process.

Borehole 1

Four samples from Borehole 1 were processed representing the deposits encountered at 4.4–4.7 m (Context 1006), 4.7-5.0 m (Context 1007), 5.4–6.2 m (Context 1008) and 6.3–6.4 m (Context 1010) below current ground level (BGL).

All four of the samples yielded waterlogged plant remains indicative of wet and/or rough ground (e.g. sedge nutlets, stinging nettle achenes, elder fruits and blackberry/raspberry fruit stones), although only at a trace level in the lowermost (Context 1010); there were also single

fragments of waterlogged hazelnut shell from Contexts 1006 and 1008 and a charred ?barley grain was recorded from Context 1010. Invertebrates were present in each deposit but preservation was uniformly poor and few identifiable remains were present – fragments of beetle sclerites were present in Contexts 1006 and 1007 and, from the latter, there was a single non-apex fragment of mollusc shell tentatively identified as of a Lymnaea species. Subjectively, representation of artefactual materials (e.g. brick/tile), fuel waste (predominantly cinder) and food waste (animal bone – including a single charred eel vertebra from Context 1008) deceased with increasing depth which perhaps indicates attempts to consolidate an area of ground which was becoming increasingly wet and/or liable to flooding? A single possible pot sherd was recovered from the lowermost of the samples processed (Context 1010). Microfossils were too few in this sequence of deposits to be of any interpretative value; the only potentially useful remains being traces of grass pollen (and possible phytolith fragments) from Context 1007.

Borehole 4

A single sample representing the deposit encountered at 5.8–7.0 m (Context 4007) BGL was processed from this borehole.

Most of the material recovered was artefactual, brick/tile fragments and a little mortar together with fuel waste (cinder, coal and a trace of indeterminate charcoal), but there was also some evidence for waterlogged preservation of plant and invertebrate remains. The last were only represented by indeterminate 'scraps' of insect cuticle and a single shell fragment but plant remains included both biconvex and trigonous sedge nutlets indicating wet/waterlogged ground conditions at deposition. A few fungal spores and hyphae were noted in the 'squash' subsample but there were no interpretatively valuable microfossils present.

Borehole 6

Two samples were processed from Borehole 6 representing the deposits encountered at 7.3–7.7 m (Context 6008) and 7.7–8.0 m (Context 6009) BGL.

Both samples again contained plant and invertebrate remains preserved by anoxic waterlogging (the former including a few roundwood twig fragments in the case of Context 6009), together with artefactual material in the form of brick/tile fragments, and for Context 6008 also mortar/plaster, together with a little fuel (coal and cinder or charcoal) and food waste (bone fragments). The upper of the two deposits (Context 6008), which contained the larger proportion of artefactual material (the residue was mostly mortar/plaster and brick/tile fragments were common), also yielded a single possible pot sherd and a charred ?wheat grain. Plant macrofossils were, once again, of taxa indicative of wet/waste ground (sedges, stinging nettle; also orache/goosefoot from Context 6009) with both deposits containing remains of additional taxa which could not be identified within the constraints of an assessment (some would most likely be identifiable, at least partially, to further study but others were simply too poorly preserved). Diatoms recorded in the 'squash' subsamples indicated aquatic deposition for both deposits with two Pisidium sp. freshwater bivalve valves noted from Context 6009

(one in the washover and one in the residue – perhaps representing a single individual) and a single freshwater Planorbis planorbis apex was present in Context 6008. The upper deposit, Context 6008, also contained some cladoceran (water flea; including Daphnia) ephippia ('resting eggs') which could suggest that the water was subject to drying-out as ephippia are formed as a response to environmental stress (as a mechanism for rapidly re-establishing populations when suitable conditions return) such as may be induced by the consequent reduction in water quality/over-crowding or, and perhaps more likely here given the increase in artefactual materials, resulting from pollution (Frey 1982). Insect remains were also recorded from both deposits but preservation was, generally, poor and no identifications could be made for the assessment (occasional beetle elytra from Context 6008 would probably be identifiable to further study, however). There was also some preservation of pollen grains/spores but numbers were relatively few and these were of no significant additional interpretative value; a fern spore was identified within those from Context 6008 and grass-type pollen grains were present in Context 6009.

Borehole 7

Five samples from Borehole 7 were processed representing the deposits encountered at 2.5–3.3 m (Context 7004), 3.5–4.0 m (Context 7006), 4.2–5.0 m (Context 7008), 6.3–6.7 m (Context 7011) and 6.7–8.0 m (Context 7012) BGL.

Aquatic deposition was indicated by the presence of diatoms in two of the samples processed from this borehole – from the lowermost, Context 7012, and also from Context 7008 (where they were quite numerous and better preserved); curiously there were no records from the intervening deposit, Context 7011. Occasional other records from these deposits provided supporting evidence for freshwater deposition – a single fragment of ?caddisfly larval case from Context 7012 and, more conclusively, frequent cladoceran ephippia, a Cristatella mucedo statoblast (suggesting deposition in the autumn when water temperature falls below around 8 degrees Celsius and the colonies die off; each statoblast potentially forming a new colony when temperatures rise again in the spring) and a single fragment of ?freshwater mussel shell from Context 7008. The cladoceran ephippia in Context 7008 are perhaps more likely to represent seasonal variations in water level/quality in this case as there was very little artefactual content to suggest pollution; there were also a few ephippia recorded from Context 7006. Waterlogged plant macrofossils from the lowermost and two uppermost of the samples processed (Contexts 7012, and 7004 and 7006, respectively) were of rough/waste ground taxa (e.g. fool's parsley, elder, blackberry/raspberry, orache/goosefoot), whereas Contexts 7008 and 7011 each contained sedge nutlets typically indicative of wet/waterlogged ground (although waste ground taxa were also represented in each case – stinging nettle in Context 7008 and orache/goosefoot in Context 7011). Terrestrial invertebrate remains were represented in all of the deposits bar Context 7011 but typically as 'scraps' of indeterminate insect cuticle (with occasional better preserved beetle sclerites in Context 7008 and, to a lesser degree, Context 7006) and there were two mollusc apices from Context 7004 (one Helicidae sp. and one of the burrowing snail Cecilioides acicula); these remains were of no significant interpretative value but large sediment samples (of several kilos) from Contexts 7006 and 7008 would probably yield useful assemblages of beetle remains. Other than the diatoms, there were no significant concentrations of interpretatively valuable microfossils.

Artefactual remains and fuel waste were recorded from four of the five deposits, the exception being Context 7008 (which gave no residue fraction), and food waste (mostly bone fragments but also including a sheep/goat incisor, an indeterminate charred grain and perhaps a half Prunus fruit stone and ?charred hazelnut shell fragment from Context 7012, and another charred hazelnut shell fragment from Context 7011) was noted from all bar Context 7008 and Context 7006. Where present, artefactual remains always included brick/tile and mortar/plaster (the latter forming most of the residue from Context 7006) and there was a rusted iron nail from Context 7006 and from Context 7012 a small piece of non-ferrous metal and a single ?pot sherd.

Borehole 8

A single sample representing the deposit encountered at 2.6–4.1 m (Context 8005) BGL was processed from this borehole.

Aquatic deposition (a few very poorly preserved, indeterminate, diatom frustules were noted) and waterlogged preservation were evinced by the remains recovered from Context 8005 and artefactual materials (brick/tile, mortar/plaster, 'glassy' slag) and fuel (cinder) and food (a single ?herring vertebra, one piece of bird eggshell and a charred wheat grain) waste were also present. Plant macrofossils, again, represented taxa of wet/waterlogged (sedge nutlets) and rough/waste (orache/goosefoot) ground and here there were some better preserved beetle remains (none could be identified within the constraints of an assessment but occasional well preserved pronota and elytra would probably be identifiable to further study and a large, several kilo, sediment sample would most likely yield an interpretatively valuable assemblage). Other microfossil remains included a small number of broken/crumpled indeterminate pollen grains/spores and a few possible phytolith fragments (cf. grass-type) but there were no concentrations of interpretatively valuable remains.

Discussion and statement of potential

This assessment has demonstrated that biological remains preserved by anoxic waterlogging and charring are present in deposits underlying the site at 46–50 Piccadilly, York.

The waterlogged plant remains consistently reflect an area of wet/waterlogged rough/waste ground and the presence of diatoms (and occasional other remains) in several deposits (Borehole 6 – Contexts 6008 and 6009 – 7.3–8.0 m BGL; Borehole 7 – Contexts 7008 and 7012 – 4.2–5.0 m and 6.7–8.0 m BGL; Borehole 8 – Context 8005 – 2.6–4.1 m BGL) indicates aquatic deposition at these locations. It should be noted, however, that the identifiable plant remains were predominantly of robust, decay-resistant, structures (such as blackberry/raspberry fruit stones, elder fruits, orache/goosefoot seeds, stinging nettle achenes and sedge nutlets) and that there is, therefore, a strong suggestion of taphonomic bias in the interpretation of the assemblages – particularly given the small size of the available sediment samples inherent in recovery by coring.

Invertebrate remains were, on the whole, rather poorly preserved and much of the material recovered was indeterminate 'scraps' of insect cuticle; there were, however, occasional better preserved remains of beetle sclerites (for example from: Borehole 1 – Context 1006 – 4.4–4.7

m BGL; Borehole 6 – Context 6008 – 7.3–7.7 m BGL; Borehole 7 – Contexts 7006 and 7008 – 3.5–4.0 m and 4.2–5.0 m BGL; Borehole 8 – Context 8005 – 2.6–4.1 m BGL) and in these areas at least it is likely that interpretatively valuable assemblages could be recovered if larger sediment samples (of several kilos) could be obtained and processed.

There was also consisted evidence for human activity which appeared to be primarily the disposal of artefactual, fuel and food waste – there did not appear to be sufficient material present to represent anything more than this but, given that the current samples have been collected from a borehole survey, and are therefore lacking in archaeological context, this can only be provisionally asserted. Casual disposal of waste materials in such an area at the periphery of occupation, or more systematic disposal in an attempt to consolidate an area of wet marginal land, would be entirely consistent with past human activities, however.

