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CANNINGTON FLOOD DEFENCE SCHEME GI WORKS, CANNINGTON, SOMERSET: GEOARCHAEOLOGICAL ASSESSMENT

Prepared for Cotswold Archaeology

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SUMMARY

This report is a geoarchaeological assessment of borehole logs obtained during Ground Investigation works carried out on the site of the proposed Cannington Flood Defence Scheme (FDS), Cannington, Somerset. The assessment was carried out by ARCA on behalf of Cotswold Archaeology.

The boreholes drilled at the site encountered bedrock of the Otter Sandstone Formation (FDS BH1 only) and of the Mercia Mudstone Group (MMG). The bedrock geology was overlain by Quaternary superficial strata comprising river terrace deposits of the Parrett Formation and by Holocene alluvial/intertidal strata of the Somerset Levels Formation.

With the exception of some partially-decayed organic matter between 1.40m and 2.20m below ground level in FDS BH8, no other specific archaeological or palaeoenvironmental indicators were noted in the Quaternary strata encountered at the site. Holocene alluvial strata at the site were assessed as being of low to moderate palaeoenvironmental potential, whilst all other strata were assessed as being of no or low palaeoenvironmental and archaeological potentials.

1. INTRODUCTION

1.1 In November 2014 and at the request of Cotswold Archaeology (CA) on behalf of their client Royal HaskoningDHV, ARCA carried out a geoarchaeological assessment of borehole logs obtained during Ground Investigation works along the proposed route of the Cannington Flood Defence Scheme (FDS) (henceforth 'the site').

1.2 This document assesses the stratigraphic sequence beneath the route of the proposed Cannington FDS. It is arranged as follows: first a brief account is provided of the geographic, geological and methodological background to the geoarchaeological project; secondly the borehole stratigraphy is described in detail; thirdly the potential of the sample resource in the boreholes to address the questions outlined in Section 1.6 is assessed. A bibliography completes the document.

1.3 The proposed development area comprises land adjacent to the A39, immediately south of the village of Cannington, Sedgemoor District, Somerset, and is centred on NGR ST 25391 28920 (Figure 1). The Cannington Brook, a minor tributary of the River Parrett, flows approximately from west to east across the northern part of the site. The site lies at approximately +19.00m OD, with ground sloping down towards the east.

1.4 The British Geological Survey (BGS) map the site as lying on bedrock of the Mercia Mudstone Group (MMG), a Triassic deposit dating from 250-200 my BP. An outcrop of the slightly older Otter Sandstone Formation, dating from 246-229 my BP, is mapped immediately to the north east of the site. Superficial deposits of Holocene alluvium and discontinuous outcrops of Pleistocene river terrace deposits are mapped in the immediate vicinity of the Cannington Brook, whilst Holocene tidal flat deposits are mapped immediately to the east and north of the site (BGS 2014).

1.5 A previous archaeological evaluation was carried out by CA in October 2013 (Cotswold Archaeology 2013) which comprised the excavation of 17 trenches. An archaeological watching brief was carried out during the course of the Ground Investigation works reported in this document (Cotswold Archaeology 2014).

1.6 The objectives of the present geoarchaeological assessment were to:

1.6.1 Determine the Holocene sedimentary sequence on the site.

1.6.2 Assess the archaeological, palaeoenvironmental and geoarchaeological potential of the Holocene sedimentary units encountered.

