BOREHOLE SURVEY AND ASSESSMENT OF ENVIRONMENTAL REMAINS AT WARWICKSHIRE COUNTY CRICKET GROUND, EDGBASTON ROAD, BIRMINGHAM

Nicholas Daffern and Nick Watson (ARCA)

Illustrated by Carolyn Hunt

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Worcestershire Archaeology,
Worcestershire Archive and Archaeology Service,
Worcestershire County Council,
The Hive,
Sawmill Walk,
The Butts,
Worcester, WR1 3PB

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1. Summary

An archaeological borehole survey was undertaken at Warwickshire County Cricket Ground, Edgbaston Road, Birmingham (NGR SP 0677 8434). The borehole survey and subsequent environmental assessment were undertaken on behalf of Mansell Construction Services Ltd in response to proposed development including intrusive ground works with the potential to disturb palaeoenvironmental remains of unknown date.

No significant remains of archaeological, palaeoenvironmental or geoarchaeological significance were identified during the fieldwork, or the subsequent assessment, due to the extensive disturbance and truncation of post-medieval and/or modern activity. This disturbance can most likely be assigned to the diversion of the River Rea associated with the development of the cricket ground between 1889 and 1904, and the assessment tentatively indicates that large quantities of made ground and overburden were deposited with the desire to backfill channels, level undulations and raise the pitch and its surroundings above the water-table and groundwater flow.

2. Background

2.1 Reasons for the project

An archaeological borehole survey was undertaken at Warwickshire County Cricket Ground, Edgbaston Road, Birmingham (NGR SP 0677 8434) (Figures 1 and 2). The borehole survey and subsequent environmental assessment were undertaken on behalf of Mansell Construction Services Ltd in response to proposed development including intrusive ground works with the potential to disturb palaeoenvironmental remains of unknown date.

2.2 Project parameters

The project conforms to relevant sections of the *Standard and guidance for an archaeological watching brief* (IfA 2008) and the *Manual of Service practice: fieldwork recording manual* (CAS 1995).

In addition, the recording, sampling, geoarchaeology and environmental assessment conform to relevant sections of *The Description and Analysis of Quaternary Stratigraphic Field Sections* (Jones *et al* 1999), *Sedimentary Rocks in the Field: A Colour Guide* (Stow 2005), *Sedimentary Rocks in the Field: A Practical Guide* (Tucker 2011), *Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2011), *Geoarchaeology: Using earth sciences to understand the archaeological record* (English Heritage 2007) and *Environmental archaeology and archaeological evaluations* (AEA 1995).

The project also conforms to a project proposal (including detailed specification) (WA 2012).

2.3 Aims

The aims of the borehole survey and environmental assessment were to determine the state of preservation, type, and quantity of environmental remains recovered, from the samples and

information provided, the results being used to assess the importance of the environmental remains.

3. Methods

3.1 Fieldwork

Nine boreholes were sunk along a north to south transect within the evaluation trench under the supervision of a Senior Environmental Archaeologist of the Service. The boreholes were sunk using a Competitor mini-tracked percussive auger rig to recover continuous/windowless cores of *c*80–100mm in diameter and 1m length with the aim of sampling alluvial and/or organic deposits that could be assessed for environmental remains and their potential for geoarchaeological analysis.

Borehole 5 could not be sunk due to the excessive presence of buried services but due to its low potential due to its position between the two channels, it was deemed that its absence would not adversely effect the assessment. Borehole 2 was not assessed geoarchaeologically as a refusal occurred *c*0.40m below ground surface resulting in the plastic liner splitting and the sample being lost. The most likely cause of this was excessive presence of brick rubble and made ground which the percussive rig was unable to penetrate.

Figure 3 and Table 1 presents the locations and the above ordinance datum (AOD) heights at which the boreholes were sunk.

BH	Easting	Northing	height AOD (m)
1	406810	284337	109.89
3	406797	284344	109.89
4	406777	284355	109.47
6	406753	284368	110.79
7	406747	284372	110.89
8	406740	284376	111.02
9	406707	284388	111.53
10	406696	284393	111.77

Table 1 Borehole coordinates and above ordinance datum heights

3.2 Structural analysis

All fieldwork records were checked and cross-referenced. Analysis was effected through a combination of structural, artefactual and ecofactual evidence, allied to the information derived from other sources.

3.3 Geoarchaeology methodology

The plastic sleeves containing the cores were slit open and the retained sediments were cleaned to expose a fresh face, photographed and then described according to standard geological criteria (Tucker 1982, Jones *et al*. 1999, Munsell Color 2000). The resultant lithological data were input into a database of the geological utilities program Rockworks 15 (RockWare 2012), and this used to generate the tabular data included in the Appendix and the cross-section included as Figure 4.

There was an average 10% sediment loss/compression in each of the boreholes. Therefore the depths quoted in the text that follows are accurate to an estimated ±0.1-0.2m.

4. Topographical and archaeological context

4.1 Geology and soils

The British Geological Survey (2012) map the study area as lying on Quaternary alluvium and river-terrace deposits, both of which lie within the broad valley (*c* 1.5km) of the River Rea. 'Alluvium' technically includes all deposits accreting in fluvial environments, but in practice the British Geological Survey uses the term as a surrogate for Holocene channel and floodplain deposits. The river is now canalised to the east of its original course following the eastern boundary of the County Cricket Ground at approximately +109m AOD and flows from the south to north. The British Geological Survey maps the solid geology beneath the superficial deposits as the Mercia Mudstone Group of the Early Triassic (250 to 200 million years ago), while these strata unconformably overlie the Bromsgrove Sandstone Formation to the west. To either side of the valley, beyond the bluff line and above *c* +140m OD are extensive fluvioglacial deposits of mid-Pleistocene age.

The site was unsurveyed in the *Soil Survey of England and Wales* (1983) due to the urban nature of the site.

4.2 Archaeological background

An extensive archaeological desk-based assessment for the site and its environs has previously been prepared by Ironbridge Archaeology (2008) which is available online (see Bibliography below); therefore the results will not be reproduced here.

4.3 Cartographic context

William Cornish's 1864 map (Ironbridge Archaeology 2008, 14) shows that the site as an triangular parcel of open land lying between the natural course of the River Rea to the west, the leat of the Avern Mill (later Edgbaston Mill House) to the east, the confluence of the river and the leat to the north, and Edgbaston Lane (now Edgbaston Road) to the south.