A small number of artefactual remains recovered from the assessed samples could, perhaps, provide dating evidence for some of the deposits and radiocarbon dating (via AMS) of plant remains (or perhaps bone/tooth) could also be employed (although the quantities of material were typically small). Potentially dateable artefacts comprised ?pot sherds from Borehole 1 (Contexts 1006 and 1010), Borehole 6 (Context 6008) and Borehole 7 (Context 7012), the iron nail from Borehole 7 (Context 7006) and the small piece of non-ferrous metal from Borehole 7 (Context 7012). All of the processed samples gave at least some remains which could be considered for submission for AMS dating – though Context 7004 should perhaps be excluded owing to hydrocarbon contamination.

Recommendations

No further study of the current samples is warranted. However, this assessment has shown that deposits at this site have the potential to provide interpretatively valuable assemblages of plant remains, probably also vertebrate remains and, to a lesser extent, invertebrates which would be of value in reconstructing the past aquatic and terrestrial habitats of the area and perhaps also provide information regarding past human activities – with a previous intervention (Finlayson 1992) indicating that these deposits span a period from the Roman through to modern times.

Any future excavations at the site should, therefore, incorporate a systematic sampling strategy and subsequent programme of assessment and, where applicable, analysis for organic remains.

In the absence of further archaeological excavation, any development of the site should aim to minimise impact on the archaeological deposits. In particular, every effort should be made to avoid works which would disturb and potentially cause de-watering of the deposits which exhibit preservation by anoxic waterlogging which, on the evidence available from this borehole survey, may occur at depths beginning at 2.6 metres BGL (as shown in Borehole 8 – Context 8005 – 2.6–4.1 m BGL).

Retention and disposal

All of the current material should be retained, for the present at least, pending a decision regarding any further work to be undertaken – in particular, the possibility of obtaining dating

for the deposits; artefactual remains recovered will be returned to the excavator to be considered by appropriate specialists.

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 1. Borehole investigations of sub-surface deposits at 46-50 Piccadilly, York: Description of submitted samples – Boreholes 1 to 8 – no samples submitted from Boreholes 2 and 3. Key: 'B' = borehole number; 'Wt /g' = weight in grams; 'Vol /ml' = approximate volume in millilitres. Approximate depths 'From' and 'To' (extrapolated from YAT original record sheets) are given in metres below current ground level (BGL).

B	From	To	Context	Wt /g	Vol /ml	Sediment description	Hydrocarbon contamination	Notes
1	4.4	4.7	1006	1375	1100	Moist, mid/dark grey-brown to mid/dark grey (occasionally mid and dark grey), silty sand to sandy silt (varies). Waterlogged macrofossils, shell (including ?mussel), ?bone and cinder present.	None	-
1	4.7	5.0	1007	225	200	Moist, mid grey-brown to mid/dark grey, sandy silt. Waterlogged macrofossils and bone present.	None	-
1	5.4	6.2	1008	550	400	Moist, mid grey-brown (externally) to mid/dark grey (internally), slightly sandy silt. Waterlogged macrofossils, ?shell and bone present.	None	-
1	6.3	6.4	1010	325	250	Moist, mid brown (externally) to mid grey (internally), slightly sandy silt, No obvious inclusions.	None	-
4	5.8	7.0	4007	500	400	Moist, mid/dark grey-brown (externally) to dark grey (internally), silt. No obvious inclusions (but may have some fine waterlogged organics).	None	
5	3.0	4.2*	5001	1525	1200	Moist, varicoloured (jumbled shades of brown, grey-brown and grey from light to dark), sandy, clay silt to silty clay (varies). Stones, brick/tile and mortar present to common; possibly	Slight	* – coring stopped at 4.2 m BGL

B	From	To	Context	Wt /g	Vol /ml	Sediment description	Hydrocarbon contamination	Notes
						some waterlogged macrofossils present?		NOT PROCESSED
6	2.8	4.0	6004	300	250	Moist, mid/dark brown to grey-brown (externally) to dark/very dark grey (internally), silty sand/sandy silt. Waterlogged macrofossils present.	High	NOT PROCESSED
6	4.15	4.5	6006	1475	1150	Moist, dark grey-brown to dark grey, slightly sandy silt. Stones present and perhaps some ?waterlogged macrofossils.	Slight	NOT PROCESSED
6	6.0	6.2	6007	300	250	Wet, mid to mid/dark grey-brown to mid grey (occasional light brown patches), silt. Fragments of ?wood present.	Moderate	NOT PROCESSED
6	7.3	7.7	6008	300	250	Moist, mid/dark grey-brown (externally) to very dark grey/black (internally), slightly sandy silt. Perhaps some waterlogged macrofossils present.	None	-
6	7.7	8.0	6009	500	400	Moist, mid grey-brown (externally) to dark grey (internally), slightly sandy silt. Bone and stones present.	None	-
7	2.5	3.3	7004	675	500	Moist, dark grey-brown to dark grey, slightly sandy silt. Waterlogged organics present – including rootlets but these may be 'ancient' (sulphide blackened).	None*	* – hydrocarbon contamination actually 'slight' but not noted on initial inspection
7	3.3	3.5	7005	800	600	Wet, mid grey-brown (externally) to light/mid grey	Slight	NOT

B	From	To	Context	Wt /g	Vol /ml	Sediment description	Hydrocarbon contamination	Notes
						(internally), 'gritty', sandy silt. Abundant ?mortar and stones.		PROCESSED
7	3.5	4.0	7006	700	500	Moist to wet, mid grey-brown to mid grey (occasional patches of light grey), silty sand to sandy silt (varies). Coal and brick/tile present and mortar common.	None	-
7	4.2	5.0	7008	225	200	Just moist, mostly mid/dark grey-brown (with occasional patches of very dark grey), silt. Possibly some decayed organics within the very dark grey patches?	None	-
7	6.3	6.7	7011	575	400	Moist, mid/dark grey-brown (externally) to mid/dark grey (internally), 'gritty' silty sand. Bone present and stones abundant.	None	-
7	6.7	8.0	7012	500	400	Waterlogged, dark brown/grey-brown, silty sand. Stones and ?bone present.	None	-
8	2.6	4.1	8005	550	400	Moist, mid brown (externally) to mid/dark to dark grey (internally) with occasional patches of light grey and mid brown, sandy silt. Waterlogged macrofossils and ?pot present.	None	-

Table 2. Borehole investigations of sub-surface deposits at 46-50 Piccadilly, 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.

Table 3. Borehole investigations of sub-surface deposits at 46-50 Piccadilly, 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

Table 4. Borehole investigations of sub-surface deposits at 46-50 Piccadilly, York. General description of the washovers and records for plant and other remains present. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (below current ground level); '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; 'nut' = nutshell fragments.; 'moss = fragments of moss 'leaves and stems''; 'ec' = earthworm egg capsules; 'i' = indeterminate non-molluscan invertebrate cuticle (mostly probably insect); 'b' = beetle sclerite fragments; 'moll' = mollusc shell; 'de' = cladoceran (including Daphnia*) ephippia; 'mor/bt' = mortar and/or brick/tile; 'sand/ss' = sand and small stones; '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.

									Macrofossils			**Botanical remains**						**Invertebrates**					**Vert.**	**Mineral/artefactual**			
B	**Dep (m)**	**CN**	**Wt (g)**	**V (ml)**	**w/o (ml)**	**res (g)**	**C14**	**Des**	**Ab**	**Div**	**Pr**	**det**	**se**	**ch**	**wood**	**nut**	**moss**	**ec**	**i**	**b**	**moll**	**de**	**bone**	**coal**	**mor/ bt**	**sand/ ss**	**cin**
1	4.4-4.7	1006	1375	1100	50	109.6	Y	5	3	3	2	5	3	2	-	1	-	-	3	2	-	-	-	-	-	-	3
1	4.7-5.0	1007	225	200	40	13.5	Y	5	3	3	2	5	3	2	1	-	-	-	3	2	1	-	-	-	1	2	3
1	5.4-6.2	1008	550	400	20	92.5	Y*	2	2	2	3	4	2	4	1	1	-	-	-	-	-	-	1	2	-	4	2
1	6.3-6.4	1010	325	250	3	42.2	Y*	2	2	2	2	2	1	4	-	-	-	-	1	-	-	-	-	2	-	5	-
4	5.8-7.0	4007	500	400	8	51.3	Y	3	3	3	2	4	3	1	-	-	-	-	2	-	-	-	-	2	2	4	2
6	7.3-7.7	6008	300	250	20	52.4	Y*	5	3	4	2	5	3	2	-	-	-	-	2	2	1	2	-	4	2	2	2
6	7.7-8.0	6009	500	400	20	108.8	Y*	5	3	3	2	5	3	3	1	-	-	1	1	-	1	-	-	1	1	1	-
7	2.5-3.3	7004	675	500	15	203.3	N	2	2	3	2	2	2	-	-	-	-	-	1	-	1	-	-	4	-	4	2

7	3.5-4.0	7006	800	600	20	307.2	Y*	2	2	3	2	3	2	1	-	-	-	-	1	1	-	1	-	4	3	4	2
7	4.2-5.0	7008	700	500	15	0	Y	5	4	4	3	5	3	-	-	-	-	-	-	2	1	3	-	3	1	2	2
7	6.3-6.7	7011	225	200	15	238.2	Y*	3	2	3	2	4	2	4	-	-	-	-	-	-	-	-	-	2	2	2	1
7	6.7-8.0	7012	575	400	20	167.8	Y*	3	3	3	2	3	2	4	1	1	-	-	1	-	-	-	-	2	2	4	-
8	2.6-4.1	8005	500	400	20	164.8	Y*	2	3	3	2	3	2	1	1	-	3	-	2	1	-	-	-	4	-	3	4

* – 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 46-50 Piccadilly, 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 (below current ground level); '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.