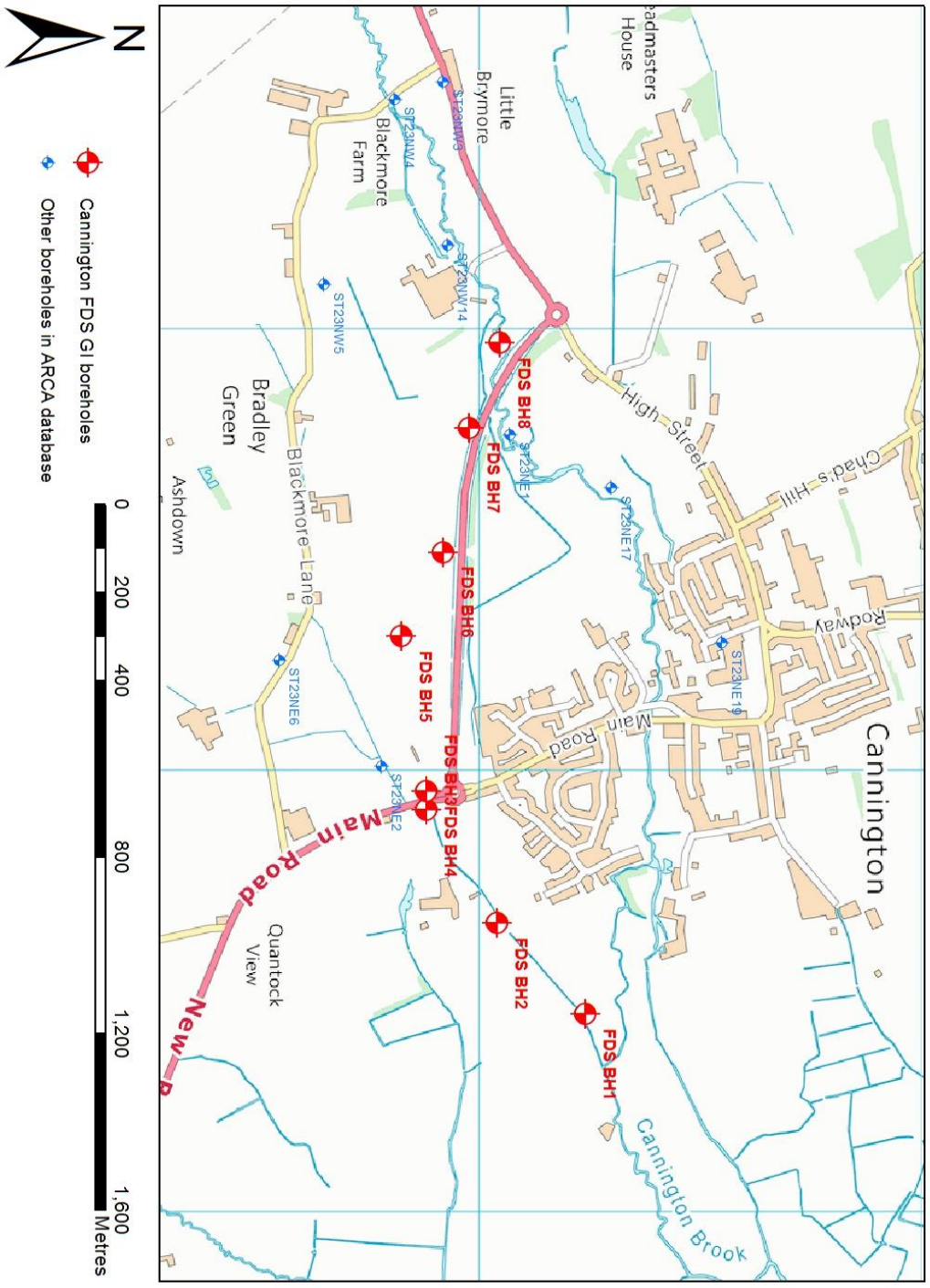

Figure 1: Position of boreholes.

2. METHODOLOGY

2.1 A total of eight boreholes, positioned as shown in Figure 1, were drilled by the Ground Investigation Contractor, Opus International, using a Commachio GEO305 Dynamic Sampling Rig. Sediments were logged by the Ground Investigation Contractor, and the logs passed to ARCA for geoarchaeological assessment.

2.2 Lithological descriptions from the boreholes were combined with positional information within a RockWorks database (RockWare 2013). The RockWorks software was then used to combine lithological units into higher-level groupings (informal and formal 'formations') corresponding to geological/geographic events. The RockWorks database was used to plot the cross section presented in Figure 2.

2.3 The geoarchaeological archive from the site consists of digital records (RockWorks database entries) which are retained on the University of Winchester server.

3. BOREHOLE STRATIGRAPHY

3.0.1 Four major stratigraphic units (formal and informal formations and members) present at the site were revealed in the boreholes drilled during the present works. These are reviewed below in chronological order.