The 1889 Ordnance Survey map of Warwickshire (1:2500), shows that the character of the site has remained constant with the exception of a grandstand and pavilion to the south of the transect location, the site being referred to as 'Warwickshire County Cricket Ground'.

By the 1904 Ordnance Survey map, the cricket ground is enclosed by pavilions and embankments and the Rea has been canalised away to the east and its present-day location. A field boundary appears to trace its old course.

5. Results

5.1 Geoarchaeology

5.1.1 Results

The borehole survey in effect sections the floodplain immediately to the south of the confluence of the Rea with the leat: boreholes (BH)1, 3 and 4 bisecting the leat; BH6, 7, 8 and 9 bisecting the Rea; and BH10 being on the west terrace 2m above the 110m contour.

The stratigraphic profiles recovered in the borehole cores accurately reflect their geographical position on the old floodplain: BH1 to BH6 recording terrace gravel overlain by a single thick (*c* 0.5m) deposit of floodplain alluvium; BH7 recording the infilling of the Rea in the 1900s; BH8 recording the sedimentation of the deep channel of the Rea and its modern fill; and BH10 recording the relict terrace gravel at 110m OD overlain by the Victorian(?) topsoil

and two distinct episodes of floodplain alluviation. Up to 1.5m of made ground (undated, but probably of early 20th century age) seals the strata in all the boreholes. There was, however, no evidence of the leat which, because of its small size, would require a trench-based approach to locate it.

In the text below the stratigraphy is reviewed in stratigraphic order from the earliest to latest deposits, while the lithological data are outlined in Appendix 1. Figure 4 plots a composite cross-section through the strata

Mercia Mudstone Group

Red clays derived from the Mercia Mudstone Group (MMG) were recovered in BH6, 7, 8, and 9. However, they were not thought to be *in situ* because of the presence of plant fragments at *c* 107m OD (4m below ground surface) in BH6 and 7 and the disrupted fissility of the clay. Fissility or parallel layering is typical of platy clay minerals when they align under pressure over time and would be expected, where the bedrock was undisturbed. The reworking of the MMG strata, therefore, is likely to be due to Quaternary glacial processes, and it forms part of the bed over which the River Rea develops in the Holocene.

Terrace and channel gravels

From the east to the west BH1 to 7 record yellowish brown sandy gravels consisting of well rounded granular to pebble-sized (2 to 64mm) quartzite particles. The gravels vary slightly in clay content and as a consequence are looser or more compacted in some zones of the stratigraphy than others. They were laid down under a fluctuating energy regime, probably in the Late Glacial and/or Holocene river. The ubiquitous rounded pebbles (they are present in the topsoil and made ground deposits also) are derived ultimately from Triassic strata but possibly reworked by glacial processes. Unfortunately, the original stratigraphic position of the gravels is disguised because of the percussive manner in which the cores are recovered from the ground whereby the strata is compressed, and sections of vacant core created where there is no recovery of sediment. By ignoring the regions of no recovery a better, but by no means perfect idea of position is obtained, and the gravels on the east bank of the River Rea are seen to lie at *c* 108.6m OD. BH8, on the other hand, records the top of the gravels 1m lower. Here a *c* 0.7m thick stratum of gravel forms the bedload of the pre-20th century Rea that is cut into the underlying redeposited mudstone. BH10, lying 50m further west, records gravels at +110m OD where they form part of the lowest terrace of the river laid down probably in the Late Glacial or early Holocene.

Channel sands and silts

BH8 records two poorly developed fining upward sequences totalling over 1m thick and trending from fine sands to silts in each case. The strata are grey black in colour reflecting a humic component, while they also contain sand-sized plant remains and a pebble-sized fragment of wood. Cultural debris is also present including a small fragment of porcelain, as well as glass and cinders. This mixture of water-lain and cultural material was probably deposited within the river channel under a fluid regime which was, at times, being regulated by human manipulation upstream (eg through the construction of weirs, and interfered with by the casual disposal of organic waste). Slack water discharge will encourage the settling out of waterlogged organic material which then becomes incorporated in the sandy or silty bedload and deposited on the point bars. The Rea, it should be remembered, is a river at the periphery of a major city and would have carried in the past a large quantity of refuse. The presence of porcelain suggests that the sequence is later than the mid-18th century.

Alluvium

Light brown grey silt/clays form compact and homogenous deposits of 0.38m (BH3) to 0.65m (BH6) thickness on the east bank of the River Rea and overlying the gravels. These

deposits formed as a result of particles falling from suspension during the ebbing of low energy floodwaters on the floodplain. Occasional iron and manganese grains and nodules, and remnants of mottles are an indication of a once fluctuating water-table which existed before the Rea was canalised. BH10, on the west bank of the river, is at the margin of the floodplain and records two flooding events as thin 10–20mm thick, grey silt/clay layers burying a soil. These events may be noted in the historical record, but are preserved in the lithological record because of their severity which has transferred suspended particles onto the terrace bounding the floodplain. They are not preserved, however, in the stratigraphic sequences on the east bank because here the alluvium has been truncated (ie the top of the alluvium is at *c* +109.1m OD in BH1, 3, and 4 compared with +110.24m OD for the alluvium interbedded with palaeosols BH10 on the west bank. It is tempting to see a slight levee recorded in BH6, positioned as it is on the channel bank where the top of the alluvium reaches to +109.49m OD, but this is stretching the evidence, particularly as we are dealing with the uncertainties of compressed deposits.

Buried soils

A relict of the Victorian topsoil developed on the terrace gravels is preserved in BH10. It is 0.12m thick, undifferentiated, and very dark grey in colour and, therefore, indicative of a high humic content. The silt/clay is homogenous and compact with fine roots and rare glass, coal and charcoal fragments. Two thin layers of alluvium overly the palaeosol and are discussed above. A turf stack is included within the sediments that comprise the made ground in BH9.