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)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
1	4.4-4.7	1006	1375	1100	50	109.6	Mostly 'woody' waterlogged plant detritus (abundance score 5), with frequent cinder (to 16 mm but mostly <6 mm; score 3) and a little indeterminate rectilinear charcoal (to 7 mm; score 2). Also a little white fibrous material (score 1) – probably a modern contaminant.	'Seeds': frequent (abundance score 3) waterlogged fragments, mostly indeterminate but including biconvex (score 1) and trigonous (score 1) sedge (*Carex*) nutlets, stinging nettle (*Urtica dioica* L.) achenes (score 1), elder (*Sambucus nigra* L.) fruits (score 1) and blackberry/raspberry (*Rubus fruticosus* L. agg./*R. idaeus* L.) fruit stones (score 1). Other plant structures: 1x piece of waterlogged hazel (*Corylus*) nutshell (to 14 mm); unidentified waterlogged structures (score 2).	Insect: frequent (abundance score 3) 'scraps' of heavily fragmented insect cuticle. No remains identifiable at assessment beyond noting that some of the fragments were of beetle (Coleoptera) sclerites (score 2) – a few of these were pronota (score 1) and *may* be identifiable to further study.	None
1	4.7-5.0	1007	225	200	40	13.5	Mostly waterlogged plant detritus (score 5) – largely 'woody' (including a few roundwood twig fragments to 10 mm; diameter to 4 mm; score 1) but with some more 'filmy' material (score 2) and	'Seeds': frequent (abundance score 3) waterlogged fragments, often indeterminate but including orache/goosefoot (*Atriplex*/*Chenopodium*; score 1), trigonous sedge nutlets (score 1),	Insect: frequent (score 3) 'scraps' of heavily fragmented insect cuticle. No remains identifiable beyond noting that some of the fragments were of beetle (Coleoptera) sclerites	None

B	Dep (m)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
							a few fragments of ?'straw' (?monocot stem; score 1). Other components comprised frequent cinder (to 14 mm but mostly <6 mm; score 3), a little indeterminate rectilinear charcoal (to 8 mm; score 2), sand (score 2), small stones (to 3 mm; score 2) and one piece of mortar (to 4 mm). Also a little white fibrous material (score 1) – probably a modern contaminant.	elder fruits (score 1) and blackberry/raspberry fruit stones (score 1). Other plant structures: unidentified waterlogged structures (score 2).	(score 2). Mollusc: 1x non-apex fragment, possibly of *Lymnaea* sp. (freshwater/waterside).	
1	5.4-6.2	1008	550	400	20	92.5	Mostly approximately equal thirds (all score 4) waterlogged 'woody' plant detritus (including a few roundwood twigs to 7 mm; diameter to 3 mm; score 1), indeterminate rectilinear charcoal (to 4 mm; with ~7 larger pieces to 20 mm) and sand. A little coal (to 3 mm; score 2) and cinder (to 5 mm; score 2) was also present.	'Seeds': some (abundance score 2) waterlogged fragments, some indeterminate but including stinging nettle achenes (score 1), elder fruits (score 1) and blackberry/raspberry fruit stones (score 1). Other plant structures: 1x piece of waterlogged hazelnut shell (to 10 mm).	None	1x charred eel (*Anguilla anguilla* (L.)) vertebra
1	6.3-6.4	1010	325	250	3	42.2	Mostly sand (score 5), with abundant indeterminate rectilinear charcoal (to 3 mm; score 4), a little coal (to 2 mm; score 2) and 'filmy' waterlogged plant detritus (score 2), and occasional very small stones (to 3 mm; score 2).	'Seeds': 1x waterlogged elder fruit. Charred grain: 1x ?barley (cf. *Hordeum*) grain.	Insect: 1x 'scrap' of indeterminate insect cuticle only.	None
4	5.8-7.0	4007	500	400	8	51.3	Mostly approximately equal parts sand (score 4) and waterlogged plant detritus	'Seeds': frequent (score 3) waterlogged fragments, including biconvex (score 2)	Insect: some 'scraps' of indeterminate insect cuticle only	None

B	Dep (m)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
							(score 4 – predominantly 'filmy'). Other components comprised a little cinder (to 4 mm), coal (to 2 mm), mortar (to 2 mm) and ?brick/tile (to 2 mm) – all score 2 – and a trace of indeterminate rectilinear charcoal (to 4 mm; score 1). Also a little white fibrous material (score 1) – probably a modern contaminant.	and trigonous (score 1) sedge nutlets; at least four other taxa represented (some of which would be determinable to further study; score 2). Other plant structures: unidentified waterlogged structures (score 1).	(score 2).	
6	7.3-7.7	6008	300	250	20	52.4	Mostly waterlogged plant detritus (score 5 – predominantly 'filmy') and abundant coal (to 10 mm but mostly less than 4 mm; score 4), with a little indeterminate rectilinear charcoal (to 5 mm), cinder (to 11 mm), mortar (to 4 mm) and sand (all score 2).	'Seeds': frequent (score 3) waterlogged fragments, including biconvex (score 2) and trigonous (score 2) sedge nutlets, orache/goosefoot seeds (score 1) and ?stinging nettle achenes (score 1); at least five other taxa represented some of which would be determinable to further study; score 3). Charred grain: 1x ?wheat (cf. *Triticum*) grain.	Insect: cuticle fragments (score 2) – mostly of beetle sclerites (score 2), including a few elytra (score 1) which would probably be identifiable to further study. Mollusc: 1x freshwater *Planorbis planorbis* (L.) apex fragment. Crustaceans: some cladoceran (including *Daphnia*) ephippia ('resting eggs') (score 2).	None
6	7.7-8.0	6009	500	400	20	108.8	Mostly waterlogged plant detritus (score 5) – largely 'woody' (including a few roundwood twig fragments to 11 mm; diameter to 4 mm; score 1) but with some more 'filmy' material (score 2). Other components comprised frequent charcoal (to 11 mm but mostly <4 mm;	'Seeds': frequent (score 3) waterlogged fragments, mostly indeterminate but including biconvex (score 1) sedge nutlets and stinging nettle achenes (score 1); at least five other taxa represented (some of which would be identifiable to further	Insect: a few 'scraps' of indeterminate insect cuticle only (score 1). Mollusc: 1x freshwater *Pisidium* sp.	None

B	Dep (m)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
							score 3), a trace of coal (to 5 mm) and sand (both score 1), and two tiny pieces of ?mortar (to 2 mm) and one of ?brick/tile (to 2 mm).	study; score 2). Other plant structures: unidentified waterlogged structures (score 1).	valve. Other: a few earthworm egg capsules (score 1) – probably intrusive (though perhaps in 'antiquity'.	
7	2.5-3.3	7004	675	500	15	203.3	Mostly sand (score 4) and coal (to 9 mm but mostly <4 mm; score 4), with a little cinder (to 5 mm; score 2) and 'filmy' waterlogged plant detritus (score 2). Also an oily sheen to the washover from residual hydrocarbon (fuel) contamination.	'Seeds': some (score 2) waterlogged fragments, some indeterminate but representing at least two additional taxa and also including fool's parsley (*Aethusa cynapium* L.) mericarp (score 1), elder fruits (score 1) and blackberry/raspberry fruit stones (score 1).	Insect: a few 'scraps' of indeterminate insect cuticle only (score 1). Mollusc: 1x terrestrial Helicidae sp. apex fragment and 1x *Cecilioides acicula* (Müller) apex (the latter a burrowing species and almost certainly intrusive).	None
7	3.5-4.0	7006	800	600	20	307.2	Mostly sand (score 4) and coal (to 13 mm but mostly <6 mm; score 4), with frequent waterlogged plant detritus (approximately equal parts 'woody' and 'filmy'; score 3) and ?mortar (to 4 mm; score 3), a little cinder (to 10 mm; score 2) and a trace of indeterminate rectilinear charcoal (to 3 mm; score 1).	'Seeds': mostly waterlogged orache/goosefoot seeds (score 2), with a few fool's parsley mericarp (score 1) and indeterminate remains representing at least two additional taxa (score 1).	Insect: a few 'scraps' of indeterminate insect cuticle (score 1) and a single strongly eroded but more or less intact weevil (Curculionidae) elytron (probably more closely identifiable to further study). Crustaceans: a few cladoceran (including, perhaps all, *Daphnia*) ephippia (score 1).	None

B	Dep (m)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
7	4.2-5.0	7008	700	500	15	0	Mostly 'filmy' waterlogged plant detritus (score 5), with frequent coal (to 8 mm; score 3), some cinder (to 5 mm) and sand (both score 2) and a few small pieces of ?mortar (to 3 mm; score 1) and 'beads' of ?slag or sphere hammerscale (to 1 mm; score 1).	'Seeds': frequent (score 3) waterlogged fragments, mostly indeterminate but including biconvex sedge nutlets (score 1) and stinging nettle achenes (score 1); at least five other taxa represented (some of which would be identifiable to further study; score 2). Other plant structures: unidentified waterlogged structures (score 2).	Insect: beetle sclerite fragments (score 2) – mostly indeterminate but including occasional elytra (score 1 – one from a small staphylinid) and pronota (score 1) most of which would probably be identifiable to further study. Mollusc: 1x fragment of ?freshwater mussel (cf. *Margaritifera*/*Unio*) shell (to 13 mm). Crustaceans: frequent cladoceran (including *Daphnia*) ephippia (score 3). Other: 1x 'moss animal' (*Cristatella mucedo* (Cuvier)) statoblast.	None
7	6.3-6.7	7011	225	200	15	238.2	Mostly approximately equal parts 'woody' waterlogged plant detritus (score 4) and indeterminate rectilinear charcoal (to 12 mm but mostly <4 mm; score 4), with a little coal (to 8 mm), mortar (to 7 mm) and sand (all score 2) and a trace of cinder (to 4 mm; score 1).	'Seeds': some (score 2) waterlogged fragments, including biconvex and trigonous sedge nutlets (both score 1) and orache/goosefoot seeds (score 1); at least two other taxa represented (perhaps determinable to further study; score 2). Other plant structures: 1x piece of charred hazelnut shell (to 6 mm).	None	None