3.1 Otter Sandstone Formation (OSF)

3.1.1 The Otter Sandstone Formation (OSF) dates to approximately 246-229 my BP (i.e. the Early-Middle Triassic period).

3.1.2 Bedrock of the OSF was encountered only in FDS BH1 in the north eastern part of the site and outcropped at +2.07m OD.

3.1.3 The OSF at the site consisted of a weak reddish brown fine sandstone.

3.1.4 OSF strata in FDS BH1 were unconformably overlain by Pleistocene terrace gravels. In coastal exposures elsewhere in

south western Britain the OSF is conformably overlain by the Mercia Mudstone Group (MMG) (BGS 2014).

3.2 Mercia Mudstone Group (MMG)

3.2.1 The Mercia Mudstone Group (MMG) dates from the Middle-Upper Triassic (250-200 my BP) and formed in a series of alluvial fans emanating from the Mendips and Bristol coalfields (Green 1992, 78). The MMG therefore comprises sand and conglomerate facies, but as the name suggests is primarily made up of silts and clays.

3.2.2 The MMG was encountered in the base of all boreholes except FDS BH1, outcropping at between +16.11m OD (in FDS BH7) and +5.29m OD (FDS BH2).

3.2.2 MMG bedrock at the site is represented by reddish brown gravelly clay and by weak reddish brown, occasionally sandy, mudstone.

3.2.3 The MMG is unconformably overlain by Quaternary strata in all boreholes: by Pleistocene terrace gravels in FDS BH2, FDS BH5, FDS BH6, FDS BH7, and FDS BH8; and by Holocene alluvium in FDS BH3 and FDS BH4.

3.3 River Terrace deposits

3.3.1 Fluvial terrace deposits were encountered above bedrock in FDS BH1, FDS BH2, FDS BH5, FDS BH6, FDS BH7, and FDS BH8. These gravels probably date to the Late Pleistocene and may relate to one or possibly two terraces, which are likely to be part of the Parrett Formation (*sensu* Campbell *et al.* 1999).

3.3.2 The terrace deposits outcrop between +2.07m OD and +6.07m OD in FDS BH1 and between +5.23m OD and +7.43m OD in FDS BH2, but outcrop between +14.81m OD and +17.61m OD in the other boreholes, suggesting that the strata in FDS BH1 and FDS BH2 may relate to a lower (and therefore later) terrace (see Figure 2).

3.3.3 Pleistocene terrace strata at the site generally consist of coarse (occasionally clayey) sands and gravels consistent with deposition on the braid plain of a high energy river system (i.e. the Pleistocene River Parrett and its tributaries).

3.3.4 Pleistocene terrace strata are (presumably unconformably) overlain by Holocene alluvium in FDS BH1, FDS BH2, and FDS BH8, but outcrop at the surface in FDS BH5, FDS BH6, and FDS BH7.

