



University of Leicester

Archaeological Services

**Geoarchaeological Assessment of
Geotechnical Cores from Barton under
Needwood, Staffordshire
NGR: SK 1885 1656 centre**

Matthew Beamish



ULAS Report No 2011-036
©2011

**Geoarchaeological Assessment of Geotechnical Cores
from Barton under Needwood, Staffordshire**

NGR: SK 1885 1656 centre

Matthew Beamish

For: RSK Group PLC

Checked by

Signed:



Date: 24.03.2011

Name:Patrick Clay

University of Leicester
Archaeological Services
University Rd., Leicester, LE1 7RH
Tel: (0116) 2522848 Fax: (0116) 2522614

ULAS Report Number 2011-036
©2011

ULAS Project 11/908

Oasis ID: universi1-97628

CONTENTS

1	Summary	1
2	Introduction.....	1
3	Geology and Topography	1
4	Historical and Archaeological Background.....	3
5	Aims and Objectives	3
6	Core Assessment.....	7
7	Results.....	8
6	Discussion.....	18
7	Conclusion	20
8	Archive.....	21
9	Oasis.....	21
10	References.....	21
11	Acknowledgements.....	22

FIGURES

Figure 1: Study Area in relation to the A38, and the confluence of the Rivers Trent, Tame and Mease, with counties, towns and cities, and National Grid.	2
Figure 2: Scheduled Monuments in relation to Study Area and coring sites.....	4
Figure 3: Historic Environment Records Monuments in relation to Study Area and coring sites	5
Figure 4: A38 and coring sites in relation to Surface and Bedrock Geology	6
Figure 5: View west from canal adjacent to Borehole 4, showing the gradual rise up onto GlacioFluvial Sheet Deposits from off the Holme Pierrepont Pleistocene terrace.	17
Figure 6: Boreholes in relation to Ordnance Survey Panprama data (50m resolution)	19
Figure 7: A38 and Coring sites in relation to Palaeochannel model produced from Lidar data	20

Geoarchaeological Assessment of Geotechnical Cores from Barton under Needwood, Staffordshire

1 Summary

Nine geotechnical borehole cores taken from alongside the A38 trunk road were assessed for geoarchaeological indicators. No alluvial sediments, or deposits containing palaeoenvironmental information were observed. Assessment of the topographic location of the cores and comparison with other studies indicates that this section of the A38 is mostly located over Pleistocene epoch deposits which have no potential for palaeoenvironmental deposits relating to Mesolithic and later archaeological deposits. However a potential for Pleistocene epoch deposits does exist.

2 Introduction

On behalf of the Highways Agency, Amey are the Managing Agent Contractor for the A38 Trunk Road. In order to inform Amey's management of the highway, a proposal for the sinking of Site Investigation (SI) boreholes alongside the carriageway was submitted to Staffordshire County Council. The area around the proposed works is rich in archaeological sites, with many Historic Environment Records (HERs) within the immediate area, some of which are also Scheduled Monuments (SMs). Following discussion between SCC, English Heritage and Amey it was determined that although Scheduled Monument Consent was not required for the work, a Geoarchaeological Assessment of the cores should be undertaken with the overall aim to enable better understanding of the underlying geological deposits.

3 Geology and Topography

The Ordnance Survey Geological Survey of Great Britain Sheets Burton Upon Trent 140 and Lichfield 154 indicates that the underlying solid geology of the site is likely to be of the Mercian Mudstone Group, and that the superficial geology is likely to be Holme Pierrepoint Sand and Gravels with to the immediate west the slightly higher ground of Glaciofluvial Sheet Deposits (Figure 5). Alluvial deposits of Holocene date lie over the floodplain to the east of the road (but at no nearer than 500m) and in the south where crossed by the road, must be immediately underlying.

The present day topography is that of low lying river valley, defined by the confluence of the rivers Trent, Tame, and Mease. The study area is adjacent with an important point in the course of the Trent where the broad south-east line that the Trent follows from Stoke on Trent, turns to the north-east (Figure 1).

The A38 is for the most part well away from the flood plain, hugging the western margins of the earlier Holme Pierrepoint terrace. In the very south of the study area, the road crosses the flood plain, the point chosen for the bridging of the Trent in the past.

Higher ground is evident to the west of the road, with low gentle rises obvious immediately beyond the canal (Figure 5). That the area each side of the road has not been flood plain within the Holocene period is evident from an abundance of prehistoric sites including Neolithic and Bronze Age ceremonial monuments, and Iron Age land boundaries. In addition to indicating that the land was suitable for settlement, monument and agriculture, the density and clarity of cropmark sites also indicate that overlying alluvial deposits are confined to the flood plain to the east and south.

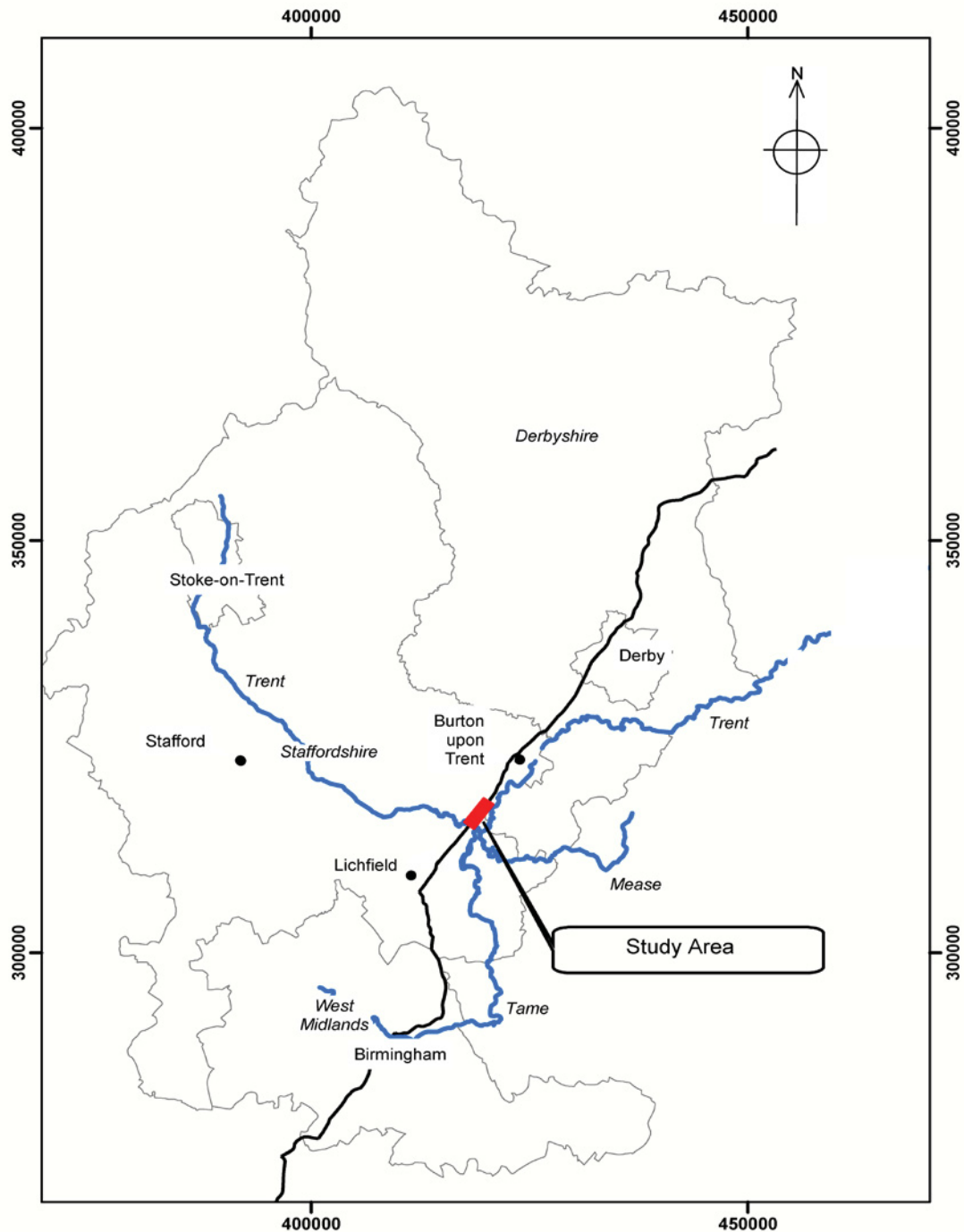


Figure 1: Study Area in relation to the A38, and the confluence of the Rivers Trent, Tame and Mease, with counties, towns and cities, and National Grid.