B	Dep (m)	CN	Wt (g)	V (ml)	w/o (ml)	res (g)	General description	Plant macrofossils	Invertebrate macrofossils	Vertebrate remains
7	6.7-8.0	7012	575	400	20	167.8	Mostly sand (score 4) and indeterminate rectilinear charcoal (to 16 mm but mostly <4 mm; score 4), with frequent waterlogged plant detritus (approximately equal parts 'woody' and 'filmy'; score 3 – 'woody' material includes a few pieces of roundwood twig (to 12 mm; diameter to 2.5 mm; score 1)), a little ?mortar (to 3 mm; score 2) and coal (to 4 mm; score 2), and a trace of ?brick/tile (to 2 mm; score 1).	'Seeds': some (score 2) waterlogged fragments, including orache/goosefoot seeds (score 1), elder fruits (score 1) and a single *Prunus* sp. (cherry/plum/sloe) fruit stone half. Charred grain: 1x indeterminate grain (shrivelled). Other plant structures: 1x piece of ?charred hazelnut shell (to 10 mm).	Insect: a few 'scraps' of indeterminate insect cuticle (score 1) and one piece of ?caddisfly (Trichoptera) larval case.	None
8	2.6-4.1	8005	500	400	20	164.8	Mostly cinder (to 16 mm; score 4) and coal (to 7 mm; score 4), with frequent (all score 3) sand, waterlogged moss 'leaves and stems' and other waterlogged plant detritus (approximately equal parts 'woody' and 'filmy'; the former including a single roundwood twig to 21 mm; diameter to 5 mm).	'Seeds': some (score 2) waterlogged fragments, including biconvex and trigonous sedge nutlets (both score 1) and orache/goosefoot seeds (score 2); at least two other taxa represented (perhaps identifiable to further study; score 2). Charred grain: 1x wheat (*Triticum*) grain – perhaps identifiable more closely.	Insect: cuticle fragments (score 2) – mostly indeterminate 'scraps' but including a few well preserved beetle sclerites (score 1, perhaps 2) which in turn included a pronotum and an elytron both of which would probably be identifiable to further study.	None

Table 6. Borehole investigations of -surface deposits at 46-50 Piccadilly, York: Residue components from samples from boreholes. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (below current ground level); '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.

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)	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
1	4.4-4.7	1006	1375	1100	109.6	75	Mostly sand (abundance score 5) and stones (to 19 mm; score 4), with frequent bone (to 40 mm; 17.2 g; score 3) and shell fragments (to 28 mm; 3.0 g; score 3), a little joined brick/tile and mortar (to 26 mm; 3.3 g; score 2), one piece of ?pot (to 27 mm; 4.0 g) and traces of cinder (to 13 mm; score 1) and rectilinear charcoal (to 6 mm; score 1). No magnetic material present.	Shell: 39x fragments of freshwater mussel (*Margaritifera*/*Unio*) shell – minimum number of valves (mnv) represented = 1. Bone: 36x fragments mostly indeterminate but including 1x medium-sized or large mammal long bone fragment and 3x small vertebrate long bone fragments; five pieces were burnt of which three were calcined.
1	4.7-5.0	1007	225	200	13.5	10	Mostly sand (score 5), with some stones (to 25 mm; score 2), brick/tile (to 20 mm; 1.8 g; score 2) and bone (to 23 mm; 0.1 g; score 2), and a little shell (to 7 mm; <0.1 g; score 1) and charcoal (to 3 mm; score 1). No magnetic material present.	Shell: 3x fragments of ?freshwater mussel shell – mnv = 1. Bone: 6x indeterminate fragments – 2x possibly fish bone.
1	5.4-6.2	1008	550	400	92.5	50	Mostly sand (score 5), with abundant stones (to 22 mm; score 4). Some bone (to 46 mm; 16.4 g; score 3) and a little shell (to 13 mm; 0.1 g; score 2) and brick/tile (to 10 mm; 0.3 g; score 2) was noted. No	Shell: 6x indeterminate fragments only.

B	Dep (m)	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
							magnetic material present.	Bone: 30x indeterminate fragments.
1	6.3-6.4	1010	325	250	42.2	25	Mostly sand (score 5), with frequent ?iron-rich sediment concretions (to 23 mm; score 3 – some of which were root cast), a little bone (to 12 mm; 0.2 g) and single pieces of ?pot (to 7 mm; <0.1 g) and 'glassy' ?slag (to 15 mm; 1.3 g). No magnetic material present.	Bone: 3x indeterminate fragments only.
4	5.8-7.0	4007	500	400	51.3	30	Almost all brick/tile (to 60 mm – largest piece, remainder <20 mm; score 5), with frequent sand (score 3), a little mortar (to 9 mm; score 2) and a single shell fragment (to 10 mm; <0.1 g). No magnetic material present.	Shell: 1x indeterminate fragment only.
6	7.3-7.7	6008	300	250	52.4	30	Mostly mortar/plaster (to 27 mm; score 4) and sand (score 4), with frequent brick/tile (to 15 mm; 7.3 g; score 3), traces of coal (to 8 mm; score 1) and cinder (to 10 mm; score 1) and a single ?pot sherd (to 15 mm; 0.9 g) and ?shot/pellet (to 3 mm; ~0.1 g – not magnetic). Biological remains comprised just five bone fragments (to 22 mm; 1.2 g) and four shell fragments (to 8 mm; <0.1 g). No magnetic material present.	Shell: 4x indeterminate fragments only. Bone: 5x indeterminate fragments, two of which were calcined.
6	7.7-8.0	6009	500	400	108.8	75	Mostly sand (score 5) and stones (to 40 mm; score 4), with a little indeterminate rectilinear charcoal (to 7 mm; <0.1 g; score 1), brick/tile (to 10 mm; 0,6 g; 5x pieces) and coal (to 9 mm; <0.1 g; score 1). There was also some bone (to 47 mm; 7.3 g; score 3) and two shell fragments (to 21 mm; 1.0 g). No magnetic material present.	Shell: 1x indeterminate fragment (to 21 mm; 0.1 g) and 1x *Pisidium* sp. freshwater bivalve valve (to 3 mm; <0.1 g). Bone: 1x small vertebrate long bone fragment (to 4 mm; <0.1 g); rest indeterminate.
7	2.5-3.3	7004	675	500	203.3	150	Mostly sand (score 4) and stones (to 35 mm; score 3), with a little indeterminate rectilinear charcoal (to 7 mm; <0.1 g; score 2), brick/tile (to 37 mm; 2.1 g; 6x pieces), mortar (to 20 mm; 14.3 g; score 2), cinder (to 13 mm; score 2) and coal (to 10 mm; <0.1; score 1). There were also	Bone: 6x indeterminate fragments – none of the remains were burnt.

B	Dep (m)	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
							six fragments of bone (to 22 mm; 2.1 g). No magnetic material present.	
7	3.5-4.0	7006	800	600	307.2	200	Mostly mortar/plaster (to 59 mm; score 5) and sand (score 3 – perhaps largely disintegrated mortar?), with a little rectilinear charcoal (to 9 mm; <0.1 g; score 1), coal (to 10 mm; <0.1 g; score 1), cinder/?slag (to 17 mm; 3.3.g; 5x pieces), brick/tile (to 22 mm; 6.4.g; score 2 – also some additional 'crumbs' which were not sorted (score 2)) and one rusted iron nail (to 41 mm; 2,7 g). There was no magnetic material present other than the nail.	Charcoal: one piece partially identified as of a diffuse-porous species.
7	4.2-5.0	7008	700	500	0	0	No separate residue fraction from this sample.	-
7	6.3-6.7	7011	225	200	238.2	175	Mostly sand (score 5) and stones (to 29 mm; score 4), with a little brick/tile (to 25 mm; 8.5 g; score 2), mortar/plaster (to 19 mm; 3.3 g; score 2), slag (to 35 mm; 35.2 g; 3x pieces) and cinder (to 38 mm; 13.3 g; 3x pieces). There was also some bone (to 38 mm; 37.5 g; 25x fragments) and one shell fragment (to 11 mm; 0.1 g). No magnetic material present.	Shell: 1x indeterminate fragment only. Bone: 3x fragments (perhaps 5x) of medium/large mammal long bone. Other fragments indeterminate – of which four were calcined.
7	6.7-8.0	7012	575	400	167.8	100	Mostly sand (score 5) and stones (to 35 mm; score 3), with some brick/tile (to 22 mm; 8.5 g; score 3) and mortar/ plaster (to 23 mm; 15.4 g; score 3) and a little cinder (to 22 mm; 2.8 g; 1x piece), metal (to 7 mm; ~0.1 g; 1x piece – non-ferrous) and ?pot (to 17 mm; 0.6 g; 1x sherd). There were also quite numerous fragments of bone and one tooth (to 31 mm; 13.5 g; score 4) and five shell fragments (to 17 mm; ~0.1 g). No magnetic material present.	Shell: 1x fragment *possibly* of freshwater mussel shell (mnv = 1); remainder indeterminate. Bone: 1x medium-mammal (probably sheep/goat) incisor (to 31 mm; 2.0 g) and 1x ?small mammal incisor fragment (to 3 mm; <0.1 g – probably mouse/vole (murine/microtine)). Remaining fragments (50x) indeterminate – 2x

B	Dep (m)	CN	Wt (g)	V (ml)	res (g)	res v (ml)	Residue description	Notes/identifications
								calcined and one part-burnt.
8	2.6-4.1	8005	500	400	164.8	100	Mostly sand (score 5) and cinder (to 22 mm; score 4), with frequent stones (to 16 mm; score 3) and small quantities of brick/tile (to 30 mm; 11.6 g; score 3), mortar/plaster(to 43 mm; 29.2 g; score 3) and 'glassy' slag (to 17 mm; 4.1 g; 6x pieces). There were also seven fragments of mollusc shell (to 6 mm; <0.1 g), one piece of bird eggshell (to 4 mm; <0.1 g), one fish vertebra (to 3 mm; <0.1 g) and one piece of rotted woof (to 18 mm; <0.1 g). No magnetic material present.	Wood: 1x indeterminate fragment only. Shell: 7x indeterminate mollusc shell fragments. Eggshell: 1x small fragment only – *perhaps* identifiable to further study. Bone: 1x ?herring (cf. *Clupea harengus* L.) vertebra.

Table 7. Borehole investigations of sub-surface deposits at 46-50 Piccadilly, York: General description of microfossil subsamples and notes on remains present. Key: 'B' = borehole; 'Dep (m)' = depth in borehole in metres (below current ground level); '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.