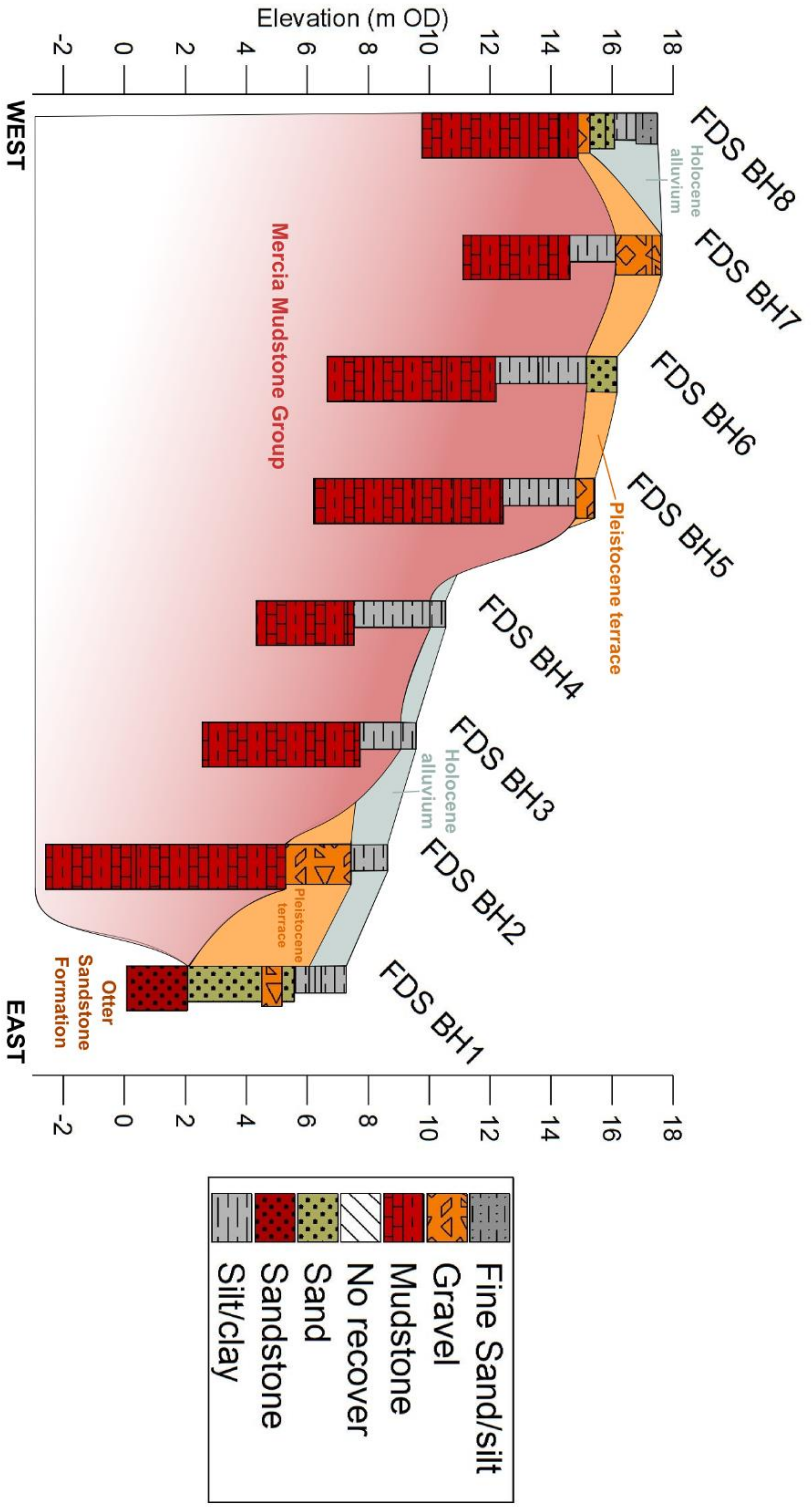

Figure 2: West to East stratigraphic transect. Not to scale horizontally.

3.4 Alluvium

3.4.1 Holocene alluvial strata were encountered at the top of FDS BH1 (outcropping above +6.07m OD), FDS BH2 (+7.43m OD), FDS BH3 (+9.07m OD), FDS BH4 (+10.03m OD), and FDS BH8 (+15.28m OD).

3.4.2 Holocene alluvium at the site generally consists of brown to grey silt/clay, although sandy alluvial strata containing partially decayed organic matter were encountered in FDS BH8 between 1.40 and 2.20m below ground level (BGL). No other organic alluvial strata were encountered in any other boreholes.

3.4.3 Given that Holocene tidal flat deposits are mapped immediately to the east of the site, it is possible that the fine grained silt/clay strata in FDS BH1, FDS BH2, FDS BH3, and FDS BH4 may have formed in an intertidal environment, and are therefore part of the Somerset Levels Formation (*sensu* Campbell *et al.* 1999). However, in the absence of any specific palaeoenvironmental indicators, it is not possible to distinguish between freshwater or intertidal sediments at the site on the basis of lithology alone.

3.4.4 The brown or mottled grey and brown colour of the majority of the silt/clay alluvial strata in all boreholes is likely to indicate that the sediments have undergone oxidisation. However, the presence of partially decayed organic particles in the alluvial strata between 1.40m and 2.20m BGL in FDS BH8 is indicative of waterlogged conditions in the basal alluvial strata in that borehole.

4. ASSESSMENT

4.1 Given the Triassic age of the Otter Sandstone Formation and the Mercia Mudstone Group, these strata have NO archaeological potential, and NO palaeoenvironmental potential.