4 Historical and Archaeological Background

The study area lies within a well researched and documented part of the Trent Valley. Highly significant archaeological deposits have been identified from several periods including the Palaeolithic, Neolithic and Saxon.

A group of Neolithic and Early Bronze Age ceremonial monuments in the immediate area have been identified as the ‘Catholme Ceremonial Complex’ (Chapman et al forthcoming). Extensive Saxon settlement remains were excavated in the 1980s (Losco-Bradley and Kinsley 2002). The area has been the subject of a recent synthetic publication (Buteux and Chapman 2009).

The A38 trunk road follows the line of the Roman road Icknield (or Ryknield) Street. Six Scheduled Monuments areas and eighty-three Historic Environment Records lie completely or partly within the Study Area (see Appendices).

5 Aims and Objectives

The Project Objective of the Specification Issued by Staffordshire County Council (Staffs CC 2011) was:

To ensure the archaeological assessment of the borehole logs recovered during the SI works and to prepare a report detailing the results of the work.

In particular this report should focus upon the potential for:

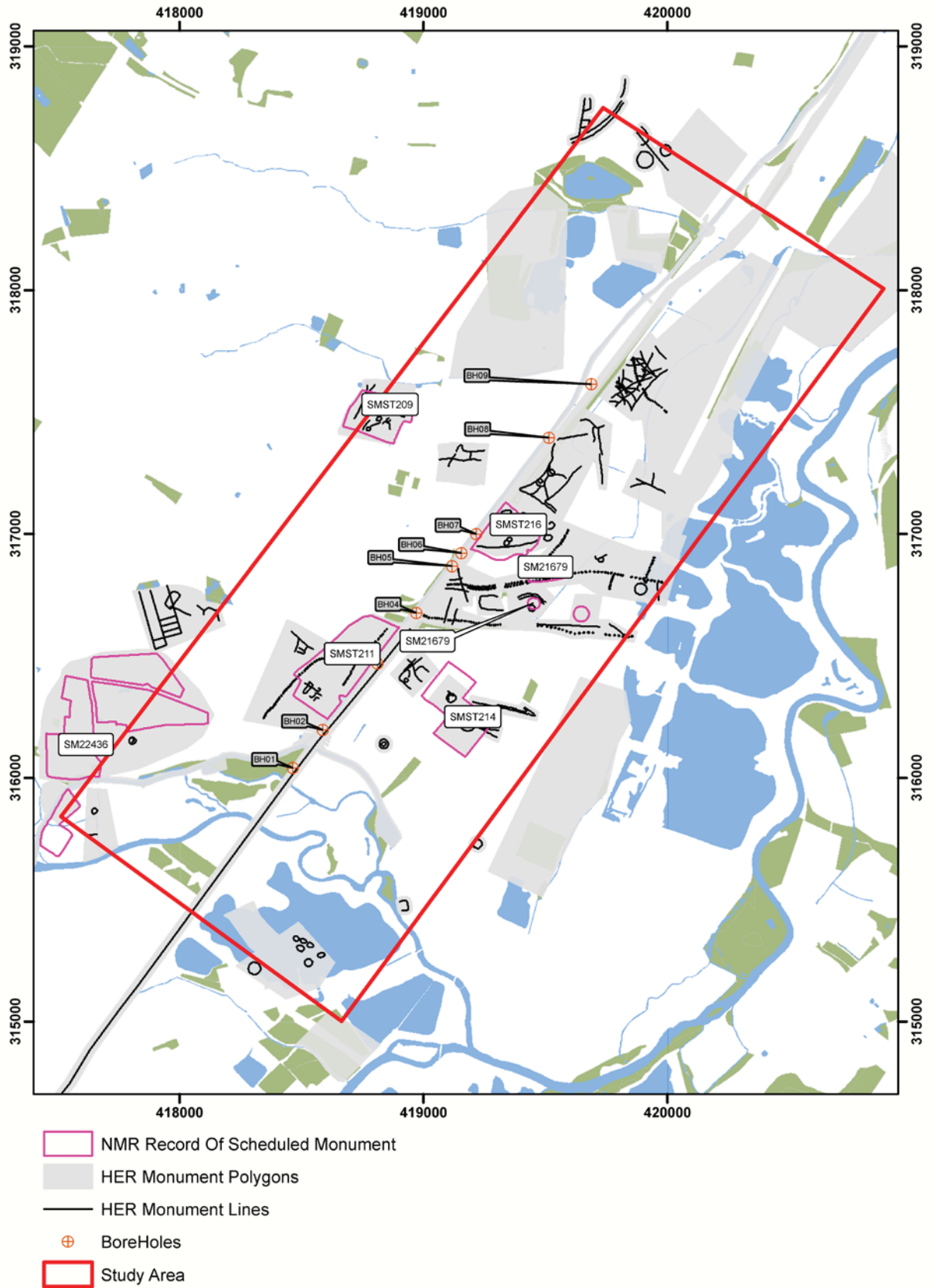
- The preparation of a deposit model for the line SI with particular attention paid to the presence of peat deposits and possible palaeochannels.
- To prepare a drawn profile and deposit description in geoarchaeological terms of all layers within each borehole.
- To identify the potential for specific deposits to contain palaeoenvironmental remains. Detailed sampling and assessment in this instance is not necessary. This will highlight potential for future study.

It has not been possible to create a deposit model as

1. No palaeoenvironmental deposits were recorded
2. No alluvial sediments were recorded
3. The extent of truncation of the deposits was not possible to quantify