				Microfossils			**Pollen/spores**		**Diatoms**		**?Phytoliths**		**Fungal spores**					
B	**Dep (m)**	**CN**	**Desc**	**Ab**	**Div**	**Pres**	**N**	**types**	**N**	**types**	**N**	**types**	**N**	**types**	**Notes/identifications**	**?micro char/ash**	**f. hy.**	**plant tissue frags**
1	4.4-4.7	1006	5	1	1	1	-	-	-	-	-	-	+	1	-	-	++	+++++
1	4.7-5.0	1007	5	2	2	2	+	2	-	-	++	1	+	1	Pollen/spores: including grass (Poaceae)-type + ?Phytoliths: grass-type ++	-	++	+++++
1	5.4-6.2	1008	2	1	1	1	-	-	-	-	-	-	+	1	Other: 1x soil-dwelling nematode (dead)	++	++	++
1	6.3-6.4	1010	2	1	1	1	-	-	-	-	-	-	-	-	-	+	+	-
4	5.8-7.0	4007	2	1	1	1	-	-	-	-	-	-	+	1	-	-	+	++
6	7.3-7.7	6008	4	3	3	2	++	3	++	4	-	-	-	-	Pollen/spores: including 1x fern (*Polypodium*) spore Diatoms: including	-	++	+++

				Microfossils			Pollen/spores		Diatoms		?Phytoliths		Fungal spores					
B	**Dep (m)**	**CN**	**Desc**	**Ab**	**Div**	**Pres**	**N**	**types**	**N**	**types**	**N**	**types**	**N**	**types**	**Notes/identifications**	**?micro char/ash**	**f. hy.**	**plant tissue frags**
															Navicula sp. and *Pinnularia* sp. – approximately half of frustules broken and more complete ones mostly heavily eroded			
6	7.7-8.0	6009	4	3	2	2	+	2	+++	4	-	-	-	-	Pollen/spores: including grass-type + Diatoms: no identifications – approximately two-thirds of frustules broken and more complete ones mostly heavily eroded	-	++	+++
7	2.5-3.3	7004	3	2	2	2	+	1	-	-	-	-	+++	2	Pollen/spores: grass-type +	++	++	++
7	3.5-4.0	7006	2	1	1	1	-	-	-	-	-	-	-	-	-	+++	++	+
7	4.2-5.0	7008	4	3	3	2	++	3	+++ +	7	-	-	+	1	Pollen/spores: including 1x ?milfoil (cf. *Myriophyllum*) +	-	++	++++

				Microfossils			Pollen/spores		Diatoms		?Phytoliths		Fungal spores					
B	**Dep (m)**	**CN**	**Desc**	**Ab**	**Div**	**Pres**	**N**	**types**	**N**	**types**	**N**	**types**	**N**	**types**	**Notes/identifications**	**?micro char/ash**	**f. hy.**	**plant tissue frags**
															Diatoms: including *Navicula* sp. and *Pinnularia* sp. – approximately half of frustules broken and more complete ones mostly eroded			
7	6.3-6.7	7011	2	2	2	1	+	1	-	-	-	-	-	-	Pollen/spores: not identifiable – crumpled	+	++	+++
7	6.7-8.0	7012	3	2	2	2	++	2	++	2	+	1	-	-	Pollen/spores: not identifiable – broken/crumpled Diatoms: no identifications - mostly broken and/or eroded (some possibly identifiable to further study) ?Phytoliths: grass-type +	-	++	+++
8	2.6-4.1	8005	2	2	2	1	++	2	+	2	+	1	+	1	Pollen/spores: not	++	+++	++

				Microfossils			Pollen/spores		Diatoms		?Phytoliths		Fungal spores					
B	**Dep (m)**	**CN**	**Desc**	**Ab**	**Div**	**Pres**	**N**	**types**	**N**	**types**	**N**	**types**	**N**	**types**	**Notes/identifications**	**?micro char/ash**	**f. hy.**	**plant tissue frags**
															identifiable – broken/crumpled Diatoms: two, perhaps, three frustules – all broken and eroded; none identifiable ?Phytoliths: grass-type +			

APPENDIX 4 – ASSESSMENT OF BASELINE CONDITIONS

By Ian Panter

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.

Laboratory analyses were performed by Geolabs (Watford) on three undisturbed sediment cores extracted by Dunelm Geotechnical & Environmental Ltd using a lightweight windowless dynamic drilling rig. Each sample was retained in its Perspex tube, which was sealed to prevent water loss and movement prior to despatch to the laboratory.

Results are in Table 1

Sample	**Depth mBPGL**	**Description**	**Organic Content %**	**Water Content %**	**Hydraulic Conductivity m/s**	**Porosity**
1008	5.50	Clayey silty sand	7.0	37.3	5.5×10^{-10}	0.52
4006	4.60	Clayey silty sandy gravel	4.8	27.5	na	na
7010	5.70	Clayey silty sand	10.0	54.1	2.1×10^{-10}	0.73

Table 1 key physical characteristics

Sample 4006 was mainly gravel and therefore deemed unsuitable for hydraulic conductivity determination using the triaxial cell technique. As a result no porosity determination was possible either.

Samples 1008 and 7010 are silty sands with clay and appreciable organic and water contents.

The sediments have very low hydraulic conductivities and relatively high porosity values, a result of the clay component, as well as the presence of organic materials. The high porosity values imply 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 falls substantially.

Based on this limited information the sub-surface deposits appear to be conducive to the long-term preservation of vulnerable organic archaeological remains. It is recommended however that a programme of ground water monitoring is implemented to identify the source of recharge of these deposits. Are the deposits effectively recharged from the river Foss or from rainfall draining through the sediments?

These questions are discussed below in relation to groundwater levels which have been monitored over the six months between 12th April and 13th October 2017 in three dipwells installed at the site during the borehole evaluation.

APPENDIX 5 – EVALUATION OF PRESERVATION CONDITIONS

By Ian Panter

Groundwater

A six month (12th April–13th October 2017) programme of groundwater monitoring in 3 boreholes has been carried out to assess the potential impacts upon the water table resulting from construction related activities. Three dipwells were installed in Boreholes 1, 4 and 7, providing a linear transect from street frontage to the river Foss, and groundwater levels measured initially on a fortnightly basis by Dunelm Geotechnical staff, and then weekly by YAT staff, using an audible dipmeter. BH 1 was installed to a depth of 5.72m below ground surface, BH4 to 3.70m and BH 7 to 6.00m.

Figure 1 shows the plot for groundwater levels and rainfall data over time (raw data can be found in Table 1). Groundwater levels are recorded in metres below ground surface (bgs), and rainfall data is derived from daily totals recorded by the University of York, Department of Electronics, at the Heslington Campus. Gaps in water level data from Borehole 7 are a result of inaccessibility of the well head due to a parked car, and no rainfall data for September 2017 had been archived and therefore was unavailable.

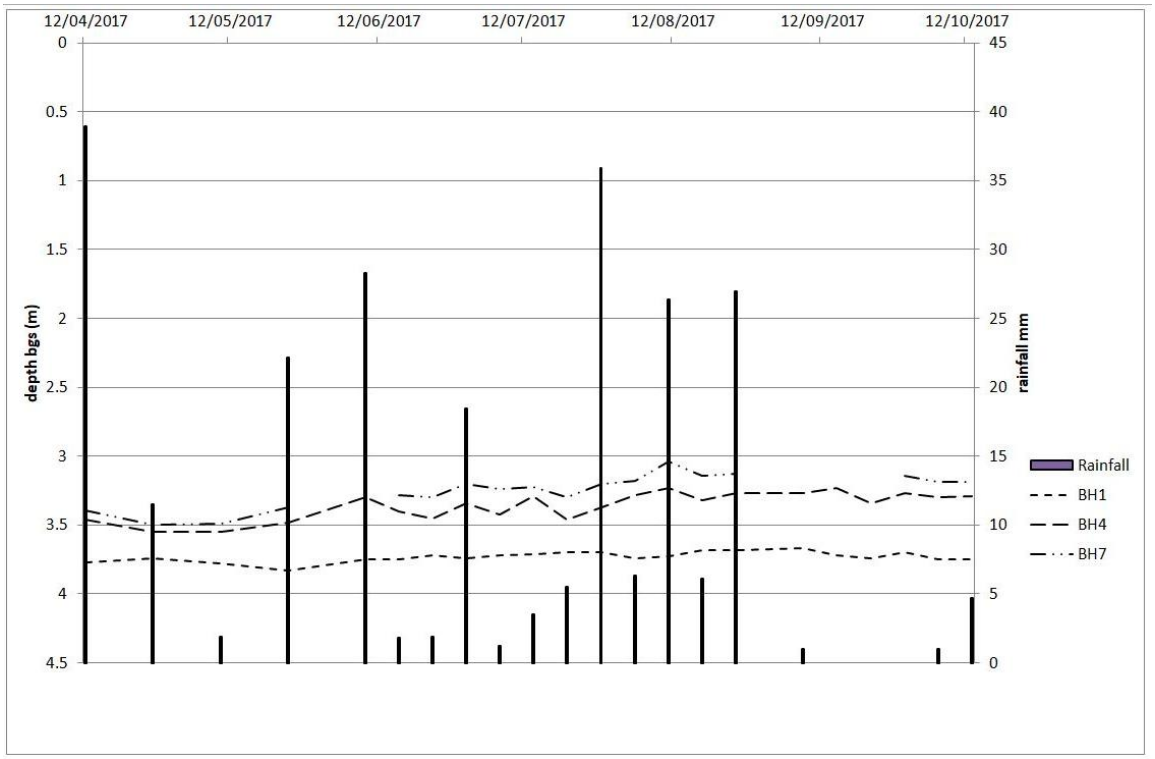

Figure 1 plots of groundwater levels in three boreholes at 48/50 Piccadilly, York, and rainfall data from the University of York, Heslington Campus. Gaps in data for BH7 due to car parking above well head.

The largest fluctuation was observed in BH 7, with a range of 46 cm (3.04–3.50 m bgs), and the lowest in BH1 with a range of 16cm (3.67–3.83m bgs), and a 32cm range was recorded from BH4 (3.23–3.55m bgs). Whilst the standing water level in BH1 has remained fairly static over the six months, the levels in both BH4 and BH 7 have been rising during the summer months.