4.2 The River Terrace deposits are assessed as having a LOW archaeological potential. Although Palaeolithic artefacts have been recovered from terrace deposits elsewhere in Somerset (e.g. Bates and Wenban-Smith 2006, Hosfield *et al.* 2007), no specific indicators of human activity were noted in the river terrace strata at the site, and any artefacts present are likely to have been reworked.

4.3 The River Terrace deposits are assessed as being of LOW palaeoenvironmental potential. Although fine-grained deposits which may contain palaeoenvironmental indicators (such as faunal remains) do occur within similar Pleistocene strata, the only such strata at the site were encountered between 1.20m and 1.70m BGL in FDS BH1 and no palaeoenvironmental indicators were noted.

4.4 The fine-grained Holocene alluvial strata are assessed as having a LOW archaeological potential since these were deposited in an alluvial/intertidal setting in which people are unlikely to have been active, and there are no specific indicators of human activity.

4.5 The alluvial strata as a whole are assessed as having a LOW to MODERATE palaeoenvironmental potential. Previous investigations of comparable deposits suggest that pollen is variably preserved in such clastic alluvial/intertidal strata and that the source of the pollen in floodplain/mudflat deposits is difficult to determine. The lack of chronological control (e.g. from datable peat strata), and the evidence of oxidisation of the sediments further restrict the potential of these strata. Nevertheless, the presence of partially decayed organic remains in strata between 1.40m and 2.20m BGL in FDS BH8 demonstrate that organic strata which may be of higher palaeoenvironmental potential may occur in the vicinity of the site.

5. ACKNOWLEDGEMENTS

5.1 ARCA would like to thank Richard Young (CA) for his help during the course of the project.

5.2 The report was written by Phil Stastney, and the project was managed for ARCA by Dr Keith Wilkinson.

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APPENDIX 1: BOREHOLE LOGS

Bore	Top	Base	Lithology	Comments
FDS BH1	0.00	0.80	Silt/clay	Stiff consistency brown slightly sandy CLAY with rootlets. [ALLUVIAL DEPOSITS]. Becoming slightly greyish brown at 0.40m begl.
FDS BH1	0.80	1.20	Silt/clay	Greyish orangish brown very gravelly very sandy CLAY. Gravel is fine to coarse angular to subangular of mudstone and sandstone. [ALLUVIAL DEPOSITS].
FDS BH1	1.20	1.70	Silt/clay	Very soft consistency orange mottled grey and red slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular of quartz and mudstone. Occasional pockets of brown silty fine sand. [RIVER TERRACE DEPOSITS]
FDS BH1	1.70	2.10	Sand	Greyish brown mottled greenish grey and reddish brown very silty very gravelly organic SAND with low cobble content of subrounded sandstone. Gravel is fine to coarse angular to subangular of sandstone and mudstone. [RIVER TERRACE DEPOSITS].
FDS BH1	2.10	2.75	Gravel	Reddish brown mottled greenish grey and reddish brown very silty very gravelly organic SAND with low cobble content of subrounded sandstone. Gravel is fine to coarse angular to subangular of sandstone and mudstone. [RIVER TERRACE DEPOSITS].

Bore	Top	Base	Lithology	Comments
FDS BH1	2.75	5.20	Sand	Very dense red occasionally mottled yellowish brown slightly silty slightly gravelly fine SAND. Gravel is fine subangular of mudstone and sandstone. [RIVER TERRACE DEPOSITS].
FDS BH1	5.20	7.20	Sandstone	Weak reddish brown fine SANDSTONE. Very closely to closely spaced fractures undulating rough infill of reddish brown sandy silty. [OTTER SANDSTONE FORMATION].
FDS BH2	0.00	1.20	Silt/clay	Stiff consistency brown gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of quartz and sandstone. [ALLUVIAL DEPOSITS].
FDS BH2	1.20	3.34	Gravel	Very dense orangish brown occasionally mottled yellowish orange silty sandy GRAVEL. Gravel is angular to subrounded sandstone. [RIVER TERRACE DEPOSITS]. Becoming dark reddish brown mottled greyish brown at 1.40m begl. Becoming medium to coarse, subangular to subrounded gravel @ 2.70m begl.
FDS BH2	3.34	8.25	Mudstone	Very weak dark reddish brown mottled grey slightly sandy MUDSTONE with occasional weak grey mudstone lithorelicts. Medium to widely spaced fractures planar rough fractures. [MERCIA MUDSTONE GROUP].
FDS BH2	8.25	11.20	Mudstone	Weak reddish brown fine MUDSTONE. Very closely to closely spaced fractures undulating rough 0-50 with occasional facture infill. [MERCIA MUDSTONE GROUP].