Made ground

The made ground can be divided into two separate deposits: red clays derived from redeposited Mercia Mudstone and dark greyish brown diamicts up to 1.5m thick composed of compact clay matrices supporting granular to cobble-sized clasts of building rubble. The latter are composed of brick, mortar, slate, coal, charcoal and cinders, as well as quartzites derived from the geological substrate. Both deposits are the result of human activity. The red clays are found in BH7 and 8 where they seal the channel fill. They may represent the deliberate infilling of the channel of the River Rea at the end of the 19th century with material dug from the new channel to the east. The diamicts are found across most of the site and may be of a similar date or perhaps a little later, by which time the properties along Raglan Road had been built (*c* 1916).

The made-ground deposits are truncated in BH1, 3 and 4 to a rump deposit of little more than 0.5m in thickness. This is probably the result of laying a hard surface at the southern end of Constance Road at the entrance to the cricket ground complex.

5.1.2 Discussion

The redeposited Mercia Mudstone Group deposits noted at the base of the sequence are likely to have been reworked in the Middle or Late Pleistocene. In BH6 and 7 granular to pebble-sized plant remains are present but they are rare. For reasons of its antiquity, and poor organic preservation, the reworked MMG strata are assessed as having LOW archaeological and palaeoenvironmental potentials.

The terrace and channel gravels are probably of Pleistocene to early Holocene date. Poor organic preservation, and the fact they represent deposition in high energy conditions, mean that they have LOW palaeoenvironmental and archaeological potentials.

The channel sands and silts are believed to date from the mid-18th century. Once again organic preservation is poor, while derivation of particles is uncertain. They are assessed as having LOW archaeological and palaeoenvironmental potentials.

The floodplain alluvium in BH1, 3, 4, 6 and 10 lacks macro organic inclusions (although microfossils might be preserved), while its chronology is uncertain. It is assessed as having LOW palaeoenvironmental and archaeological potentials.

The buried soil in BH10 and the turf stack in BH9 are believed to of 19th century date. Good organic preservation and a reasonably secure chronology lead to an assessment of MODERATE palaeoenvironmental and archaeological potentials.

The made ground is believed to date from the end of the 19th and the beginning of the 20th century, and represents dumped and bioturbated material. Its poorly sorted nature, young age, and uncertainty of particle derivation means that it is assessed as having LOW palaeoenvironmental and archaeological potentials.

5.2 Artefacts

Due to the nature/methodology of the investigation, recovery of finds was unlikely; however, a small assemblage of artefacts was retrieved during the works.

All of the assemblage was of late post-medieval and modern date, and it consisted primarily of undiagnostic fragments of ceramic building material. The exception to this were fragments of clear window glass from BH8 (3.42–3.62m below ground surface (BGS)/ 107.6–107.4m AOD) and B10 (0.30–1.70m BGS/ 111.47–110.07m AOD), and porcelain fragments from BH8 (3.23m BGS/ 107.79m AOD) and BH9 (1.60m BGS/ 109.93m AOD). The latter was waste from porcelain manufacture (such material was once sold as hardcore and so can turn up well away from its production source; Derek Hurst, pers comm), and it is quite possible that during the diversion of the River Rea and the creation of the enclosed cricket pitch between 1889 and 1904, porcelain wasters were imported to the site to act as a method of backfilling channels, levelling undulations and raising the pitch and its surroundings above the water-table and groundwater flow.

5.3 Environmental remains

No deposits suitable for the recovery of palaeoenvironmental remains were identified during the initial fieldwork or during the subsequent geoarchaeological assessment.

5.4 Wood assessment

A single fragment of wood was recovered from 3.80m BGS/107.22 AOD in BH8. Working of the wood was evident with definite mechanical, lathe-like, tooling/cut marks. Its preservation was generally very good with little or no evidence for chemical, biological or mechanical decay and no mineralization of the sample was apparent. The wood structure itself was still fibrous indicating that little or no degradation of the tissues had occurred. There was little or no indication of skewing, warping or compression upon the sample with the structure of the sample still evident and 'fresh' on both the interior and, more notably, the outer margins. The lack of decay to the outer margins of the wood is particular notable as:

> '… decay always starts from the outside and moves towards the inside. Artefacts therefore often consist of a well preserved inner core surrounded by a decayed soft outer layer. Degraded waterlogged wooden artefacts may be much more fragile than they first appear. Indeed, if of any size, they are unlikely to be able to bear their own weight once removed from the ground. Loss of water from the most degraded outer surface begins as soon as the wood is exposed during excavation' (English Heritage 2010).

Bearing this in mind, the excellent condition of the Edgbaston wood indicates rapid burial.

It could, therefore, be concluded, when also taking into account its burial position, that this wood had probably been deliberately dumped as a component of the made ground/levelling deposits.

6. Discussion

The investigation has shown that the archaeological and palaeoenvironmental remains present across the transect are of low archaeological potential due to the extensive disturbance and truncation of post-medieval and/or modern date. This disturbance can most likely be assigned to the diversion of the River Rea from its former course running through the site to its present position demarcating the eastern boundary of the site. The significant quantities of made ground encountered during the assessment are a product of these works and the desire to backfill river channels and the leat, levelling undulations and raise the pitch and its surroundings above the water table and groundwater flow.

7. Significance

Due to the absence of archaeological or palaeoenvironmental remains encountered both during the works and the subsequent assessment, no statement of significance is required.

8. Recommendations

The following recommendations are made with regard to further work on the samples considered as part of this report:

- no further geoarchaeological or palaeoenvironmental work is recommended on the cores reported here.

9. The archive

The archive consists of:

3	Field progress report AS2
1	Photographic records AS3
13	Digital Photographs

10. Acknowledgements

The Service would like to thank the following for their assistance in the conclusion of this project: John Booth and Martin Sollars (Mansell Construction Services Ltd), Keith Wilkinson and Nick Watson (ARCA), Mike Hodder (Birmingham City Design and Conservation Team), and Derek Hurst for editing this report.