Urban hydrology is considerably complex and dynamic with potential influences upon ground water levels including rainfall and river levels, leaking water mains and other water sources such as drains and soak-aways. The river Foss is canalised where it flows through York, and its height regulated by the Foss Barrier, and is therefore unlikely to have a major influence upon groundwater levels, apart from acting as a barrier to ground water flow, which appears to be the case at 46-50 Piccadilly. Over the course of the six month period, the standing water levels levels in both BH 4 and 7 have risen from a low of around 3.5m to a height of circa 3.0m below ground surface.

Cumulative weekly rainfall data obtained from the Heslington Campus, University of York, has been used to assess whether ground water levels are influenced by rainfall. Daily rainfall was recorded throughout much of the monitoring period, only 39 days (21%) were dry between April and October, with higher single rainfall events recorded on the 5th April (22.64mm, one week before monitoring commenced), 28th June (16.13mm), 22nd July (16.17mm) and 23rd August (25.81mm). The wet summer (only 26 days were dry during the 3 months of June, July and August) has no doubt contributed to the rise in standing water in BHs 4 and 7.

Episodes of more intense rainfall events do result in subsequent rises in the standing water levels in BH4 and BH7, often quite rapidly.

Geotechnical Testing

Three undisturbed core samples extracted by Dunelm Geotechnical & Environmental Ltd using a lightweight windowless dynamic drilling rig were analysed by Geolabs Ltd, a summary of the key results are presented in Table 1. The complete test results and certificates are included in the appendices.

Sample	**Depth m bgs**	**Description**	**Organic Content %**	**Water Content %**	**Hydraulic Conductivity m/s**	**Porosity**
BH1 1008	5.50	Gravelly sandy organic rich silty clay	7.0	37.3	5.5×10^{-10}	0.52
BH4 4006	4.60	Slightly organic clayey silty sandy gravel	4.8	27.5	na	na
BH7 7010	5.70	Gravelly sandy organic rich silty clay	10.0	54.1	2.1×10^{-10}	0.73

Table 1 key geotechnical characteristics

The sample from BH4, Context 4006 was mainly gravel and unconsolidated and hence it was not possible to determine hydraulic conductivity or porosity values.

The sediments from BH1 (Context 1008) and BH7 (Context 7010) are described as silty clays which are organic rich (organic contents of 7% from context 4006, and 10% from context 7010), and high water contents ranging from 27.5% to 54.1% from BH 7.

Hydraulic conductivities values from BH1 and BH 7 are low and typical for clay based sediments. The porosity values are also typical of sediments having a clay component, and an appreciable organic content.

Porosity values of 0.52 (BH1) and 0.73 (BH7) imply these sediments have the capacity to hold a large volume of water when saturated, and that their low hydraulic conductivities suggests that the clay based sediments will not drain rapidly if the water table falls substantially for a sustained period of time. However, the sandy gravel rich sediment from BH4 will be freely draining and won't be capable of holding water if the water table is lowered.

Conclusion

The six month monitoring programme has demonstrated that the below-ground deposits at 46–50 Piccadilly are recharged primarily through rainfall with a general trend of groundwater flow towards the River Foss. Therefore, as the site already comprises standing buildings and areas of hard standing then any broadly similar new construction should not present a barrier to continued groundwater recharge across the site. The substantial clay component ensures that the sediments have a low hydraulic conductivity and are therefore likely to retain water during periods when the water table is lowered, either through low rainfall or temporary ground works associated with redevelopment.

APPENDIX 6 – WRITTEN SCHEME OF INVESTIGATION

WRITTEN SCHEME OF INVESTIGATION FOR EVALUATION OF IMPACT ON ORGANIC ARCHAEOLOGICAL DEPOSITS AT 46–50, PICCADILLY, YORK

Site Location: 46–50 Piccadilly, York.

NGR: SE 6061 5153
Proposal: Archaeological Evaluation
Planning ref: **17/00429/FULM**

Prepared for: Northminster Ltd

Document reference: YAT Report 2017/40

1 INTRODUCTION

1.1 Northminster Ltd has submitted a planning application for the redevelopment of the NCP Car Park, 46–50 Piccadilly, York. The site contains archaeological deposits that will be impacted upon by the development proposals.

The development site lies within an area of considerable archaeological importance for understanding the morphology of the River Foss river regime and associated occupation and interactions of past local populations. A small excavation carried out by York Archaeological Trust in 1992 provides a guide indicating that well-preserved waterlogged deposits of the Roman, Anglo-Scandinavian, and medieval periods are overlain by post-medieval and modern, non-waterlogged deposits which form in total around 8m of deposition below the present ground level.

1.2 This Written Scheme of Investigation (WSI) has been prepared in response to a specification agreed in consultation with the City of York Archaeologist, John Oxley, and Historic England.

The City of York Archaeologist has requested the preparation of a proposal for further archaeological borehole evaluation, including a condition assessment of the waterlogged deposits, and a subsequent programme of water monitoring. The monitoring aims to assess the condition of deeply-buried and potentially organic waterlogged deposits identified during the 1992 so that the impact of the proposed hotel development upon archaeological deposits can be assessed. Of particular concern would be any potential 'halo' effect caused by below-ground intrusions or structures into sensitive water-logged deposits, the preservation of which is dependent on the stability of ground conditions.

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 and all relevant standards and guidance.

2 SITE LOCATION & DESCRIPTION

2.1 The proposal site fronts onto Piccadilly and is bounded to the east by the River Foss (Figure 1). The underlying solid geology of the site is sandstone of the Sherwood Sandstone Group with superficial deposits of alluvial silt, clay, sand and gravel (http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

The building currently occupying the site was built in the 1950s as a garage and is largely of concrete with a glass shop frontage facing Piccadilly.

The present ground level is relatively flat at around 9.5m OD, however archaeological investigation has shown that natural glacial deposits, buried ground surfaces and archaeological deposits slope down toward the River Foss from a ridge of high ground on Piccadilly (see Section 4.2).

3 DESIGNATIONS & CONSTRAINTS

3.1 The client is responsible for investigating designations of the site regarding listed building, conservation areas etc. York Archaeological Trust (YAT) are appointed purely to deliver the Archaeological Evaluation as outlined in this document. The site lies within York's Area of Archaeological Importance as defined by the Scheduled Monuments and Archaeological Areas Act 1979.

3.2 The positioning of the evaluation boreholes has been designed for optimal coverage across the site to provide a comprehensive deposit model. However, the positioning has been restricted to some extent by the standing buildings which limit machine access for the borehole rig and underground obstructions and utilities linked with the previous use of the building as a garage, such as fuel tanks. The continuing use of the building as a car park also limits the placement of the boreholes as they must remain accessible for occasional monitoring. Every effort will be made to place the boreholes as close as possible to the locations shown in Figure 2.

4 ARCHAEOLOGICAL INTEREST

4.1 Period-by-period summary

The Piccadilly area has been subject to numerous archaeological interventions since the 1980s. The following overview of the current archaeological knowledge of the site and surrounding area is taken from YAT Report 2016/85 (Reeves 2016).

4.2 The topography and regime of the River Foss

The importance of York's waterfronts and their potential to provide information about areas of the city once the focus for trade and commerce has long been recognised. The work of York Archaeological Trust since 1972 has shown that excavation of waterfront sites can reveal evidence for 'the economic basis of the city's life throughout its history' (Addyman et. al. 1988, 1). During the extensive 1981–2 watching brief on the area now occupied by the Coppergate Centre on the west bank of the River Foss the ancient course of the river was found along with revetments, installations, ship fragments, and traces of the water defences of York Castle.

Further excavations at the site of the former ABC Cinema, 22 Piccadilly, defined an earlier river channel and associated 11th-century riverside revetments (Addyman et. al. 1988, 8).

The 46–50 Piccadilly site is situated on ground at the confluence of the Rivers Ouse and Foss close to the point where these rivers penetrate the York Morraine. The historic fluvial morphology of the lower River Foss is not well understood. What little information there is comes from borehole records and excavations carried out along the south-west side of Piccadilly, Coppergate and more recently the Hungate area; all of which demonstrate a complex landscape morphology which is the product of both natural geological processes and large-scale alterations caused by human agency throughout historic periods.

Evidence from the Walmgate and Piccadilly areas, largely derived from small-scale keyhole excavations carried out by YAT in the early 1990s, has provided valuable evidence about the topographical development of the River Foss and its waterfront areas.

Walmgate occupies a ridge of high ground leading to the crossing point of the Foss at Foss Bridge. The top of natural glacial deposits identified at 31 Walmgate on the street frontage was at depths between 9.92m OD to 9.60m OD (Robinson 2013, 6–7, 15).

To the east of this ridge the archaeological evidence from the proposal site and adjacent sites shows that the ground level on the eastern Foss bank has been increased considerably since the Roman period through land reclamation. At 17–21 Piccadilly, approximately 25m north of the proposal site, the natural slope towards the Foss was identified between 4.5m BPGL (approximately 5.5m OD) at the south end of the site to 7.6m BPGL (Approximately 2.4m OD) at the northern end (Lilley 1991, 2). At 50 Piccadilly natural was identified at 1.2m OD and a borehole watching brief at 38 Piccadilly identified natural at approximately 9m BPGL –a depth of approximately 1.65m OD. The slope across the same area today is only around 1.6m (YAT Gazetteer 613; Gajos 2013, 7).

4.3 Prehistoric

Prehistoric remains from York are scarce, amounting to a small number of casual finds since the 19th century, mainly from the south-west of the River Ouse and a small number of undated but possibly pre-Roman features (Wellbeloved 1862, 61–3; Radley 1974, 10–4; Hall 1996, 25). However, evidence is increasingly being found for Bronze Age and Iron Age activity focused on the York Moraine, particularly to the east of the city. Closest of these discoveries, found at 25 Lawrence Street some 0.6km to the east of Piccadilly, was a Bronze Age cremation urn discovered in 2007 (Reeves forthcoming) and an assemblage of Neolithic flint tools consistent with occupation recovered from recent excavations at Hungate (Kendall 2009, 175) some 0.35km to the north of the site both within the lower Foss. Considerable evidence for late Neolithic and Bronze Age occupation comes from further east on the moraine such as the recent discoveries in the Heslington area, approximately 3.5km to the east of the city, made during the expansion of the University of York (Antoni, Johnson and McComish 2009).