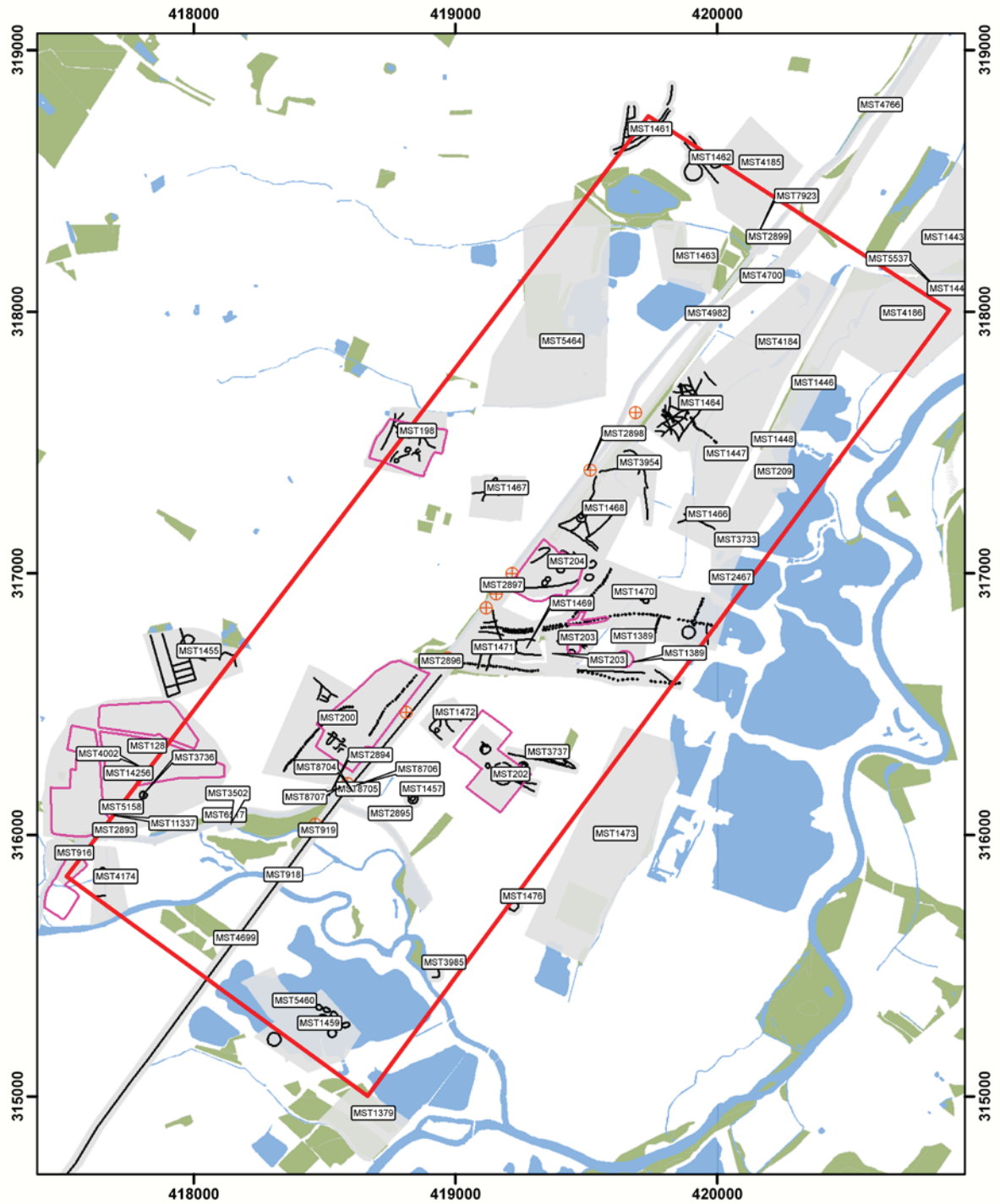
No borehole profiles were drawn because

1. It was only possible to access the borehole liners once they have been recovered to Quedgeley, Gloucester
2. Access to the borehole proper would not be possibly due to the mechanics of the coring operation and the small size of the bore



Contains Ordnance Survey data © Crown copyright and database right 2011
 Contains Staffordshire Historic Environment Record data. © Staffordshire County Council

Figure 2: Scheduled Monuments in relation to Study Area and coring sites



- NMR Record Of Scheduled Monument
- HER Monument Polygons
- HER Monument Lines
- + BoreHoles
- Study Area

Contains Ordnance Survey data © Crown copyright and database right 2011
 Contains Staffordshire Historic Environment Record data. © Staffordshire County Council.

Figure 3: Historic Environment Records Monuments in relation to Study Area and coring sites

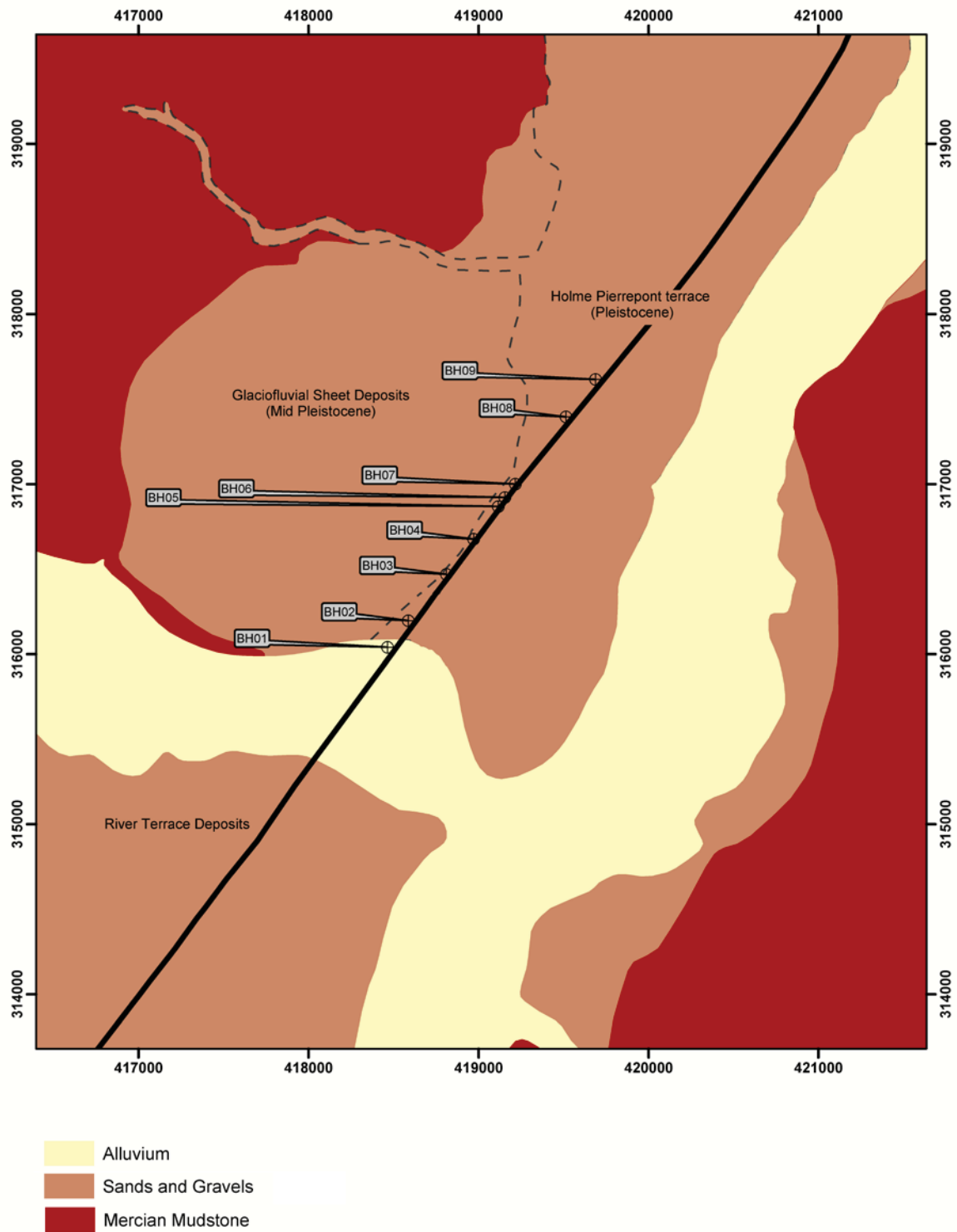


Figure 4: A38 and coring sites in relation to Surface and Bedrock Geology

(after Buteux and Chapman 2009 Fig 3.10 with amendments)

6 Core Assessment

Methodology

The cores had been drilled overnight during the week ending 27th February 2011 by Geotechnical Engineering, and retrieved liners subsequently taken to a laboratory at Quedgeley, Gloucester where they were logged.

The draft logs were provided to the author in advance of a pre-arranged visit and these formed the basis for the assessment.

Samples included one or two bulk samples taken in bags from the upper levels of each hole, and one, two, or three 1m liners, depending upon the depth of the borehole. These bagged deposits were not usually contained in the liner samples, which generally started at 1.2m from the surface of each borehole. The upper part of each liner was prone to soil contamination from above during the coring process.

Each retrieved bulk bag, and plastic liner was opened and inspected against the logs. Notes were taken on soil sediment colours and textures using standard archaeological procedures.

Geotechnical Engineering Limited
BOREHOLE LOG



CLIENT AMEY
 SITE A38 BARTON CANAL PATH EMBANKMENT EROS
 Start Date 22 February 2011
 End Date 22 February 2011

BH02

Sheet 1 of 1
 Scale 1 : 50
 Depth 4.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
22/02/11 0800hrs	1B	0.60				✓	Driller notes tarmacadam (0.00-0.05m) over concrete with re-bar. (MADE GROUND)	0.60		
	2X	1.25 - 1.65 1.25 - 2.00	Nil	S 9			Orangish brown sandy subrounded and rounded fine to coarse quartzite GRAVEL. (MADE GROUND) 1.25m: Loose, becoming brown.	1.50		
	3U 4X	2.00 - 2.45 2.00 - 3.00					Loose brown slightly sandy clayey subrounded and rounded fine to coarse quartzite GRAVEL. Soft orangish brown slightly gravelly silty CLAY. Gravel is subrounded and rounded quartzite.	1.65		
	5X	3.00 - 3.45 3.00 - 4.00	Nil	S			2.40m: Becoming grey. Brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL. Orangish brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL.	2.70		
22/02/11 1700hrs 2.30m							Firm reddish brown slightly silty slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse siltstone. Borehole completed at 4.00m.	3.00		
								3.60		
								4.00		
								(8.00)		
EQUIPMENT: Geotechnical Terrier 2000 rig. METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (84mm) 3.00-4.00m. CASING: Not used. BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 3.20m, granular response zone 3.20-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: On completion borehole collapsed from 5.00 to 3.50m.										
EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS										
water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks				CONTRACT 25202	CHECKED	
2.10	Nil									

Geotechnical Engineering Ltd, Tel. 01482 527743 25202.GPJ TRIAL.UJ.GPJ GEOTECH.GLB 03/03/2011 11:08:57 ED EW

Geoarchaeologist Notes:

BH02, Sample 1B 10YR 3/4 Course Sands with clay clasts - redeposited
 BH02; Sample 2X: 5YR 5/6 Yellowish Red Coarse sands and gravels giving way to 10YR 4/6 Dark Yellowish Brown Clayey sands and gravels at 1.7m 09:34:55
 BH02; Sample 5X: Clean clast supported sands and gravels.