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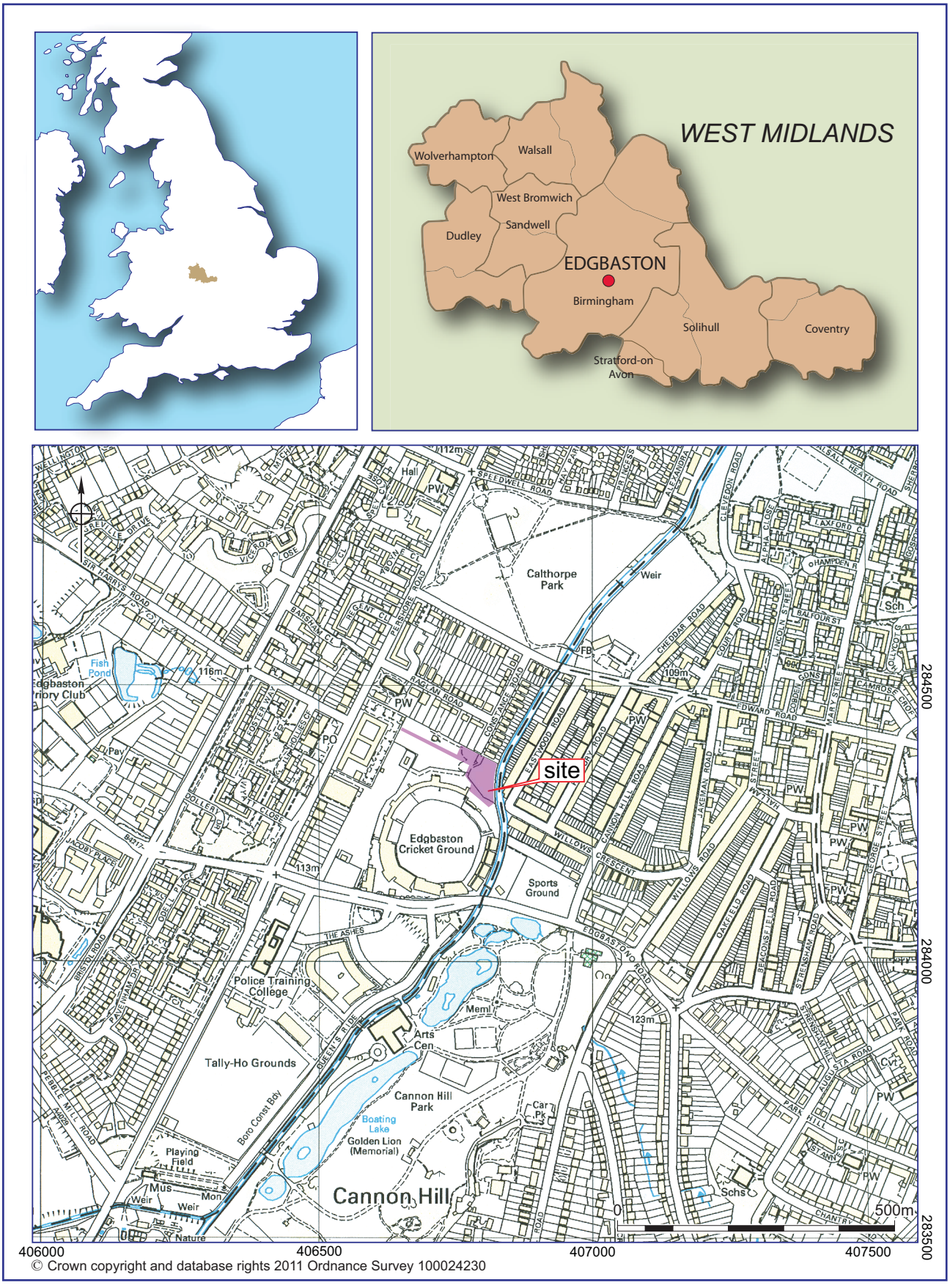