Prehistoric water levels at the site of 46–50 Piccadilly would have fluctuated in tandem with those of the tidal Ouse (Briden 1997, 170; Duckham 1967, 17). The resulting complex marshland ecosystem was likely a place of significance and a valuable subsistence resource to local populations (Whyman and Howard 2005, 14). Although it is unlikely, there may be evidence for prehistoric activity preserved at 46–50 Piccadilly, its location and the waterlogged

nature of the buried deposits in the area could also hold potential for valuable information about fluvial landscape morphology and environment during this period.

4.4 Roman

The site is approximately 450m south-east of the south-east corner of the Roman fortress founded in AD 71. Although the archaeological evidence for Roman activity in the area to the south-east of the River Foss is relatively sparse compared to the fortress area the area seems to have been utilised throughout the Roman period (McComish 2007).

Roman Road 1a, leading to *Eboracum* from *Throlam* near Holme-on-Spalding-Moor is thought to have converged with the Road 1b, a minor road from the south, some 150m to the south east of the 46-50 Piccadilly site. Roads 1a and 2, from *Petuaria* (Brough-on-Humber) are thought to have converged approximately 30m north of 46–50 Piccadilly (RCHMY I, 2; Ottaway 2004, 12; Ottaway 2015, 9; HTAY 2015, Sheet F). Roman burials were discovered sometime before 2007 by Malton Archaeological Partnership immediately south of Dixon Lane (McComish 2007). A Roman Altar dedicated to the native god Arciaco was found at St Denys Church on Walmgate and two other coffined Roman burials were found nearby (RCHMY 1, 69–70, 118; HTAY 2015, Sheet F).

Evidence for Roman use of the Foss as a navigation comes from 1951–52 excavations for the construction of the Telephone Exchange building in Garden Place, Hungate, where walls and piles interpreted as a Roman wharf and the buried former course of the river were discovered (RCHMY I, 64). In the Piccadilly area, evidence for riverbank activity on the east bank of the Foss comes from excavations at numbers 38, 40 and 50 Piccadilly. A line of stone pillars beneath the Tax Offices on Piccadilly was interpreted as possible evidence for a Roman riverside jetty (Ottaway 1993, 69).

Furthermore, excavations at 38 and 50 Piccadilly suggest there was significant occupation and river front land use during the late 2nd–3rd centuries in the vicinity of the site comprising evidence for management of the riverside, dumped occupation material including domestic pottery and evidence of possible industrial activity.

4.5 Anglian

Evidence for Anglian period York is generally elusive and what has been recovered to date is sparsely distributed across the city. Excavated sites and the distribution of find spots suggests that settlement at York was polyfocal with distinct nuclei spread out across the former Roman fortress and colonia, interspersed with cultivated or waste areas (AY 7/2, 298; Palliser 2014, 37). As yet, no evidence has been found for wharves or intensive occupation, however, evidence from sites along the course of the River Foss suggests occupation and other activity along the river bank. A number of Anglian pot sherds have been recovered from Hungate (AY 7/2, 196; YAT forthcoming) and the Haymarket excavations (Reeves forthcoming), at 22 Piccadilly Anglian pottery, probably of early–mid 9th century date was recovered from two trenches, one of which was associated with a wicker fence running parallel to the river. Silt accumulations above these levels indicate the area was prone to flooding. Further evidence came from 38 Piccadilly where a sherd of Badorf ware was recovered from some 8m below modern street level beneath a substantial accumulation of probable 11th-century alluvial silt.

At 17–21 Piccadilly a 9th century relief-band amphora fragment was recovered from around 5m below the modern street level at around 5.7m OD (AY 7/2, 196–197; Appendix 2)

The site, 46–50 Piccadilly, is close to one of the most important Anglian period sites excavated in York, the former Redfearn National Glass works, 46–54 Fishergate, which is around 0.4km to the south (AY 7/1). The majority of the evidence for Anglian activity elsewhere in the city comes from artefacts which may be the result of casual losses through transient activity and may not necessarily be convincing evidence of occupation. However, evidence from the 1985–6 excavation of 46–50 Piccadilly provides evidence of an important production and trading centre, or *wic,* occupying an area of around 2,500m² sited on the lower east bank of the River Foss, directly opposite the point of confluence with the River Ouse (AY 7/1). This 7th–late 9th century settlement apparently began as a well-organised, probably planned, settlement rather than one that developed organically to exploit the natural communications provided by the rivers and the east–west land route of the York Moraine.

More recent excavations at the former Mecca Bingo and in the Blue Bridge Lane area a little further south from Fishergate have produced further evidence of Anglian period pit groups and occupation (Spall and Toop 2011, 7). Excavation carried out at the junction of Dixon's Lane/George Street in 2006 discovered further evidence for activity possibly associated with the *wic* approximately 100m to the east of 46–50 Piccadilly (AYW 9, McComish 2007). Based on current archaeological evidence the 46–50 Piccadilly site lies just to the north-west of the possible Anglian settlement (Figure 4; Palliser 2014, 24).

4.6 Anglo-Scandinavian

The site lies within an extensive area of Anglo-Scandinavian activity to the south-east of the former Roman fortress. It has been suggested that the Anglian period *wic* at Fishergate was in decline by the 860s–870s and was replaced at around this time by occupation around the Ousegate/Coppergate area (AY 8/4, 299–304). However, evidence found in 2007 for craft and trade activity at Dixon Lane/George Street, located midway between the Fishergate and Coppergate/Ousegate areas, suggests a wider spatial continuity between the Anglian *wic* and the Anglo-Scandinavian settlement in the late 9th–10th centuries (AYW 8). Evidence for Anglo-Scandinavian activity from YAT excavations at 118–126, 76–82 and 104–112 Walmgate suggests that Walmgate became an important thoroughfare in the burgeoning 9th- and 10th -century town and a substantial suburb developed in the area. The nearby churches of St Stephen, Fishergate and St Denys, Walmgate are thought likely of pre-Conquest origins. A number of sites along Piccadilly have revealed traces of Anglo-Scandinavian activity such as bone working evidence from excavations at 38, 50, and 84 Piccadilly (AY 8/4, 469–472).

4.7 Medieval

The landscape of the River Foss was drastically altered by the damming of the southern end of the river at Castle Mills during the Norman period to exploit its waters to feed the moat of the Norman castle at York (VCHY 1961, 509–510). The resulting body of water was called the *Stagnum Regis,* the King's pool. The dam of the Fishpool of the Foss probably provided a causeway across the Foss at the site of the modern Castle Mills Bridge. The first documentary

evidence for a bridge at Castle Mills is not until 1585 and the structure was destroyed during the Siege of 1644 (VCHY 1966, 519–520; Raine 1955, 196). Cartographic evidence, as well as evidence from the excavations at 38 and 84 Piccadilly show that the area which now forms the west side of Piccadilly was largely flooded by the creation of the Fishpool and remained so for much of the late medieval period, during which time the King's Fishpool gradually silted up and some of the land formerly flooded reclaimed. Historic maps show the areas flooded based on archaeological and cartographic sources and the gradual change in area taken up by the King's Pool during the early modern period (Not reproduced here; see Desk Based Assessment, YAT Report 2016/85).

The Walmgate sector of the city was enclosed with defences in the late 12th century (RCHMY 2, 11; HTAY 2015, 31). Fishergate Postern, 0.2km to the south was built sometime in the 14th century (Raine 1955, 20).

Cartographic evidence suggests that 46–50 Piccadilly was at the riverside edge of gardens to the rear of properties fronting onto Walmgate during this period and the archaeological evidence discussed further in Section 6 of this report indicates that waste was dumped along the riverside where there were perhaps jetties or revetments designed to consolidate and reclaim land from the river.

4.8 Post-medieval

Canalisation of the River Foss began in the late 18th century, the first stretch from Castle Mills to Monk Bridge being opened in 1794. It was continued to Sheriff Hutton in 1801. Factories and Warehouses at Hungate were still accessible via the Foss Navigation until the 1960s even though its use as a navigation was in decline. In recent decades the remaining light industry has relocated, making way for largely residential development (VCHY 1961, 475; Fife and Walls 1981, 23–25; YAT forthcoming).

The modern street named Piccadilly runs from Pavement across the River Foss and along its east bank to the east end of Castle Mills Bridge. A lane or open space existed at the south end by 1610 and was widened and re-named Piccadilly after the London Street c. 1840. It was extended north to Pavement in 1912 (RCHMY 5, 199).

Much of the street is built over land that was formerly covered by the Kings Pool of the River Foss. The gradual development of the post-medieval landscape can be traced through the historic maps of which there is a sequence available dating from the 17th century. On Speed's map of 1610 the site is depicted as open ground

Richards' map of 1685, which is largely a copy of an earlier map by Captain James Archer (surveyed 1673 and published 1682; not reproduced), shows open ground, presumably used for commercial horticulture with property boundaries and a path or street leading from Walmgate to the east bank of the River Foss. The distinction between streets built-up with houses, and lesser pathways on these early maps is unclear. Their exact location and orientation in relation to the modern landscape is also difficult to determine with complete accuracy but it seems there has, for a considerable time, been some form of access to the east bank of the Foss from Walmgate and the north side of St Denys' church yard.

By 1750, the publication date of Chassereau's map, the area around St Denys' church is largely built-up, the path leading to the east bank of the Foss is no longer shown and a new path or street leading south towards the Castle Mills Bridge area is indicated, forming the predecessor to the modern southern end of Piccadilly.

4.9 Modern

Hargrove's map of 1818 appears to differentiate between probable horticultural land to the north-west and west of St Denys' church and what appears to be open ground to the south-west. The line of the path running south towards Fishergate Postern from the west end of the churchyard is in Hargrove's map delineated with a dashed line, possibly indicating it was of lesser status than other lanes shown further to the east. The 1852 Ordnance Survey map shows the path widened and formalised after the creation of Piccadilly.