Geotechnical Engineering Limited

BOREHOLE LOG



CLIENT AMEY

BH03

SITE A38 BARTON CANAL PATH EMBANKMENT EROS

Sheet 1 of 1

Start Date 22 February 2011

Scale 1 : 50

End Date 22 February 2011

Depth 3.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru-ment	description	depth (m)	reduced level (m)	legend		
22/02/11 0800hrs							Driller notes sandy clay (topsoil). (MADE GROUND)					
	1B	0.60						0.60				
	2B	1.00		Nil	S 10		Brown slightly silty sandy subangular and subrounded fine to coarse quartzite GRAVEL and COBBLES. (MADE GROUND)	1.20				
	3X	1.20 - 1.65 1.20 - 2.00					Medium sense orangish brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL and COBBLES.	1.85				
	4D	2.00 - 2.45	2.00		S 41		Bluish grey clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL.	1.95				
	5X	2.00 - 3.00					Pinkish brown SAND. Dense orangish brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL.	2.00				
	6X	3.00 - 3.45 3.00 - 3.70	2.00		C 43			3.40				
22/02/11 1700hrs 1.55m							Orangish brown fine to coarse SAND.	3.70				
							Borehole completed at 3.70m.					
<p>EQUIPMENT: Geotechnical Terrier 2000 rig. METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (84mm) 3.00-3.70m. CASING: 113mm to 2.00m. BACKFILL: On completion, borehole backfilled with bentonite pellets and the surface reinstated.</p> <p>EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS</p>												
<p>water strike (m) casing (m) rose to (m) time to rise (min) remarks</p> <p>1.15 Nil</p>									<p>CONTRACT 25202</p>		<p>CHECKED</p>	

Geotechnical Engineering Ltd, Tel. 01452 527143 25202.GPJ TR14A JK.GPJ GEOTECH.CLB 08/03/2011 11:08:58 ED EIW

Geoarchaeologist Notes:

BH03, Sample 1B: 10YR 3/2 Dark Brown loamy sand with clasts of fine sand 2.5YR 4/8 Red. Mixed.
 BH03; Sample 2B: 7.5YR 3/2 Dark Brown sandy silt loam. Some fine roots visible. Mixed unsorted gravels.
 BH03; Sample 3X: Yellowish Brown 10YR 5/6 clayey gravels greying at 2m where gives way to Medium to Coarse sands. The clay component of this deposit indicates deposition in the Pleistocene. NB Base of sample as marked includes some organic matter and a dark silt loam. As this is not on the log, it probably represents contamination of the core, and possibly also inversion of the core.
 BH03, Sample 5X As per logs
 BH03, Sample 6X As per logs

Geotechnical Engineering Limited

BOREHOLE LOG



BH04

CLIENT AMEY
 SITE A38 BARTON CANAL PATH EMBANKMENT EROS
 Start Date 23 February 2011
 End Date 23 February 2011

Sheet 1 of 1
 Scale 1 : 50
 Depth 3.90 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
23/02/11 0800hrs							Driller notes tarmacadam (0.00-0.05m) over concrete. (MADE GROUND)	0.60		
	1B	0.60								
	2B	1.00					Loose brown slightly silty sandy subangular to subrounded fine to coarse quartzite GRAVEL.			
	3X	1.20 - 1.65 1.20 - 2.00	Nil	S 9						
	4D	2.00 - 2.45	2.00	S 39				2.00		
	5X	2.00 - 3.00					Dense orangish brown sandy subrounded and rounded fine to coarse quartzite GRAVEL.			
	6D	3.00 - 3.45	2.00	S 28						
	X	3.00 - 3.80						3.50		
23/02/11 1700hrs 2.80m	X	3.80 - 4.14 3.80 - 3.90	2.00	C*66			Dense orangish brown, slightly gravelly SAND. Gravel is subrounded and rounded fine to coarse quartzite.	3.90		
							Borehole completed at 3.90m.			
(8.00)										
<p>EQUIPMENT: Geotechnical Terrier 2000 rig. METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-2.00m, (84mm) 2.00-3.00m, (76mm) 3.00-3.80m, (66mm) 3.80-3.90m. CASING: 113mm to 2.00m. BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip 2.70m, granular response zone 2.70-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: Borehole continually collapsing from 3.00m. On completion borehole collapsed from 3.90 to 2.70m.</p>										
EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS										
water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS			CONTRACT	CHECKED	
1.20	Nil							25202		

Geoarchaeologist Notes:

- BH04; Sample 1B: 7.5YR 2.5/1 Black sand, gravel and clinker.
- BH04; Sample 2B: Very dark grey (7.5YR 3/1) Very dark grey slightly loamy sand. Glass frags noted - made ground.
- BH04; Sample 3X: between 1.3 and 1.75m a band of Very dark grey (2.5Y 3/1) clayey sand and gravel noted. No organic material was visible. Sands and gravels above (starting at 1.20m) and below indicate integrity.
- BH04; Sample 5X: As per log, becoming increasingly sandy to base.
- BH04; Sample X: As per log, very sandy.

Geotechnical Engineering Limited

BOREHOLE LOG



CLIENT AMEY

BH05

SITE A38 BARTON CANAL PATH EMBANKMENT EROS

Sheet 1 of 1

Start Date 23 February 2011

Scale 1 : 50

End Date 23 February 2011

Depth 1.85 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
23/02/11 0800hrs	1B	0.70					Driller notes tarmacadam (0.00-0.05m) over concrete hardcore. (MADE GROUND)	0.70		
	2D	1.20 - 1.65	Nil	S 8			Loose dark greyish brown slightly silty sandy subangular and subrounded fine to coarse GRAVEL and COBBLES of clinker and fine grained crystalline material. (MADE GROUND)	1.40		
23/02/11 1700hrs 1.10m	3X	1.20 - 1.85	1.85				Loose orangish brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL with occasional cobbles. Borehole completed at 1.85m.	1.85		
								8.00		

EQUIPMENT: Geotechnical Terrier 2000 rig.
 METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-1.85m.
 CASING: 113mm to 1.85m.
 BACKFILL: On completion, borehole backfilled with bentonite pellets and the surface reinstated.
 REMARKS: Refusal at 1.85m, borehole abandoned. Ground water encountered at 1.85m and rose above ground level.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.85	1.85	+0.10m		water level above ground level.

CONTRACT **25202** CHECKED

Geotechnical Engineering Ltd, Tel: 01452 527743 25202.GPJ TRIAL.UH.GPJ GEOTECH.CLB 08/03/2011 11:06:59 ED EW

Geoarchaeologist Notes:

BH05; Sample 1B 7.5 YR 2.5/1 Black. Smells bituminous
 BH05; Sample 3X. Clayey nature indicates this is probably a Pleistocene deposit.