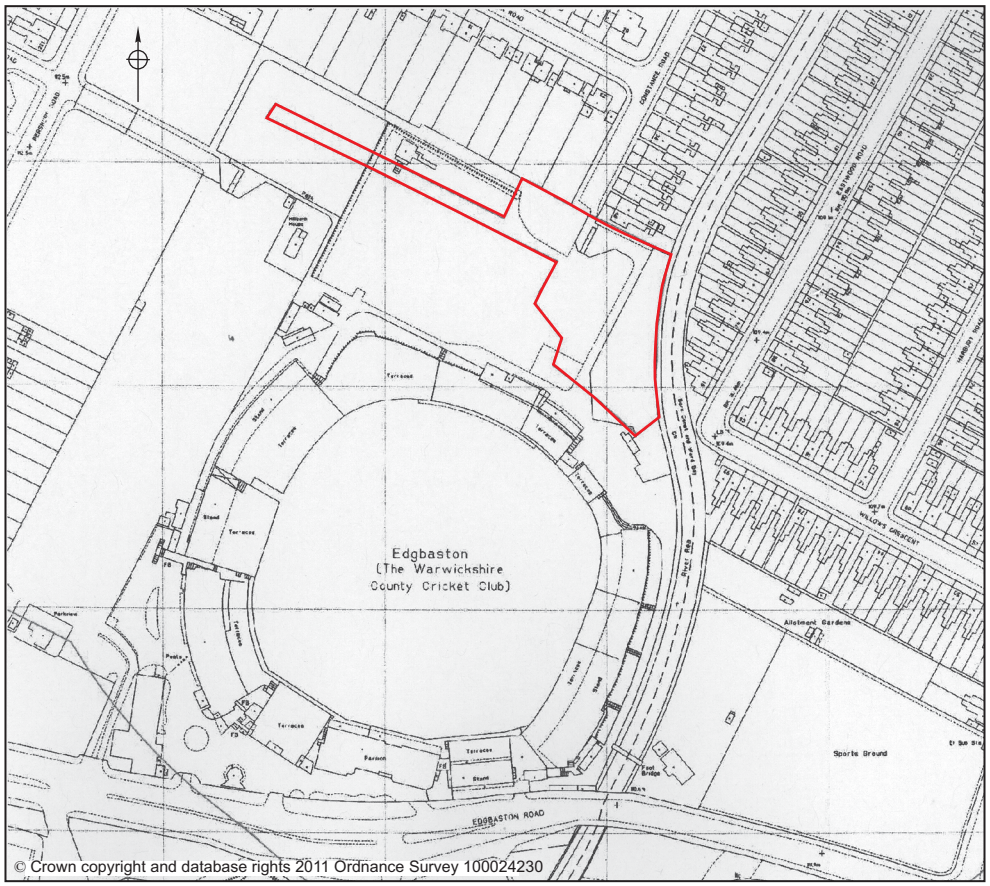
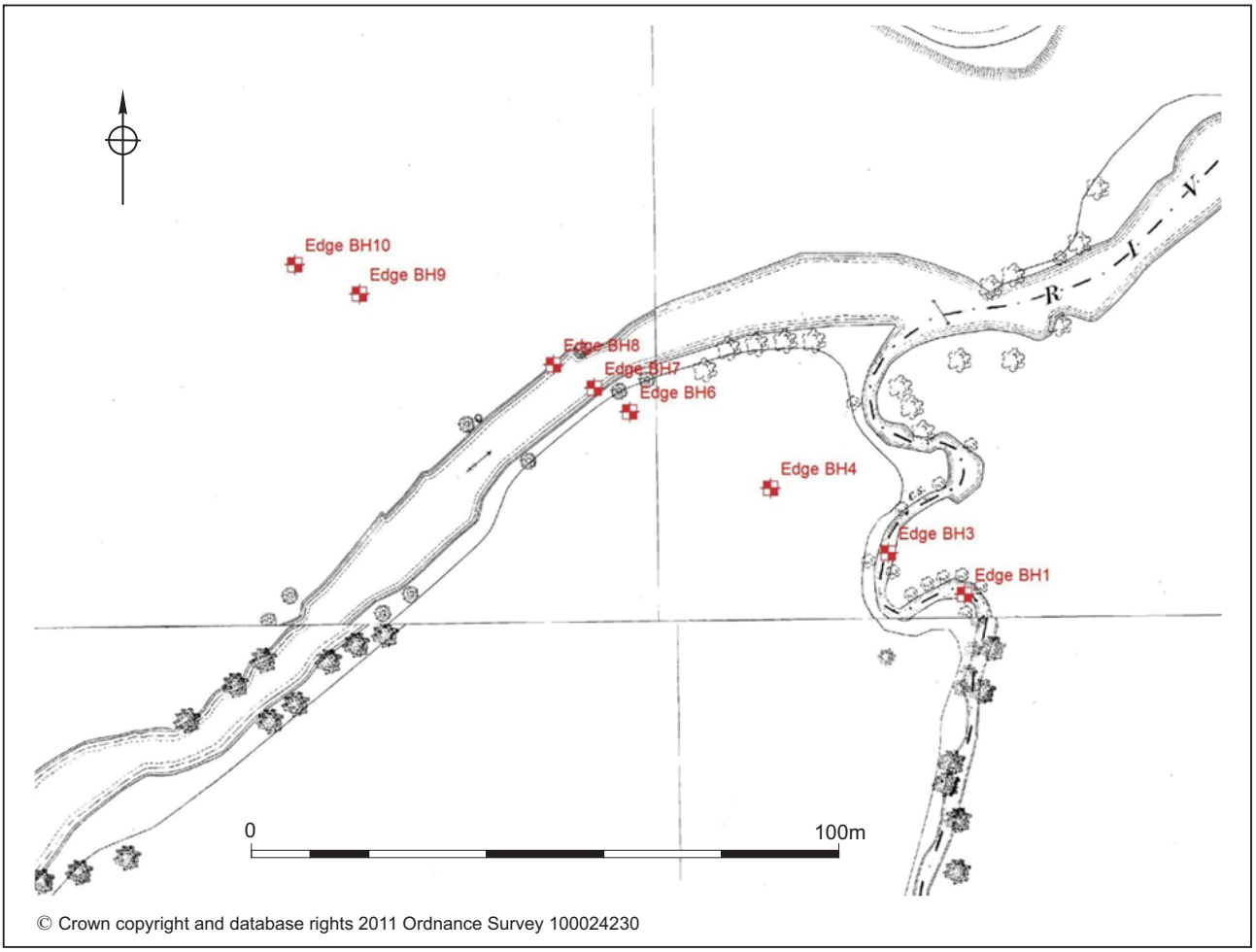
Figures