By 1852 St Denys' Street had been extended along a line to the south-west with a slight dog-leg and is shown as a built-up street of terraced houses. The properties on the north side of the street appear to be small houses with yards and those on the south appear to be back-to-back houses. Walmgate was a notorious area in the 19th century associated with poverty, crime and prostitution. A block of terraced dwellings, immediately south-west of St Denys' Church, were known as Plow's Rectory Buildings. Finnegan describes these as an unwholesome terrace amongst which there were a small number of 'houses of ill fame' such as 'Todds' and 'Mrs Varley's'. Several diseased and destitute prostitutes entered the work house from this address (Finnegan 1979, 54–55).

In the 19th-century the terraced houses of St Denys' Street ran from Walmgate to the south-west across the 46–50 Piccadilly site almost towards the bank of the River Foss. A search of City of York Council 'Imagine York' images archive returned only 1, relatively uninformative, photograph of the east corner of St Denys Street at its junction with Walmgate taken in c. 1933. The eastern end of the street appears to follow a property boundary or thoroughfare running south-west from Walmgate along the north side of St Denys' church, a route that can be traced in the historic maps as far back as Speed's map of 1610.

The buildings on Piccadilly are predominantly of 20th-century date consisting of a number of former garages, warehouses, offices and retail shops with some residential flats and a large hotel at the Castle Mills end of the street. A terrace of four small houses (numbers 41, 43, 45) built shortly before 1850 is recorded by the Royal Commission as having been demolished before 1961 and the former White Swan Hotel (now Pavement Vaults and residential flats) at the northernmost end of the street incorporates partial remains of a three-storey mid-18th -century house (RCHMY 5, 199).

Number 46–50 Piccadilly was built as a motor garage in 1955 and evidence of this former use is present in both the internal layout of the building and surviving fixtures and fittings. An assessment of the architectural merit of these buildings and their historic landscape setting is beyond the remit of this report, however, the building is unusual and as there are few examples of such buildings remaining in York, many others having been destroyed without record investigation and recording of the buildings may be informative.

5 DEPOSIT SEQUENCE BASED ON 1992 SITE INVESTIGATION (YORYM:1992.10)

5.1 Summary of YAT Report 1992/14 Archaeological Evaluation at 50 Piccadilly

An evaluation excavation was carried out by York Archaeological Trust at 50 Piccadilly, York over 8 weeks in 1992 on behalf of the Polar Motor Company (York) Ltd. The excavation was directed by Rhona Finlayson who subsequently wrote the evaluation report on which the following summary is based (YAT Report 1992/14).

A single 3m x 3m trench 8 metres deep was excavated down to a height of 2m OD at which level natural glacial deposition was identified. This small evaluation excavation is the principal source for understanding the archaeological potential of 46–50 Piccadilly.

5.1.1 Natural

Glacial deposition consisting of a compact grey-blue sandy clay and friable light brown sandy clay with occasional iron-panning and small pieces of plant matter was encountered at 2.6m OD.

5.1.2 Roman

The Roman activity identified during the 1991 excavation at 46–50 Piccadilly begins in the late-2nd century when two small parallel drainage ditches aligned north-south 0.3m apart were dug into natural deposits. Environmental evidence from samples suggested they intermittently carried water and that the surrounding landscape may have been rough grazing or weedy waste ground. Deposits above the backfilled ditches showed that the ground surface was subsequently raised with an isolated post being the only suggestion of structural activity: All being subsequently sealed by burnt material suggesting possible industry in the vicinity, into which another linear feature of uncertain function was dug. This was followed by a sequence of dumped domestic refuse and a line of stakes in the 3rd century. These deposits were overlain by a rough cobble surface followed by an organic build-up, again, all of 3rd century date.

5.1.3 Probable Anglo-Scandinavian

The Roman ditches were overlain by a series of levelling or dumped deposits interspersed with occasional cut features including a post-hole and a ditch. Deposits included burnt residues, possible burning in situ, domestic midden material tipping west towards the river overlain by remnants of a cobble surface at a height of 4.35m OD.

5.1.4 Medieval

Above the level of the cobble surface remnants was a build-up of humic silty clays containing pottery dated to the 11th–12th centuries. Thin lenses of organic material with vivianite inclusions suggested alternating waterlogged and dry conditions and an increasingly pronounced slope to the west was noted as these deposits had accumulated.

A large dump of irregularly-shaped tree-trunk timbers, found at approximately 4.6m OD, was interpreted as a possible boundary or perhaps discarded material, dumped at the margins of a timber yard to consolidate the ground surface.

These levels were followed by 14th century build-up with evidence for sporadic water-logging and organic material with copious domestic waste and hay and straw remnants probably

representing discarded bedding or feed from animal keeping. A domestic cat skeleton was also recovered from these deposits, which tended towards sloping westwards indicating continued riverside waste tipping.

A row of substantial vertical posts, circular in profile, and various horizontal timbers, some of which had been nailed to the posts were discovered at around 5.2m OD and interpreted as revetments for ground consolidation and the possible creation of a terrace of higher ground. The excavator stressed the inherent interpretive limitations due to the small window of excavation.

Fourteenth century activity consisted of a series of dumped organic material and a large dump of large tile fragments all tipping steeply towards the river. Deposits to the west of the revetment already discussed consisted of dumped and built-up material, formed in still/slow moving water according to evidence from environmental sample analysis.

Compact clay and a series of horizontal planks found at 6.05m OD ranging in length from 0.47m–2m, had later been used to consolidate the earlier timber revetment and was overlain by a further series of dumps and levelling material dated to the 15th century by pottery.

5.1.5 Post-medieval

Above the late medieval deposition was a series of dumps and levelling deposits including demolition material and 17th century pottery. This activity was shown to have continued into the 18th century when a further 0.5m build-up of dumped material was deposited.

5.1.6 Modern

Above these deposits was a series of linear features, evidence for 18th–19th century horticultural use of the land shown on Todd's Map of 1829.

The uppermost 0.3–0.5m layers of hand-dug deposition contained human bone and demolition material presumed to have originated from St Denys' Church yard. It was suggested by the excavator that this material was probably re-deposited when Plow's Rectory Buildings, shown on the 1852 OS map, were constructed during which parts of the churchyard may have been disturbed, or possibly when the tax office on the site opposite was built.

The uppermost deposition was removed by mechanical digger and it was found that the foundations of the building present at the time of excavation intruded to a maximum of 1.5m and therefore had not impacted on significant archaeological deposits.

5.1.7 Existing Borehole

A single borehole was put in on the site (York HER EY 04063) as part of the works for the Coppergate II proposals, but as the scheme never went ahead, no monitoring work was carried out (John Oxley CYC pers. comm.).

6 PROPOSED DESIGN AND IMPACT ON ARCHAEOLOGICAL SEQUENCE

6.1 Foundation design

6.1.1 The proposed design comprises two buildings, a hotel and restaurant building fronting onto Piccadilly and a small residential block at the rear of the site overlooking the River Foss. A detailed foundation design is not available at this stage but it is likely to be piled.

6.1.2 The development site is approximately 1600m² in area. The site is currently relatively level at around 9.45m OD but slopes gently up to around 9.9m OD near the car park entrance in the north-east corner on the Piccadilly frontage.

6.2 Impact of hotel and residential building on archaeological deposits

6.2.1 The potential archaeological impacts of the scheme are largely dependent on the foundation design and the depth of the required to formation level. Further impacts may result from the inclusion, for example, of underground parking, swimming pools or flood mitigation such as attenuation tanks. At the time of writing such details remain to be finalised, however the latter do not currently form part of the current proposed scheme.

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.

6.3.2 A programme of on-going water monitoring post-evaluation will be undertaken to understand the site hydrology and potential impact of the development. Data-loggers will be considered if appropriate and practical; otherwise monitoring will be conducted using a dip-meter.

7 AIMS OF FURTHER BOREHOLE EVALUATION

7.1 The aims of further borehole evaluation would be:

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

- to install dip-wells and undertake a programme of water-level monitoring to determine the impact of the development on these deposits, either by data-logger if practicable or using a dip-meter

8 EVALUATION METHODOLOGY

8.1 The evaluation will comprise the following elements:

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

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 eight window sample boreholes will be drilled using a compact tracked rig. Three boreholes, numbers 1, 4 and 6, are in locations where the current, on-going use of the car park will not prevent on-going water monitoring post-application. The location of all the boreholes

is shown on Figure 2. It is highly likely that below ground constraints (see 3.2 above) 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 Boreholes will be located 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 evaluation. The recording methodology is set out in Section 9. The aim is to locate and characterise 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 evaluation are reached, samples will be taken for two separate purposes: firstly, to understand the bioarchaeological content, and secondly, to assess the permeability and condition of the organic deposits. The aims are outlined briefly below and are described in further detail in sections 8 and 10.

- General Biological Analysis samples will be taken from the core where organic deposits are identified. These samples will be processed and assessed for the recovery of archaeological plant macrofossil and insect remains, charcoal, bones etc and for the presence, abundance and condition of diatoms. If suitable material is present for AMS dating this will be sent to SUERC (see Section 9).

- A set of up to six 300mm long Class 1 undisturbed samples will be recovered from the organic waterlogged deposits for specialist assessment by Geolabs (Section 9) for: triaxial permeability testing, porosity/bulk density/moisture content testing, particle size distribution analysis and chemical redox potential testing.

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. Where possible, the results will then be cross-referenced to deposits identified in the 1992 excavation (Finlayson 1992a).

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.

10 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), *Environmental Archaeology: A Guide to the Theory and Practice of Methods from Sampling and Recovery to Post -Excavation* (English Heritage 2011, 2nd Edition), and *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record* (English Heritage 2004).

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

(PRS). The purpose of these samples is to establish baseline conditions regarding preservation of organic remains, by characterising the potential organic deposits via the recovery of charcoal, burnt seeds, bone, artefacts, macrofossils and microscopic remains such as pollen and insects.

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

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

10.9 60mm diameter standpipes will be inserted into each borehole, surrounded by gravel and Bentonite surrounds and capped with a lockable cover. If practicable, *in-situ* data loggers will be installed in the dip-wells. If this is not possible then monitoring will be conducted using a dip-meter.

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

11 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/.

12 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.

13 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.

14 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.

15 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.

16 REINSTATEMENT

16.1 Dip-wells will be installed in each borehole and surrounded with gravel and Bentonite. A lockable cover will be fitted.

176 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
- 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

18 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.

19 COPYRIGHT

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

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See also the Historic England website for current guidance documents:

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