Geotechnical Engineering Limited

BOREHOLE LOG



CLIENT AMEY
 SITE A38 BARTON CANAL PATH EMBANKMENT EROS
 Start Date 24 February 2011
 End Date 24 February 2011

BH06

Sheet 1 of 1
 Scale 1 : 50
 Depth 3.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru-ment	description	depth (m)	reduced level (m)	legend
24/02/11 0800hrs	1B	0.50					Driller notes brown sandy gravel. (MADE GROUND)	0.50		
	2B	1.00					Orangish brown slightly silty sandy subrounded and rounded fine and medium quartzite GRAVEL.	1.20		
	3D	1.20 - 1.65		Nil	S 7					
	4X	1.20 - 2.00					Loose orangish brown mottled bluish grey slightly clayey sandy subangular and subrounded fine to coarse quartzite GRAVEL.	1.65		
	5U	2.00 - 2.45					Firm brown slightly gravelly sandy CLAY. Gravel is subangular and subrounded fine to coarse quartzite.			
	6X	2.00 - 3.00								
	7D	3.00 - 3.45	2.00		S 49					
	8X	3.00 - 3.80								
24/02/11 1700hrs 2.58m							Dense orangish brown slightly silty slightly gravelly SAND. Gravel is subangular to subrounded fine to coarse quartzite.	3.80		
							Borehole completed at 3.80m.			
EQUIPMENT: Geotechnical Terrier 2000 rig. METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (84mm) 3.00-3.80m. CASING: (113mm) to 2.00m. BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 2.90m, granular response zone 2.90-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: On completion borehole collapsed from 3.80 to 2.90m.										
EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS										
water strike (m)		casing (m)		rose to (m)		time to rise (min)		remarks		
2.75		2.00								
								CONTRACT 25202		CHECKED

Geotechnical Engineering Ltd, Tel: 01452 527743 25202.GPJ TRIAL.UK.GPJ GEOTECH.GLB 03/03/2011 11:08:59 ED EW

Geoarchaeologist Notes:

BH06; Sample 1B: 7.5YR 4/3 Brown Sandy Loam. Contains abundant sm<med rounded gravels.
 BH06; Sample 2B: Strong brown 7.5YR 4/6, silty clay sand. Not at all clayey - ?fluvial deposit.
 BH06; Sample 4X Top missing. Higher gravels silty 10YR 3/2 Dark Greyish Brown. No organics visible:
 BH06; Sample 6X: Clayey gravels appear glacial in nature.

Geotechnical Engineering Limited

BOREHOLE LOG



CLIENT AMEY

BH07

SITE A38 BARTON CANAL PATH EMBANKMENT EROS

Sheet 1 of 1

Start Date 24 February 2011

Scale 1 : 50

End Date 24 February 2011

Depth 3.60 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/11 0800hrs	1B	0.50					Driller notes tarmacadam (0.00-0.05m) over concrete hardcore. (MADE GROUND)	0.50		
	2B	1.00					Black ashy sandy subangular and subrounded fine to coarse GRAVEL and COBBLES of clinker and fine grained crystalline material. (MADE GROUND)	1.00		
	3D	1.20 - 1.65		Nil	S 8		Brown slightly clayey sandy subrounded and rounded fine to coarse quartzite GRAVEL and COBBLES.	1.20		
	4X	1.20 - 2.00					Grey slightly clayey sandy subangular to subrounded fine to coarse quartzite GRAVEL.	1.25		
	5D	2.00 - 2.33	2.00		S*63		Very dense orangish brown slightly silty sandy subangular and subrounded fine to coarse quartzite GRAVEL.			
	6X	2.00 - 3.00								
	6D	3.00 - 3.45	2.00		S 38			3.00		
	7X	3.00 - 3.60					Dense orangish brown slightly silty sandy subangular and subrounded fine to coarse quartzite GRAVEL with rare cobbles.	3.60		
24/02/11 1700hrs 2.70m							Borehole completed at 3.60m.			

EQUIPMENT: Geotechnical Terrier 2000 rig.
 METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (84mm) 2.60-3.60m.
 CASING: 113mm to 2.00m.
 BACKFILL: On completion, borehole backfilled with bentonite pellets and the surface reinstated.
 REMARKS: Borehole collapsed from 3.00-2.90m, sample recovered in run from 2.90-3.60m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.50	2.00			

CONTRACT 25202 CHECKED

Geotechnical Engineering Ltd, Tel: 01452 527743 25202.GPJ TRIAL JK.GPJ GEOTECH-CLB 0303/2011 11:05:00 ED RW

Geoarchaeologist Notes:

BH07; Sample 4X As per logs
 BH07; Sample 6X: As per logs. Sands and gravels more silty and less clayey than those above
 BH07; Sample 7X As per logs

Geotechnical Engineering Limited
BOREHOLE LOG



CLIENT AMEY
 SITE A38 BARTON CANAL PATH EMBANKMENT EROS
 Start Date 24 February 2011
 End Date 24 February 2011

BH08
 Sheet 1 of 1
 Scale 1 : 50
 Depth 4.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/11 0800hrs	1B	0.50					Driller notes brown sandy gravel. (MADE GROUND)	0.50		
	2B	1.00					Orangish brown slightly gravelly silty fine to coarse SAND. Gravel is subrounded and rounded fine to coarse quartzite. (MADE GROUND)	1.00		
	3X	1.20 - 1.65 1.20 - 2.00		Nil C 5			Black ashly sandy subangular and subrounded fine to coarse GRAVEL and COBBLES of clinker and fine grained crystalline material. (MADE GROUND)	1.20 1.50		
	4X	2.00 - 2.31 2.00 - 3.00		Nil C*82			Loose brown slightly silty slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular and subrounded fine to coarse quartzite. (MADE GROUND)	2.00 2.15		
	5X	3.00 - 3.32 3.00 - 4.00		Nil C*80			Loose orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is subangular and subrounded fine to coarse quartzite. 1.83m: Becoming brown. Firm brown sandy CLAY. Very dense orangish brown sandy subangular and subrounded fine to coarse quartzite GRAVEL.	2.15 3.00 4.00		
24/02/11 1700hrs 3.40m							Borehole completed at 4.00m.	4.00		
								8.00		

EQUIPMENT: Geotechnical Terrier 2000 rig.
 METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (84mm) 3.00-4.00m.
 CASING: Not used.
 BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 3.20m, granular response zone 3.20-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.
 REMARKS: On completion borehole collapsed from 4.00 to 3.20m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
------------------	------------	-------------	--------------------	---------

AGS CONTRACT 25202 CHECKED

Geotechnical Engineering Ltd, Tel: 01452 527743 25202 G.P.J. TRIAL/IN-G.P.J. GEOTECH/CLB 03/03/2011 11:08:00 ED EW

Geoarchaeologist Notes:

- BH08; Sample 1B – Not seen
- BH08; Sample 2B: Black clinker and gravel mix.
- BH08; Sample 3X. As per logs
- BH08; Sample 4X. 7.5YR 3/2 Dark Brown clayey sand. Fluvio-glacial?
- BH08; Sample 5X: As per logs.

Geotechnical Engineering Limited

BOREHOLE LOG



CLIENT AMEY

BH09

SITE A38 BARTON CANAL PATH EMBANKMENT EROS

Sheet 1 of 1

Start Date 25 February 2011

Scale 1 : 50

End Date 25 February 2011

Depth 3.45 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	instru-ment	description	depth (m)	reduced level (m)	legend
25/02/11 0800hrs	1B	0.50					Driller notes brown sandy gravel. (MADE GROUND)	0.50		
	2B	1.00					Brown slightly silty sandy subangular to subrounded fine to coarse clinker GRAVEL. (MADE GROUND)	1.00		
	3D	1.20 - 1.65					Loose orangish brown sandy subangular and subrounded fine to coarse quartzite GRAVEL.	1.45		
	4X	1.20 - 2.00		Nil	S 8					
	5D	2.00 - 2.45	2.00				Soft orangish brown and bluish grey slightly gravelly sandy CLAY. Gravel is subrounded and rounded quartzite.	2.00		
	6X	2.00 - 3.00			S 39					
	7D	3.00 - 3.45	2.00				Very dense orangish brown slightly silty sandy subrounded and rounded fine to coarse quartzite GRAVEL.	3.45		
25/02/11 1700hrs 1.92m	8X	3.00 - 3.20			S 20					
								Borehole completed at 3.45m.		