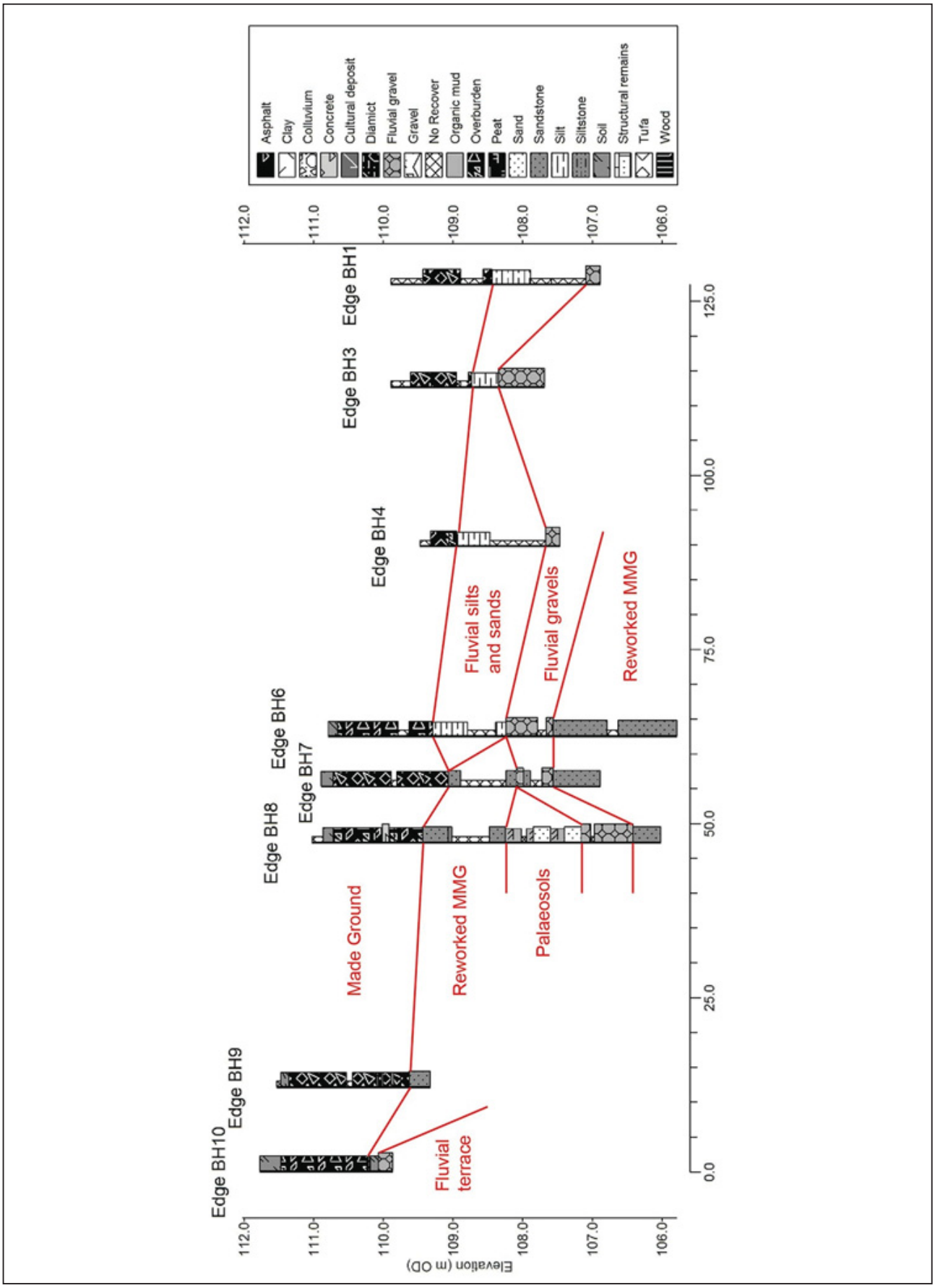
Location of the site *Figure 1*



Area of investigation *Figure 2*



Borehole locations plotted against 1st edition OS map *Figure 3*



Cross section *Figure 4*

Plates

Plate 1Sinking Borehole 3, looking south-west

Plate 2 Sinking Borehole 3, looking north-east

Plate 3 Sinking Borehole 7, looking south-west

Plate 4 Sinking Borehole 7, looking south-east

Appendix 1 - Borehole Descriptions

Appendix: Stratigraphic descriptions

Bore	Top (m)	Base (m)	Lithology	Comment
BH1	0.00	0.46	No Recover	Void
	0.46	0.70	Overburden	5 Y 4/2 Dark greyish brown, loose, poorly sorted gravel of granular to pebble sized of angular to well rounded quartzites and red brick fragments. Sharp boundary to:
	0.70	1.00	Overburden	2.5 Y 3/2 Very dark greyish brown silt/clay with frequent fine to medium sand-sized mineral grains, occasional angular to rounded granular to pebble-sized quartzite clasts and granular-sized charcoal fragments. No ped structure.
	1.00	1.32	No Recover	Void
	1.32	1.45	Overburden	5 YR 3/2 Dark reddish brown, loose, sandy gravel of granular to pebble-sized angular clasts of cinder and slag, mortar and concrete. occasional granular-sized charcoal fragments, rare well-rounded quartzite cobble and plant fragments (twig). Sharp boundary to:
	1.45	2.00	Silt	7.5 YR 5/4 Brown, compact, silt/clay with frequent fine to medium sand. Irregular lenses of medium sand (7.5 YR 4/4) bioturbated by occasional roots. Occasional black granular-sized charcoal/manganese fragments and orange iron oxide mottles.
	2.00	2.30	No Recover	Void
	2.30	2.80	Fluvial gravel	5 YR 3/2 Dark reddish brown, loose, sandy gravel of granular to pebble-sized angular clasts of cinder and slag, mortar and concrete. occasional granular-sized charcoal fragments, rare well-rounded quartzite cobble (No recover) Sharp boundary to:
	2.80	3.00	Fluvial gravel	2.5 Y 7/4 Pale yellow, loose, medium sandy gravel of moderately well-sorted granular to pebble-sized rounded quartzite clasts. Occasional oxide mottle and pebble- sized brown clay lens.

Bore	Top (m)	Base (m)	Lithology	Comment
BH3	0.00	0.28	No Recover	Void

	0.28	0.58	Overburden	7.5 YR 3/2 Dark brown diamict with frequent coarse sand, granular to large pebble sized angular and rounded rock (quartz) and red brick clasts. Sharp boundary to:
	0.58	0.94	Overburden	7.5 YR 3/0 Very dark grey diamict with frequent coarse sand, granular to large pebble-sized angular and rounded rock (quartz) and red brick clasts. Cobble-sized red brick and purple sst clasts. Granular-sized charcoal fragments.
	0.94	1.00	No Recover	Void
	1.00	1.11	No Recover	Void
	1.11	1.16	Overburden	7.5 YR 3/0 Very dark grey diamict with frequent coarse sand, granular to large pebble sized angular and rounded rock (quartz) and red brick clasts. Cobble-sized red brick and purple sst clasts. Granular-sized charcoal fragments. Sharp boundary to:
	1.16	1.54	Silt	5 YR 5/3 Reddish brown silt/clay with frequent fine to medium sand. Sharp boundary to:
	1.54	2.20	Fluvial gravel	5 YR 5/3 Reddish brown, poorly sorted and clast supported clayey gravel. Granular to cobble-sized clasts of predominantly well rounded quartzites.

Bore	Top (m)	Base (m)	Lithology	Comment
BH4	0.00	0.15	No Recover	Void
	0.15	0.41	Overburden	7.5 YR 4/2 Brown, loose, clayey gravel of angular and poorly sorted granite clasts, coarse sand to pebble-sized. Sharp boundary to:
	0.41	0.52	Overburden	2.5 Y 3/2 Very dark greyish brown silt/clay with frequent granular-sized charcoal fragments, occasional small well rounded pebbles of quartzite and eroded lenses of red and yellow coarse sands. Sharp boundary to:
	0.52	1.00	Silt	10 YR 4/1 Dark grey, compact, silt/clay grading into 7.5 YR 4/4 Brown Occasional to frequent sand to granular-sized manganese grains and nodules and rare well rounded quartzite pebbles.
	1.00	1.80	No recover	Void/ Compression: core label reads 1-1.40 but sediment at base 1-1.80m
	1.80	2.00	Fluvial gravel	10 YR 6/4 Light yellowish brown, loose, sandy gravel of well rounded quartzite pebbles. Well sorted medium sand fraction.