Bore	Top	Base	Lithology	Comments
FDS BH3	0.00	0.50	Silt/clay	Soft to firm consistency orangish brown slightly gravelly silty CLAY. Gravel is fine to coarse angular mudstone with rootlets. [ALLUVIAL DEPOSITS].
FDS BH3	0.50	1.85	Silt/clay	Stiff to very stiff consistency reddish brown occasionally mottled black slightly gravelly silty CLAY. Gravel is fine to medium angular to subangular mudstone. [MERCIA MUDSTONE GROUP]. Becomes highly weathered mottled greenish grey at 1.2m begl to 1.85m begl.
FDS BH3	1.85	3.00	Mudstone	Very weak reddish brown occasionally mottled greenish grey and black silty MUDSTONE. [MERCIA MUDSTONE GROUP].
FDS BH3	3.00	7.00	Mudstone	Weak reddish brown occasionally mottled greenish grey MUDSTONE. Very closely spaced fractures planar rough. [MERCIA MUDSTONE GROUP].
FDS BH4	0.00	0.50	Silt/clay	Soft to firm consistency mottled reddish brown slightly gravelly slightly sandy CLAY with occasional rootlets. Gravel is subangular fine to coarse of mudstone and sandstone. [ALLUVIAL DEPOSITS].
FDS BH4	0.50	3.00	Silt/clay	Stiff becoming very stiff consistency brown becoming reddish brown mottled greenish grey slightly gravely silty CLAY with occasional rootlets. Gravel is subangular to subrounded fine to coarse of mudstone and occasional quartz. Occasional mudstone lithorelicts. [MERCIA MUDSTONE GROUP].

Bore	Top	Base	Lithology	Comments
FDS BH4	3.00	3.20	Mudstone	Hard reddish brown occasionally mottled greenish grey mottled slightly sandy MUDSTONE. [MERCIA MUDSTONE GROUP].
FDS BH4	3.20	6.20	Mudstone	Weak reddish brown occasionally mottled greenish grey MUDSTONE. Close to medium spaced fractures planar rough. [MERCIA MUDSTONE GROUP]
FDS BH5	0.00	0.60	Gravel	Orangish brown silty very sandy GRAVEL with rootlets. Gravel is angular medium to coarse of sandstone and mudstone. RIVER TERRACE DEPOSITS].
FDS BH5	0.60	1.20	Silt/clay	Firm to stiff consistency reddish brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular fine to medium of mudstone. Occasional fine black organic fragments. [MERCIA MUDSTONE GROUP].
FDS BH5	1.20	3.00	Silt/clay	Very stiff consistency reddish brown occasionally mottled grey and black gravelly CLAY. Gravel is angular fine of mudstone and quartz. [MERCIA MUDSTONE GROUP].
FDS BH5	3.00	4.60	Mudstone	Extremely weak reddish brown occasionally mottled grey and black MUDSTONE. Medium spaced fractures planar rough. Weathered black on fracture surface. [MERCIA MUDSTONE GROUP].
FDS BH5	4.60	5.90	Mudstone	Extremely weak reddish brown occasionally mottled grey MUDSTONE. Closely spaced fractures planar rough. [MERCIA MUDSTONE GROUP].