25202.GPJ TRIAL JK.GPJ GEOTECH-GLB 03/03/2011 11:09:01 ED EW
Geotechnical Engineering Ltd, Tel: 01452 527743

EQUIPMENT: Geotechnical Terrier 2000 rig.
 METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (98mm) 1.20-3.00m, (98mm) 3.00-3.20m.
 CASING: 113mm to 2.00m.
 BACKFILL: On completion, a standpipe piezometer (19mm) was installed with tip at 2.20m, granular response zone 2.20-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.
 REMARKS: Borehole collapsed from 3.20 to 2.20m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water sink (m)	casing (m)	rose to (m)	time to rise (min)	remarks		CONTRACT 25202	CHECKED
1.78	2.00						

BH09; Sample 1B: Very Dark grey (7.5YR 3/1) sand - Made ground.
 BH09; Sample 2B: Brown (10YR 4/3) Sandy gravel. Contains common flecks of manganese - indicating waterlogging. Small rooty material noted - this maybe contamination.
 BH09, Sample 4X: Gravelly clay does not look riverine
 BH09; Sample 6X: As per logs.

A number of boreholes contained probable layers of redeposited gravels within the upper 1 to 2m. Sometimes this material was retained within the core, and sometimes only recorded within the logs, as the cores started at 1.2m down.



Figure 5: View west from canal adjacent to Borehole 4, showing the gradual rise up onto GlacioFluvial Sheet Deposits from off the Holme Pierrepont Pleistocene terrace.

6 Discussion

No alluvial sediments or palaeoenvironmental deposits were observed or recorded in any of the nine cores. Most lower sand and gravel deposits within the cores were interpreted to be of probable fluvio-glacial (Pleistocene period) rather than riverine (Holocene period) by virtue of their clayey character.

As no evidence of Holocene period channels or palaeoenvironmental deposits were recorded, it is not possible to produce a deposit model from this data.

To help assist the understanding of the local topography, and geomorphology, the borehole cores were viewed in relation to simple elevation data (the freely available Ordnance Survey 50m resolution tiles) and the results of the Lidar research published in the recent synthetic publication “Where Rivers Meet” (Buteux and Chapman 2009).

The low resolution Ordnance Survey data when colour mapped to highlight elevation differences within the local area only, clearly shows that the area of the borehole cores (apart from the extreme southern end) occupies higher ground than the current valley bottom and that the A38 crosses lower lying ground with a much higher potential for Holocene period palaeoenvironmental deposits to the immediate south, and also possibly to the north (Figure 6).

Previous research integrating fine resolution LiDAR data with detailed map and photographic study has resulted in the detection of probable Pleistocene channel courses within the Holme Pierrepont terrace, and these have been mapped along with Holocene palaeochannel courses (Buteux and Chapman 2009, Fig 4.2). The borehole locations are shown in relation to this map (Figure 7), and the likely locations of Pleistocene and Holocene period deposits are re-affirmed.

The close proximity of the Whitemoor Haye faunal and floral remains some 1.25km south of BH01 makes clear the potential for Pleistocene period palaeoenvironmental remains within these sands and gravels.

The location of the borehole cores between the edge of a Roman Road, and an eighteenth Century canal has led to the upper levels of the cores containing made ground. Layers of redeposited gravel may relate to the construction of either. The construction of either may have also resulted in the removal of soils and sediments and the truncation of the upper profiles.

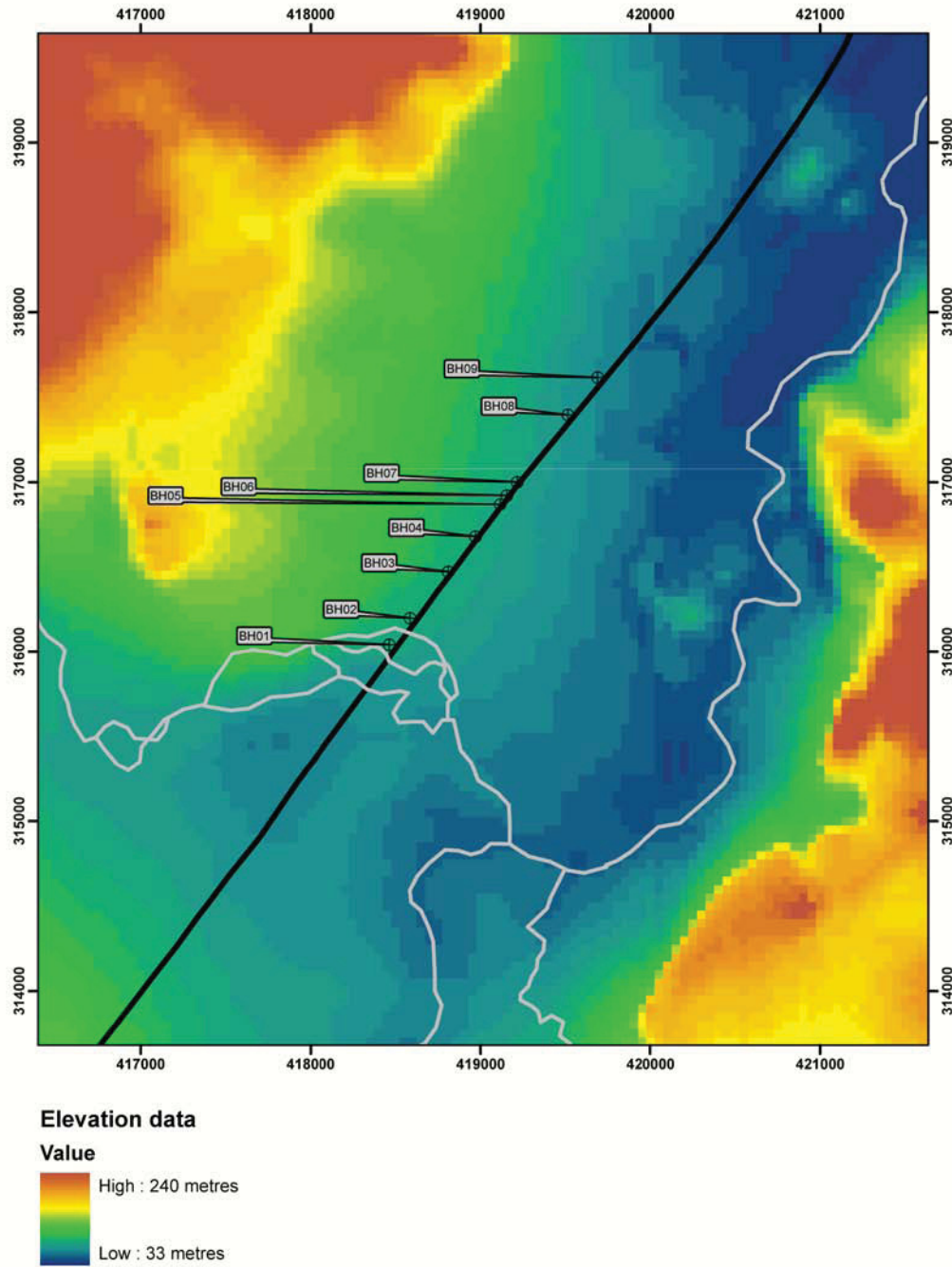


Figure 6: Boreholes in relation to Ordnance Survey Panprama data (50m resolution)