Bore	Top (m)	Base (m)	Lithology	Comment
BH6	0.00	0.14	Soil	10 YR 3/2 Very dark greyish brown silt/clay with occasional fine sand, frequent angular and well rounded granular to pebble-sized rock fragments of quartzite, cinder, and brick. Frequent fine roots, A horizon preserved. Sharp boundary to:
	0.14	1.00	Overburden	10 YR 4/2 Dark greyish brown, compact, diamict. Frequent granular to cobble-sized fragments of brick, asphalt, rounded quartzites, mortar and concrete.
	1.00	1.16	No recover	Void
	1.16	1.50	Overburden	10 YR 3/1 Very dark grey diamict. Frequent granular to cobble-sized fragments of brick, mortar, concrete, coal, wood and rounded quartzites.
	1.50	2.00	Silt	10 YR 4/3 Brown silt/clay. Rare pebble- sized coal fragment and rounded quartzites at top (contamination from unit above).
	2.00	2.40	No recover	Void
	2.40	2.55	Silt	10 YR 4/3 Brown silt/clay. Rare pebble- sized coal fragment and rounded quartzites at top (contamination from unit above).
	2.55	3.00	Fluvial gravel	10 YR 4/3 Brown , compact, clast-supported sandy clayey gravel of granular to pebble-sized well rounded quartzites. Occasional lens of 10 YR 6/8 brownish-yellow medium sands. Clay matrix reduced around 2.80m to 10 YR 5/1 Grey. Sharp boundary to:
	3.00	3.13	No recover	Void
	3.13	3.23	Fluvial gravel	10 YR 4/3 Brown , compact, clast-supported sandy clayey gravel of granular to pebble-sized well rounded quartzites. Occasional lens of 10 YR 6/8 Brownish yellow medium sands.
	3.23	4.00	Sandstone	2.5 YR 4/4 Reddish brown, compact silt/clay with occasional granular to pebble-sized black plant remains
	4.00	4.16	No recover	No recover
	4.16	5.00	Sandstone	2.5 YR 3/4 Dark reddish brown compact silt/clay. Rare quartzite pebble and granular-sized plant remains in upper section of core.

Bore	Top (m)	Base (m)	Lithology	Comment
BH7	0.00	0.17	Soil	7.5 YR 3/2 Dark brown compact silt/clay with a fine granular crumb structure. Frequent angular granular to pebble-sized fragments of red brick, concrete, charcoal, mortar and rock. A horizon preserved. Frequent roots. Sharp horizon to:
	0.17	1.00	Overburden	10 YR 3/2 Very dark greyish brown, compact diamict with frequent granular to cobble-sized clasts of well rounded quartzites, angular concrete, and brick. Frequent granules of angular, black, vesicular cinder and occasional pebble-sized 7.5 YR 5/4 brown clay lenses.
	1.00	1.09	No Recover	Void
	1.09	1.48	Overburden	10 YR 3/2 Very dark greyish brown, compact diamict with frequent granular to cobble-sized clasts of well rounded quartzites, angular concrete, and brick. Frequent granules of angular, black, vesicular cinder and occasional pebble-sized 7.5 YR 5/4 brown clay lenses. Sharp boundary to:
	1.48	1.82	Overburden	10 YR 3/1 Very dark grey, compact diamict. Frequent granular to pebble-sized clasts of angular rock fragments, cinder and well rounded quartzite. Frequent granular-sized charcoal fragments distributed throughout unit. Sharp boundary to:
	1.82	2.00	Sandstone	5 YR 4/3 Reddish brown silt/clay with occasional, angular, grey green, pebble-sized siltstone clasts.
	2.00	2.65	No Recover	Void
	2.65	2.80	Sandstone	5 YR 4/3 Reddish brown silt/clay with occasional, angular, grey green, pebble-sized siltstone clasts.. Sharp boundary to:
	2.80	2.90	Fluvial gravel	7.5 YR 5/6 Strong brown, compact, sandy clayey gravel of poorly sorted well rounded quartzite clasts granular to pebble-sized. Sharp boundary to:
	2.90	3.00	Sandstone	7.5 YR 3/2 Dark brown sandy clay with frequent granular to pebble-sized charcoal fragments. Unit is loose at base of core.
	3.00	3.17	No Recover	Void
	3.17	3.33	Fluvial gravel	5 YR 4/3 Reddish brown, loose sandy clayey gravel of well rounded granular to pebble-sized quartzite clasts. Sharp boundary to:
	3.33	4.00	Sandstone	5 YR 3/3 Dark reddish brown silt/clay with rare pebble-sized plant fragment and rare granular-sized fragments towards the base.

Bore	Top (m)	Base (m)	Lithology	Comment
BH8	0.00	0.15	No Recover	Void
	0.15	0.30	Soil	10 YR 3/2 Very dark greyish brown silt/clay with poor granular crumb structure. Frequent granular to pebble-sized fragments of concrete, brick, and well rounded quartzites. Occasional granular-sized charcoal fragments. A horizon preserved and frequent roots. Sharp boundary to:
	0.30	0.91	Overburden	10 YR 3/3 Dark brown compact diamict with frequent clasts of granular to cobble-sized well rounded quartzite, and angular brick. Frequent granular to pebble-sized charcoal fragments. Sharp boundary to:
	0.91	1.00	Overburden	7.5 YR 4/4 Brown silt/clay with occasional quartzite pebble.
	1.00	1.10	Concrete	Concrete. Sharp boundary to:
	1.10	1.18	Overburden	Brick. Sharp boundary to:
	1.18	1.58	Overburden	10 YR 3/1 Very dark grey, compact diamict. Frequent granular to pebble-sized clasts of angular rock fragments, cinder and well rounded quartzite. Frequent granular-sized charcoal fragments distributed throughout unit. Sharp boundary to:
	1.58	1.95	Sandstone	7.5 YR 5/6 Strong brown, compact, sandy clayey gravel of poorly sorted well rounded quartzite clasts granular to pebble-sized. Sharp boundary to:
	1.95	2.00	Sandstone	5 YR 3/3 Dark reddish brown silt/clay.
	2.00	2.54	No Recover	Void
	2.54	2.77	Sandstone	5 YR 3/3 Dark reddish brown silt/clay. Sharp boundary to:
	2.77	3.00	Organic mud	5 Y 3/1 Very dark grey silt/clay with occasional fine sand and frequent plant fibres and granular-sized plant remains (organic alluvium).
	3.00	3.07	No Recover	No recover
	3.07	3.17	Organic mud	5 Y 3/1 Very dark grey silt/clay with occasional fine sand and frequent plant fibres and granular-sized plant remains (organic alluvium). Sharp boundary to:
	3.17	3.42	Sand	2.5 Y 4/0 Grey, compact sandy clay irregularly stained black with occasional granular-sized plant remains sometimes concentrated in lenses. Sandy fraction increases in grain size to very coarse with rare well rounded granular and small pebble-sized quartzite clasts at the base. One granular-sized sherd of white porcelain ?at 3.23m. Sharp boundary to:

	3.42	3.62	Organic mud	5 Y 3/1 Very dark grey, compact, organic silt/clay with occasional coarse sand; frequent plant fibres and granular-sized plant fragments, and rare quartzite pebble. Unit is laminated at base. One granular-sized sub angular clear glass fragment at 3.51m. Sharp boundary to:
	3.62	3.86	Sand	2.5 Y 2/0 Black, coarse sand with rare black clay lens. Grain size increases towards base. Rare black, pebble-sized, angular fragment of a vesicular and vitrified material (cinder) and worked lathe-like cobble-sized wood fragment at 3.80m. Gradual boundary to:
	3.86	4.00	Fluvial gravel	5 YR 4/3 Reddish brown, compact, clayey gravel of well rounded quartzite clasts sand to cobble-size.
	4.00	4.05	No Recover	No recover
	4.05	4.60	Fluvial gravel	7.5 YR 5/4 Brown sandy gravel of moderately well sorted granular to small pebble-sized quartzite clasts. Sharp boundary to:
	4.60	5.00	Sandstone	2.5 YR 3/4 Dark reddish brown, compact and homogenous silt/clay

Bore	Top (m)	Base (m)	Lithology	Comment
BH9	0.00	0.06	No Recover	Void
	0.06	0.17	Soil	2.5 Y 3/2 Very dark greyish brown silt/clay with occasional fine sand. Poorly developed fine crumb structure. A horizon preserved with frequent fine roots. Occasional well-rounded quartzite pebble, granular-sized charcoal and red brick fragments. Sharp boundary to:
	0.17	1.00	Overburden	2.5 Y 4/2 Dark greyish brown diamict of frequent granular to cobble-sized well rounded quartzite clasts, granular to pebble-sized brick fragments and charcoal granules. Rare pebble-sized brown clay inclusions.
	1.00	1.09	No Recover	Void
	1.09	1.43	Overburden	2.5 Y 3/2 Very dark greyish brown, compact diamict of granular to pebble-sized clasts of well rounded quartzites, angular brick and mortar fragments and frequent charcoal granules. Sharp boundary to:
	1.43	1.46	Soil	2.5 Y 2/0 Black silt/clay with occasional fine sand and frequent fine roots.

	1.46	1.50	Overburden	7.5 Y 3/0 Very dark grey silt/clay with occasional fine sand-sized mineral grains. Frequent granular-sized fragments of charcoal, brown clay inclusions, rounded quartzites and coal. Rare pebble-sized angular slate fragment. Sharp boundary to:
	1.50	1.53	Soil	2.5 Y 2/0 Black silt/clay with occasional fine sand and frequent fine roots. Sharp boundary to:
	1.53	1.64	Overburden	7.5 Y 3/0 Very dark grey silt/clay with occasional fine sand-sized mineral grains. Frequent granular-sized fragments of charcoal, brown clay inclusions, coal, and pebble-sized rounded quartzites. Pebble-sized white porcelain sherds at 1.60m. Sharp boundary to:
	1.64	1.68	Soil	2.5 Y 2/0 Black silt/clay with occasional fine sand-sized mineral grains and frequent fine and granular -sized roots. Sharp boundary to:
	1.68	1.78	Overburden	Crushed brick (Victorian?)
	1.78	1.90	Overburden	10 YR 3/2 Very dark greyish brown, compact diamict. Frequent granular to pebble-sized mortar fragments, cinder and well rounded quartzites; granular charcoal, and brick. Sharp boundary to:
	1.90	2.20	Sandstone	2.5 YR 3/4 Dark reddish brown, compact silt/clay.

Bore	Top (m)	Base (m)	Lithology	Comment
BH10	0.00	0.30	Soil	10 YR 3/2 Very dark greyish brown silt/clay with occasional fine sand-sized mineral grains and a moderately well developed fine crumb structure and fine roots. Preserved A horizon. Occasional granular to small pebble- sized fragments of brick, charcoal and well rounded quartzites. Sharp boundary to:
	0.30	1.00	Overburden	10 YR 3/2 Very dark greyish brown, compact diamict of frequent granular to cobble-sized clasts of brick and well rounded quartzites. Frequent charcoal granules, occasional pebble-sized slate and cinder and light brown clay inclusions. Rare coal, cobble, and granular-sized angular fragment of clear glass. Sharp boundary to:
	1.00	1.53	Overburden	10 YR 3/2 Very dark greyish brown, compact diamict of frequent granular to cobble-sized clasts of brick and well rounded quartzites. Frequent charcoal granules, occasional pebble-sized slate and cinder, and light brown clay inclusions. Rare coal, cobble, and granular-sized angular fragment of clear glass. Sharp boundary to:
	1.53	1.55	Silt	Gley 1 2.5/10Y Greenish black silt/clay with rare fine sand-sized mineral grains and frequent fine, black humic spots. Sharp boundary to:

1.55	1.57	Soil	10 YR 3/1 Very dark grey silt/clay with occasional fine sand-sized mineral grains and plant fibres. Sharp boundary to:
1.57	1.58	Silt	Gley 1 3/1 Very dark greenish grey silt/clay with rare fine sand-sized mineral grains. Sharp boundary to:
1.58	1.70	Soil	10 YR 3/1 Very dark grey, compact and homogenous silt/clay with frequent medium sand-sized mineral grains, occasional granular-sized charcoal fragments and rounded quartzite clasts. Rare granular-sized clear glass fragment and red brick fragment. Frequent roots. Gradual boundary to:
1.70	1.90	Fluvial gravel	2.5 YR 4/4 Brown, loose clayey gravel of granular to pebble-sized well rounded quartzite clasts.