Bore	Top	Base	Lithology	Comments
FDS BH5	5.90	9.20	Mudstone	Weak, reddish brown occasionally mottled grey MUDSTONE. Closely spaced fractures planar rough. Stained black on weathered fracture surface. [MERCIA MUDSTONE GROUP].
FDS BH6	0.00	1.00	Sand	Grass over reddish brown slightly gravelly slightly clayey silty SAND with a low cobble content. Gravel is coarse sub rounded sandstone. Cobbles are sub rounded sandstone. [RIVER TERRACE DEPOSITS].
FDS BH6	1.00	2.45	Silt/clay	Stiff consistency reddish brown mottled black gravelly CLAY. Gravel is fine to coarse angular very weak mudstone and sandstone. [MERCIA MUDSTONE GROUP].
FDS BH6	2.45	2.60	Silt/clay	Stiff consistency reddish brown mottled light brown fissured CLAY with occasional silt partings. [MERCIA MUDSTONE GROUP].
FDS BH6	2.60	4.00	Silt/clay	Hard reddish brown gravelly fissured CLAY occasionally mottled light grey. Gravel is fine to medium weak mudstone. [MERCIA MUDSTONE GROUP].
FDS BH6	4.00	5.60	Mudstone	Extremely weak reddish brown MUDSTONE. Fissures closely spaced with black oxidations on fissures. Some fissures infilled with firm reddish brown clay. [MERCIA MUDSTONE GROUP]
FDS BH6	5.60	8.00	Mudstone	Extremely weak reddish brown MUDSTONE. Recovered as stiff to hard gravelly clay. Gravel is fine to medium angular mudstone. [MERCIA MUDSTONE GROUP].
FDS BH6	8.00	9.50	Mudstone	Weak reddish brown MUDSTONE. Fissures closely spaced. [MERCIA MUDSTONE GROUP].

Bore	Top	Base	Lithology	Comments
FDS BH7	0.00	0.30	Gravel	Reddish brown slightly sandy silty GRAVEL with rootlets. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. [RIVER TERRACE DEPOSIT].
FDS BH7	0.30	1.50	Gravel	Reddish brown occasionally dark brown slightly sandy silty GRAVEL with low cobble content. Gravel is angular to subangular fine to coarse of quartz sandstone and mudstone. Cobbles of subangular to subrounded sandstone. [RIVER TERRACE DEPOSITS]. Moderate cobble content at 1.10m begl.
FDS BH7	1.50	3.00	Silt/clay	Stiff consistency reddish brown slightly gravelly silty CLAY with mudstone lithorelicts. Occasionally mottled black. Gravel is subangular to subrounded, fine to coarse of mudstone. [MERCIA MUDSTONE GROUP].
FDS BH7	3.00	3.70	Mudstone	Extremely weak grey MUDSTONE recovered as angular medium to coarse gravel. [MERCIA MUDSTONE GROUP].
FDS BH7	3.70	6.50	Mudstone	Extremely weak becoming weak at 4.0m begl, reddish brown occasionally mottled grey and black MUDSTONE. Closely spaced. Fractures are planar rough. Slightly silty infill. Fracture surfaces weathered black. [MERCIA MUDSTONE GROUP].
FDS BH8	0.00	0.70	Fine Sand/silt	Grass over reddish brown slightly clayey silty SAND. [ALLUVIAL DEPOSIT]
FDS BH8	0.70	1.40	Silt/clay	Firm consistency reddish brown mottled black silty CLAY [ALLUVIAL DEPOSIT].

Bore	Top	Base	Lithology	Comments
FDS BH8	1.40	1.70	Sand	Grey mottled brown slightly clayey gravelly SAND with occasional part decayed organic matter. Gravel is fine to coarse angular flint and sandstone. [ALLUVIAL DEPOSIT]
FDS BH8	1.70	2.20	Sand	Light brown occasionally mottled black very gravelly SAND with occasional part decayed organic matter. Gravel is fine to coarse angular sandstone. [ALLUVIAL DEPOSIT].
FDS BH8	2.20	2.60	Gravel	Reddish brown clayey fine to coarse angular to sub rounded mudstone GRAVEL. [RIVER TERRACE DEPOSIT]
FDS BH8	2.60	3.20	Mudstone	Very stiff gravelly CLAY/ extremely weak MUDSTONE. Gravel is fine to coarse angular mudstone. [MERCIA MUDSTONE GROUP].
FDS BH8	3.20	4.20	Mudstone	Stiff consistency reddish brown mottled greenish grey gravelly MUDSTONE. Close to medium spaced. Gravel is subangular to subrounded fine to medium quartz. Fractures weathered black. [MERCIA MUDSTONE GROUP].
FDS BH8	4.20	7.70	Mudstone	Extremely weak becoming weak reddish brown MUDSTONE. Close to medium spaced. Fractures planar rough to smooth. Fractures weathered black. [MERCIA MUDSTONE GROUP].