Contains Ordnance Survey data © Crown copyright and database right 2011

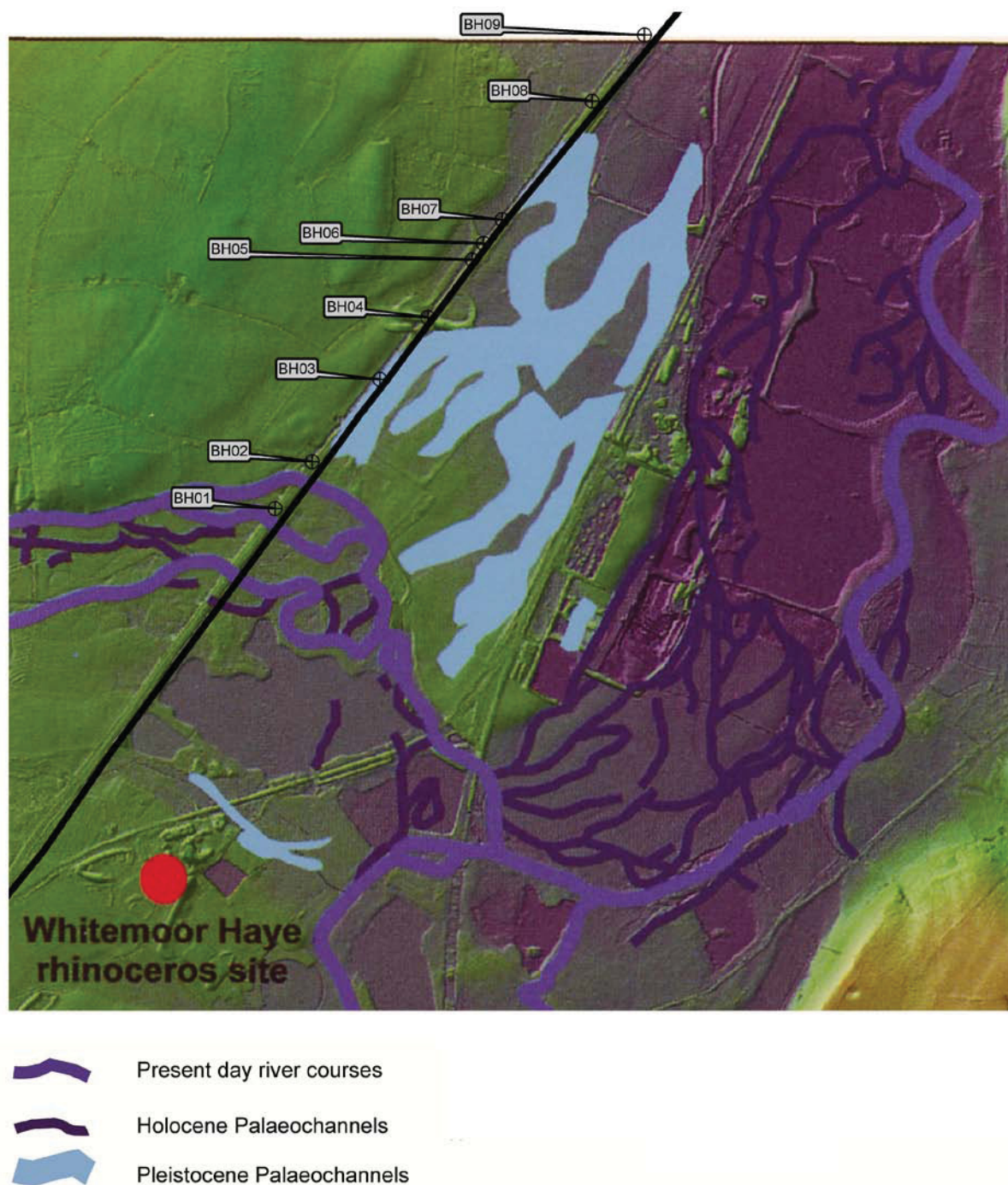


Figure 7: A38 and Coring sites in relation to Palaeochannel model produced from Lidar data

(after Buteux and Chapman 2009 Fig 4.2)

7 Conclusion

Nine boreholes cored beside the A38 in Barton under Needwood did not recover any deposits containing palaeoenvironmental remains. No alluvial sediments were recorded. The lack of data prevented the modelling of the deposits.

Assessment of the borehole locations against known geological mapping, and the results of Pleistocene and Holocene palaeochannel mapping studies indicate that the part of the A38 studied lies over Pleistocene period deposits, and the potential for Holocene period palaeoenvironmental remains is low. Holocene period palaeoenvironmental remains are probably of higher potential to the south-west, where the A38 crosses the River Trent, and possibly to the north, where the Holocene floodplain is closer to the road.

The potential for Pleistocene period palaeoenvironmental deposits is evidenced by examples such as Whitemoor Haye, 1.25km to the south. From the results of previous studies modelling Pleistocene palaeochannels, this section of the A38 lies on the very western edge of these deposits.

8 Archive

The archive will consist of the following:

Unbound copy of this report.

Field Notes.

Digital Photo Record

There are no finds associated with the archive. The Potteries Museum and Art Gallery at Hanley, Stoke-on-Trent have made no indication that this archive is suitable for deposition and no accession number has been given.

9 Oasis

Although Staffordshire HER is not subscribed to the Oasis programme of fieldwork reporting, this report will be uploaded to Oasis: Oasis record *universi1-97628*.

10 References

Buteux, S., and Chapman, H., 2009, Where Rivers Meet. The Archaeology of the Catholme and Trent-Tame Confluence. CBA Res Rep 161

Chapman, H.P., Hewson, M., and Wilkes, M.S., forthcoming, The Catholme Ceremonial Complex, Staffordshire, UK. *Proc Prehist Soc*

Losco-Bradley, S., and Kinsley, G., 2002, Catholme, An Anglo-Saxon Settlement on the Trent Gravels in Staffordshire Trent and Peak Archaeology Unit, University of Nottingham.

Staffordshire County Council, 2011, Specification for an geoarchaeological assessment of boreholes site investigation (SI) works on the line of the A38 (Ryknield street), East Staffordshire

11 Acknowledgements

Thanks to Brigitte Buss of RSK Group PLC for organising the assessment and to Liz Withington and Sam Theophilus of Geotechnical Engineering for their help and hospitality. Thanks also to Thomas Levick of Amey for supplying the coordinate data for the boreholes.

Matthew Beamish
ULAS
University of Leicester
University Road
Leicester LE1 7RH

Tel: 0116 252 2848
Fax: 0116 252 2614
Email: mgb3@le.ac.uk

22.03.2011

Appendix I

Borehole coordinates

<u>CODE</u>	<u>EASTING</u>	<u>NORTHING</u>	<u>HEIGHT</u>
BH01	418464.54	316041.25	54.13
BH02	418587.11	316197.37	52.85
BH03	418811.11	316470.10	52.25
BH04	418970.84	316677.40	52.30
BH05	419117.01	316868.90	52.79
BH06	419155.19	316922.00	52.87
BH07	419216.36	317000.64	52.24
BH08	419514.48	317395.61	53.12
BH09	419688.17	317615.28	50.77

NB Height is surface of Borehole

Appendix II

Scheduled Monuments partly or completely within Study Area

MONUMENT_NO	NAME	DATE_OF_AC	AREA_HA
ST209	Earthworks centring on 320yds (300m) NW of the Junction Inn, Efflinch		4.07
21679	TIMBER CIRCLE, HENGI-FORM MONUMENT AND PART OF A PIT ALIGNMENT AT CATHOLME	36502	0.31
ST211	Pit alignments running NE and SW centring 320yds (300m) N of Wychnor Bridge		8.32
ST214	Circular enclosures centring 300yds (270m) W of Wychnor Junction		5.53
ST216	Enclosures and cursus 300yds (270m) SE of Efflinch		3.95
22436	WYCHNOR DESERTED MEDIEVAL VILLAGE, MOATED SITE, MOATED ENCLOSURE AND TWO FISHPONDS	33900	2.07

Historic Environment Records, partly or completely within Study Area

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade
MST11337	Churchyard, St. Leonard's Church, Wychnor	CHURCHYARD	1100 to 1199	Monument	
MST6517	Pillbox, Wychnor	PILLBOX	1940 to 1941	Building or Structure	
MST1462	Ring Ditch and Linear Features, Barton Turn	RING DITCH, LINEAR FEATURE	-3000 to - 701	Monument	

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade
MST2894	Bridge 43, Canal Junction and Lock, Trent and Mersey Canal, Wychnor	CANAL LOCK, ROVING BRIDGE	1765 to 1799	Monument	
MST1389	Timber Circle, Catholme	TIMBER CIRCLE	-3000 to -701	Monument	
MST5464	Ridge and Furrow, Barton under Needwood	RIDGE AND FURROW	1066 to 1539	Monument	
MST918	Wychnor Bridges	ROAD BRIDGE, ROAD BRIDGE	1251 to 1795	Monument	
MST2467	Barton Mill	WATERMILL	1547 to 1899	Monument	
MST3502	Wychnor Mill	WATERMILL	1547 to 1899	Monument	
MST3954	Linear Feature, Mill Bridge, Barton under Needwood	LINEAR FEATURE	Unknown	Monument	
MST1389	Timber Circle, Catholme	TIMBER CIRCLE	-3000 to -701	Monument	
MST4184	Cropmarks, Barton under Needwood	LINEAR FEATURE, ENCLOSURE	-2350 to 409	Monument	
MST1457	Ring Ditch, Wychnor Bridges	RIDGE AND FURROW, RING DITCH	-3000 to 1899	Monument	
MST202	Ring Ditches, Wychnor Junction	LINEAR FEATURE, RING DITCH	-3000 to -701	Monument	
MST1463	Enclosures, Fields Systems and Ring Ditches, Barton Turn	ENCLOSURE, FIELD SYSTEM, RING DITCH	-3000 to -701	Monument	
MST1467	Cropmarks, Efflinch, Barton Under Needwood	ENCLOSURE	Unknown	Monument	
MST128	Wychnor Deserted Medieval Village	DESERTED SETTLEMENT	1066 to 1485	Monument	
MST3736	Ring Ditch, Wychnor	RING DITCH	-3000 to -	Monument	

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade	
MST1469	Cropmarks, Catholme, Barton Under Needwood	ENCLOSURE	701 Unknown	Monument		
MST5158	St. Leonard's Church, Wychnor	CHURCH, PLAQUE, CROSS, WAR MEMORIAL, CHURCH	1100 to 1945	Monument	Listed Building	II*
MST4186	CROPMARKS	RING DITCH, LINEAR FEATURE	-3000 to -701	Monument		
MST5537	Ridge and Furrow, Barton Under Needwood	RIDGE AND FURROW	1066 to 1485	Monument		
MST2896	Canal Bridge Number 15, Trent and Mersey Canal	ACCOMMODATION BRIDGE	1547 to 1899	Monument		
MST4002	Enclosures, Wychnor Farm	ENCLOSURE	-2350 to 409	Monument		
MST1471	Pit Alignment, Catholme	PIT ALIGNMENT, LINEAR FEATURE	-1000 to 409	Monument		
MST7923	Wharfe House, Station Road, Barton under Needwood	DETACHED HOUSE	1800 to 1899	Building or Structure	Listed Building	II
MST4766	Trent and Mersey Canal (Lichfield Road to Woodend Farm)	CANAL	1771 to 1771	Monument		
MST3737	Ring Ditch, Wychnor Junction	RING DITCH	-4000 to -1501	Monument		
MST2899	Barton Turn Lock and Bridge, Trent and Mersey Canal, Barton Under Needwood	ACCOMMODATION BRIDGE, CANAL LOCK	1547 to 1899	Monument		
MST1443	Cropmarks, Walton Station, Barton Under Needwood	RING DITCH, LINEAR FEATURE, ENCLOSURE	-3000 to 409	Monument		

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade	
MST1444	Ridge and Furrow at land excavated at Barton Quarry.	RIDGE AND FURROW	1066 to 1539	Monument		
MST3985	Enclosure, Wychnor Junction	ENCLOSURE	-2350 to 409	Monument		
MST209	Ring Ditch, Causewayed Enclosure and other Structures, Fatholme	BUILDING, BUILDING, RING DITCH, BUILDING, CAUSEWAYED ENCLOSURE	-4000 to 1899	Monument		
MST204	Enclosure and Cursus, Efflinch, Catholme	RING DITCH, CURSUS?	-4000 to -701	Monument		
MST198	Enclosure and Ring Ditches, Efflinch	ENCLOSURE, RING DITCH, LINEAR FEATURE	-3000 to 409	Monument		
MST1466	Cropmarks, Barton Under Needwood	LINEAR FEATURE	Unknown	Monument		
MST1448	Cropmarks, Barton Under Needwood	PIT ALIGNMENT, ENCLOSURE, LINEAR FEATURE	-2350 to 409	Monument		
MST1447	Cropmarks, Fatholme	ENCLOSURE, PIT ALIGNMENT, RING DITCH	-3000 to 409	Monument		
MST3733	Cropmarks, Barton under Needwood	RING DITCH, PIT ALIGNMENT, ENCLOSURE	-3000 to 409	Monument		
MST5460	Ridge and Furrow, Alrewas	RIDGE AND FURROW	1066 to 1485	Monument		
MST8705	Stables and Hayloft, Wychnor Bridges Farm	STABLE	1800 to 1834	Building or Structure	Listed Building	II
MST2898	Mill Bridge / Bridge 39, Trent and Mersey Canal, Barton under Needwood	ACCOMMODATION BRIDGE	1766 to 1799	Monument	Listed Building	II
MST14256	Church Farm, Wychnor	FARMSTEAD	1600 to 1649	Monument		
MST1461	Enclosures and Linear Features, Barton Turn	LINEAR FEATURE, ENCLOSURE	Unknown	Monument		

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade
MST2895	Canal Arm and Basin, Trent and Mersey Canal, Wychnor	CANAL BASIN, CANAL	1775 to 1899	Monument	
MST2897	Catholme Bridge, Trent and Mersey Canal, Barton under Needwood	ACCOMMODATION BRIDGE	1775 to 1899	Monument	
MST203	Hengi-Form Monument, Catholme	HENGIFORM MONUMENT	-3000 to -1001	Monument	
MST1473	Settlement, Catholme Lane, Barton under Needwood	GRUBENHAUS, SETTLEMENT, SETTLEMENT	-1000 to 1065	Monument	
MST4174	Linear Features and Ring Ditch, Wychnor	LINEAR FEATURE, RING DITCH	-3000 to -701	Monument	
MST1446	Cropmarks, Fatholme	LINEAR FEATURE, RING DITCH	-3000 to -701	Monument	
MST1470	Cropmark Features, Catholme	PIT ALIGNMENT, LINEAR FEATURE, ENCLOSURE?	-1000 to 409	Monument	
MST4185	Linear Features and Ring Ditch, Barton	LINEAR FEATURE, RING DITCH	-3000 to -701	Monument	
MST4982	Plaster Mill, Barton-under-Needwood	PLASTER MILL	1800 to 1899	Building or Structure	
MST4699	Ryknild Street (Knowle Hill to Catholme)	ROAD	43 to 409	Monument	
MST1459	Ring Ditches, Wychnor Bridges, Alrewas	RING DITCH, RIDGE AND FURROW	-3000 to 1899	Monument	
MST916	Wychnor Moated Manor	MOAT	1066 to 1539	Monument	
MST1379	Ring Ditch and Linear Feature, North of the River Tame	RING DITCH, LINEAR FEATURE	-2350 to -701	Monument	

MonUID	Name	MonType	DateRange	Notes	LB_Status and Grade	
MST1468	Cropmarks East of Efflinch, Catholme	RIDGE AND FURROW, RING DITCH	-3000 to 1899	Monument		
MST8706	Smithy Cottage, Ryknild Street, Alrewas	BLACKSMITHS WORKSHOP, OUTBUILDING, SMITHS COTTAGE	1800 to 1834	Building or Structure	Listed Building	II
MST8704	Wychnor Bridges Farmhouse, Ryknild Street, Wychnor	FARMHOUSE	1800 to 1834	Building or Structure	Listed Building	II
MST8707	Bridge 42, Trent and Mersey Canal, Wychnor	CANAL BRIDGE	1800 to 1864	Monument	Listed Building	II
MST203	Hengi-Form Monument, Catholme	HENGIFORM MONUMENT	-3000 to -1001	Monument		
MST919	Wychnor Bridges	ROAD BRIDGE	1795 to 1795	Monument		
MST1464	Cropmarks, Millbridge	PIT ALIGNMENT	-2350 to 409	Monument		
MST1472	Enclosures, Catholme	LINEAR FEATURE, ENCLOSURE	-2350 to 409	Monument		
MST1476	Ring Ditch, Wychnor	RING DITCH	-3000 to 409	Monument		
MST1455	Ring Ditch, Enclosures and Linear Features, North of Wychnor	LINEAR FEATURE, RING DITCH, ENCLOSURE	-3000 to 409	Monument		
MST2893	Cow Bridge	ACCOMMODATION BRIDGE	1547 to 1899	Monument		
MST200	Pit Alignment and Enclosures, Wychnor Bridges	RIDGE AND FURROW, ENCLOSURE, PIT ALIGNMENT	-2350 to 1485	Monument		
MST4700	Ryknild Street (Catholme To Clay Mills)	ROAD	43 to 409	Monument		

Contact Details

Richard Buckley or Patrick Clay
University of Leicester Archaeological
Services (ULAS)
University of Leicester,
University Road,
Leicester LE1 7RH

T: +44 (0)116 252 2848

F: +44 (0)116 252 2614

E: ulas@le.ac.uk

w: www.le.ac.uk/ulas



INVESTOR IN PEOPLE



THE UNIVERSITY OF THE YEAR 2008/9